CRITERION-III

EVIDENCE(S), AS PER SOP

METRIC No. 3.4.5	Number of research papers published per teacher in the Journals as notified on UGC website during the year

RNI No. UPHIN/2010/35514

ISSN-0976-349X

अंक–21

जून–2022

यू.जी.सी. केयर लिस्ट में सम्मिलित

इतिहास दृष्टि

संपादक

सैयद नजमुल रज़ा रिज़वी

संपर्क

228-आर, पूरबी बशारतपुर
निकट एच.एन. सिंह क्रॉसिंग
गोरखपुर-273004

दक्षिणकोसल में ग्राम प्रशासन

डॉ. अनूप परसाई
विभागाध्यक्ष, प्रा.भा. इतिहास, शासकीय छ.ग. स्नातकोत्तर महाविद्यालय, रायपुर

डॉ0 नितेश कुमार
सहायक प्राध्यापक, प्राचीन भारतीय इतिहास, संस्कृति एवं पुरातत्त्व, अध्ययनशाला,
पंडित रविशंकर शुक्ल विश्वविद्यालय, रायपुर

देश के हृदय में स्थित मध्यप्रदेश का दक्षिण पूर्व क्षेत्र "छत्तीसगढ़" कहलाता है। प्राचीनकाल में दक्षिणकोसल, महाकोसल, दण्डकारण्य, महाकांतार, गोंडवाना आदि के कुछ भू–भाग इसमें सम्मिलित है। वर्तमान में बिलासपुर, सरगुजा, रायगढ़, रायपुर, बस्तर, दुर्ग, राजनांदगांव जिले के भू–भाग इस नाम की परिधि में आते हैं जबकि पूर्व में सम्मिलित सम्बलपुर का क्षेत्र अलग होकर उड़िसा प्रांत में शामिल है। पं. लोचन प्रसाद पाण्डेय के अनुसार "दक्षिणकोसल" की सीमा उत्तर में गंगा दक्षिण में गोदावरी, पश्चिम में उज्जैन और पूर्व में पूर्वी समुद्र तटवर्ती पाली थी। वास्तव में मध्ययुग में इस क्षेत्र का गढ़ी के कारण छत्तीसगढ़ नाम पड़ा। अतीत से ही यह क्षेत्र भारतीय संस्कृति का एक महत्वपूर्ण केन्द्र बिन्दु था। उत्तर–दक्षिण एवं पूर्व–पश्चिम के मध्यप्रदेश की एकता को अक्षुण्य बनाये रखने का महत्वपूर्ण कार्य छत्तीसगढ़ ने किया।

वैदिक काल से आरंभ कर तेरहवीं शताब्दी के अंत तक भारत के भिन्न–भिन्न अंचलों पर राज्य करने वाले राजवंशों अथवा अन्य प्रकार की शासन प्रणाली वाले राज्यों की प्रशासनिक व्यवस्था अंतर्गत ग्राम को सबसे छोटी प्रशासनिक इकाई के रूप में स्वीकार किया जाता रहा है। वैदिक काल में ग्राम के प्रमुख को ग्रामणी कहते थे, जिसकी गणना राज्य के रत्नियों में की जाती थी। सर चार्ल्स मेटकॉफ के अनुसार "भारत के ग्राम सदस्य छोटे–छोटे गणतन्त्र हैं, जो प्रायः आत्म निर्भर हैं और वैदेशिक संबंधों से प्रायः स्वतंत्र हैं। ऐसा लगता है कि उनके इसी गुण के कारण उनका अस्तित्व चिरस्थायी है ग्राम समुदायों के इस संघ (जिसमें प्रत्येक एक छोटे से राज्य के समान है) ने भारत की जनता के रक्षण में कदाचित अन्य सभी तत्वों से अधिक योग दिया है जबकि अन्य राष्ट्रों में सामान्यतः यह देखा गया है कि जब उनके बीच युद्ध होते हैं तो वे भूमि का नाश कर देते हैं और कृषि के अयोग्य अर्थात् उसर बना देते हैं, इसके विपरीत भारत में जहॉ कि खेत जोतने वालों की एक पवित्र और एक ऐसा वर्ग मानते हैं कि जिसके कार्यों में हस्तक्षेप न किया जाये, चाहे पड़ोस में ही युद्ध हो रहा हो, किसान अपना कार्य बिना खतरे के करते रहते हैं। शत्रु एक दूसरे की भूमि को आग लगाकर अथवा वृक्षों को काटकर शत्रु प्रदेश को हानि नहीं पहुँचाते हैं।" बी.ए. सेलीटोर ने लिखा है कि "ग्राम आर्थिक जीवन का केन्द्र होने के साथ–साथ एक राजनीतिक और न्यायिक इकाई भी था। मनुस्मृति में कहा गया है कि राजा 2, 5, 100 गांवों के बीच राज्य का नियंत्रण बनाये रखने के लिये एक सैनिकों की टुकड़ी रखें। इसे प्रत्येक 10, 20, 100 और 1000 गांवों के उपर अपने अधिकारी नियुक्त करने चाहिये।" वैदिक काल से ही ग्रामों में सभा या महासभा का अस्तित्व था परंतु पंचायत शब्द ग्राम सभा के लिये मध्य युग में प्रचलित हुआ। डॉ. बेनी प्रसाद का कहना है कि "उत्तरी भारत तथा दक्षिण भारत में प्रशासन का विकास भिन्न और स्वतंत्र रेखाओं पर

ISSN : 0974-3065

।। नामूलं लिख्यते किञ्चित् ।।

इतिहास दर्पण
ITIHAS DARPAN

अंक 28 (1) (वर्ष प्रतिपदा) Volume XXVIII (1) (Varsa Pratipada)

कलियुगाब्द 5125, विक्रम संवत् 2080, ईसवी सन् 2023

Kaliyugābda 5125, Vikrama Saṁvat 2080, i.e. CE 2023

अखिल भारतीय इतिहास संकलन योजना

बाबा साहेब आपटे स्मृति भवन, 'केशव कुञ्ज', झण्डेवाला, नयी दिल्ली 110 055

AKHILA BHĀRATĪYA ITIHĀSA SAṄKALANA YOJANĀ

Baba Saheb Apte Smriti Bhawan, 'Keshav Kunj', Jhandewalan, New Delhi-110 055

इतिहास दर्पण [अंक 28(1), वर्ष प्रतिपदा, कलियुगाब्द 5125, ईसवी सन् 2023], पृ. 13-16,
ISSN 0974-3065, UGC-CARE Journal ID-101002593

...त अन्वेषित महापाषाणिक पुरास्थल सिपकोना : खारुन नदी घाटी के विशेष संदर्भ में

...कुमार मिश्र / ढालसिंह देवांगन / प्रवीन कुमार मिश्र / भाग्यश्री दीवान

...के हृदय स्थल में स्थित छत्तीसगढ़ राज्य का प्राचीन इतिहास ...तिहासिक परिवर्तनों का साक्षी रहा है। यह क्षेत्र नदियों, ...पठारों एवं सघन वनों से आच्छादित है अत: प्राकृतिक ...यह मानव के निवास के लिए उपयुक्त रहा है किन्तु सर्वोत्तम ...स्थल के रुप में सदैव नदियों को ही सर्वोपरी माना गया ...भारतीय संस्कृति में नदियों का विशेष स्थान रहा है एवं भारतीय ...न केवल जल के स्रोत के रूप में बल्कि एक जीवन देने ...जननी के रूप में पूजी जाती रही है। मानव जीवन से संबंधित ...पहलुओं जिनमें–जन्म, शिक्षा, विवाह, रीति-रिवाज, धार्मिक ...जैसे कर्म सम्मिलित है इनका आयोजन नदियों के तट ...ही हुआ करता था इन्हीं कार्यों में दाह संस्कार की प्रथा का ...भी महत्वपूर्ण है। इसी संदर्भ में छत्तीसगढ़ प्रांत के मध्य ...में प्रवाहित होने वाली प्रमुख नदी खारुन के बायें तट ...स्थित ग्रांम **सिपकोना** का **महापाषाणिक संस्कृति** के महत्व ...दृष्टि से विशेष स्थान है।

सिपकोना ग्राम खारुन नदी के बायें तट पर सिकोला नाले ...पास स्थित है। यह दुर्ग जिले के पाटन तहसील के अंर्तगत ...ग्रांम पंचायत है। यह पुरास्थल सिपकोना जाने वाले मार्ग में ...सड़क के किनारे खेतों में स्थित है। इस स्थल को **''चितावर''** ...नाम से जाना जाता है। इस स्थल के चितावर नाम से ही यह ...स्पष्ट होता है कि यहाँ कभी न कभी दाह संस्कार की प्रक्रिया ...रही होगी। यह पुरास्थल सर्वप्रथम हमारे द्वारा खारुन नदी ...घाटी के सर्वेक्षण के दौरान प्रकाश में आया है। प्रस्तुत लेख में ...खारुन नदी घाटी के सर्वेक्षण के परिणाम स्वरुप प्रकाश में आये ...**महापाषाणिक** पुरास्थल की जानकारी देना है।

मृतकों के अंतिम संस्कार की शुरुआत सम्भवत: **''निअण्डर्थल मानव''** ने किया[1] किन्तु नवपाषाण काल में मिट्टी के बर्तनों में ...द्रव्य-पदार्थ भर कर मृतकों के साथ दफनाने की प्रथा का प्रारंभ 1200 ईसा पूर्व के लगभग हुआ। नव पाषाण युग की समाप्ति के बाद दक्षिण में जिस संस्कृति का प्रसार हुआ उसे **वृहत** अथवा **महापाषाणिक संस्कृति** कहा गया है। इस संस्कृति के लोग अपने मृतकों के अवशेषों को सुरक्षित रखने के लिए बड़े-बड़े पत्थरों का प्रयोग करते थे।

वृहतपाषाणिक अथवा महापाषाणिक समाधि शब्द अंग्रेजी भाषा के **''मेगालिथ''** (MEGALITH) शब्द का हिन्दी रुपान्तरण है। मेगालिथ शब्द की व्युत्पत्ति यूनानी भाषा के **''मेगॉस''** (MEGAS) और (LITHES) **''लिथॉस''** शब्द से हुई है।[2] मेगॉस का अर्थ विशाल और लिथॉस का तात्पर्य पाषाण से है।

यह संस्कृति प्राचीन मानव के शवाधान परंपरा से हमें अवगत कराती है। इनकी रचना करते समय चतुर्दिक दीवालों के स्थान पर विशालकाय प्रस्तर खण्ड खड़े किये जाते थे तथा कभी-कभी उन पर छत के रुप में एक बड़ा पत्थर रख दिया जाता था।[3] इनके निकट कपितय मृद्भाण्ड, लौअस्त्र एवं दैनिक जीवन की उपयोगी वस्तुएँ रख दी जाती थी। महाश्म संस्कृति से संबंधित जिन स्मारकों की सर्वप्रथम प्राप्ति हुई वे सम्भवत: बहुत ही बड़े-बड़े पत्थरों से बनाए गये थे अत: इनकों महापाषाण कहा गया किन्तु महापाषाणिक सभी स्थलों से ऐसी आकृति नही मिलती है। इस संस्कृति के लोगों ने मृतकों को दफनाने की विभिन्न प्रक्रिया को जन्म दिया। इस परंपरा का सर्वाधिक प्रसार भारत के दक्षिण प्रान्तों में अधिक हुआ है। भारत में महापाषाणिक संस्कृति के कई प्रकार मिले हैं जिनमें डोलमेन (DOLMENOID CIST), छत्रशिला (UMBRELLA STONE), फर्ण शिला (HOOD STONE), संगोरा (CAIRN CIRCLE), गुफा समाधि (ROCKCUT CAVES), अन्त्येश्टि कलश (POT BURIAL) एवं सर्वाधिक मेनहीर (MENHIR) मिलते हैं।[4]

इसी क्रम में छत्तीसगढ़ राज्य के विभिन्न क्षेत्रों से भी

RNI No. UPHIN/2010/35514 ISSN-0976-349X

अंक-23 जून-2023

यू.जी.सी. केयर लिस्ट में सम्मिलित

इतिहास दृष्टि

संपादक

सैयद नजमुल रज़ा रिज़वी

संपर्क

228-आर, पूरबी बशारतपुर
निकट एच.एन. सिंह क्रॉसिंग
गोरखपुर-273004

Archaeological Investigation of Bewarti, Kanker

Dr. Nitesh Kumar Mishra
Assistant Professor, SoSin Ancient Indian History Culture and Archaeology, Pt. Ravishakar Shukla University, Raipur, Chhattisgarh

Bhenu
Research Scholar, SoSin Ancient Indian History Culture and Archaeology, Pt. Ravishakar Shukla University, Raipur, Chhattisgarh

Abstract
The Archaeological investigation took place on the Village – Bewarti, Kanker. From the previous work, some archaeological remains already have been noticed in Kanker district by the researchers. Through the further investigation a Megalithic remains and Pictograph were noticed within the village. This research paper will mainly consist of the unreported pictograph and megalithic site of Bewarti. There will be the detailed information about the findings. The detailed study will be done of the figures of the painting in "Layamatta hill" and the megalithic remains within the village. The research paper also consists of the developing phase of the rock art which can be seen in the tribal communities. The research will content about the importance of the rock art and megalithic culture in the tribal society. Various rituals are performed on the both sites by the tribal people till today. This research paper will describe the new investigation site and related rituals which are performed by the tribal people. The paper will consists of the study of correlation between the rock art and the various arts forms and cultures present in the tribal community.

Keywords
Layamatta, Pictograph, ocher color, Tribal belief, Megalithic, Stone, Muria Gonds

Introduction

Bastar is known for rich tribal communities with that this area is very potential of archaeological remains. Till today the King policy still living with own places and they are attached with the tribal's. Going back to the primitive age, prehistoric evidences were notified by scholars from many places. After that prehistoric, early historic, historic, medieval and British remains are present. Some culture sequences are not in vague these days that is why Archaeological investigation is necessary to know about the facts related to these cultures. Kanker is an upper part of Bastar division and located southern part of Chhattisgarh state. In 1819 to 1904 Kanker comes under the Nagpur division and after that in 1905 it merge to central province in British Government. Kanker occupied 20'6' to 20'24' latitude and 80'48' to 81'48' east longitude of Uttar Bastar. At present 7 Block comes under the Kanker district – Kanker, Charama, Narharpur, Bhanupratappur, Durgukondal, Koyalibeda, and Antagarh.

When we look on to the historical and cultural aspects of kanker district we see to through different angle of history. From the prehistoric to the historical evidence scattered within the city and connected area. Bewarti village one of the important archaeological area were Pictograph and megalithic remains noticed by the exploration. Regarding to the megalithic culture is still in a practice. Ancient megalithic reported from the Dhamtari and Balod district which are very close to the District. Some site like Karhibhadar, Karkabhat, Mujgahan, Dhanora etc. Rock art

UGC Care List

ISSN 2347-2979

RNI No. 26030/73

संप्रेषण-179

साहित्य, कला एवं संस्कृति का सृजन संवाहक

• वर्ष : 59

• अंक : 181 (जुलाई-सितम्बर, 2022)

प्रधान संपादक

चंद्रभानु भारद्वाज

संपर्क : संप्रेषण, 119, श्रीजी नगर, दुर्गापुरा, जयपुर-302018

छत्तीसगढ़ की खैरवार जनजाति का ऐतिहासिक एवं सांस्कृतिक अध्ययन

डॉ. अनूप परसाई
विभागाध्यक्ष, प्रा.भा. इतिहास, शासकीय छ.ग. स्नातकोत्तर महाविद्यालय, रायपुर
डॉ0 नितेश कुमार
सहायक प्राध्यापक, प्राचीन भारतीय इतिहास, संस्कृति एवं पुरातत्त्व, अध्ययनशाला, पंडित रविशंकर शुक्ल विश्वविद्यालय, रायपुर

देश के हृदय में स्थित मध्यप्रदेश का दक्षिण पूर्व क्षेत्र "छत्तीसगढ़" कहलाता है। प्राचीनकाल में दक्षिणकोसल, महाकोसल, दण्डकारण्य, महाकांतार, गोंडवाना आदि के कुछ भू–भाग इसमें सम्मिलित है। वर्तमान में बिलासपुर, सरगुजा, रायगढ़, रायपुर, बस्तर, दुर्ग, राजनांदगांव जिले के भू–भाग इस नाम की परिधि में आते हैं जबकि पूर्व में सम्मिलित सम्बलपुर का क्षेत्र अलग होकर उड़िसा प्रांत में शामिल है। पं. लोचन प्रसाद पाण्डेय के अनुसार "दक्षिणकोसल" की सीमा उत्तर में गंगा दक्षिण में गोदावरी, पश्चिम में उज्जैन और पूर्व में पूर्वी समुद्र तटवर्ती पाली थी। वास्तव में मध्ययुग में इस क्षेत्र का गढ़ी के कारण छत्तीसगढ़ नाम पड़ा। प्राचीनकाल से ही इस क्षेत्र में अनेक वन्य जातियॉं, निवास करती थी। जिनमें गौड़, खैरवार, कंवर, उराव, हल्बा, कोरबा आदि मुख्य है। अतीत से ही यह क्षेत्र भारतीय संस्कृति का एक मुख्य केन्द्र रहा है।

छत्तीसगढ़ अंचल की खैरवार जनजाति खुरवार, खरिया, खैरवा आदि कई नामों से जानी जाती है। खैरवार शब्द की उत्पत्ति खैर से मानी जाती है । विन्ध्य के क्षेत्र से वृक्ष से कत्था के कारण इस जनजाति का नाम खैरवार पड़ा।(1) इनके मूलस्थान के संदर्भ में विद्वानों की यह धारणा है कैमूर की पहाड़ी या खैरागढ़ है। जहॉं से यह झारखण्ड, उत्तरप्रदेश, छोटानागपुर, छत्तीसगढ़ के क्षेत्रों में बस गये। उत्तरप्रदेश एवं झारखण्ड के क्षेत्रों यह जनजाति स्वयं को अभिजात्य मानते हैं एवं ब्राह्मणों जैसा जीवन व्यतीत करते हैं।(2) खैर जनजाति की उत्पत्ति के संदर्भ में एक किवदन्ती भी है कि प्राचीनकाल से बिहार राज्य के पलामऊ जिले में जनसाय नाम एक पराक्रमी राजा था जिसके पास तीन बाण थे इन बाणों के माध्यम से उसकी यह इच्छा थी कि तीनों लोकों पर विजय प्राप्त करे। यह कहा जाता है कि एक दिन भगवान वेश बदलकर राजा के समक्ष अवतरित हुये एवं उनसे प्रश्न किये कि तीनों बाणों का किस कार्य के लिये उपयोग करोगे? प्रतिउत्तर में राजा ने कहा कि इन बाणों से त्रिलोक विजय करूंगा। यह कह कर उसने धनुश से एक–एक कर के बाणों को छोड़ा। बाण छोड़ने के पश्चात् दो बाण राजा के हाथ में वापिस आ गये, परंतु एक बाण भगवान के पैर के तलवे के नीचे चुम गयी, जिसके कारण क्रोधित होकर भगवान ने राजा के सिर को काट कर पलामु जिले के बारेसांड नामक स्थान में एक खैर वृक्ष में लटका दिया। यही कारण है कि राजा के समस्त जाति वर्ग के जितने लोग थे, वे सभी खैरवार कहलाये।(3)

इस जाति में दो प्रमुख गोत्र पाये जाते हैं। प्रथम सूर्यवंशी और दूसरा दोलवंशी। इन दोनों गोत्रों में आपसी मेल–जोल, खान–पान तो विद्यमान है, परंतु परंपरानुसार शादी–विवाह वर्जित है। दोनों गोत्र अपने को क्षत्रिय मानते हैं यही कारण है कि नाम के साथ सिंह क्षत्रिय सूचक के रूप में रखते हैं। छत्तीसगढ़ क्षेत्र में यह रायगढ़, बिलासपुर, कोरबा, चांपा के क्षेत्र में निवास करते हैं। ग्रीश्मकाल में यह जंगलों में अस्थायी निवास बनाकर इस जनजाति के लोग वृक्षों से कत्था निकालते हैं एवं वापस अपने स्थायी निवास में चले आते हैं(4) इसके अतिरिक्त यह कृशि कार्य भी करते हैं। इस जनजाति की उत्पत्ति के संदर्भ में यह धारणा है कि राजा हरिशचंद्र के पुत्र रोहिताक्ष्य के पुत्रों से हुई है। रायबहादुर हीरालाल एवं रसेल खैरवारों की उत्पत्ति चैरो एवं सन्याल से हुई है। खैरवारों के सामाजिक जीवन सहज एवं सरल है। इस जनजाति का मुख्य भोजन चांवल तथा कोदो का पेज हैं (5) ये विभिन्न प्रकार के वस्त्र एवं आभूशणों को धारण करते हैं जिस स्थान पर खैर के वृक्षों की बहुलता होती है उसी स्थल पर इस जाति के लोग रहना पसंद करते हैं। इनके घर ईंट, मिट्टी, लकड़ी एवं बांस के बने रहते हैं। जिनकी छते घास, फूस, खपरैल की बनी रहती है। दीवालों में पीली मिट्टी की कलात्मक पुताई करते हैं घर में जीवनोपयोगी सभी वस्तुतयें रहती है। खैरवारों में घर के प्रति विशेश मोह पाया जाता है इस जनजाति का सामाजिक संगठन सुदृढ होता है। इनका मुखिया महतो–माझी कहा जाता है। जो वंशुनगत होता है जातिगत झगड़ों का फैसला पंचायत

(UGC Care Journal)

ISSN : 0974-0053

(IIJIF) Impact Factor : 3.65

उन्मीलन

Vol. 34, Issue-09 (September, 2022)

(A Multidisciplinary Refereed Research Journal)

प्रधान संपादक

यशदेव शल्य : मुकुन्द लाठ

संपादक

अम्बिकादत्त शर्मा

दर्शन प्रतिष्ठान

जयपुर

Chitra Gupha: unexplored rock art site of Koriya district

Dr. Nitesh Kumar Mishra
Assistant Professor, SoS in AICHA, Pt. Ravi Shankar Shukla University, Raipur (CG)

Anshu Mala Tirkey
Researcher SoS in AICHA, Pt. Ravi Shankar Shukla University, Raipur

Baleshwar Kumar Besra
MA. In Archaeology & Museology (RU)

Abstract
This research paper will mainly consist of the unreported rock art site of Koriya district (Chitra Gupha). In this paper there will be the detailed information about the rock paintings. The detailed study will be done of the various figures of the paintings. The research paper also describes the rituals and art skill of the Gond tribe, which are similar to the figures of rock paintings. There will be the detailed information about the Shobha kala made by the tribe and (Chauk making) in the ceremonies of the Gond tribe. The paper will consists of the geographical background of the districts and village of the rock art site. This paper will also describe about the basic information about the rock art like style, measurement of figures and detailed information about the colors used in the paintings.

Key words - exquisite deer, mythological form,Chauk, illustration,Sobha Kala, Gond tribe,

Introduction

After the origin of man, different types of natural events took place on this earth. In which mainly heavy rain, cold winds and there was also a fear of animals. To save life, man had to resort to cave in the mountains located amidst the thick forest. In these cave, humans first invented paintings. Since this painting was made by humans on the stone wall of their caves, it became famous s rock painting. The rock paintings present a living depiction of the activities of human beings and their sentiments. The human first depicted the things, which they have seen at that time. Mankind used natural colors to make these pictures. Apart from these, humans also made figures by carving for illustration. The main feature of these paintings made by humans is that these figures have been not erased for thousands ofyears. But it has been tarnished by rain, heat and stone erosion. Rock paintings are found from the prehistoric to the historical period. Rock painting depicts the creativity, intelligence and artistic skills of human beings. Rock paintings are important archaeological evidence of the existence of primitive man. There are mainly three types of rock arts such as pictographs, petroglyphs and geoglyphs.[1]Pictographs paintings are made with different colors like red, white, yellow, blue, black and green etc. A wooden brush was used to paint pictures. In petroglyphs and geoglyphs, engraved figures are made. Stone tools were used to carve the images. In rock art, paintings are depicted in different styles such as representational style, decorative style, naturalistic style and geometrical style etc.[2] In rock paintings, figures are made in single line drawing and some in some rock arts shaded figures are also depicted. In some paintings, human and animals are depicted with the decoration of geometrical designs. In prehistoric period, the art skills of man continued to develop, time to time. The human of prehistoric times were not only adept at making stone tools but were also fabulous in making the rock paintings. Human painted rock paintings in

ISSN : 2347 : 2979

179

शरद

संप्रेषण

साहित्य, कला एवं संस्कृति का सृजन संवाहक

अंक 183 (जनवरी-मार्च 2023)

संपादक

चंद्रभानु भारद्वाज

खारुन नदी घाटी से प्राप्त प्रमुख जैन पुरास्थल एवं शिल्प

डॉ. नितेश कुमार मिश्र (सहायक प्राध्यापक)
बालसिंह देवांगन (शोधार्थी)
भाग्यश्री दीवान (शोधार्थी)
प्राचीन भारतीय इतिहास, संस्कृति एवं पुरातत्त्व अध्ययनशाला, पं.रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)

प्रस्तावना

भारतीय उपमहाद्वीप के प्रगति सम्पन्न प्रदेशों में छत्तीसगढ़ की महती भूमिका रही है। छत्तीसगढ़ भारत के 26 वे राज्य के रुप में 1 नवम्बर 2000 को मध्यप्रदेश से पृथक होकर नये राष्ट्र के रुप में अस्तित्व में आया।[1] प्राचीन भारत के राजनीतिक एवं सांस्कृतिक इतिहास में वर्तमान छत्तीसगढ़ की सीमा के अंतर्गत आने वाले भू–भाग का महत्वपूर्ण योगदान है। किसी राष्ट्र के सम्पन्नता के लिए के लिए उनके भू–भौतिक संरचनाओं को अधिक उत्तरदायी माना जाता है। इस प्रदेश में प्रकृति की सदैव असीम कृपा रही है। घने वन, पर्वत प्रदेश, नदियाँ, खनिज एवं जीवन निर्वाह के लिए खाद्य सामाग्री अर्थात मानव के प्रारंभिक आवश्यकताओं को पूर्ण करने के लिए साधनों की उपलब्धता पर्याप्त मात्रा में थी एवं इनके सर्वांगीण विकास के लिए यही कारक अधिक समचिन प्रतीत होते हैं। कालान्तर में इसी पृष्ठभूमि का प्रयोग मनुष्य ने अपने रहने के लिए किया।

इस प्रदेश में प्रागैतिहासिक काल से ही मानवीय गतिविधियों के होने के साक्ष्य उपलब्ध हैं यह अनुक्रम बाद के कालों में भी जारी रहा। ऐतिहासिक काल में इस भू–भाग में मौर्य, कुषाण गुप्त, वाकाटक, नल, शरभपुरीय, पाण्डु–वंशी, कलचूरि एवं नाग वंश के शासकों ने प्रत्यक्ष एवं अप्रत्यक्ष रुप से शासन किया इनके पुरातात्त्विक प्रमाणों में इनके द्वारा जारी किया गये अभिलेख, सिक्के एवं बनवाये गये स्थापत्य एवं मंदिर के नमूने तथा मूर्ति अभी शेषहैं। प्राचीन काल में इस अंचल के विभिन्न नामों का उल्लेख किया गया है। दक्षिण कोसल की स्थिति एवं नाम के संबंध में अनेक विद्वान रामायण[2], महाभारत[3] एवं पुराणों[4] में मिलते हैं। इस स्थल का नाम समय एवं काल के अनुसार बदलता रहे हैं। इस राज्य के प्राचीन नाम कोसल, दक्षिण कोसल, दण्डकारण्य, महाकान्तार, चेदिसगढ़ एवं महाकोसल इत्यादि मिलते हैं।

मानव अपने विकास कम में तीव्रता के साथ आगे बढ़ रहा था। आवास के साथ ही भोजन एवं जल इनकी प्रारंभिक आवश्यकताएं थी। इन अवाश्यकताओं की पूर्ति के लिए ये कभी जंगलों में कभी की कन्द्राओं तो कभी मैदानी भू–भागों में निवास एवं भ्रमण करता रहता था सम्भवतः इन आवश्यकताओं की अधिकतम पूर्ति प्राकृतिक झीलों एवं नदियों के तट पर हुई होगी जहाँ जल की मात्रा अन्य स्थान से अधिक थी। चूकिं सभी कारकों में जल का प्रयोग सर्वाधिक होता था एवं उपयोगिता की दृष्टि से अधिक महत्वपूर्ण थी। बाद में जब जल के महत्व को समझा गया होगा तो इनके संग्रहण की व्यवस्था जरुर उत्पन्न हुई होगी इस कारण इनका झुकाव नदियों एवं झीलों की ओर हुआ होगा एवं इनके आस आवास स्थान बनाये गये जहाँ इन्हें पर्याप्त मात्रा में जल के साथ अन्य वस्तुओं की पूर्ति हुई होगी।

जिस प्रकार से मानव के शरीर में रक्त वाहिकाएं प्रसारित होती है एवं इसका सीधा संबंध हृदय से होता है उसी प्रकार छत्तीसगढ़ को भारत का हृदय स्थल कहा गया है एवं यहाँ बहने वाली नदियों का संबंध छत्तीसगढ़ के भूमि से है। यह निश्चित तौर पर कहाँ जा सकता है कि किस सभ्यताएं जिस स्थान पर पुष्पित एवं पल्लवित हुई वह नदियाँ ही थी। नदियाँ अपने साथ बहुत सी मिट्टी लाती है इन मिट्टी की ऊर्वरता का पता सम्भवतः मानव ने नवपाषाण काल में ही लगा लिया जब इन्होनें प्रारंभिक कृषि करना प्रारंभ किया होगा। धीरे–धीरे इनकी आवश्यकताएं और बढ़ती गई

ISSN : 09755756

कला - वैभव

KALA - VAIBHAW

UGC CARE LISTED JOURNAL

संयुक्तांक 28 – 29 (वर्ष 2021–22, 2022–23)
विभागीय शोध – जर्नल (रेफरीड)

प्रधान संपादक
डॉ. मंगलानंद झा

प्राचीन भारतीय इतिहास, संस्कृति एवं पुरातत्त्व विभाग
इन्दिरा कला संगीत विश्वविद्यालय, खैरागढ़ (छ.ग.)

खारून नदी घाटी के नवअन्वेषित पुरास्थल सती स्तम्भ एवं योद्धा प्रतिमाओं के विशेष संदर्भ में

डॉ. नितेश कुमार
श्री ढालसिंह देव
भाग्यश्री दी

सती प्रथा का प्रचलन भारत में प्राचीन काल से ही देखा गया है। सती प्रथा कुछ पुरातन समुदाय विशे प्रचलित एक ऐसी धार्मिक प्रथा थी, जिसमें किसी पुरुष के मृत्यु उपरान्त उनकी पत्नी अपने पति के अंतिम संस्का दौरान उनकी चिता में प्रविष्ट होकर आत्मदाह कर लेती थी जो सम्भवतः स्वेक्छापूर्ण होता था। साहित्यिक पुरातात्विक स्त्रोतों के माध्यम से इस बात की पुष्टि होती है।

सती प्रथा का प्रारंभ माँ सती जो कि राजा दक्ष् की पुत्री थी, के समय से माना जाता है। मान्यताओं अनुसार जब सती अपने पिता द्वारा अपने पति शिव के अपमान करने पर नाराज होकर अग्नि में प्रविष्ट हो जाती है आत्मदाह कर लेती हैसम्भवतः इस घटना ने इस प्रथा को जन्म दिया होगा किन्तु निश्चित तौर पर यह कहना नहीं होगा क्योकि इसमें शिव जीवित रहते हैं और सती होने के लिये पति की मृत्यु आवश्यक मानी गई है। रामा एवम् महाभारत में भी इस प्रकार की घटना का उल्लेख मिलता है। रामायण काल में रावण के पुत्र मेघनाथ की मृत्यु पश्चात् उनकी पत्नी सुलोचना के सती होने के प्रमाण मिलते हैं एवं महाभारत कालीन कुरु वंशी पांडु के मृत्यु के उ उनकी छोटी रानी माद्री ने अपने पति के साथ अग्नि में समाहित हो गयी थी।

अभिलेखों में सती होने की सर्वप्रथम सूचना गुप्त कालीन अभिलेख भानुगुप्त के "एरण अभिलेख मिलता है।[1] इस अभिलेख से ज्ञात होता है कि युद्ध में गोपराज की मृत्यु के बाद उनकी पत्नी सती हुई थी। छत्तीस अंचल में मल्हार, सेमरसल (बिलासपुर) एवं आतुरगाँव (कांकेर) से अभिलिखित स्मृति-प्रस्तर के प्रमाण मिले किन्तु इनमें दुर्ग जिले के छातागढ़ (मोहलई) से प्राप्त प्रस्तर लेख महत्त्वपूर्ण जान पड़ता है। इस लेख में प्रथम द्वितीय सदी ई की ब्राह्मी लिपि एवं प्राकृत भाषा का प्रयोग किया गया है।[3] इस अभिलेख में निशा एवम् समि नामक गृहणी के पंचत्त्व में विलीन होने की सूचना मिलती है।

मध्यकाल एवम् उत्तर मध्यकाल में बाह्य आक्रमणों की सर्वाधिक सूचना मिलती है इस दौरान पुरुषों मृत्यु हो जाने पर उनकी पत्नी अपनी अस्मिता व आत्मसम्मान को महत्त्वपूर्ण समझते हुए भी अपने पति की चि खुद को झोंक देती थी अथवा विवशतावश आत्मदाह को उचित समझती थी। किन्तु कालांतर में इस प्रथा में कुरीतियों का समावेश हुआ एवं इसने एक कुप्रथा का रूप धारण कर लिया। सती स्तम्भ, सती चौरा एवम् योद्धा की प्रतिमा यें छत्तीसगढ़ राज्य के अनेक पुरास्थलों से प्राप्त हुए है, जिनसे यह अनुमान लगाया जा सकता है कि प्रथा का चलन या प्रभाव इस अंचल में भी रहा होगा। इन सही स्तंभों को मुख्य रुप से गाँव के मुख्य चौराहे, तालाब किनारे एवं नदी के तटवर्ती भू-भागों में गडाया जाता था। छत्तीसगढ़ राज्य के प्रमुख पुरास्थल जैसे राजिम[4], भोरमदेव तरपोंगा[6],देवबलोदाआदि से सती स्तंभ एवम् योद्धाओं की प्रतिमाओं की प्राप्ति हुई है। बस्तर क्षेत्र के विभिन्न स्था जैसे बड़ेडोंगर, छोटेडोंगर, बांगोली, तीर्थगढ, चपका, टेमरा से भी सती स्तंभों की प्राप्ति हुई है।[7]

ISSN : 2581-8872 Vol - 4, No. - 3, April - 2022

Unnati International Journal of Multidisciplinary Scientific Research

Peer Reviewed - Refereed Journal
Impact Factor - 4.8, Open Access,
Double Blind, Monthly Online Journal

Google scholar | ISRS International Scientific Research Solution | Indian Tech | GLOBAL CERTIFICATION SERVICES

EDITOR
PRASHANT KUMAR

PUBLISHED BY
International Scientific Research Solution
Web : www.srfresearchjournal.com
Email : isrsjournal@gmail.com

CONTENTS

Unnati International Journal of Multidisciplinary Scientific Research (U.I.J.M.S.R.)
Peer Reviewed - Refereed Journal & Impact Factor - 4.8, Open Access, Double Blind
Monthly Online Journal, ISSN : 2581-8872, Vol. : 4, No. : 3, April – 2022, Special Issues

2022

विमुक्त अर्धघुमन्तु अनुसूचित जाति नट के सामाजिक–आर्थिक जीवन का नृजातिवृतांत्तामक अध्ययन (नटः छत्तीसगढ़ के विमुक्त घुमन्त/अर्धघुमन्तु अनुसूचित जाति नट के विशेष संदर्भ में)

हेमन्त कुमार
शोधछात्र, मानवविज्ञान अध्ययनशाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)
डॉ. जितेन्द्र कुमार प्रेमी
ऐसोसिएट प्रोफेसर, मानवविज्ञान अध्ययनशाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)

सारांश :- प्रस्तुत अध्ययन जो कि छत्तीसगढ़ राज्य के जांजगीर-चांपा जिला एवं रायपुर, धमतरी जिला के अन्तर्गत निवासरत विमुक्त घुमन्तु-अर्धघुमन्तु अनुसूचित जाति 'नट' पर किया गया एक नृजातिवृतांत्तामक अध्ययन है। अध्ययन से प्राप्त जानकारी के आधार पर वर्तमान समय में छत्तीसगढ़ राज्य निवासरत 'नट' जाति पूर्ण घुमन्तु न रह कर अब वह खेल-तमाशा दिखाते हुये अर्धघुमन्तु जीवन जीने लगा है। अर्धघुमन्तु जीवन जीने के कारण इनके सामाजिक-सांस्कृतिक, आर्थिक, राजनीतिक एवं शैक्षणिक पक्ष अन्य जाति-जनजातियों के अपेक्षा पिछड़ा हुआ है। लेकिन पर-संस्कृतिकरण के कारण पूर्व के अपेक्षा वर्तमान समय में इनके सभी पक्षों में बतलाव/परिवर्तन स्पष्ट रूप से देखने को मिला है।

उददेश्य एवं अभिप्राय/लक्ष्य :- छत्तीसगढ़ की 'नट' जाति की सामाजिक-आर्थिक एवं सांस्कृतिक पक्षों का सम्पूर्ण सहभागी अवलोकन पद्धति के द्वारा इनके विलुप्त हो रही सांस्कृतिक विरासत का लिखित दस्तावेजीकरण के आधार संरक्षण करना एवं अध्ययन से प्राप्त तथ्यों एवं निष्कर्षों के आधार पर 'नट' जाति के सर्वांगीण विकास के परिप्रेक्ष्य में आवश्यकता आधारित हस्तक्षेपी सुक्षाव प्रस्तुत करना जिससे कि इन्हें राष्ट्र व समाज की मुख्यधारा में समाहित किया जा सकें।

शोध प्रविधि :- निम्न अध्ययन पूर्ण रूप से गुणात्मक एवं वर्णानात्मक है जो कि सहभागी अवलोकन पद्धति तथा सहायक शोध उपकरणों के रूप में साक्षात्कार निर्देशिका, समूहवार्ता, केन्द्रिय समूहवार्ता, वयैक्तिक अध्ययन जैसे गुणात्मक शोध उपकरणों के द्वारा किया गया है।

कुंजीशब्द :- विमुक्त, घुमन्तु, अर्धघुमन्तु, जाति, नट, छत्तीसगढ़।

प्रस्तावना :- भारत में विभिन्न प्रकार के विमुक्त घुमन्तु-अर्धघुमन्तु जाति-जनजातियाँ अपने-अपने विभिन्न सांस्कृतिक विभिन्नताओं के साथ अनेक राज्यों में निवासरत है। अपने विभिन्नताओं के लिए पहचाने जाने वाला राज्यों में से एक अपना राज्य छत्तीसगढ़ भी है जहां विभिन्न प्रकार के जाति-जनजातियों के साथ विमुक्त घुमन्तु-अर्धघुमन्तु जाति भी निवासरत है। इस विमुक्त घुमन्तु-अर्धघुमन्तु जातियों में से एक जाति 'नट' भी है जो अपने विभिन्न प्रकार के करतब, कलाबाजी के लिए जाना जाता है। 'नट' संस्कृत शब्द के 'नाट' से लिया गया शब्द है जो न+ट दो शब्दों से मिलकर बना है। जिसका अर्थ नृत्य, नाटक अथवा अभिनय करना रहा है। नृजाति समूह 'नट' को छत्तीसगढ़ राज्य में "डंगचगहा" के नाम से पहचाना (जाना) जाता है। "डंगचगहा" शब्द मुख्य रूप से दो शव्द डंग+चगहा से मिलकर बना है। 'डंग' का अर्थ "बाँस" से है और 'चगहा' का अर्थ "चढ़ना" से है अर्थात् बाँस के सहारे रस्सी पर चढ़कर विभिन्न प्रकार के खेल-तमाशा, करतब दिखाने से है। विश्व भर में कई मानव जाति/जनजातियों के समूह निवासरत है। जो अपने देशकाल, प्रस्थिति, वातावरण के अनुकुल अपने-अपने क्षेत्रों में निवासरत है। ऐ जाति/जनजातियों को वहां के निवासी/नागरिक घोषित करते हुये वहां के प्रशासनिक नियमो के अनुसार उसे जीवन गुजारने/जीवन जीने की स्वतन्त्रता देती है। उसी के अनुसार वहां की जाति/जनजाति अपना वह अपने परिवार एवं समाज की कार्यो को सुचारू रूप से संचालन करते हुये वह उस राष्ट्र/देश में जीवन गुजारते है। विश्व के अनेक देशों में जाति/जनजातियों को जन्म से ही वह वहां की नागरिक होता है। अर्थात् वह देश जब से बना या स्वतन्त्र हुये है तब से वहां के अन्य जाति/जनजातियों के तरह सभी नियम कानून समान रूप से सभी के लिए लागू रहता है। लेकिन भारत देश में ऐसा नहीं हुआ था। भारत जो विश्व में अपने विभिन्नताओं के लिए जाने जाते है व देश एकता में अनैकता के लिए जाने जाते है, अर्थात भारत विभिन्नताओं का देश है। देश में विभिन्न प्रकार के धर्म, जाति/जनजाति, पंथ, विभिन्न समूह, सम्प्रदाय के मानने वाले लोग निवास करते है। (जोशी, 2021)[1] भारत देश में लगभग 6500 जाति/जनजातियाँ पायी जाती है। जनगणना (2011)[2] तथा NCDNST (2008)[3] के अनुसार इस जाति/जनजातियों में से एक विमुक्त घुमन्तु आपराधिक जनजातियाँ है जो अपने विभिन्न भागों में वहां विभिन्न नामों से जाने जाते है। यह विमुक्त घुमन्तु, अर्ध-घुमन्तु, आपराधिक जनजातियाँ जो भारत के कुल आबादी का लगभग 7 प्रतिशत जनसंख्या का प्रतिनिधित्व करता है। डॉ. बाबासाहेब अंबेडकर ने अपने 'हु वेअर अनटचेबल' ग्रंथ में भारत में इनकी जनसंख्या 1930 में लगभग 50 लाख बताई है। (धारासुरे, 2020 पृ. 25)[4]

शोध आलेख : छत्तीसगढ़ की नट बोली पर पर-संस्कृतीकरण के प्रभाव का नृजातिभाषावैज्ञानिक अध्ययन / हेमन्त कुमार एवं प्रो. जितेन्द्र कुमार प्रेमी

Arjun Kumar शुक्रवार, मार्च 31, 2023

छत्तीसगढ़ की नट बोली पर पर-संस्कृतीकरण के प्रभाव का नृजातिभाषावैज्ञानिक अध्ययन
- हेमन्त कुमार एवं प्रो. जितेन्द्र कुमार प्रेमी

शोध सार : यह अध्ययन छतीसगढ़ के विमुक्त अनुसूचित जाति नट की "नट बोली" पर आधारित अध्ययन है। विमुक्त घुमंतू प्रवृत्ति के कारण नट नृजाति समूह अलग-अलग भाषा एवं बोली के बोलने वाले लोगों के संपर्क में आते गए और इनकी भाषा-बोली में पर-संस्कृतीकरण ने पैर पसार लिया। पर-संस्कृतीकरण के कारण वर्तमान युवा पीढ़ी में कुछ लोग ही अपने बोली के विषय से अनभिज्ञ है। अधिकांश युवा पीढ़ी अपनी "नट बोली" से विमुख हो गई है। इन तथ्यों को ध्यान में रखते हुये छत्तीसगढ़ की नट जाति की नट बोली का लिखित दस्तावेजीकरण के रूप में संरक्षण तथा अध्ययन से प्राप्त तथ्यों एवं निष्कर्षों के आधार पर नृजाति समूह के सर्वांगीण विकास (भाषा-बोली) के परिप्रेक्ष्य में आवश्यकता आधारित सुझाव प्रस्तुत करने के उददेश्य से यह अध्ययन किया गया है। इस दस्तावेजीकरण के लिए सहभागी अवलोकन पद्धति तथा सहायक उपकरणों के रूप में साक्षात्कार निर्देशिका, समूहवार्ता, केन्द्रीय समूहवार्ता एवं वयैक्तिक अध्ययनों का प्रयोग किया गया है। मानवविज्ञान विषय अपने संपूर्णता के लिए जाना जाता है और भाषा स्वयं मनुष्य के विकास का प्रतीक है। भाषा और मानवविज्ञान दोनों एक दूसरे के पूरक है। अर्थात भाषा या बोली किसी भी मानव समूह, राज्य, राष्ट्र की संस्कृति का मुख्य आधार होती हैं। भाषा एक ऐसा माध्यम है जो समाज तथा संस्कृति को निरंतरता प्रदान करता है। संस्कृति, समाज एवं भाषा विकास के उद्भव, विकास के क्रम, ध्वनियों के प्रकार परिवर्तन, शब्दों के विविध प्रकार तथा शब्दों के अर्थ का विस्तृत अध्ययन मानवविज्ञान विषय प्रस्तुत करता है।

बीज शब्द : विमुक्त, नृजाति, नट, भाषा-बोली, पर-संस्कृतिकरण, समाज।

मूल आलेख : मानव और भाषा का संबंध मानव सभ्यता के जन्म के साथ ही प्रारम्भ हुआ है। जब से इस पृथ्वी पर मानव सभ्यता ने जन्म लिया उसके साथ भाषा ने भी जन्म लिया। यह अलग बात है कि भाषा का स्वरूप व प्रकार अलग-अलग था। मनुष्य प्रारम्भ सें भाषा का उपयोग संकेतो के रूप में करते थे जिसका स्पष्ट प्रमाण हमें प्राचीन लिपि में लिखे अवशेषों पर संकेतो (चित्र) के रूप में लिखे लेखों से पता चलता है जो धीरे-धीरे समयानुसार प्रचलन में अधिक आने पर वह मानव समाज का एक अभिन्न शब्दों/वार्तालाप के वाहक के रूप में परिवर्तन हो गया, जो समयानुसार बदलता गया और संकेतो से भाषा तथा भाषा से लिखित लिपि के रूप में आया। सामान्य रूप से देखे तो जब कोई मनुष्य संकेत के माध्यम से दूसरे मनुष्य को अपने हाव-भाव, क्रिया, संकेत के माध्यम से अपने विचार मंत को प्रकट करता है और उसे सामने वाला व्यक्ति समझ लेता है तो वह भाषा कहलाती है। वर्तमान समय में जो हम आज भाषा-बोली का प्रयोग करते है वह एक संकेत ही तो है। संकेत को आज हम यह मानकर चलते हैं कि इसका एक अमुख अर्थ का बोधक या बोध है और यह संकेत हमें खालीस्तान कार्य करने को कह रहा है। (2010)1

पृथ्वी पर जन्म लेने वाला प्रत्येक मानव केवल मानव से ही नहीं बल्कि वह अपने सम्पर्क में आने वाले लगभग सभी प्रणियों से स्थिति-परिस्थिति के अनुसार वह अपने विचार या भाव को दूसरे जीवों से भी वार्तालाप या भाव या संकेत के माध्यम से प्रकट करता है। भाव या विचार को प्रकट करने के लिए सदैव मुख की आवाज की जरूरूत नहीं समझता। इसे वह अपने संकेत जैसे-क्रोध के लिए मुख की उदासीनता या आँख से घूरने की भाव प्रवृत्ति से हम सामने वाले को क्रोध के भाव को प्रकट करते है तो कभी-कभी हम हाँ नहीं को सिर हिलाकर संकेत के माध्यम से अपने भाव/भाषा को प्रकट करते हैं। उसी प्रकार से हम पशु-पक्षियों को अपने हाथों से उसे सहला कर दुलार (प्यार) करते हैं। अर्थात वह जानवर हमारे भाव को समझकर शांत बैठ जाता है या गर्दन हिलाने लगता है या हाथों को चाटने लगता है। इस तरह से संकेतो से भावों को समझने की प्रवृत्ति मानव के साथ-साथ पशु-पक्षियों में भी है।(2002, 2013)2

भाषा की उत्पत्ति का कोई ऐसा सटीक व वैज्ञानिक प्रमाण उपलब्ध नहीं है जो भाषा की उत्पत्ति के कारणों या आधारों की खोज करने में सहायक हो। भाषा की उत्पत्ति को लेकर भाषा-वैज्ञानिको में हमेशा एक-दूसरे से विवादास्पद रहा है। इस संबंध में प्रसिद्ध भाषा-वैज्ञानिक सक्सेना का कहना हैं "जिन ध्वनि-चिह्नों द्वारा मनुष्य परस्पर विचार-विनिमय करता है, उनको समष्टि रूप से भाषा कहते है।"(2000)3 भाषा-वैज्ञानिकों का मानना है कि भाषा की रचना या उत्पत्ति मानव समाज के माध्यम से ही होता है। अर्थात समाज में सामाजिक, आर्थिक, राजनीति, धार्मिक, स्वास्थ्य इत्यादि सामाजिक विकास/उत्थान और पतन में जो शब्द या बातों का संबंध मानव से संबंधित होता है वह सभी भाषा से संबंधित होता है। वह सभी भाषा के विकास में सहायक होता है। भाषा तथा समाज को प्रमुख रूप से दो शक्तियाँ प्रभावित करती है। पहला आंतरिक शक्ति, दूसरी बाह्य शक्ति। दोनों प्रत्यक्ष-अप्रत्यक्ष रूप से समाज और भाषा को प्रभावित करती है। भाषा की मुख्य सम्पत्ति उनकी शब्द भंडार होती है। शब्द-भंडार में जिन शब्दों का संबंध मानव के प्राकृतिक और सामाजिक परिवेश से है जो उनकी नित्य-प्रतिदिन की आर्थिक एवं सामाजिक कार्रवाई में काम आता है, उसे मूल शब्द-भंडार माना जाता है। (2002)4 भाषा विज्ञान शब्द जो मूलत: अंग्रेजी Linguistics से है जो सर्वमान्य माना जाता है। Linguistics शब्द की व्युत्पत्ति लैटिन शब्द Lingua से हुआ माना जाती है, जिसका अर्थ "जिह्वा" है। और जिह्वा का अर्थ भाषा से है। भाषा और मानवविज्ञान का संबंध उसी प्रकार से है जिस प्रकार से भाषा और मानव का संबंध जन्म से लेकर मानव के मृत्यु तक के सफर भाषा उनके साथ रहता है। अर्थात मानव चाहे पहाड़ो, जंगलों, आधुनिक नगर में रहता ही क्यों न हो भाषा उनकी अमूल्य धन/संपत्ति/धरोहर है। जब से इस पृथ्वी पर मानव सभ्यता का जन्म हुआ उसी के साथ भाषा का भी जन्म हुआ होगा? प्रारंभिक मानव सभ्यता के समय मानव की भाषा लिपि के रूप में न रह कर संकेतों के रूप में रही है। जो कालान्तर में धीरे-धीरे संकेत भाषा में परिवर्तन हो गई। आज मानव अपने आप को श्रेष्ठता की श्रेणी में रखता है, उसका प्रमुख कारण उसकी भाषा वाक्य शक्ति है। मानव जाति का सम्पूर्ण विकास भाषा के माध्यम से ही विकसित हुआ

UGC-CARE Approved Refereed-Peer Reviewed Journal
ISSN-0970-7603

भारतीय शिक्षा शोध पत्रिका

BHARATIYA SHIKSHA SHODH PATRIKA

वर्ष 42, अंक 1(i), जनवरी–जून 2023
Vol. 42, No. 1(i), January-June 2023

भारतीय शिक्षा शोध संस्थान
सरस्वती कुंज, निराला नगर, लखनऊ–226020 (उत्तर प्रदेश)
Bharatiya Shiksha Shodh Sansthan
Saraswati Kunj, Nirala Nagar, Lucknow-226020 (Uttar Pradesh)
Ph. No. 0522-2787816, E-mail: sansthanshodh@gmail.com
Website : www.bssslko.org.in

अनुसूचित जाति नट की सामाजिक-आर्थिक स्थिति का अध्ययन
(छत्तीसगढ़ राज्य के जांजगीर-चांपा जिला के विशेष संदर्भ में)

*हेमन्त कुमार, **प्रो. जितेन्द्र कुमार प्रेमी

सारांश

छत्तीसगढ़ राज्य में विभिन्न जाति-जनजातीय के लोग यहाँ निवास करते हैं जो अपने व्यवसाय, संस्कृति, खान-पान, रहन-सहन, वस्त्र एवं पहनावा इत्यादि विभिन्नताओं के लिए देश में जाने जाते हैं। छत्तीसगढ़ राज्य में निवासरत "नट" जाति अपने खेल-तमाशा, कलाबाजी एवं छत्तीसगढ़ के लिए जाने जाते हैं जिनकी सामाजिक एवं आर्थिक स्थिति संतोषप्रद नहीं है। प्रस्तुत शोध लेख छत्तीसगढ़ के "नट" जाति की सामाजिक-आर्थिक स्थिति पर आधारित है जिसकी प्रतिपूर्ति के लिए 210 प्रदर्श का चयन सामान्य दैव-निर्दशन पद्धति के द्वारा जांजगीर-चांपा, बिलासपुर, बलौदाबाजार एवं रायपुर जिला में निवासरत "नट" बहुल गांव से किया गया है। "नट" जाति के अधिकांश लोग अशिक्षित तथा धार्मिक पूजा-पाठ में अधिक विश्वास करने वाले हैं। इनका मकान कच्चा एवं अर्धपक्का तथा मुख्य आय का स्त्रोत खेल-तमाशा, कलाबाजी है। खेल-तमाशा को प्राथमिकता देने के कारण नृजाति समूह नट के परिवार में सदस्यों की संख्या अधिक है।

परिचय

एक अनुमान के अनुसार दक्षिण एशिया में विश्व के सर्वाधिक घुमंतू नृजाति समूह निवास करती है जिनमें से लगभग 10% जनसंख्या भारत की विमुक्त एवं घुमंतू जातियों की है। हालाँकि भारत में 500 प्रकार की विमुक्त जनजातियों/जातियों के समुदाय निवास करते हैं जो कि भारत की 7% जनसंख्या का प्रतिनिधित्व करती हैं। NCDNST (2008)[1] "नट" शब्द का अर्थ नृत्य, नाटक अथवा अभिनय करना है। "नट" समुदाय की उत्पत्ति कैसे हुई, यह स्पष्ट नहीं है लेकिन कुछ विद्वान इनकी उत्पत्ति राजस्थान से मानते हैं। इसी कड़ी में Hanjaavaliy (2012)[2] ने "रैगर" समाज के अपने अध्ययन में बताया है कि भारत में सात प्रकार के "नट" पाये जाते हैं जिनमें- गुजराती नट, राज नट, भ्रेच्या नट, चमारों के नट, मुल्ल नट एवं रैगरों के नट सम्मिलित हैं। ये अनेक स्थानों पर घूम-घूम कर अपने व अपने परिवार के जीविकोपार्जन के लिए कलाबाजी, करतब, तमाशा एवं गाने-बजाने का कार्य करते हैं। MOSJE (2017)[3] भारत के अधिकांश राज्यों जिनमें बिहार, छत्तीसगढ़, दिल्ली, हरियाणा, हिमाचल प्रदेश, झारखण्ड, मध्यप्रदेश, पंजाब, राजस्थान, त्रिपुरा, उत्तरप्रदेश, उत्तराखंड, पश्चिम बंगाल एवं चंडीगढ़ केन्द्र शासित प्रदेश सम्मिलित हैं, उनमें "नट" जाति को अनुसूचित जाति का दर्जा प्राप्त है। छत्तीसगढ़ में "नट" जाति की पहचान तमाशा एवं करतब दिखाने वाली, नाच-गान एवं भिक्षावृत्ति के द्वारा जीवन-यापन करने वाली जाति के रूप में रही है। छत्तीसगढ़ में इसकी पहचान "डंगचगहा" नृजाति के रूप में की जाती है। छत्तीसगढ़ में "नट" जाति प्रायः जांजगीर-चांपा, बलौदाबाजार, भाटापारा, बिलासपुर, रायपुर, दुर्ग, कवर्धा, राजनांदगांव, कोरबा, रायगढ़, महासमुंद, धमतरी इत्यादि जिलों के विभिन्न गांवों में निवासरत हैं। भारत सरकार की जनगणना (2011)[4] के अनुसार नट, कालबेलिया, सपेरा, नवदिगार एवं कुबुतर की कुल जनसंख्या 4,86,058 थी। सामाजिक सर्वेक्षण (2014)[5] के अनुसार छत्तीसगढ़ राज्य में "नट" जाति की कुल जनसंख्या 97859 हैं। शर्मा (2006)[6] के अनुसार नृजाति समूह "नट" की कद मध्यम, शरीर का रंग सावला एवं हल्का गेहुँआ, बाल लम्बे घने एवं मुलायम तथा शरीर पर बालो की मात्रा मध्यम बताया हैं।

जिस प्रकार भारतीय समाज माता (नारी) को समाज, परिवार को जोड़ने वाली जगत जननी के रूप में मानता है, इस कारण भारतीय समाज में नारी/माता को धन की देवी माना गया है। अनुसूचित जाति नट में महिलाओं को घर परिवार के साथ सामाजिक संगठन का एक प्रमुख आधार माना जाता है। यह अलग बात है कि "नट" समाज में महिलाओं की भागीदारी प्रत्यक्ष रूप से नहीं दिखती है लेकिन घर की पूरी जिम्मेदारी एक महिला पर निर्भर रहती है। "नट" समाज में महिला खेल-तमाशा दिखाने के लिए घर से बाहर जाती है जबकि पुरुष घर/झोपड़ी/त्रिपाल में रहकर घर की कार्य करते हैं जैसे- खाना बनाना, पानी भरना इत्यादि कार्य महिला का खेल-तमाशा दिखाकर आने से पहले पुरुष घर का पूर्ण कार्य समाप्त कर खेल दिखाने वाली/वाला का इंतजार करते रहता है। जब खेल वाली/वाला घर/डेरा में आते हैं तो दिन-भर का आय का हिसाब अपने जीवन-साथी को

* शोधछात्र, मानवविज्ञान अध्ययनशाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.) (Communicating Author)
** प्रोफेसर, मानवविज्ञान अध्ययनशाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)

In vitro Propagation of *Curcuma caesia* Roxb. via Bud Culture Technique and ISSR Profiling of the Plantlets for Genetic Homogeneity

Anjum Afreen, Singh Vikram, Adil Smriti and Quraishi Afaque*
School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, INDIA
*drafaque13@gmail.com

Abstract
An in vitro propagation protocol has been developed for Curcuma caesia Roxb., an endangered medicinal plant by Foundation for Revitalisation of Local Health Traditions and Central Forest Department of India. The plant bears poorly germinated seeds and produces two-storage organs: rhizomes and multiple root tubers. Only rhizomes have medicinal-economic values. They serve as propagules too, which results in a shortage of planting material. Therefore, a complete one-year production cycle of C. caesia has been standardized through in vitro propagation including explants establishment (one month), subculture cycles (seven months), rooting (one month) followed by primary hardening (one month) and secondary hardening (two months).

Dormant shoot buds on rhizome served as explants for culture initiation on Murashige and Skoog (MS) medium supplemented with different concentrations of 6-benzyladenine (BA) and kinetin (KIN) in combination with citric acid (CA), adenine sulfate (AdS) and indole-3-acetic acid (IAA). Maximum bud break (70%) was obtained on MS with 8 mg L^{-1} BA, 8 mg L^{-1} KIN, 100 mg L^{-1} CA, 200 mg L^{-1} AdS and 2 mg L^{-1} IAA (standard medium). Shoot production potential continued on this medium during the subsequent seven-month-long subculture cycle. The in vitro raised shoots rooted best on ½-strength MS containing 1 mg L^{-1} indole-3-butyric acid. Plantlet survival rate was >95% after acclimatization. The genetic homogeneity of plantlets with the mother plant was analyzed using Inter Simple Sequence Repeats which generated a monomorphic banding pattern to confirm the uniformity of in vitro raised plantlets of C. caesia.

Keywords: Meristem culture, Kali Haldi, Subculture, Rooting, Acclimatization.

Introduction

Curcuma caesia Roxb., popularly known as 'Kali Haldi' ('Black Turmeric' in English), is a perennial, tuberous rhizomatous herb belonging to the family Zingiberaceae[28]. It is an endangered plant native to Central and North-East India[23] where it is used as a spice and in food preservation. The rhizome is rich in camphor curcuminoids, phenolics, flavonoids, certain proteins, amino acids, essential oil and alkaloids[30]. Sesquiterpenes and monoterpenes from the extract of *C. caesia* rhizomes have good antioxidant, anti-inflammatory and tumor cell inhibitory activities[2,6,10,20]. The essential oil from leaves of *C. caesia* also possesses the potential and biologically important activity and can be used as natural antioxidants, anti-inflammatory and antimicrobial agents in pharmaceutical industries[7].

The Central Forest Department of India has declared this species an 'endangered herb' due to biopiracy[21]. It is categorized as a critically endangered species of Central India[14]. *C. caesia* bears seeds that are poorly germinated[10]. Therefore, the plant is commonly propagated through underground rhizomes only[4]. Medicinal and economic values reside in these rhizomes. Moreover, the plant produces many underground root tubers too. These root tubers have no market value. Thus, due to the production of two storage organs, the yield of the desired part- rhizome becomes low during its cultivation. The harvested rhizomes, after cultivation, are sold for the recovery of cultivation cost and profit-making. Hence, lower yields of the rhizomes create a shortage of the propagules for cultivation resulting in very high costs for its saplings[16]. Low rhizome productions result in the propagule unavailability for cultivations.

Hence, to fulfil the demand, it is directly harvested from the forests pushing the plant into endangered status[22]. *In vitro* culture technique facilitates the production of planting materials to propagate species[27]. Reports are there for plantlet regeneration of *C. caesia* via meristem culture[3,4,5,29,35] or via callus too[31,37]. However, all these reports neither examine the regeneration efficiency during subculture cycles nor analyze the genetic fidelity of the regenerants. The present study reports a complete one-year *in vitro* production cycle and genomic template stability of the plantlets of *C. caesia*.

Material and Methods

Healthy rhizomes of *C. caesia* were collected from the National Center for Natural Resources, Pandit Ravishankar Shukla University, Raipur (India) in June 2019. Rhizomes were first washed with running tap water to remove soil particles followed by treatment with surfactant tween-20 for 5 to 10 min and a fungicide solution containing 0.1% (w/v) Bavistin 50WP (BASF India Ltd., Mumbai, India) and 0.25% (w/v) Carbendazim 50WP (Hindustan Insecticides Ltd., Bathinda, India) for 20 minutes. The dormant shoot buds (explants) on the rhizome were chopped off; the surface

Brazilian Journal of Botany
https://doi.org/10.1007/s40415-022-00830-3

GENETICS & EVOLUTIONARY BIOLOGY - ORIGINAL ARTICLE

Screening of a new candidate tree legume- *Pithecellobium dulce* (Roxb.) Benth., for lead remediation

Satyam Kumar Kumbhakar[1] · Ravishankar Chauhan[1,2] · Vikram Singh[1] · S. K. Jadhav[1] · Afaque Quraishi[1]

Received: 25 November 2021 / Revised: 3 August 2022 / Accepted: 3 August 2022

Abstract
A fast-growing, leguminous tree species- *Pithecellobium dulce* (Roxb.) Benth., was screened in vitro against Pb-stress for the first time. In the current study, Pb toxicity affected the seedlings growth, lipid peroxidation, hydrogen peroxide production, antioxidant enzymes activity, proline content, and genomic template stability in a dose-dependent manner. The plant showed a high Pb tolerance, uptake and accumulation (> 2300 mg Kg^{-1}). Citric acid application could mitigate Pb-stress in the seedlings exhibited by the examined morphological, biochemical, and molecular parameters, including remarkably enhanced Pb uptake by the roots. Citric acid addition to the Pb solution reduced lipid peroxidation and ROS production in the seedlings roots, stem, and leaves. Citric acid also induced the antioxidant enzymes activities in the seedlings that were reduced by Pb exposure. Citric acid-mediated recovery under Pb-stress was evidenced by the growth and development of the seedlings, higher chlorophyll pigments, lower proline content and maximum tolerance index. The Pb exposure altered the genomic template stability that was also recovered by citric acid. Thus, after further field studies, *P. dulce* with citric acid mitigation may prove suitable for Pb remediation from contaminated sites.

Keywords Antioxidant enzymes · Genomic template stability · Lipid peroxidation · Pb-stress · Pb-accumulation · Phytoremediation

1 Introduction

Globally, lead (Pb) contamination in soils is a growing concern (Wang et al. 2021). Pb is highly toxic, non-biodegradable and long half-life heavy metal that is present in abundance (Frank et al. 2019; Latif et al. 2020). It can cause severe damage to ecosystems as well as human health (Cano-Ruiz et al. 2020). Excessive use of paints, mining, sludge, industrial waste, and agricultural activities are mainly responsible for Pb contamination of the environment (Frank et al. 2019; Samreen et al. 2021; Raju et al. 2021). Patra et al. (2020) stated that Pb contamination of agricultural land is a major environmental concern. Pb may enter the human body through ingestion and inhalation, this first one being directly linked with the food chain and can cause severe diseases (Iheanacho et al. 2017; Vladimirovich et al. 2021). Pb toxicity showed a negative relationship with nutrient uptake, antioxidant activity, and photosynthesis in plants. In response to metal-induced toxicity, Plants have evolved defense mechanisms including synthesis of antioxidant enzymes (Giannakoula et al. 2021) such as SOD, CAT, and APX that help to maintain cellular redox homeostasis. This redox equilibrium may be disturbed due to the excess generation of reactive oxygen species under Pb-stress (Giannakoula et al. 2021). ROS induces oxidative stress and lipid membrane peroxidation that damages the biological molecules and alters normal metabolic pathway resulting in cellular destruction (Pourrut et al. 2011).

Presently, several phytotechnologies are available to treat contaminated areas due to their low cost and environmentally friendly nature (Yan et al. 2020). Trees due to their long life cycle, huge biomass, and extensive root system are considered more suitable for the purpose than the grasses or other plants (Kaur et al. 2019). An ideal tree candidate must be fast-growing, multiple stress-tolerant, able to grow on poorly nutrient soils combined with high toxicant tolerance, uptake, and accumulation. *Pithecellobium dulce*

✉ Afaque Quraishi
drafaque13@gmail.com

[1] School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur 492010, India

[2] National Center for Natural Resources, Pt. Ravishankar Shukla University, Raipur 492010, India

Plant Stress 5 (2022) 100089

Contents lists available at ScienceDirect

Plant Stress

journal homepage: www.sciencedirect.com/journal/plant-stress

Review

Gamma radiation: A potential tool for abiotic stress mitigation and management of agroecosystem

Priya Katiyar [a], Neha Pandey [a,b], S. Keshavkant [a,*]

[a] School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur 492 010, India
[b] Kristu Jayanti College (Autonomous), Bengaluru, India

ARTICLE INFO

Keywords:
Gamma rays
Abiotic stress
Reactive oxygen species
Antioxidants
Mutation

ABSTRACT

Context: Being sessile, it is impossible for the plants to evade from the unfavourable environmental conditions prevailing due to various abiotic stresses like heat, salinity, drought, flood, heavy metals, and high radiance amongst many others. These abiotic stresses disrupt plant growth and limit crop productivity to a large extent globally. Crop plants need to acclimatize themselves in these unsuitable environmental and edaphic conditions utilizing their inherent biological mechanisms. Massive amount of pertinent researches have been done in the last few decades regarding utilization of gamma rays for improvement in traits, and management of agro-ecosystem by developing superior quality crops/ germplasms. It has been well established that the gamma rays promotes abiotic stress tolerance in plants at low doses (50–100 Gy). Gamma rays are also being widely used as mutation techniques in an attempt to raise abiotic stress tolerance and, disease resistant crop varieties. Furthermore, a better understanding of tolerance mechanisms induced by gamma rays will help in improving crop productivity under stress conditions. However, the potential mechanisms involved in this are still indefinable. This review illustrates general information about gamma ray, its dose dependant responses; beneficial effects and lethality, and also the potential mechanism(s) underlying the tolerance induction and performance enhancement of plants growing under various abiotic stress conditions.

Objective: To elucidate the role of gamma rays as a potential tool for stress mitigation and management of agroecosystem.

Methods: Gamma rays have been used quite differently by various researchers for alleviation of abiotic stress imposed responses in plants.

Results and conclusions: Application of gamma radiation has popularly been noticed to enhance nutrient uptake, modulate biosyntheses of numerous secondary key metabolites and osmolytes, and regulate various metabolic activities to engender tolerance against environmental stresses.

Significance: In most of the developing and under developed nations, owing to limited development in agro-management systems, abiotic stresses are seen to cause potential threats to growth and productivity of crops. Therefore, it is essentially to explore novel cost effective possibilities like use of low dose of gamma rays in crop plants for improvement in their performance during these rapidly changing climatic conditions.

1. Introduction

Crop plants encounter various abiotic stresses in their life span owing to global warming and climatic abnormalities which majorly limits their growth and productivity. Drought, temperature extremes, salinity and acidity of soil, light intensity, submergence, and anaerobiosis are dominant abiotic stresses amongst others, and are hostile to farming and the ecosystem (Wania et al., 2016). Crop plants of approximately 90% of cultivable area are facing one or several of the above stresses (dos Reis et al., 2012), which results in approximately 70% losses in the yield of major food grains *viz*.; *Oryza sativa, Triticum aestivum* and *Zea mays,* and hence affecting food security (Tigchelaar et al., 2018). As per the report of FAO (2007), merely 3.5% land area has left untouched by any of the environmental constrain.

Amongst the enlisted abiotic stresses, salinity becomes the most stubborn one by escalating the salt concentration in the arable land

Abbreviations: Reactive Oxygen Species, ROS.

* Corresponding author.
E-mail address: skeshavkant@gmail.com (S. Keshavkant).

https://doi.org/10.1016/j.stress.2022.100089
Received 29 December 2021; Received in revised form 13 April 2022; Accepted 14 April 2022
Available online 16 April 2022

JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

A comparative study of (Response surface methodology) RSM and (Artificial Neural Network and Genetic Algorithm) ANN-GA for optimization of biohydrogen production by *Pseudomonas aeuroginosa* SBT-Pa 092

Veena Thakur* [1], J. Satya Eswari [2] and S. K. Jadhav[3]

1- Government Pandit Shyam Shankar Mishra College Deobhog, Gariyaband, Raipur. Chhattisgarh India
2- Department of Biotechnology, National Institute of Technology, Raipur. Chhattisgarh India
3- School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur. Chhattisgarh India

Abstract:

This communication discusses the optimization of carbon and nitrogen sources for the enhanced bio-hydrogen production from rice mill effluent. Three critical factors, concentrations of glucose (10-20 g/l), yeast extract (1-5 g/l) and Ammonium per sulphate (1-2 g/l) were optimized by response surface methodology (RSM) with central composite design (CCD) for better production. The hydrogen produced by *Pseudomonas aeuroginosa* SBT-Pa 092 was enhanced after using RSM. The value of R^2 obtained by ANN after training (75%) are 14 samples, validation (15%) are 3 samples and testing (15%) are 3 samples were 0.86976, 0.78299, and 0.94523 for bio hydrogen production. The value of R^2 obtained by ANN after training (40%) = 10 samples, validation (25%) = 5 samples and testing (25%) = 5 samples were 0.79317, 0.8596 and 0.90984 respectively, for biohydrogen production. The % error for ANN and RSM were 0.0016 and 0.01 for biohydrogen production, which showed the authority of ANN in exemplifying the non-linear behaviour of the system. Thus, ANN/RSM together successfully identify the substantial process conditions for Biohydrogen production. The results obtained indicate that use of both RSM and ANN with appropriate experimental design can be used to optimize culture conditions for enhancement of hydrogen production.

Key words: Biohydrogen, *Pseudomonas aeuroginosa* SBT-Pa 092, RSM, CCD and ANN.

Introduction:

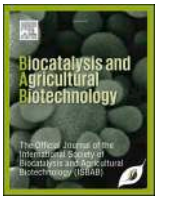
To meet the energy requirements of the society the world economy is completely dependent upon the fossil fuel. The rising cost and harmful effect of fossil fuels on the environment has resulted in the development of eco-friendly and alternative source of energy. Hydrogen is considered as an environment friendly and clean source of energy as it does not produce any of the green house gases during combustion [Wang et al 2014; Jiang et al 2014]. Also it is having high energy content (142 kJ/g) which is 2.75 times higher than the fossil

Biocatalysis and Agricultural Biotechnology 47 (2023) 102565

Contents lists available at ScienceDirect

Biocatalysis and Agricultural Biotechnology

journal homepage: www.elsevier.com/locate/bab



Bacterial consortia mediated induction of systemic tolerance to arsenic toxicity *via* expression of stress responsive antioxidant genes in *Oryza sativa* L.

Neha Pandey [a,b], Roseline Xalxo [a], Jipsi Chandra [a], S. Keshavkant [a,*]

[a] *School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur, 492 010, India*
[b] *Kristu Jayanti College (Autonomous), K. Narayanapura, Kothanur, Bengaluru, 560 077, India*

ARTICLE INFO

Keywords:
Antioxidative enzymes
Arsenic
Bacterial consortia
Gene expression
Oxidative stress
Plant growth promotion

ABSTRACT

Arsenic (As) is a toxic metalloid which pollutes soil and water, and negatively affects the growth and development of plants at different levels. This study investigated the effects of As-resistant and plant growth promoting (PGP) bacterial consortia on the germination and growth attributes of two cultivars (Swarna and MTU 1010) of rice (*Oryza sativa* L.) under As-flooded environment. The consortium consisted of five bacterial strains; *Bacillus nealsonii* strain ARP2, *Pseudomonas nitritireducens* strain ARP3, *Exiguobacterium aestuarii* strain ARRP3, *Bacillus tequilensis* strain ART2 and *Microbacterium paraoxydans* strain ADT5, which were isolated from different regions of Chhattisgarh, India. Soils inoculated with the bacterial consortia and supplemented with As(V)/As(III) were used to grow rice seeds under *in vitro* conditions. The results ascertained that the seedlings inoculated with the bacterial consortia grew well even in the presence of As, which was marked by increased shoot and root length, biomass, and total chlorophyll content. Further, inoculation of bacterial consortia reduced the oxidative stress to a significant level by up-regulating the expressions of protective genes encoding antioxidant enzymes. This consortium could decrease the As accumulation in plants upon successful colonization in the rhizosphere, suggesting possible exploitation of it for enhanced growth of plants and in the remediation of As-contaminated soils.

1. Introduction

Arsenic (As) is a toxic and non-essential metalloid for plants, leading to different phytotoxic effects (Yoon et al., 2015). It exists primarily as inorganic arsenate [As(V)] and/or arsenite [As(III)], which are the dominant species in soil environments, and their chemical behaviour is heavily influenced by the striking redox reactions of soil (Ascar et al., 2008). Although arsenic occurs naturally in the environment, irrigation with As-contaminated water has increased the risk of this metalloid being transferred and accumulating in subsequent food chains (Jabłońska-Czapla et al., 2020). It is a potent carcinogen and mutagen, which raises potential hazard and concern for both public health and the environment (Kapaj et al., 2006). Having similarity with phosphate (PO_4^{-3}), As(V) easily enters into the plant cell *via* high-affinity phosphate transporters, while As(III) is incorporated by aquaporin channels (Allevato et al., 2019). Both these result in severe toxicity, which is marked by the disturbances in various physiological and biochemical processes and genetic stability (Talukdar, 2011).

* Corresponding author.
E-mail address: skeshavkant@gmail.com (S. Keshavkant).

https://doi.org/10.1016/j.bcab.2022.102565
Received 24 June 2022; Received in revised form 19 October 2022; Accepted 24 November 2022
Available online 29 November 2022
1878-8181/

Analytical Methods

ROYAL SOCIETY OF CHEMISTRY

PAPER

View Article Online
View Journal

Cite this: DOI: 10.1039/d2ay01088g

Selective detection of tartaric acid using amino acid interlinked silver nanoparticles as a colorimetric probe†

Sushama Sahu and Kallol K. Ghosh*

A variety of biomolecules with different functional groups play critical roles in almost all the processes occurring in living cells. Interaction of metallic nanoparticles (NPs) with various biomolecules generates a layer of molecules on their surface, and this biomolecular rich layer formed on the NP surface is described as a 'biomolecular corona'. The physicochemical properties of the NPs, including size, adsorption affinity, and charge on the particles' surfaces are the major factors influencing the characteristics of this corona. The formation of various biomolecular corona has been studied well, whereas the amino acid corona is relatively new by exploring their stability. In the present study, a novel formation of an amino acid corona with a fundamental interaction mechanism for a selective detection procedure using a colorimetric platform has been proposed. Herein, amino acid-coated silver NPs (AgNPs) have been used as a template with spectroscopic (steady state UV-Vis, FTIR) and imaging (HR-TEM, DLS) techniques. Our findings demonstrated that among different amino acid coronas, glutathione (GSH) stabilized AgNPs show a rapid reaction with tartaric acid. The extent and thermodynamics of the formed complex between the GSH/AgNPs and tartaric acid have also been studied and this suggested that the complex formed is spontaneous and energy releasing in nature.

Received 5th July 2022
Accepted 29th July 2022

DOI: 10.1039/d2ay01088g

rsc.li/methods

1. Introduction

In the last decade, researchers have reported that various particles directed into biological fluids are inevitably and immediately (>0.5 min) covered by different biomolecules, including proteins, peptides, enzymes or amino acids, and these form a "corona" on the surface of the particles. The protein corona was first found by Dawson and co-workers.[1–3] Here, the proteins are shown to be associated with the nanoparticles (NPs) and they participate in the formation of a "biomolecular corona" found by Monopoli *et al.*[3,4] The formation of this type of corona results in a change of the NP surfaces with an increase in their diameter.[5,7] The

School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur-492010, Chhattisgarh, India. E-mail: kallolkghosh@gmail.com; Tel: +91-94252 16204

† Electronic supplementary information (ESI) available. See https://doi.org/10.1039/d2ay01088g

Sushama Sahu has completed her M.Phil. from the School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur, India, in 2018. Currently, she has submitted her PhD thesis with Prof. Kallol K. Ghosh, at the School of Studies in Chemistry, Pt. Ravishankar Shukla University. Her research interests are the development of new functionalized nanoparticles, analytical studies and methods for the quantification of biomolecules, environmental contaminants and pollutants in real samples.

Dr Kallol K. Ghosh is Professor and Head at the School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur, India. He has been the INSA/JSPS fellow at Seikei University, Tokyo, Japan, and James Chair visiting fellow at the St. Francis Xavier University, Antigonish, Canada. He has published over 211 articles. His research is focused on micellar catalysis, solubility of polycyclic aromatic hydrocarbons, hydroxamic acids, detoxification of chemical warfare simulants and reactivation kinetics of organophosphate inhibited acetylcholinesterase by oxime reactivators.

Environmental Science Nano

ROYAL SOCIETY OF CHEMISTRY

CRITICAL REVIEW

View Article Online
View Journal

Cite this: DOI: 10.1039/d2en00503d

Recent advances on gold and silver nanoparticle-based colorimetric strategies for the detection of different substances and SARS-CoV-2: a comprehensive review

Sushama Sahu, Srishti Sharma, Ramsingh Kurrey and Kallol K. Ghosh *

Received 24th May 2022,
Accepted 19th July 2022

DOI: 10.1039/d2en00503d

rsc.li/es-nano

Nanoparticle (NP)-based colorimetric methods are extensively used for the rapid detection of environmental contaminants, different substances and SARS-CoV-2 in various fields such as environmental science, virology, pollution research, and the food industry, as well as biomedicine. Colorimetric sensors exhibit high sensitivity and selectivity, are easy to handle, portable, safe for screening purposes and can be visualized by the naked eye. Herein, the colorimetric sensing approaches of the two most commonly used metallic NPs, *i.e.*, gold (Au) and silver (Ag), and their physicochemical methods are discussed, as metallic NPs show good efficiency due to their unique optical and chemical properties. This review summarizes the progress on colorimetric sensors based on metallic NPs as sensors and their applications, elucidating the utility and superior features of metallic-NP-based colorimetric assay for the detection of different environmental contaminants, biomolecules and SARS-CoV-2 in the environmental as well as human biological samples. An outlook with respect to the trends and future development of the proposed sensors is also provided.

Environmental significance

This review summarizes the research on gold (Au) and silver (Ag) nanoparticle (NP)-based colorimetric assays for the detection of different substances and SARS-CoV-2 in the environment as well as human biological samples. Herein, a series of fabrication methods for colorimetric sensors are discussed. In contrast to conventional techniques, nanomaterial-based colorimetric sensors exhibit enhanced selectivity and comparatively higher sensitivity, and allow onsite detection. Such nanosensors are cost-effective and show upgraded performance compared with other samples, and play a prominent role in a wide range of analytical applications. Additionally, the synthesized metallic NPs show better stability, minimal toxicity and biocompatibility, hence attributing them with superior properties compared to other sensors. Among different types of colorimetric-based assays employed for surface modification, NP-based biosensors have received tremendous attention due to their quick response and high specificity. The future scope of this field is to develop more approachable colorimetric probes with "non-aggregation" processing, driving this field toward a new trend of Au and Ag NPs-based probes. The fabrication of hand-held devices, digital imaging software and point-of-care technologies is also of great interest to researchers. Thus, this method may deliver a bright future for Au and Ag NPs-based colorimetric probes.

1. Introduction

The detection of environmental contaminants and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) related to various fields, either from environmental or biological samples, has been possible due to the unique and superior properties of nanomaterials (NMs). Many research studies have reported a wide range of applications for nanostructures in developing detection systems for environmental contaminant and SARS-CoV-2, with the challenges faced.[1–5] NMs exhibit high surface reactivity, high surface area, strong adsorption capacity, and high catalytic efficiency.[1,2] A variety of NMs have been used to design efficient sensors for the detection of target species, such as metal and metal oxide nanoparticles (NPs), carbon-based NMs (as polymeric NMs) and silicon. The size-dependent properties, reactivity, large surface-to-volume ratio (S/N) and their high degree of functionalization leads to nanosensors with excellent sensitivity and selectivity.[2,3] Aside from different properties, functionalization is another significant factor, using a variety of organic ligands *via* covalent bond formation, that improves the responses of NPs toward the detection of environmental toxicants and SARS-CoV-2.[3]

Among the various NPs, the advantageous properties of gold (Au) and silver (Ag) NPs, such as unique optical,

School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur-492 010 Chhattisgarh, India. E-mail: kallolkghosh@gmail.com; Tel: +91 94252 16204

Chemical Thermodynamics and Thermal Analysis 8 (2022) 100089

Contents lists available at ScienceDirect

Chemical Thermodynamics and Thermal Analysis

journal homepage: www.elsevier.com/locate/ctta

Micellization properties of quinolinium based surfactants: 1-alkylquinolinium bromide and 6-hydroxy-1-alkylquinolinium-bromide by fluorimetry, conductivity and surface tension measurements and its parameters

Jyotsna Lakra [a], Deepti Tikariha Jangde [a], Birendra Kumar [c,*], Kallol K. Ghosh [b]

[a] Department of Chemistry, APSGMNS Government PG College, Kawardha, C.G. 491995, India
[b] School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur C.G. 492010, India
[c] Department of Chemistry, Government Rajmata Vijayaraje Sindhiya Kanya Mahavidyalaya, Professor Colony, Kawardha, C.G. 491995, India

ARTICLE INFO

Keywords:
Quinolinium
Surfactant
CMC
Conductivity meter
Fluorescence
Surface tension

ABSTRACT

Quinolinium surfactants possessing pyridinium rings have a wide range of biological applications due to its antimicrobial activity. In this study, we have used quinolinium based surfactant series i.e.1-alkylquinolinium bromide and 6-hydroxy-1-alkylquinolinium-bromide. The physicochemical behavior of quinolinium based surfactant have been carried out by various techniques viz. conductivity, surface tension and fluorescence measurements in aqueous and 10% (v/v) methanol at 300K.The critical micelle concentration (CMC) values found from conductivity, surface tension and fluorescence are in good agreement of a surfactant in aqueous and 10% (v/v) methanol. The CMC value of 1-alkyquinolinium-bromide series is higher than its derivative series (6-hydroxy-1-alkyquinolinium-bromide). The values of Γ_{max} increases with increases chain length of the both the quinolinium surfactants, as well as A_{min} values increases with increasing chain length of surfactants.

1. . Introduction

Self-organized assemblies have enormous prospective applications owing to their amphiphilic character [1–7]. The physicochemical properties of surfactant are of paramount importance for its applications [8–11]. Cationic surfactants are of great interest both for scientific community and chemical fields, because of their interesting properties, which can be potentially applied in chemical industries. Its advent has greatly broadened the perspective of interfacial sciences [12–14]. Apart from its biological significance being a cationic species, quinolinium compounds have characteristic properties [15–18]. This created its own importance as corrosion inhibitors and in emulsion polymerization, textile engineering etc [19–20]. Attributing to the excellent antimicrobial properties these surfactants are generally used as bactericide in various systems [21]. Quinolinium surfactants have the ability to π-stack among themselves that finds interest in supramolecular chemistry and in biology [22–25]. Quinolinium compounds acts as an important probe for the sensing of halides as well as have medicinal importance [26–28]. The electronic states and luminescence properties of quinolinium surfactants and their derivatives have been investigated [29–30].

The characteristic properties of cationic quinolinium surfactants with aqua-solvent media make it a very interesting topic of research. Micellization behavior of n-quinolinium surfactants have been not well studied in aqua-solvent media. Herein, we have used methanol and water for determination of micellization behavior of n-quinolinium surfactants by different methods. Methanol plays a significant role in numerous chemical processing applications, fundamentally interesting both from a practical and theoretical perspective [31]. Methanol –water system possesses remarkable interactions, which may affect self-assembly of surfactant [32]. Methanol is added in water, it breaks water structure then decrease in dielectric constant and increase in viscosity [33]. The physical properties of methanol such as density, viscosity coefficient and dielectric constant have investigated [34].

A number of researchers have been focused to synthesis of quinolinium based surfactants [35]. Marek et al. [36] prepared the quaternary quinolinium surface active agents possessing different alkyl chain length i.e. series of C_8 to C_{20}. Research group successfully developed an HPLC method for the successful distinction of all prepared long chain quinolinium derivatives and members of series.

Lava et al. [37] synthesized ionic liquid crystals based on quinolinium and isoquinolinium salts by quarternization of quinoline and isoquinoline. Investigations have been done on introducing the alkyl

* Corresponding author.
E-mail address: birendrajangde@gmail.com (B. Kumar).

https://doi.org/10.1016/j.ctta.2022.100089
Received 18 June 2022; Received in revised form 17 September 2022; Accepted 4 October 2022

RSC Advances

ROYAL SOCIETY OF CHEMISTRY

PAPER

View Article Online
View Journal | View Issue

Cite this: *RSC Adv.*, 2023, **13**, 701

Facile and scalable synthesis of un-doped, doped and co-doped graphene quantum dots: a comparative study on their impact for environmental applications†

Reena Suryawanshi, Ramsingh Kurrey, Sushama Sahu and Kallol K. Ghosh *

In recent years, graphene quantum dots (GQDs) received huge attention due to their unique properties and potential applicability in different area. Here, we report simple and facile method for the synthesis of GQDs and their functionalization by doping and co-doping using different heteroatom under the optimized conditions. The doping and co-doping of GQDs using boron and nitrogen have been confirmed by FTIR and TEM. The UV-visible and fluorescence techniques have been used to study the optical properties and stability of functionalized GQDs. Further, the screening for enhancement of quantum yields of all GQDs were performed with fluorescence and UV-visible spectra under the optimized conditions. The average QY was obtained as 16.0%, 83.6%, 18.2% and 29.6% for GQDs, B-GQDs, N-GQDs and B,N-GQDs, respectively. The sensor was used to determine paraoxon in water samples. The LOD was observed to be 1.0×10^{-4} M with linearity range of 0.001 to 0.1 M. The RSD was calculated for the developed B,N-GQDs based sensor and observed to be 2.99% with the regression coefficient as 0.997. All the doped, co-doped and un-doped GQDs possess remarkable properties as a fluorescent probe.

Received 22nd August 2022
Accepted 20th October 2022

DOI: 10.1039/d2ra05275j

rsc.li/rsc-advances

1. Introduction

Graphene quantum dots (GQDs) are new emerging members of the luminescent carbon family.[1–4] These are crystalline semiconductors prepared using graphene and single or 4–5 layered zero-dimensional graphene sheets with a diameter <20 nm of the exciton Bohr radius. GQDs exhibit remarkable physicochemical, electronic and optical (photoluminescence (PL) and electrochemiluminescence (ECL)) properties with good photostability. GQDs also exhibit multicolour emission, biocompatibility and chemical inertness derived from the quantum confinement and edge effects.[5,6] Thus, GQDs are desirable candidates for tremendous applications, including biosensing, bioimaging, optical sensing, photocatalysis, optoelectronics, *etc.*[7,8] Naik *et al.*[4] studied the effect of pH on GQDs by developing a molecular scale rapid synthetic method for GQDs using citric acid as a carbon precursor. Li *et al.*[2] developed sulphur and nitrogen co-doped GQD-assisted chemiluminescence for the sensitive detection of tryptophan and mercury in human plasma and water samples. Zhao *et al.*[60] synthesized oxygen-enriched N-GQDs *via* a green synthetic method and reported their advantages in pH-sensitive photoluminescence and mercury detection.

Recently, graphene and graphene-based materials have gained wide attention owing to various applications.[9] Doping and co-doping of GQDs with various heteroatoms, such as boron, sulphur, nitrogen, fluorine, chlorine, bromine, iodine, potassium and selenium, and co-dopants have proven to be effective approaches to modulate their intrinsic electronic, luminescence and reactive properties.[10,11] Yu *et al.*[12] studied functionalized GQDs *via* electrochemical exfoliation of carbon fibers for the detection of sulfide ions. Herein, GQDs show fascinating properties and size-dependent optical properties as an environmentally friendly system.

Huang *et al.*[13] developed a highly fluorescent nanoprobe carbon dot-desferrioxamine B (CD-DB) *via* the conjugate connection of CDs and desferrioxamine B for the detection of iron ions. The determination of the fluctuation of ascorbic acid induced by hypoxia in cells and *in vivo* system. The nanoprobe exhibited excellent sensitivity and selectivity for the detection of Fe^{3+} and AA. Since a decade, many researchers have reported the synthesis and functionalization methods of graphene based materials to enhance their application in various fields. The highly fluorescent behaviour of graphene-based materials has gained increasing attention.[14–16] GQDs were synthesized by the use of citric acid as a precursor and then characterized by fluorescence and UV-visible spectroscopic techniques. Furthermore, graphene was used as sensor for sensitive and selective

School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur-492010, Chhattisgarh, India. E-mail: kallolkghosh@gmaill.com

† Electronic supplementary information (ESI) available. See DOI: https://doi.org/10.1039/d2ra05275j.

molecules

MDPI

Article

Sustainable Phenylalanine-Derived SAILs for Solubilization of Polycyclic Aromatic Hydrocarbons

Illia V. Kapitanov [1,†], Surya M. Sudheer [1], Toshikee Yadav [1,2], Kallol K. Ghosh [2], Nicholas Gathergood [3], Vijai K. Gupta [1,4] and Yevgen Karpichev [1,*]

[1] Department of Chemistry and Biotechnology, Tallinn University of Technology (TalTech), 12618 Tallinn, Estonia; vijai.gupta@sruc.ac.uk (V.K.G.)
[2] School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 92010, India; kallolkghosh@gmail.com
[3] School of Chemistry, College of Science, University of Lincoln, Lincoln LN6 7TS, UK; ngathergood@lincoln.ac.uk
[4] Biorefining and Advanced Materials Research Centre, SRUC, Parkgate, Dumfries DG1 3NE, UK
* Correspondence: yevgen.karpichev@taltech.ee; Tel.: +372-620-4381
† Current address: Gemini PharmChem Mannheim GmbH, 68305 Mannheim, Germany.

Abstract: The solubilization capacity of a series of sustainable phenylalanine-derived surface-active ionic liquids (SAILs) was evaluated towards polycyclic aromatic hydrocarbons—naphthalene, anthracene and pyrene. The key physico-chemical parameters of the studied systems (critical micelle concentration, spectral properties, solubilization parameters) were determined, analyzed and compared with conventional cationic surfactant, CTABr. For all studied PAH solubilization capacity increases with extension of alkyl chain length of $PyPheOC_n$ SAILs reaching the values comparable to CTABr for SAILs with n = 10–12. A remarkable advantage of the phenylalanine-derived SAILs $PyPheOC_n$ and $PyPheNHC_n$ is a possibility to cleave enzymatically ester and/or amide bonds under mild conditions, to separate polycyclic aromatic hydrocarbons in situ. A series of immobilized enzymes was tested to determine the most suitable candidates for tunable decomposition of SAILs. The decomposition pathway could be adjusted depending on the choice of the enzyme system, reaction conditions, and selection of SAILs type. The evaluated systems can provide selective cleavage of the ester and amide bond and help to choose the optimal decomposition method of SAILs for enzymatic recycling of SAILs transformation products or as a pretreatment towards biological mineralization. The concept of a possible practical application of studied systems for PAHs solubilization/separation was also discussed focusing on sustainability and a green chemistry approach.

Keywords: surface-active ionic liquids (SAILs); enzymatic decomposition; biodegradability; sustainability; solubilization; polycyclic aromatic hydrocarbons (PAHs)

Citation: Kapitanov, I.V.; Sudheer, S.M.; Yadav, T.; Ghosh, K.K.; Gathergood, N.; Gupta, V.K.; Karpichev, Y. Sustainable Phenylalanine-Derived SAILs for Solubilization of Polycyclic Aromatic Hydrocarbons. *Molecules* **2023**, *28*, 4185. https://doi.org/10.3390/molecules28104185

Academic Editor: Owen Curnow

Received: 30 April 2023
Revised: 16 May 2023
Accepted: 17 May 2023
Published: 19 May 2023

1. Introduction

Ionic liquids (ILs) have been widely used in many industries [1–3] and are one of the core focuses of research over the past two decades [4,5]. ILs are proposed as more desirable than conventional volatile solvents in many physical and chemical processes, often referred as "green" solvents [6]. They can be of natural origin and be prepared by a "benign by design" approach [5,7]. Designing ILs that lead to a reduction in the losses of solvents as well as less damage to the environment is an important aspect in green chemistry [6]. Ionic liquids in general fulfil many of the 12 criteria as a green solvent related to the availability, price, recyclability, synthesis, toxicity, biodegradability, performance, stability, flammability, storage, and renewability [8]. Ionic liquids can offer a better alternative to volatile solvents, which has led to its massive use in industrial applications such as separation and purification, and as chemical catalysts, biorefinery concepts [3], extractions [1] and others [9–12]

Journal of the Indian Chemical Society xxx (xxxx) xxx

Contents lists available at ScienceDirect

Journal of the Indian Chemical Society

journal homepage: www.journals.elsevier.com/journal-of-the-indian-chemical-society

Analytical approaches on some selected toxic heavy metals in the environment and their socio-environmental impacts: A meticulous review

Alka Patle [a], Ramsingh Kurrey [b,*], Manas Kanti Deb [b], Tarun Kumar Patle [b], Deepak Sinha [a,**], Kamlesh Shrivas [b]

[a] Department of Chemistry, Government Nagarjuna Post Graduate College of Science, Raipur, 492010, Chhattisgarh, India
[b] School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur, 492010, Chhattisgarh, India

ARTICLE INFO

Keywords:
Heavy metals
Socio-environmental impacts
Analytical techniques
Extraction methods
Removal and remediation methods

ABSTRACT

Heavy metals are a group of metals and metalloids that have relatively high density and are toxic even at ppb levels. The excess intake of heavy metals in human bodies though the environment may cause various humans health problems. Analytical approaches of some selected toxic heavy metals in the environment and their socio-environmental impacts are discussed in this review. In this present investigation, we have also discussed the design and development of nanomaterials for the detection of metal ions along with kinetic approaches. The isolation or pre-concentration and determination of heavy metals from complex matrices become challenging for analytical chemists and researchers. The fundamentals on sample preparation and analysis of some selected heavy metals employing different analytical tools for qualitative and quantitative determination of these pollutants in real samples are also discussed. In addition, this compiled work enhanced our knowledge in learning about pathway mechanisms and the degree of their risk assessment.

1. Introduction

The heavy metals are considered to be one of the main sources of the pollutants in the environment, since they have significant toxic effect on its ecological and measurable quantities [1]. The metals having high densities, atomic weights, or atomic numbers are called heavy metals, and they are naturally present in environmental and biological samples in different composition of origins [2]. Any metallic chemical element with a relatively high density that is dangerous or poisonous at low concentrations is classified as heavy metal. Some heavy metals such as mercury (Hg), cadmium (Cd), arsenic (As), chromium (Cr), thallium (Tl), iron (Fe), copper (Cu), cobalt (Co), vanadium (V), zinc (Zn), manganese (Mn), nickel (Ni), and lead (Pb) are very essential as nutrients for biochemicals and physiologicals functioning [3–5]. Main sources for heavy metals as environmental pollutants are industrial and agriculture waste, mining, tailing, occupational exposure and paints etc [6]. On the other hand some heavy metals are highly toxic due to their extensive use and widespread distribution in the environment [7,8]. The permissible limits of heavy metals have been reported by World Health Organization (WHO) and Environmental Protection Agency (EPA) etc to set discharge levels of environmental pollutants into the atmosphere [9]. The permissible limits has been set by different organizations/agencies in the ranged of 10–250 mg/L. If the heavy metal cross their permissible limits may causes various human health problems such lungs, kidney and liver damage, heart attack and disturbing nervous system [10]. A Permissible limit set of different regulatory agencies for heavy metals are shown in Table 1.

Majorities of the authors have been reported that the heavy metals are easily absorbed onto biological samples due to the various chemical and physical phenomenons [11]. In addition, industrial and agriculture waste, mining, tailing, occupational exposure and paints waste containing large amount of heavy metal are release into the environment. Heavy metals are ubiquitous distributed non-biodegradable chemical substances that lead to a greater risk to human health by its accumulation in the human body through different ways such as air, beverages, vehicle emissions, batteries, food chain, and industrial activities in which water plays a key role [12–15]. The excess intake of heavy metals though the others human activities may cause various human health problems such as cardiovascular diseases, cancer mortality, neurological disorders [16]. These are increase the environmental concentration of

* Corresponding author.
** Corresponding author.
E-mail addresses: ramsinghkurrey@gmail.com (R. Kurrey), drsinha333@gmail.com (D. Sinha).

https://doi.org/10.1016/j.jics.2022.100545
Received 12 November 2021; Received in revised form 19 May 2022; Accepted 22 May 2022
Available online 27 May 2022

Results in Chemistry 4 (2022) 100456

Contents lists available at ScienceDirect

Results in Chemistry

journal homepage: www.sciencedirect.com/journal/results-in-chemistry

Recent advances on analytical methodologies for screening and detection of biophenols and their challenges: A brief review

Ramsingh Kurrey [a,*], Anushree Saha [a], Shubhra Sinha [a], Yogeshwari Sahu [a], Madhuri Khute [b], Bhuneshwari Sahu [a], Manas Kanti Deb [a]

[a] School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 492010 Chhattisgarh, India
[b] Govt. Nagarjuna P.G. College of Science, Raipur 492010 Chhattisgarh, India

ARTICLE INFO

Keywords:
Biophenols
Phytochemical study
Sources, analytical methodologies
Problem and challenges

ABSTRACT

Biophenols (BPs) are one of the natural phytochemical products, found majorly in fruits, cereals, vegetables and beverages. BPs has gotten a lot of press in recent years due to their abundance in nature as well as biological activities. Furthermore, they are potential targets for food and pharmaceutical industries. Many extraction techniques are presented in this paper. Among all the techniques presented in this paper, pressing and solvent extraction methods are considered as traditional techniques while supercritical fluid extraction, solid phase microextraction, microwave assisted extraction, and Enzyme assisted extraction are considered as advanced techniques. The fundamentals on analysis of BPs employing different analytical instrumental techniques for qualitative and quantitative determination in environmental samples are also discussed. Only a few specific polyphenolic chemicals have had their safety and health claims formally sanctioned, therefore recent international regulatory laws are examined. In addition to the health claims and marketing of polyphenols as a functional food, the effects of food processing on polyphenol bioavailability are investigated. A number of investigational agents or polyphenol-rich content like HQC/QC and honey, from photochemistry are being also explored for recent antiviral treatment of COVID-19 and their treatment strategies. The day-by-day advancement in the analytical methodologies for BPs detection provides the platform to find out the health favorable components. This review focuses on the various extraction techniques, structure identification of plant extracts and quantification of BPs.

Introduction

It was once said, "you are what you eat" and "let food be the medicine and medicine be the food". Although these were said years ago, but they still sustain their core meanings. It is noteworthy and widely accepted fact that a healthy diet and better health are closely related [1]. Phytochemicals refer to the plant chemicals which are non-essential nutrients which play essential defensive properties against diseases. It is believed that these chemicals are produced by the plants to protect themselves. However, according to the recent studies, these chemicals can also protect humans against diseases. Biophenols (BPs) are one of the natural phytochemical products, found majorly in fruits, cereals, vegetables and beverages. Researchers have studied many health benefits of several phenolic rich fruits and vegetables etc. Phenols are basically secondary metabolites of the plants. Secondary metabolite components generally participate in defense systems against radiation or aggression by pathogens. In food, polyphenols may possibly contribute to the flavor, color, acidity, bitterness, odor and oxidative stability [2]. BPs which are found everywhere in plant-based foods, include a gamut of molecules which contain an aromatic ring along with one or more hydroxyl groups on it [3]. Regular intake of phenolic group-based products may help in reducing the incidence of cardiovascular disease, colon cancer, liver disorders, obesity, diabetes etc. These have been discussed by many researchers [1] (see Table 1).

The advantages of BPs include their accessibility and low toxicity while low bioavailability and swift metabolism are their disadvantages [4,5]. It is an interesting fact that the number of literature citations on BP has grown logarithmically in all journals [3]. In the last few decades, compounds from natural sources have proved out to be of potential use in the pharmaceutical as well as others industries and are now being used for the design and development of new pharmacological drugs [4]. Various surveys have been done on BPs, covering many literatures over

* Corresponding author.
E-mail address: ramsinghkurrey@gmail.com (R. Kurrey).

https://doi.org/10.1016/j.rechem.2022.100456
Received 9 March 2022; Accepted 26 July 2022
Available online 29 July 2022

Colloids and Surfaces A: Physicochemical and Engineering Aspects 654 (2022) 129947

Contents lists available at ScienceDirect

Colloids and Surfaces A: Physicochemical and Engineering Aspects

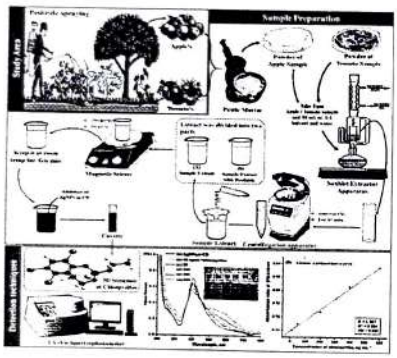
journal homepage: www.elsevier.com/locate/colsurfa

α-Cyclodextrin functionalized silver nanoparticles as colorimetric sensor for micro extraction and trace level detection of chlorpyrifos pesticide in fruits and vegetables

Bhuneshwari Sahu, Ramsingh Kurrey *, Beeta Rani Khalkho, Manas Kanti Deb *

School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 492 010, Chhattisgarh, India

GRAPHICAL ABSTRACT



ARTICLE INFO

Keywords:
Silver nanoparticles
Alpha-cyclodextrin
UV–visible spectrophotometry
Chlorpyrifos pesticide
Fruits and vegetables samples

ABSTRACT

We report a novel UV-Vis spectrophotometry combined with micro Soxhlet extraction method for the detection of CPS pesticide in fruits and vegetables based on alpha-cyclodextrin capped silver nanoparticles (AgNPs/α-CD). Recently, CPS pesticide has been used as a disinfectant in post-harvesting agriculture to prevent or inhibition of recent outbreaks (COVID-19) with pathogens contamination resulting in an increased concentration of pesticides in the environment. Therefore, we developed an AgNPs/α-CD as a chemical sensor for the detection of CPS loaded on agricultural products. The sensing mechanism for the detection of CPS pesticide is based on the change in color of the AgNPs/α-CD from yellow to red followed by the redshift of the LSPR absorption band (410/570 nm) in the UV-Vis region after the addition of the analyte into the NPs solution. The changes of color and LSPR band shifting of AgNPs are observed only in CPS pesticides due to the H-bonding and non-covalent interactions of oxygen moieties with AgNPs/α-CD. Limit of detection (LOD) and limit of quantification (LOQ) in the region of 4.0 and 13.0 ngmL^{-1} have been achieved for CPS pesticide using AgNPs/α-CD, respectively. These data establish the potential for this sensor for the use CPS pesticide analysis at trace levels.

* Corresponding authors.
E-mail addresses: ramsinghkurrey@gmail.com (R. Kurrey), debmanas@yahoo.com (M.K. Deb).

https://doi.org/10.1016/j.colsurfa.2022.129947
Received 11 June 2022; Received in revised form 4 August 2022; Accepted 11 August 2022
Available online 19 August 2022

chemistry

MDPI

Article

Cationic Polystyrene Resin Bound Silver Nanocomposites Assisted Fourier Transform Infrared Spectroscopy for Enhanced Catalytic Reduction of 4-Nitrophenol in Aqueous Medium

Anushree Saha [1], Ramsingh Kurrey [1,2], Santosh Kumar Verma [3] and Manas Kanti Deb [1,2,*]

[1] School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 492010, India
[2] National Center for Natural Resources, Pt. Ravishankar Shukla University, Raipur 492010, India
[3] State Forensic Science Laboratory, Home Department, Government of Chhattisgarh, Raipur 492001, India
* Correspondence: debmanas@yahoo.com; Tel.: +91-94255-03750

Abstract: The present work reported a novel strategy to construct supported cationic-polystyrene-resin-bound silver nanocomposites for enhanced catalytic reduction of 4-nitrophenol in an aqueous medium. The Fourier transform infrared spectroscopy (FTIR) was used as a model instrument for the study of catalytic reduction of 4-nitrophenol using cationic-polystyrene-resin-bound silver nanocomposite materials. The mechanism is based on the reduction of 4-nitrophenol to 4-aminophenol due to the electron transfer process that occurred between donor borohydride (BH_4^-) and acceptor 4-nitrophenol. The polystyrene resin provides support and surface area to increase the catalytic activity of silver nanoparticles. The diffused reflectance-Fourier transform infrared spectroscopy revealed the binding of silver particles onto the surface of cationic polystyrene resin beads. Furthermore, the catalyst was easily separated by the filtration and drying process and was able to reuse. A quantitative analysis of this work has also been performed. The linearity range, the limit of detection, and the limit of quantification obtained for the present method were 0.1×10^{-4} to 1.0 M, 0.6 M, and 2.1 M, respectively. Moreover, a good catalytic efficiency was found to be 96.8%. The advantages of the current method are its simplicity, sensitivity, rapidity, low cost, ease of preparation, and excellent catalytic efficiency to reduce 4-nitrophenol from an aqueous solution.

Keywords: nitro-aromatic compound; composite materials; CR-AgNCs; catalysis; FTIR

Citation: Saha, A.; Kurrey, R.; Verma, S.K.; Deb, M.K. Cationic Polystyrene Resin Bound Silver Nanocomposites Assisted Fourier Transform Infrared Spectroscopy for Enhanced Catalytic Reduction of 4-Nitrophenol in Aqueous Medium. *Chemistry* **2022**, *4*, 1757–1774. https://doi.org/10.3390/chemistry4040114

Academic Editors: Manoj B. Gawande and Venkata Krishnan

Received: 24 November 2022
Accepted: 13 December 2022
Published: 16 December 2022

1. Introduction

The nitro-aromatic compounds (NAC) are important primary resources for fabricating different types of industrial chemicals, dyes, insecticides, fungicides, pharmaceuticals, and volatile products. The NAC mainly includes nitrophenol and nitrobenzene constituents, which have toxic and perilous properties [1]. The exposure of nitrophenol compounds to environmental parts may cause different types of health problems. According to the US Environmental Protection Agency, nitrophenol has been considered one priority pollutant [2,3]. It causes eye irritation, nausea, headaches, tiredness, and cyanosis in humans [3,4]. Many techniques, such as degradation, adsorption, electrochemical cure, etc., have been proposed regarding its removal from aquatic resources [4,5]. On the other hand, the shortcomings of these conventional managements include high cost, strict operating conditions, slow degradation rate, and efficiency can remarkably slow down their applications on a large scale [4,5]. The nitrophenol conversion or reduction product aminophenol has an essential role in manufacturing palliatives, antipyretics, and different cosmetic products [3,6]. Therefore, the current reduction methods of hydrogenating reduction may be eye-catching for researchers in several fields because it is necessary to convert the pollutants to renewable and reliable resources.

In the past few years, nanotechnology has received enormous attention due to its several potential applications [7]. Further, recent studies of composite materials fabrication and

Carbon Trends 15 (2023) 100248

Contents lists available at ScienceDirect

Carbon Trends

journal homepage: www.elsevier.com/locate/cartre

Nitrogen and Sulphur co-doped Graphene: A Robust Material for Methylene Blue Removal

Shubhra Sinha[a], Indrapal Karbhal[a,*], Manas Kanti Deb[a,*], Anushree Saha[a], Rajiv Nayan[a], Ramsingh Kurrey[a], Shamsh Pervez[a], Kallol K. Ghosh[a], Santosh Singh Thakur[b], Manish K. Rai[a], Manmohan L. Satnami[a], Kamlesh Shrivas[a]

[a] School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur, (C.G.) 492010, India
[b] Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.) 495009, India

ARTICLE INFO

Keywords:
Graphene
Adsorption
Doping
Methylene blue and removal

ABSTRACT

N, S co-doped graphene (NSG) has been synthesized by using graphene oxide, cyanamide and sodium sulphide as a source of C, N and S respectively. Due to its excellent electronic properties and stability, NSG has been used as an adsorbent for methylene blue (MB) removal from aqueous solution. Adsorption efficiencies of Graphene, N-doped graphene, S-doped graphene and NSG were compared during the study and it was found that NSG was the most efficient material for the adsorption of MB. The study was carried out in the UV-visible region by observing the changes in absorbance. NSG has excellent properties to adsorb the MB dye with a removal efficiency of 93.76±0.2%. Additionally, desorption studies were also carried out using 0.1 M cetylpyridinium chloride as cationic surfactant and the desorption% was found to be 50.28±0.1%, signifying its reusability as an adsorbent. This indicates that NSG opens a new window for the design of heteroatom-doped carbon material as well as its application in the adsorption studies. Accordingly, the synthesized material will be employed for wastewater treatment as a reusable adsorbent of MB in the near future with high efficiency and appreciable stability. In addition, the material has several other future applications such as electrode material for supercapacitor battery, sensor, adsorbent for metal ions and biomolecules, etc.

1. Introduction

In the recent past, heteroatom (N, P, B and S) doping on graphene and its budding application opportunities have attained great attention. It is noteworthy that chemical doping helps to modify the properties of graphene and unlocks various potential features that have widespread applications like water purification, energy storage, biomarker, catalyst and many more. It is seen that in the case of undoped graphene, the antibonding (π^*) and bonding (π) orbitals (which make up its conduction and valence bands respectively) are degenerate. Furthermore, it is remarkable that supreme, undoped graphene is chemically inert in nature. This is because, its delocalized π system tightly binds and passivates its unpaired electrons, which hinder its certain properties like reactivity and absorptivity. Providentially, doping on graphene with heteroatoms can confer it with plentiful active sites. In addition, its adaptable nature allows it to be used as a part of composite materials since chemical modifications facilitate favourable adjustment of its surface properties [1–3]. The dopant atoms exert local chemical changes in the conventional structure of graphene, thereby, improving its electrical and thermal conductivities and also its charge carrier densities. These chemical treatments eventually cause various structural defects and the formation of new functional groups on graphene. Hence, doping on graphene with heteroatoms has eventually opened up new opportunities in the field of dye removal and various other fields [4–6].

However, it is worth mentioning that if pure catalysts are employed for the decomposition of such stubborn dyes, then it would require a longer reaction time and larger reactor volume to achieve an acceptable amount of adsorption. Therefore, doping can be employed as an efficient alternative approach to enhance the catalytic property of catalysts and modulate their optical and other properties [7,8]. Among various heteroatoms, nitrogen and sulphur are two of the most commonly used dopants in the case of graphene and its derived materials due the presence of active lone pair of electrons in nitrogen and sulphur [9].

Methylene blue (MB), which is also known as methylthioninium chloride, is a synthetic basic dye. It is an organic chloride salt that has 3,7-bis(dimethylamino)phenothiazine-5-ium as the counter ion (Fig. 1).

* Corresponding authors.
E-mail addresses: ikarbhal@gmail.com (I. Karbhal), debmanas@yahoo.com (M.K. Deb).

https://doi.org/10.1016/j.cartre.2023.100248
Received 11 October 2022; Received in revised form 12 December 2022; Accepted 14 January 2023

Talanta 259 (2023) 124526

Contents lists available at ScienceDirect

Talanta

journal homepage: www.elsevier.com/locate/talanta

Recognition of malathion pesticides in agricultural samples by using α-CD functionalized gold nanoparticles as a colorimetric sensor

Bhuneshwari Sahu, Ramsingh Kurrey, Manas Kanti Deb *, Beeta Rani Khalkho, Suryakant Manikpuri

School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur, CG-492010, India

ARTICLE INFO

Handling Editor: A Campiglia

Keywords:
Malathion
Colorimetric detection
Plasmonic nanoparticles
AuNPs/α-CD
Agricultural samples

ABSTRACT

Herein, a rapid, precise alpha-cyclodextrin (α-CD) based gold nanoparticles (AuNPs) for selective detection of malathion pesticides has been reported. These are organophosphorus pesticides (OPPs), that can cause a neurological disease by inhibiting the activity of acetylcholinesterase (AChE). It is important to exploit a quick and sensitive approach for monitoring OPPs. Hence in the present work, a colorimetric assay for the detection of malathion has been developed as a model of OPPs from the environmental sample matrices. The physical and chemical properties of synthesized alpha-cyclodextrin stabilized gold nanoparticles (AuNPs/α-CD) were studied with various characterization techniques, including UV–visible spectroscopy, TEM, DLS and FTIR. The designed sensing system displayed linearity in the broad range of malathion concentrations, 10–600 ng mL^{-1} with a limit of detection and the limit of quantification values 4.03 ng mL^{-1} and 12.96 ng mL^{-1}, respectively. The application of the designed chemical sensor was extended to the malathion pesticide determination in real samples such as vegetables, which resulted in almost 100% recovery rates in all the spiked samples. Thus, due to these advantages, the present study established a selective, facile and sensitive colorimetric platform for the direct detection of malathion within a very short time (5 min) with a low detection limit. The practicality of the constructed platform was further executed by the detection of the pesticide in vegetable samples.

1. Introduction

Malathion is an organophosphate pesticide (OPPs) commonly used in agriculture to control boll weevils and fruit flies. This pesticide is classified as Class III (moderately toxic) by the Environmental Protection Agency (EPA), with evidence of carcinogenicity. The maximum residue limit (MRL) for this pesticide in foods has been set at 8 mg L^{-1} by the Food and Drug Administration [1]. OPPs are widely applied to improve agricultural products due to their effectiveness against pests destroying crops [2,3]. However, the improper use of OPPs may cause various environmental pollution, such as water and soil, which further lead to food safety issues. According to the World Health Organization (WHO) reports, approximately 1.5 billion children are suffering from diarrhea as a result of taking contaminated food per year, which directly results in more than 3 million deaths [4]. The toxicity of pesticides is directly proportional to their ability to inhibit the enzymatic activity of acetylcholinesterase (AChE). AChE is an important enzyme for the nervous system and it plays a very important role in the decomposition or degradation of acetylcholine [5]. The accumulation of acetylcholine may cause the failure of organs [6]. To confirm foodstuffs' safety, maximum residue limits (MRLs) of the pesticides have also been established. In this framework, the European Commission (EC) has established a general MRL of 0.01 mg/kg for pesticides in food, and also MRL is recognized for malathion 1 mg/kg by FAO in the fruits [7]. Consequently, there is a need to develop a sensitive method for the detection of OPPs.

The conventional analytical methods for the determination of malathion like enzyme-linked immune sorbent assay (ELISA) [8], surface-enhanced Raman scattering (SERS) technique [9], gas chromatography (GC) [10], colorimetric detection method and molecular imprinting technique [11,12] that have been applied for the determination of pesticides from the environmental samples. All these analytical techniques require sample pre-treatments, and are time-consuming, complicated and expensive to implement. Currently, because of the ease of use, the ability to perform on-site analysis, and to provide naked-eye visual detection, the colorimetric method has been found as a

* Corresponding author.
E-mail address: debmanas@yahoo.com (M.K. Deb).

https://doi.org/10.1016/j.talanta.2023.124526
Received 16 December 2022; Received in revised form 30 March 2023; Accepted 3 April 2023
Available online 7 April 2023
0039-9140/

Water Air Soil Pollut (2022) 233:411
https://doi.org/10.1007/s11270-022-05863-8

BTEX in Ambient Air of India: a Scoping Review of their Concentrations, Sources, and impact

Aishwaryashri Tamrakar · Shamsh Pervez · Madhuri Verma · Dipanjali Majumdar · Yasmeen Fatima Pervez · Carla Candeias · Princy Dugga · Archi Mishra · Sushant Ranjan Verma · Manas Kanti Deb · Kamlesh Shrivas · Manmohan L. Satnami · Indrapal Karbhal

Received: 28 January 2022 / Accepted: 6 September 2022 / Published online: 7 October 2022

Abstract Toxic gaseous organic air pollutants such as benzene, toluene, ethylbenzene, and xylene isomers (m, p, and o-x) (BTEX) are considered hazardous due to its adverse impacts on human health and on climate change. This review identifies the major research questions addressed so far and the research gap in research articles, published between 2001 and 2022, focusing on the ambient BTEX concentrations in different locations in India along with its sources, ozone formation potential (OFP), and associated health risks. The ambient levels of BTEX were also compared with those of other Asian countries. A comparison of ambient BTEX levels with different microenvironments in India is also presented. BTEX concentrations were found in the range of 30.95 to 317.18 μg m^{-3} and multi-fold higher in urban environments than those measured in the rural air. In most reported studies, the order of occurrence of BTEX compounds was toluene > benzene > xylene isomers > ethylbenzene and winter had higher concentrations than in other seasons, including summer. As far as BTEX levels in classified areas of urban environments are concerned, traffic locations have shown the highest BTEX concentrations, followed by residential, commercial, and industrial locations. OFP indicated that xylene isomers and toluene contributed to ozone formation. The major gaps in reported studies on BTEX measurement are (1) source apportionment; (2) impact on lower tropospheric chemistry, human health, and climate change; and (3) removal techniques from air.

Keywords BTEX · Ozone formation potential (OFP) · Volatile organic compound (VOCs)

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11270-022-05863-8.

A. Tamrakar · S. Pervez (✉) · M. Verma · P. Dugga · A. Mishra · S. R. Verma · M. K. Deb · K. Shrivas · M. L. Satnami · I. Karbhal
School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur-492010, Chhattisgarh, India
e-mail: shamshpervez@gmail.com

D. Majumdar
CSIR-National Environmental Engineering Research Institute, EKDP, E. M. Bypass, Kolkata Zonal Laboratory, i-8, Sector CKolkata-700 107, Kolkata, India

Y. F. Pervez
Department of Chemistry, Dondi-Lohara, Government Eklavya College, Balod, Chhattisgarh, India

C. Candeias
Geosciences Department, GeoBioTec, University of Aveiro, Aveiro Santiago Campus, Aveiro, Portugal

C. Candeias
EpiUnit, Public Health Institute, University of Porto, Porto, Portugal

ACS EARTH AND SPACE CHEMISTRY

http://pubs.acs.org/journal/aesccq

Article

Atmospheric Abundance of $PM_{2.5}$ Carbonaceous Matter and Their Potential Sources at Three High-Altitude Glacier Sites over the Indian Himalayan Range

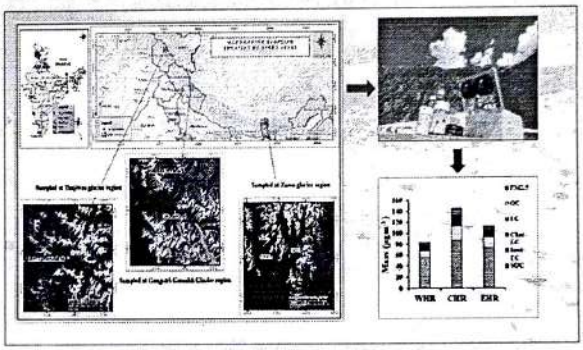
Sushant Ranjan Verma, Shamsh Pervez,* Papiya Mandal, Judith C. Chow, John G. Watson, Syed Muzaffarali Andrabi, Madhuri Verma, Princy Dugga, Noor Afshan Khan, Yasmeen Fatima Pervez, Archi Mishra, Manas Kanti Deb, Indrapal Karbhal, Suresh Tiwari, Kallol K. Ghosh, Kamlesh Shrivas, and Manmohan Lal Satnami

Cite This: https://doi.org/10.1021/acsearthspacechem.2c00216

Read Online

ACCESS | Metrics & More | Article Recommendations | Supporting Information

ABSTRACT: This study inspects the concentrations of fine particulate matter ($PM_{2.5}$) mass and carbonaceous species, including organic carbon (OC) and elemental carbon (EC), as well as their thermal fractions in the Indian Himalayan glacier region at the western Himalayan region (WHR; Thajiwas glacier, 2799 m asl), central Himalayan region (CHR; Gomukh glacier, 3415 m asl), and eastern Himalayan region (EHR; Zemu glacier, 2700 m asl) sites, throughout the summer and winter periods of 2019–2020. Ambient $PM_{2.5}$ samples were collected on quartz fiber filters using a low-volume sampler, followed by carbon (OC and EC) quantification using the IMPROVE_A thermal/optical reflectance methodology. Different seasonal variations in $PM_{2.5}$ and carbonaceous species levels were found at all three sites investigated. Averaged $PM_{2.5}$ mass ranged 55–87 $\mu g\ m^{-3}$ with a mean of 55.45 ± 16.30 $\mu g\ m^{-3}$ at WHR, 86.80 ± 35.73 $\mu g\ m^{-3}$ at CHR, and 72.61 ± 24.45 $\mu g\ m^{-3}$ at EHR. Among the eight carbon fractions, high-temperature OC4 (evolved at 580 °C in the helium atmosphere) was the most prevalent carbon fraction, followed by low-temperature OC2 (280 °C) and EC1 (580 °C at 2% oxygen and 98% helium). Char-EC representing incomplete combustion contributed to 56, 67, and 53% of total EC, whereas soot-EC contributed to 38, 26, and 43% of total EC in WHR, CHR, and EHR, respectively. The measured OC/EC ratios imply the presence of secondary organic carbon, whereas char-EC/soot-EC ratios suggested that biomass burning could be the predominant source of carbon at CHR, whereas coal combustion and vehicular emission might be dominant sources at WHR and EHR sites.



KEYWORDS: *$PM_{2.5}$, Himalayan glacier aerosol, carbonaceous matters, char-EC and soot-EC, secondary organic aerosol, biomass burning*

1. INTRODUCTION

Carbonaceous aerosols, including organic and elemental carbon, are important components of suspended particulate matter (PM), especially in the respirable fraction with aerodynamic diameters less than 2.5 $\mu m(PM_{2.5})$.[1] These carbonaceous aerosols work as climate forcing[2] agents and contribute to glacier retreat via interactions with solar radiation in the atmosphere.[3,4] The Himalayan glacier contains the most extensive glacial area outside the polar regions and is also known as the "Third pole".[5] Severe glacier retreat in the Himalayan region has the potential to disrupt water availability to billions of residents living in the Indo-Gangetic plain.[5−11] Because of lower population density and minimal industrial activities, the Himalayan region is considered to be one of the most pristine region, alongside the Arctic and Antarctic.

However, the emergence of atmospheric brown clouds (ABCs) over south Asia raised environmental concerns.[12−14] Numerous studies have suggested that long-range transport of pollutants from the Indo-Gangetic plain to the Himalayan region during premonsoon is the vital factor.[15,16] In addition, local sources from low lands of the Himalayan region also contribute to air pollution.[17] Most of studies were conducted in the foothills[18−20] rather than high altitudes of the Himalayan region.[21−23] This study measures ambient $PM_{2.5}$ and carbonaceous matter (OC and EC) over three subregions of Himalayan glacier locations to evaluate associated spatiotem-

Received: July 19, 2022
Revised: November 3, 2022
Accepted: November 3, 2022

Science of the Total Environment 857 (2023) 159516

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv

Chemical fractionation of particulate-bound metal(loid)s to evaluate their bioavailability, sources and associated cancer risk in India

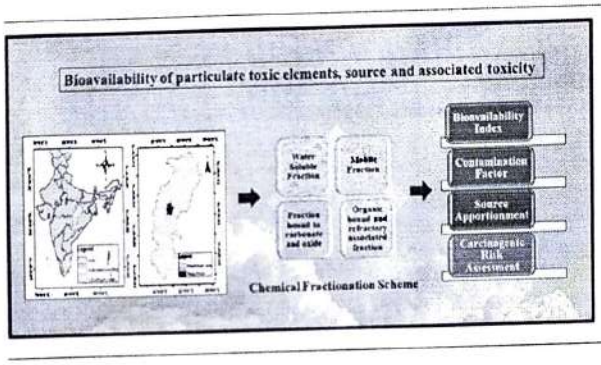
Archi Mishra [a], Shamsh Pervez [a,*], Madhuri Verma [a], Carla Candeias [b], Yasmeen Fatima Pervez [c], Princy Dugga [a], Sushant Ranjan Verma [a], Indrapal Karbhal [a], Kallol K. Ghosh [a], Manas Kanti Deb [a], Manmohan L. Satnami [a], Kamlesh Shrivas [a], Aishwaryashri Tamrakar [a]

[a] School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 492010, Chhattisgarh, India
[b] GeoBioTec Research Centre, Department of Geosciences, University of Aveiro, 3810-193 Aveiro, Portugal
[c] Government Dr. Waman Wasudev Patankar Girls PG College, Durg, Chhattisgarh, India

HIGHLIGHTS

- Chemical fractionation of 11 metal(loid)s in Indian ambient fine and coarse particulates
- $PM_{2.5}$ metal(loid)s bioavailable fractions are 2.4-fold higher than those for coarse mode.
- Mn has shown highest bioavailable fraction in both fine and coarse particulate mode.
- Source apportionment of fine and coarse particulate metal(loid)s bioavailable fractions
- Bioavailable index, contamination factors and Carcinogenic risks were estimated.

GRAPHICAL ABSTRACT



ARTICLE INFO

Editor: Philip K. Kopke

Keywords:
Chemical fractionation
Bioavailable fraction
Source apportionment
Cancer risk
Health risk index
Source markers

ABSTRACT

Eleven potentially toxic metal(loid)s (Al, As, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, and Zn), proven source markers of mineral based coal-fired industrial emissions and vehicular exhausts, were analysed using the four steps sequential extraction method to evaluate metal(loid)s concentration, in total and fractions of bioavailable and non-bioavailable for fine ($PM_{2.5}$) and coarse ($PM_{10-2.5}$) particulate modes. A total of 26-day-wise samples with three replications (total number of samples = 78) were collected in January–December 2019 for each PM_{10} and $PM_{2.5}$ at an urban-residential site in India. In both the coarse and fine particulate modes, Pb and Cr have respectively shown the highest and lowest total concentrations of the measured metal(loid)s, indicating the presence of coal-fired power plants and heavy vehicular activities near to study area. In addition, Mn has shown highest bioavailable fraction for both coarse and fine particulate modes. More than 50 % of metal(loid)s concentration, in total to a bioavailable fraction (BAF) were observed in case of As, Cd, Cr, Co, Mn, Ni, and Pb of $PM_{2.5}$. Mn and Zn have shown similar behaviour in the case of coarse particulate mode. Source apportionment of metal(loid)s bioavailable fractions using positive matrix factorization (PMF 5.0) has found three significant sources: crustal and natural dust (30.04 and 39 %), road traffic (49.57 and 20 %), and industrial emission (20.39 and 41 %) for coarse and fine particulate mode, respectively. Cancer risk through the inhalation pathway was high in total concentration but lower in BAF concentration in both age groups (children and adults).

* Corresponding author.
E-mail address: shamshpervez@gmail.com (S. Pervez).

http://dx.doi.org/10.1016/j.scitotenv.2022.159516
Received 24 June 2022; Received in revised form 13 October 2022; Accepted 13 October 2022
Available online 18 October 2022

ScienceDirect

Journal of the Indian Chemical Society
Volume 99, Issue 7, July 2022, 100483

Diazotized reagent for spectrophotometric determination of glyphosate pesticide in environmental and agricultural samples

Harshita Sharma [a], Anushree Saha [b], Arun Kumar Mishra [a], Manish Kumar Rai [b], Manas Kanti Deb [b]

Show more

https://doi.org/10.1016/j.jics.2022.100483
Get rights and content

Abstract

A new sensitive spectrophotometric method for the determination of glyphosate herbicide in environmental and agricultural samples is developed. The reaction is based on diazotization followed by coupling of glyphosate with *p*-dimethyl amino benzaldehyde. The resulted complex absorption spectra was observed at λ_{max}=420nm. The effects of other metal ions and pesticides were also tested for selective determination of glyphosate. The analytical parameters were optimized and have been successfully applied for determination of glyphosate in various environmental samples such as soil, water and vegetables. This method has a lower limit detection of 6μg of glyphosate. Beer's law is obeyed over the concentration range of 6.0μg–24.0μg glyphosate in 25mL of the final solution at 420nm. The standard deviation and relative standard deviation calculated are 0.0055 and 1.023, respectively. The molar absorptivity of the colored system is 1.91×10^{10}L $mol^{-1}cm^{-1}$ and Sandell's sensitivity is found $0.408\times10^{-5}\mu g cm^{-2}$. The proposed method is simple, sensitive, highly reproducible and time saving as compare to those complicated time consuming methods.

Graphical abstract

Kinetic Study of Solvent Effect on the Hydrolysis of Mono-3, 5-Dimethylaniline Phosphate

Shashibala Kindo[1], Manish K. Rai[1], Ramsingh Kurrey[1], Joyce Rai[2]

[1]School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur -492010, Chhattisgarh, India.

[2]Chhattisgarh Concil of Science and Technology, Raipur,492014, Chhattisgarh, India.

***Corresponding Author**: mkjkchem@gmail.com, sashikindo@gmail.com

Abstract:

The hydrolysis of phosphate esters is one of the most fundamental chemical and biochemical reaction. The kinetic solvent effect on the hydrolysis of mono-3, 5-dimethylaniline phosphate has been studied in aqueous mixtures of varying compositions (0-40% v/v) of some protic and aprotic solvents at four different temperatures. The rate of reactions increases with increasing proportion of solvents. Activation parameters (E_a, $\Delta H^{\neq}$, $\Delta G^{\neq}$, $-\Delta S^{\neq}$) have been evaluated. The significance of these parameters have been explained on the basis of solvent-solute interaction, solvent of the transition state of the medium.

Keywords: Hydrolysis, mono-3, 5-dimethylaniline phosphate, Solvent effect, Activation parameters.

Introduction

Phosphorus is an essential element for all life as the building block of many structural and functional components of living organisms[1,2]. Phosphorus has a significant role in living systems, and so the reactions of phosphate esters in solution and in enzyme are of the great importance[3]. Most of the phosphorus in living system exists in the form of phosphate. Phosphate based compounds are key ingredients in biological system[4]. They play a key role in life processes[5], in living organism for growth, development and maintenance of all plants and animals. Phosphate esters are the building blocks of life, and are involved in facilitating all cellular processes, from cellular signaling to protein synthesis[6]. Phosphate esters are widely used in variety of industries, including plastics, foams, paints, furniture building materials[7] and electronics[8]. They are used as plasticizers, as flame retardants, as stabilizer for antifoaming and additives to floor polishes, lubricants, lacquers and hydraulic fluids[9]. Most chemical reactions are carried out in solution. Solvent play an important role in determining chemical reactivity[10]. Chemical reactions can be affected by the solvent through several kinds of interactions. Studies on solvent effects are generally carried out by means of relationships between reactivity properties that is reaction rate or several types of selectivity and empirical parameters representing different kinds of solute-solvent interactions[11].The rate of an elementary chemical reaction may change by order of magnitude when the solvent is changed The role of the solvent in governing a chemical reaction is far from passive[12].Therefore a proper understanding of solvent effects is essential to any model of chemical reactivity. Solvent influence both chemical reactivity and reaction rates. The importance of solvent effects has long stimulated attempts to define solvent polarity in terms of

DOI: 10.52228/JRUB.2023-35-2-7

JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue

JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)

An International Scholarly Open Access, Peer-reviewed, Refereed Journal

SPECTROPHOTOMETRIC DETERMINATION OF TRICHLORFON INSECTICIDE AND ITS APPLICATION IN AGRICULTURAL AND ENVIRONMENTAL SAMPLES

[1]Chhaya Bhatt, [2]Anushree Saha, [3]Suryakant Manikpuri and [4]Manish Kumar Rai

[1,2,3]Research Scholar, [4]Professor

[1,2,3,4]School of Studies in Chemistry

[1,2,3,4]Pt. Ravishankar Shukla University, Raipur-492 010 Chhattisgarh, India

Abstract: A spectrophotometric method has been developed based on the modification of the Fujiwara reaction for the determination of trichlorfon at ppm level. Trichlorfon on its alkaline hydrolysis gives chloroform, which react with pyridine to produce pink color. In the present method the pink color acquired in the preceding reaction is discharged with a few drops of acetic acid, followed by the addition of p-nitro aniline reagent, which produces a yellow color dye. The absorption maxima of the yellow color dye formed is measured at 430 nm. Beer's law is obeyed in the range of 2.0-5.0 µg/10 mL of Trichlorfon. The molar absorptivity of the colored system is 4×10^{-5} L $mol^{-1}cm^{-1}$ and Sandell's sensitivity is 0.20×10^{7} µg cm^{-2}. This method is free from interference by other pollutants and can be successfully applied for the determination of trichlorfon in various environmental samples.

Index Terms - Pesticide, Trichlorfon, Detection Techniques, Environmental Samples.

I. INTRODUCTION

Pesticides are organic toxic compounds used against a wide range of pests that can enter the food chain through a variety of routes, creating health issues in both human and animals. Varieties of ailments are caused due to pesticide exposure [1]. These have been widely utilized to prevent or reduce damage caused by pests, weeds, and illnesses, so benefiting agricultural manufacturing. These are used by farmers in the agriculture industry for crop protection, pre- and post-harvesting. Pesticide use is expected to protect roughly 30% of global agricultural production. [2]. Organophosphate insecticides have significantly increased agricultural output. These are commonly employed in pre and post harvest treatments to combat fruit and vegetable diseases [3]. Because pesticides are among the most dangerous chemical industry products, there is a high demand for disposable, low-cost, and simple monitoring instruments [4].

Organophosphate pesticides have been widely used in recent decades. Apart from agricultural benefits, OPs have negative toxicological consequences on both animal and human populations [5]. Neurotoxins derived from organophosphates are amongst the most dangerous chemicals known. These chemicals have been extensively utilized in modern agriculture as pesticides and insecticides, as well as chemical warfare agents in terrorist attacks or military operations [6]. Trichlorfon [O,O-dimethyl-(2,2,2-trichloro-1-hydroxyethyl)-phosphonate] is an organophosphate insecticide that is used to combat cockroaches, crickets, silverfish, bedbugs, cattle grubs, flies, ticks, leaf-miners, and leaf-hoppers [7]. It is crucial for the non-destructive and quick detection of trichlorfon insecticide in fruits, because of the intricacy of the matrix found in vegetables, particularly spicy foods, determining tiny levels of trichlorfon is difficult. [7,8]. However, it is toxic to humans via ingestion and dermal absorption and has the potential to cause tumors, genetic mutations and to affect the reproductive system. Trichlorfon is an organophosphorus ester insecticide that is mildly toxic. Overexposure from manufacturing or use, as well as accidental or purposeful intake, can result in serious poisoning. Trichlorfon is unlikely to constitute a hazard to persons who are occupationally exposed if acceptable work practices, hygienic measures, and safety precautions are followed. Despite its severe toxicity to non-target arthropods, trichlorfon has been utilized with few or no detrimental impacts on environmental creature populations. Trichlofon has very strong dermal and inhalation effects. It is poisonous to humans and other warm-blooded animals. The oral LD50 for rats is 630 mg kg^{-1}. Organophosphate pesticide poisoning has been a major cause of concern around the world due to its severe effects on the nervous and reproductive systems of living beings [9]. For agricultural and domestic application, several organophosphorus pesticide formulations are available. Every year, our laboratory receives reports of these insecticides being misused in a number of poisoning instances, including suicide and homicide. Because of the extensive usage of these insecticides, a simple and specific method of detection is required [10]. The detection of human beneficial substances, contaminants as well as pollutants from environmental samples is very necessary and many researchers have reported their work in these regards [11-13]. Previously, a method that

Eco. Env. & Cons. 29 (January Suppl. Issue) : 2023; pp. (S12-S19)
Copyright@ EM International
ISSN 0971–765X

DOI No.: http://doi.org/10.53550/EEC.2023.v29i01s.003

Detection of Azoxystrobin in Environmental Samples using FTIR Spectroscopic Method

Ajay Kumar Sahu[1*], Bharat Lal Sahu[2*], Shobhana Ramteke[3], Yaman Kumar Sahu[1], Manoj Kumar Banjare[4], Manish Kumar Rai[1] and Joyce Rai[5]

[1]School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 492 010, Chhattisgarh, India
[2]Department of Chemistry Guru Ghasidas Central University Bilaspur CG 495 009, India
[3]Integrated Regional office, Govt of India, Ministry of Environment, Forests and Climate Change, Aranya Bhawan, Naya Raipur 492 002, CG, India
[4]MATS School of Sciences, MATS University, Pagaria Complex, Pandri, Raipur 492 004, C.G., India
[5]Chhattisgarh Council of Science and Technology, Raipur, Chhattisgarh 492 014, India

(Received 2 May, 2022; Accepted 4 July, 2022)

ABSTRACT

A new UV-Visible spectrophotometric method for determination of fungicide azoxysrtobin was developed. The method is based on the bromination of azoxystrobin to form dibromoazoxystrobin which react with Potassium iodide, Potassium iodate mixture in the presence of leucomalachite green (LMG) to form a bluish green colored complex. Characterization was done for the synthesis of bluish green colored complex by using UV-Vis spectrophotometer and FTIR methods. As a result, the UV-Visible absorption spectrum was observed at 615 nm. The limits of detection and limits of quantification were observed at 0.0019 µg ml^{-1} and 0.0059 µg ml^{-1} respectively. We have also studied the conformational and functional group (such as most characteristic band of O-H stretching frequency observed at 3346.49 cm^{-1}, Bonding N-H symmetrical is 1645.50 cm^{-1}, C=C bending is 691.07 cm^{-1}. Symmetrical stretching C-N is 1493.13 cm^{-1} and 1404.70 cm^{-1}, C-C stretching and other vibrational is 1059.74 cm^{-1}). Involved in the complexation between azoxystrobin and bromination by FTIR method. This developed method has been successfully applied for the detection of azoxystrobin in various environmental samples. Beer's law obeyed over the concentration range of 0.5-13 µg mL^{-1} in final solution volume of 10 ml. The reproducibility assessed by carrying out seven days replicate analysis of a solution containing 5 µg ml^{-1} of azoxystrobin in a final solution of 10 mL. The molar absorptivity of the colour system is 1.936×10^{6} L mol^{-1} cm^{-1} and Sandell's sensitivity is 0.800 $\times10^{-4}$ µg cm^{-2}. The relative standard deviation (RSD) for the absorbance value was found to be 1.9%. The suggested method is free from the interference of other toxicant agents. The analytical parameters were optimized and the method was applied to the determination of azoxystrobin in water, soil and food samples.

Key words : UV-Visible Spectrophotometer, FTIR, Azoxystrobin, Bromination and Leucomalachite green (LMG).

Introduction

Pesticides are the major basis with signicant role in ensuring safety from the destruction caused by many pests. At present time, the viable food production can't achieved without the vital role of pesticides. Pesticides are applied directly on the plants which are able to determine for long time in vegetables. When pesticides are use in the field, it is assessed that only about 1% of the pesticide is able to

ISSN NO : 1869-9391

SPECTROPHOTOMETRIC METHOD FOR THE DETERMINATION OF QUIZALOFOP-P-ETHYL HERBICIDE IN AGRICULTURAL SAMPLE USING CHARGE TRANSFER COMPLEX

Chhaya Bhatt[a*], Hashita sharma[b], Manish Kumar Rai[a], Joyce Rai[c],

[a]*School of Studies in Chemistry, Pt. Ravishankar Shukla University Raipur-492 010 Chhattisgarh, India*

[b]*Department of Chemistry, Government Nagarjuna Post Graduate College of Science, Raipur, 492010, Chhattisgarh, India*

[c]*Chhattisgarh Council of Science & Technology, VigyanBhavan, Vidhan Sabha Road, Raipur-492014, Chhattisgarh, India*

***Corresponding Authors**

Abstract- *In order to improve crop quality and yield storage life, a wide range of pesticides have been utilized in agriculture. However, due to the expanding population and fast urbanization, pesticide use has increased now more than ever before. The constant usage of these pesticides has led to environmental contamination and health risks for people. A simple and sensitive spectrophotometric method was developed for determination of quizalofop-p-ethyl herbicide in food samples. quizalofop-p-ethyl (QPE) is a post-emergence herbicide that effectively controls grass weeds and is often detected in the environment. However, the biochemical and molecular mechanisms of QPE degradation in the environment remains unclear. quizalofop-p-ethyl (QPE), a unitary R configuration aromatic oxyphenoxypropionic acid ester(AOPP) herbicide, was widely used and had led to detrimental environmental effects The method is based on acid hydrolysis of quizalofop-p-ethyl, quizalofop-p-ethyl get dissociated then the chlorinated part of the dissociated product was reacted with Fe (II) to form yellow color complex. Its λmax was found to be 420nm. The influences of various experimental parameters on the absorbance of the charge transfer complex of quizalofop-p-ethyl with Fe (II) are studied. The absorbance of complex was measured at 420 nm. The charge transfer complex of herbicide with Fe (II) shows molar absorptivity $1.5x10^7 Lmol^{-1}cm^{-1}$ and Sandell's sensitivity $1.0x10^{-5}$. Analytical parameters were optimized and successfully applied to the determination of quizalofop-p-ethyl in various samples. The method shows a linear range from 2-18 μg mL^{-1}. The percent recovery for determination of quizalofop-p-ethyl in commercial formulations was found to be 89.35-106.57 %. The limit of detection and quantification was found to be 0.188 μg mL^{-1} and 0.571μg mL^{-1} respectively.*

Key Words: *Pesticides, Quizalofop-p-ethyl herbicide, Vegetables, UV–Vis spectrophotometer, charge transfer complex.*

NJC

ROYAL SOCIETY OF CHEMISTRY

PAPER

Check for updates

Cite this: *New J. Chem.*, 2022, 46, 20879

Nitridation of Cr–urea complex into nanocrystalline CrN and its antiferromagnetic magnetostructural transition study†

Dadan Singh, [a] Saumya Tamrakar, [a] Kamlesh Shrivas *[b] and Khemchand Dewangan *[a]

An antiferromagnetic nanocrystalline CrN interstitial compound was prepared using $Cr(NO_3)_3{\cdot}9H_2O$ and urea as starting materials. Initially, a Cr–urea complex was obtained from the solid-state reactions between starting chemicals. Then, the resulting complex was thermally heated to partially decompose into a compound containing Cr–N/Cr–O–N bonds, followed by a nitridation process under the flow of NH_3 gas that replaced all the oxygen with nitrogen from the precursor and produced CrN nanoparticles. The powder X-ray diffraction (XRD) pattern of the nitridated product confirmed the phase-pure formation of cubic rock-salt CrN with the space group $Fm\bar{3}m$. Electron microscopy studies revealed that the CrN nanoparticles agglomerated and the average mean diameter of the nanoparticles was calculated to be 22.92 nm. The high-resolution X-ray photoelectron spectroscopy (XPS) spectra of Cr (2p) and N (1s) confirmed the existence of the (+III) oxidation state of Cr in the sample. The antiferromagnetic characteristics of the prepared agglomerated CrN nanoparticles are discussed in comparison to the literature data available of the bulk counterparts. The zero-field cooled (ZFC) and field cooled (FC) temperature-dependent magnetization studies showed that the CrN nanoparticles experience an antiferromagnetic transition at a Néel temperature of 265.44 K. At this temperature, the CrN nanocrystals undergo a magnetostructural transition, *viz.* a paramagnetic cubic lattice transforms into an antiferromagnetic orthorhombic lattice, which can be ascribed to magnetic stress arising during antiferromagnetic-ordering.

Received 29th July 2022,
Accepted 10th October 2022

DOI: 10.1039/d2nj03765c

rsc.li/njc

Introduction

The incorporation of nitrogen into the chromium metal lattice produces two stable interstitial nitrides, CrN and Cr_2N.[1,2] CrN has a face-centered cubic (fcc) crystal structure where nitrogen atoms occupy all the octahedral holes in the fcc chromium lattice. Since CrN is an intermetallic compound of chromium and nitrogen, its crystal lattice does not strictly contain the Cr^{3+} and N^{3-} ions.[3] In contrast, Cr_2N crystallizes into a hexagonal lattice corresponding to a hexagonal close-packed arrangement of chromium atoms with an arbitrary distribution of nitrogen atoms in six octahedral interstices.[3,4] Generally, Cr_2N coexists as a secondary phase in the refractory alloy, chrome steel, and surface coatings.[5–7] In the laboratory, the single-phase formation of CrN/Cr_2N depends on the synthesis route and reaction parameters like starting materials, temperature, reaction time, *etc.*

CrN is mainly known for its impressive structural, magnetic, and electronic properties, including hardness and good resistance to wear and coating.[8–13] Also, its high-temperature melting and refractory nature make it a potential candidate for energy-harvesting[14,15] and medicine to design novel medical devices.[16] Thus, in recent years, manipulating the shape and size of CrN at the nanoscale has attracted considerable attention for the advancement of its physicochemical properties for numerous potential applications. For example, mesoporous CrN was employed as a Pt catalyst support for methanol electrooxidation. Interestingly, this Pt/CrN catalyst exhibits high catalytic conversion and tolerance toward corrosion in a high potential window. Hence, it could be an exciting supporting material to substitute carbon black, which is generally known to corrode under a high potential.[17] In another report, CrN nanoparticles embedded in graphitic carbon capsules were used as a Pt-free electrocatalyst in a similar oxygen reduction reaction.[18] Recently, the electrocatalytic efficiency of nanostructured CrN has also been investigated for the nitrogen

[a] *Department of Chemistry, Indira Gandhi National Tribal University, Amarkantak 484887, MP, India. E-mail: khemchand.dewangan@igntu.ac.in*

[b] *School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 492010, CG, India. E-mail: kshrivas@gmail.com*

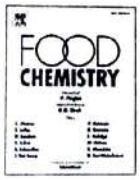
† Electronic supplementary information (ESI) available: Fig. S1–S7 and Table S1. See DOI: https://doi.org/10.1039/d2nj03765c

Food Chemistry 383 (2022) 132449

Contents lists available at ScienceDirect

Food Chemistry

journal homepage: www.elsevier.com/locate/foodchem



Smartphone-integrated printed-paper sensor designed for on-site determination of dimethoate pesticide in food samples

Sanyukta Patel [a], Kamlesh Shrivas [b,*], Deepak Sinha [a,*], Monisha [b], Tarun Kumar Patle [b], Sanjay Yadav [b], Santosh Singh Thakur [c], Manas Kanti Deb [b], Shamsh Pervez [b]

[a] Department of Chemistry, Government Nagarjuna Post Graduate College of Science, Raipur, CG 492010, India
[b] School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 492010, CG, India
[c] Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Koni Bilaspur 495009, Chhattisgarh, India

ARTICLE INFO

Keywords:
Cu@Ag NPs
Smartphone
Paper sensor
Colorimetry
Dimethoate
Foods

ABSTRACT

Herein, a user-friendly and portable smartphone-integrated printed-paper sensor was designed with Cu@Ag nanoparticles (NPs) for on-site monitoring of dimethoate pesticide in food samples, and the results obtained are compared with those obtained by UV–vis spectrophotometry. The working principle for identification of dimethoate pesticide is the change of yellow color NPs to reddish-yellow with associated bathochromic shift of absorption peak when pesticide introduced onto the fabricated paper or glass vial containing the NPs. A smartphone-color detector App and colorimetry were used for quantitative analysis of dimethoate in food samples. Linearity range for analysis of dimethoate using paper sensor and colorimetry were 100–2000 μgL^{-1} and 50–2500 μgL^{-1} with detection limit of 30 and 16 μgL^{-1}, respectively. The advantages of using smartphone-integrated paper devices are rapid, instrument-free detection and economic in terms of consumption of lower amounts of NPs solution compared to other NPs-based colorimetric methods.

1. Introduction

Pesticides are extensively used in agriculture that increase the yield of the crop as required to meet the needs of the world population. Pesticides are exploited in agricultural land to prevent the growth of bacteria, fungi, weeds, nematodes, rodents, etc. Among different pesticides, organophosphorus pesticides (OPPs) are being globally used because of high insecticidal activity and low diligence (Pan, Sun, Li, Zhan, Xu, & Zhu, 2018; Kim et al., 2017). Dimethoate is one of the important phosphorus based OPPs employed to destroy the growth of the insects on leaves, flowers, fruits, vegetables, etc. The intake of this pesticide through food, water and air results in harmful consequences on human health. The acceptable value for daily intake of dimethoate is 0.002 mg kg^{-1} body weight day^{-1} (FAO/WHO, 1994). The residues of dimethoate in food possess severe health problems such as depression, anxiety, irritability as well as its high exposure can lead to anemia and cancer (Hung, Lee, Hu, & Chiu, 2018; Liu et al., 2013). Hence, the analysis of dimethoate in food and water is a very key issue to avoid the exposure of toxicants that influence human health and other environmental systems.

Gas chromatography (GC) (Ramadan, Lahmek, Jlelati, & Mandil, 2013), high performance liquid chromatography-mass spectrometry (HPLC-MS) (Montesano, Olsson, Kuklenyik, Needham, Bradman, & Barr, 2007), fluorescence spectrometry (Hung et al., 2018; Hsu et al., 2017), gas chromatography-mass spectrometry (GC–MS) (Xiong, Zhang, Zhang, Zhang, Chen, & Zhang, 2012), capillary electrophoresis-mass spectrometry (CE-MS) (Yang, Xu, Shen, Wang, Xu, Chen, & Fu, 2009), and colorimetry (Mitic, Zivanovic, Miletic, Grahovac, & Pecev, 2012; Das et al., 1994) are commonly employed for separation and identification of pesticides in food and other environmental samples. Although these techniques are sophisticated, sensitive and accurate for the determination of dimethoate at low levels though they require more maintenance cost. Moreover, these instruments are difficult to apply at on-site analysis. On the contrary, colorimetry is a facile, rapid and cost-effective method for the analysis of dimethoate. The main limitation of colorimetric assays is making use of chromophoric organic compounds or dyes which are hazardous in nature as well occasionally not found specific to a particular chemical substance in a variety of samples (Mitic et al., 2012; Das et al., 1994). Therefore, another apparent method is needed which should be exempted from the use of chromophoric reagents or dyes.

* Corresponding authors.
E-mail addresses: kshrivas@gmail.com (K. Shrivas), drsinha333@gmail.com (D. Sinha).

https://doi.org/10.1016/j.foodchem.2022.132449
Received 14 October 2021; Received in revised form 8 February 2022; Accepted 10 February 2022
Available online 14 February 2022

Current Nanoscience, 2022, 18, 465-477

REVIEW ARTICLE

Application of Silver Nanoparticles as a New Alternative Antiviral Agent for SARS-CoV-2: A Review

Reena Jamunkar[1], Kamlesh Shrivas[2,*], Deepak Sinha[1,*], Sanyukta Patel[1], Monisha[2], Alka Patle[1], Antresh Kumar[3] and Subhash Banerjee[4,*]

[1]*Department of Chemistry, Government Nagarjuna Post Graduate College of Science, Raipur, CG 492010, India;* [2]*School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur, CG 492010, India;* [3]*Department of Biochemistry, Central University of Haryana, Jant-Pali Mahndergarh-123031, HR, India;* [4]*Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur, CG, 495009, India*

Abstract: ***Background:*** Today, SARS-CoV-2 (COVID-19), a viral disease caused by the novel coronavirus (a tiny crowned virus), has become one of the threats for human beings all over the world and caused the death of millions of people worldwide. Many vaccines have been developed and administered to people in several countries; however, due to their propensity to create new strains, it appears that curing all corona strains will be challenging. So, it is necessary to identify the structure of the virus, mechanism of action, and its antiviral activities against drugs and other functional materials.

Methods: AgNPs have unique physicochemical and antimicrobial properties. This review describes the structure and nature of the virus and the mechanism of action of an antiviral drug such as silver nanoparticles (AgNPs) with the virus. In addition, different methods for synthesis of AgNPs, application of AgNPs as an antiviral agent against influenza virus, human immuno deficiency virus (HIV), herpes simplex virus type 1 (HSV-1), hepatitis B virus (HBV), polio virus, respiratory syncytial virus (RSV), are discussed. Also, the most probable applications and properties of AgNPs that can help prepare it as an antiviral agent are discussed.

Results: The use of AgNPs against various viruses, including the coronavirus family, is found to be effective; therefore, it can be considered for the development of antiviral agents, disinfectants, antiviral coated mask, and their therapeutic use against the treatment of novel coronavirus with minimum side effect and great efficiency.

Conclusion: AgNPs were successfully used for the treatment of various viral diseases of the coronavirus family such as H1N1, H3N2, influenza, even for SARS and MERS coronaviruses. AgNPs coated masks, disinfectants, fabrics, wipes, and inhalation systems are effective for the inhibition of SARS-CoV-2 infection. Since sanitizers have a temporary effect, the development of some other potential alternatives having low toxicity, ease of use, long lasting efficiency, health cautiousness, minimum side effect, sustainable fabrics is required.

ARTICLE HISTORY

Received: April 27, 2021
Revised: June 09, 2021
Accepted: August 20, 2021

DOI:
10.2174/1573413717666211118105415

Keywords: AgNPs, antiviral agent, SARS-CoV-2, green synthesis, H1N1, H3N2.

1. INTRODUCTION

Nanoparticles (NPs) can be defined as particles having a size in the range of 1-100 nm [1]. The particle size and size distribution are considered the most important characteristics accountable for their physical, chemical, and biological activities to determine the biological fate, targeting ability, and toxic nature of NPs [2]. Manipulation of shape and size of NPs in nanotechnology offers tremendous applications in drug delivery, treatment, and diagnosis of varieties of diseases [3]. NPs less than 10 nm in size can easily pass the blood vessels to enter the blood stream and clear out from the kidney. In contrast, larger particles (>10 nm) get entrapped inside the cell, which are later captured by the phagocyte system. As a result, nanoparticles have promising applications in a diverse area of science. In spite of the remarkable advantages of nanoparticles, there are some limitations encompassing their large surface area and small size, leading to cause aggregation of NPs that make physical handling more difficult both in dry and liquid forms [4]. Coronavirus disease (COVID-19) is an infectious pandemic disease caused by SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), which became very difficult to control as it has spread all over the globe with significantly higher morbidity

*Address correspondence to these authors at the Department of Chemistry, Government Nagarjuna Post Graduate College of Science, Raipur, CG 492010, India; School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur, CG 492010, India; Department of Chemistry, Guru Ghasidas Vishwavidyalaya, Koni, Bilaspur, CG 495009, India
E-mails: drsinha333@gmail.com (Deepak Sinha); kshrivas@gmail.com (Kamlesh Shrivas); ocsb2006@gmail.com (Subhash Banerjee)

1875-6786/22 $65.00+.00

Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 299 (2023) 122824

Contents lists available at ScienceDirect

Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy

journal homepage: www.journals.elsevier.com/spectrochimica-acta-part-a-molecular-and-biomolecular-spectroscopy

A portable smartphone-assisted digital image fluorimetry for analysis of methiocarb pesticide in vegetables: Nitrogen-doped carbon quantum dots as a sensing probe

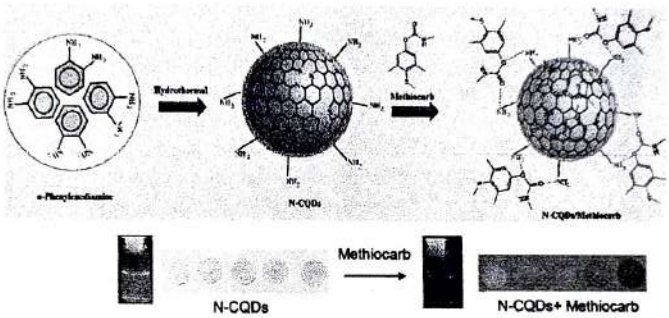
Sanyukta Patel [a], Kamlesh Shrivas [b,*], Deepak Sinha [a,*], Indrapal Karbhal [b], Tarun Kumar Patle [c], Monisha [b], Tikeshwari [b]

[a] Department of Chemistry, Government Nagarjuna Post Graduate College of Science, Raipur, CG 492010, India
[b] School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 492010, CG, India
[c] Department of Chemistry, Pt. Sundarlal Sharma Open University, Bilaspur 495009, Chhattisgarh, India

HIGHLIGHTS

- Nitrogen-doped carbon quantum dot (N-CQDs) designed for detection of methiocarb.
- Fluorescent-paper sensor with smartphone is exploited for analysis of methiocarb.
- Detection of methiocarb is based on quenching of fluorescence intensity of N-CQDs.
- Fluorescent-paper sensor is instrument free, portable, user-friendly and rapid.

GRAPHICAL ABSTRACT



ARTICLE INFO

Keywords:
Nitrogen-doped carbon quantum dot
Sensing probe
Paper sensor
Fluorimetry
Methiocarb
Vegetables

ABSTRACT

The increasing use of pesticides in the agriculture fields strengthen the crop production to meet the needs of increasing population. The residues in water and food materials cause several health hazards. Herein, nitrogen-doped carbon quantum dot (N-CQDs) is designed for determination of methiocarb pesticide in vegetables by fluorescent paper sensor and compared the results with fluorimetry. The fluorescent paper-based detection is performed by recording the change in fluorescence of N-CQDs with introduction of methiocarb using smartphone and ImageJ software. Good linear range was acquired for analysis of methiocarb from 10 to 1000 μgL^{-1} with a low detection limit (LOD) of 3.5 μgL^{-1} in fluorimetry; and 700–10,000 μgL^{-1} with a LOD of 500 μgL^{-1} in fluorescent paper sensor. A better recovery from 92.0 to 95.4% illustrating the selectivity of both methods for analysis of methiocarb in vegetables. Thus, the advantage of using N-CQDs as a fluorescent sensor for analysis of methiocarb in vegetables is instrument free, portable and user-friendly.

* Corresponding authors.
E-mail addresses: kshrivas@gmail.com (K. Shrivas), drsinha333@gmail.com (D. Sinha).

https://doi.org/10.1016/j.saa.2023.122824
Received 17 February 2023; Received in revised form 21 April 2023; Accepted 3 May 2023
Available online 9 May 2023

RSC Advances

PAPER

Cite this: RSC Adv., 2023, 13, 17179

Inkjet-printed flexible graphene paper electrode for the electrochemical determination of mercury†

Tushar Kant, [a] Kamlesh Shrivas, *[a] Tikeshwari[a] and Vellaichamy Ganesan [b]

Received 26th April 2023
Accepted 26th May 2023

DOI: 10.1039/d3ra02757k

rsc.li/rsc-advances

Here, we report an inkjet-printed graphene paper electrode (IP-GPE) for the electrochemical analysis of mercuric ions (Hg(II)) in industrial wastewater samples. Graphene (Gr) fabricated on a paper substrate was prepared by a facile solution-phase exfoliation method in which ethyl cellulose (EC) behaves as a stabilizing agent. Scanning electron microscopy (SEM) and transmission electron microscopy (TEM) were utilized to determine the shape and multiple layers of Gr. The crystalline structure and ordered lattice carbon of Gr were confirmed by X-ray diffraction (XRD) and Raman spectroscopy. The nano-ink of Gr-EC was fabricated on the paper substance *via* an inkjet printer (HP-1112) and IP-GPE was exploited as a working electrode in linear sweep voltammetry (LSV) and cyclic voltammetry (CV) for the electrochemical detection of Hg(II). The electrochemical detection is found to be diffusion-controlled illustrated by obtaining a correlation coefficient of 0.95 in CV. The present method exhibits a better linear range of 2–100 μM with a limit of detection (LOD) of 0.862 μM for the determination of Hg(II). The application of IP-GPE in electrochemical analysis shows a user-friendly, facile, and economical method for the quantitative determination of Hg(II) in municipal wastewater samples.

Introduction

Mercury (Hg) is a harmful metal pollutant that exists as Hg(II), methyl mercury (CH_3Hg), and dimethyl mercury ($(CH_3)_2$ Hg) in nature.[1] Hg is exploited in the production of cathode tubes, batteries, mercury vapor lamps, pesticides, *etc.* It is released from coal-burning industries into the ecological system.[1,2] The waste released from these industries containing Hg contaminates natural freshwater reservoirs. The entry of this toxic metal into the human body causes severe health problems including the failure of vital organs, and damage to the functions of nucleic acids and the immune system, while exposure to higher concentrations results in death.[3–5] Thus, the analysis of Hg in wastewater samples is essential to prevent contamination of clean water bodies.

There are several techniques, such as cold vapor-atomic fluorescence spectrometry (CV-AFS),[6] ICP-mass spectrometry (ICP-MS),[7] CV atomic absorption spectrometry (CV-AAS)[8] and inductively coupled plasma-atomic emission spectrometry (ICP-AES),[8] *etc.* have been available for analysis of Hg from environmental samples. Even though these techniques are highly sensitive they need expensive consumables and trained personnel for operating these sophisticated instruments. In addition, the size of these instruments is comparatively larger in size and thus it is difficult to operate at the sample source.[6–8] Thus, it is urged to develop an alternative method that should be cost-effective and portable for the determination of Hg from water samples.

Recently, nanomaterials (NMs) are exploited as sensing probes in colorimetric,[9] fluorometric,[10] electro-chemiluminescent,[11] and electrochemical[12,13] methods for analyzing Hg(II) in various samples. Amongst all these techniques, electrochemical approaches are recognized as user-friendly, inexpensive, simple, and applied at the sample source.[12] Most of the methods utilized metal NMs like platinum (Pt), gold (Au), silver (Ag), and carbon-based nanostructures.[13,14] For the preparation of NMs, expensive metallic salts such as $AgNO_3$, $HAuCl_4$, and hazardous reducing agents (such as hydrazine monohydrate, $NaBH_4$, *etc.*) are used.[14] To address this problem, carbon-based NMs such as graphene (Gr) can be an alternative material for making efficient and cost-effective electrochemical devices. Gr-based conductive nano-ink has attracted considerable attention in the electrochemical field as it shows a lowering of manufacturing cost, better stability, and better conductivity. In addition, Gr exhibits good mechanical strength and chemical stability for the fabrication of electrochemical devices.[12,15] Zhang *et al.* demonstrated a Gr-based electrochemical device for the selective study of Hg(II). Here, the glassy carbon electrode (GCE) modified with Gr and DNA was applied for sensing Hg(II) in drinking water by differential pulse voltammetry (DPV).[16] Motlagh *et al.* illustrated the modification of GCE with Gr and methacrylic acid polymer and exploited it for the measurement

[a]School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur-492010, C.G., India. E-mail: kshrivas@gmail.com

[b]Department of Chemistry, Institute of Science, Banaras Hindu University, Varanasi-221005, UP, India

† Electronic supplementary information (ESI) available. See DOI: https://doi.org/10.1039/d3ra02757k

Microchemical Journal 182 (2022) 107867

Contents lists available at ScienceDirect

Microchemical Journal

journal homepage: www.elsevier.com/locate/microc

N-doped, silver, and cerium co-doped carbon quantum dots based sensor for detection of Hg^{2+} and captopril

Lakshita Dewangan [a], Yogyata Chawre [a], Jyoti Korram [a], Indrapal Karbhal [a], Rekha Nagwanshi [b], Vishal Jain [c], Manmohan L. Satnami [a,*]

[a] School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur (C. G.) 492010, India
[b] Department of Chemistry, Govt. Madhav Science P. G. College, Ujjain (M.P.) 456010, India
[c] University Institute of Pharmacy, Pt. Ravishankar Shukla University, Raipur (C. G.) 492010, India

ARTICLE INFO

Keywords:
N-CQDs
N/Ag-CQDs
N/Ce-CQDs
Fluorescence quenching
Fluorescence recovery

ABSTRACT

A stable carbon quantum dots doped with nitrogen (*N*-CQDs), co-doped with silver (N/Ag-CQDs), and co-doped with cerium N/Ce-CQDs were synthesized using hydrothermal method. As-synthesized N/Ag-CQDs and N/Ce-CQDs showed high quantum yield compared to *N*-CQDs. These carbon quantum dots were used as a probe for the detection of mercury and captopril. The fluorescence quenching (turn-off) of *N*-CQDs, N/Ag-CQDs and N/Ce-CQDs was occured with the addition of Hg^{2+} ion. On the other hand, captopril showed fluorescence recovery (turn-on) of *N*-CQDs, N/Ag-CQDs and N/Ce-CQDs which are quenched by Hg^{2+} ion. The fluorescence recovery of CQDs is due to the high affinity of thiol group of captopril towards Hg^{2+} ion to form Hg-S bonds. On the basis of fluorescence quenching (turn-off), Hg^{2+} was determined with low limit of detection of 1.43 nM, 0.93 nM and 1.38 nM using *N*-CQDs, N/Ag-CQDs and N/Ce-CQDs, respectively as fluorescence nanoprobes. The fluorescence turn-on of the CQDs has been applied for the detection of captopril with low limit of detection of 1.65 μM, 0.46 μM and 1.22 μM using *N*-CQDs, N/Ag-CQDs, and N/Ce-CQDs respectively. The developed sensing probe showed good sensitivity and high fluorescence efficiencies.

1. Introduction

In recent years, carbon quantum dots (CQDs) luminescence efficiency was evaluated in a useful way like heteroatom doping [1–3]. Compared with undoped CQDs, non-metallic atom like nitrogen doping on CQDs decreases some surface defects, increases their optical properties and quantum yields. CQDs doped with non-metallic atom (N) in combination with either co-doping with metal (Ag^{+}) and rare earth element (Ce^{3+}) could provide very bright fluorescence with good surface passivation, resistance to photobleaching and ultra-high photoluminescence quantum yields because of excitation energy traps [4–7]. The photoluminescence mechanism of heteroatom CQDs or co-doped CQDs depends on energy traps and conjugated electronic structure. The co-dopant silver (Ag^{+}) is used as biocompatible element with nitrogen passivated surface of CQDs, which enables the participation of lone pair electron of nitrogen for effectively enhancement of quantum yields [6,8–9]. On the other hand silver act as a strong lewis acid which has high affinity for nitrogen donor atom, that could result in formation of a stable complex between Ag-N by electron transfer mechanism and the outcome was successfully synthesized N/Ag-CQDs. In the N/Ce-CQDs, carboxyl group of CQDs can coordinate with Ce^{3+} in the interstitial state and provide more electrons for the CQDs. Cerium shows high stability in Ce^{3+} state, which protects the 4f energy level from the crystalline field and external chemical environment, and is used as an antioxidant for biomedical applications [10–14]. The applications of single heteroatom doped and co-doped CQDs have been reported for detection of drugs like daunorubicin [15], methimazole [16], gemcitabine [17], levodopa [18], cisplatin [19], and heavy metal ions like iron [20], arsenic [21], mercury [22], lead [23], organic pollutants [24], peroxides [25] and copper [26].

Mercury (Hg^{2+}) is a toxic heavy metal pollutant and has become a serious problem worldwide because of its endanger impact on human health [27]. For the sake of human health, it causes serious damage to kidney, brain, endocrine system and central nervous system even at very low concentration. [28–29] Numerous analytical techniques such as colorimetric [30], fluorometric [31], electrochemical [32] and surface

* Corresponding author.
E-mail address: manmohanchem@gmail.com (M.L. Satnami).

https://doi.org/10.1016/j.microc.2022.107867
Received 25 June 2022; Received in revised form 29 July 2022; Accepted 1 August 2022
Available online 8 August 2022

ACS APPLIED NANO MATERIALS

www.acsanm.org

Article

Förster Resonance Energy Transfer between Multicolor Emissive N-Doped Carbon Quantum Dots and Gold Nanorods for the Detection of H_2O_2, Glucose, Glutathione, and Acetylcholinesterase

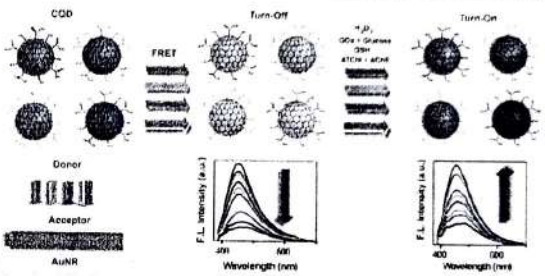
Yogyata Chawre, Manmohan L. Satnami,* Ankita B. Kujur, Kallol K. Ghosh, Rekha Nagwanshi, Indrapal Karbhal, Shamsh Pervez, and Manas K. Deb

Cite This: ACS Appl. Nano Mater. 2023, 6, 8046−8058

Read Online

ACCESS | Metrics & More | Article Recommendations | Supporting Information

ABSTRACT: Multicolor emissive nitrogen-doped carbon quantum dots (CQDs) were synthesized by the hydrothermal method and characterized using spectroscopic and electron microscopic techniques. Förster resonance energy transfer (FRET) between CQDs and gold nanorods (AuNRs) has been investigated that occurs due to the distinctive overlap of transverse and longitudinal bands of AuNRs with the fluorescence (FL) spectra of CQDs. Significant FL quenching (turn-off) of CQDs by AuNRs and their recovery (turn-on) have been observed due to etching of AuNRs and end-to-end assemblies that lead to the detection of biomolecules like H_2O_2, glucose, glutathione (GSH), and acetylcholinesterase (AChE). The redox reaction of Au(0) with H_2O_2 results in the decomposition of AuNRs to give Au(I) ions, thereby inducing the fluorescence recovery of CQDs (turn-on). The interruption of the FRET phenomenon by the production of H_2O_2 from the reaction of glucose oxidase in the presence of glucose and a thiol-containing compound from the reaction of acetylthiocholine and the AChE enzyme causes the FL recovery of CQDs, respectively. Moreover, the assembly of AuNRs leads to the FRET disruption, and FL turn-on signals were found to be measures of GSH. In comparison to the UV−visible approach, the FL measurements through the FRET process are found to be more sensitive under the same reaction conditions. The practical applicability of the proposed sensing system has been verified using human plasma samples.



KEYWORDS: *multicolor emissive carbon quantum dots, fluorescence resonance energy transfer, gold nanorods, hydrogen peroxide, glucose, glutathione, acetylcholinesterase, sensing*

1. INTRODUCTION

Carbon quantum dots (CQDs) have attracted immense attention worldwide due to their spellbinding photoluminescence (PL) and electrochemical properties.[1−5] They have been used in a variety of applications ranging from optoelectronic devices to biomedical fields like bioimaging and biomolecule sensing.[2−4] Doping of CQDs primarily with nitrogen has demonstrated to be effective in enhancing their emission properties, quantum yields (QYs), and stabilizing excitons due to surface passivation.[5] CQDs appear to be a rising star in the field of luminescence material because of their unique optical and electronic behavior, photostability, environment friendliness, low toxicity, and high chemical stability and are found to be an alternative potential material against semiconductor quantum dots and organic dyes.[6−8] To improve the PL efficiency, different strategies and raw materials have been used to synthesize CQDs with high QYs.[9,10] However, there are certain areas that require in-depth findings such as uncertainty about PL mechanisms and the limiting application of blue-emitting CQDs in the biological field. For an in-depth investigation of the PL mechanism, synthesis, characterization, and PL behavior of multicolor emissive CQDs are imperious.[11,12] Consequently, the synthesis of mild, facile, novel multicolor CQDs with a good QY, a tunable optical band, and a large molar extinction coefficient remains highly desirable. The PL spectra are shifted to a slightly longer wavelength as a function of size and materials. Tuned CQD color and PL can be achieved by controlling the temperature and time during their synthesis process.[13]

The most fascinating properties of CQDs are the PL emission due to the surface state and core-related emission.

Received: April 5, 2023
Accepted: April 18, 2023
Published: April 27, 2023

ACS APPLIED BIO MATERIALS

www.acsabm.org

Article

β-Cyclodextrin Stabilized Nanoceria for Hydrolytic Cleavage of Paraoxon in Aqueous and Cationic Micellar Media

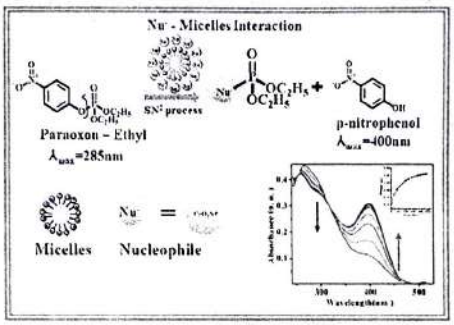
Pinki Miri, Indrapal Karbhal, Manmohan L. Satnami,* Vinod K. Jena, and Sanjay Ghosh*

Cite This: ACS Appl. Bio Mater. 2023, 6, 1488−1494

Read Online

ACCESS | Metrics & More | Article Recommendations | Supporting Information

ABSTRACT: Beta-cyclodextrin (β-CD) stabilized cerium oxide nanoparticles (β-CD@CeO_2 NPs) were synthesized through a hydrothermal route. The electronic properties, surface functional group, surface composition, size, and morphologies of the as-synthesized β-CD@CeO_2 NPs were characterized using UV−visible spectroscopy, FTIR analysis, high resolution X-ray photoelectron spectroscopy (HRXPS), high resolution transmission electron microscopy (HRTEM), and field emission scanning electron microscopy (FESEM). The pH-dependent variation of the ζ-potential of β-CD@CeO_2 NPs and the catalytic activity of the NPs for the hydrolysis of paraoxon were investigated. The observed pseudo-first-order rate constant (k_{obs}) for the hydrolysis of paraoxon is increased with increasing pH and the ζ-potential of β-CD@CeO_2 NPs. The kinetics and mechanism of hydrolysis of paraoxon in the aqueous and cationic micellar media have been discussed.



KEYWORDS: *organophosphorus pesticides, paraoxon, nanoceria, hydrolytic cleavage, pH-dependent reactions, cationic surfactant, micellar catalysis*

1. INTRODUCTION

Neurotransmission activator enzyme acetylcholinesterase (AChE), which influences the metabolism of acetylcholine (ACh), is an important regulator in the brain for the continuous function of the body.[1] Organophosphorus (OPs) compounds are the most popular nerve agents.[2,3] They inhibit AChE activity through phosphorylation. The accumulation of acetylcholine on the neuromuscular junctions and synaptic space cause cholinergic crisis and dysfunction of the muscles needed for breathing and stopping the heartbeat. Therefore, it is essential to dispose of the organophosphorus compounds safely. In agriculture, some of the notable OP pesticides such as chlorpyriphos, dichlorvos, phosmet, ethyl paraoxon, methyl parathion, and malathion are widely used for "pest" destruction.[4] Previously, different types of enzymes[5] and organic nucleophile[6] have been used for degradation of these toxic OP compounds. A metal-based nanoparticle alternative of nanozymes has contributed immensely to this field of research due to its characteristic properties such as a nano size range ~1−100 nm, specific surface properties, easy availability, and cost effectiveness as compared to the organophosphatase enzymes and organic nucleophiles.

Lanthanide series elements, especially cerium ion, which is a hard acid in nature, have a high affinity to interact with oppositively charged groups such as phosphate. In comparison to metal oxides[7] and metal−organic frameworks,[8,9] the oxide form of cerium (CeO_2) is a more attractive agent due to its applications in photocatalysis, water splitting, and catalytic conversion.[10−12] Cerium oxide (CeO_2) in the nanoscale range is applicable in many areas such as in the agriculture field for crop improvement and crop stress tolerance,[13] and in the biomedical field as a theragnostic agent for cancer treatment,[14] as a bioscaffold,[15] and for drug and gene delivery.[16] The occurrence of two ionic valencies (Ce^{3+}/Ce^{4+}) on the active sites of nanoceria is responsible for the oxygen vacancy generation on the surface, which facilitates the phosphohydrolase activity of CeO_2 NPs.[17−20] Because of their ionic valency state, they behave as radical scavengers.[21] Nanoceria exhibit pH-dependent variation of surface charges (negative, positive, or neutral) and other specific properties[22] like homogenization, dispersion, and stabilization in aqueous solutions, which help in its application as oxidase,[23] catalase,[24] biomolecule adsorbent,[25] sensors,[26,27] etc. Recent advancements in research have proven the enzyme mimetic like activity and catalytic phosphorylation activity[28] of CeO_2 NPs with several biomolecules such as DNA, RNA, nucleic acid, and peptides.[29−31]

Received: December 13, 2022
Accepted: March 13, 2023
Published: March 20, 2023

IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

Gold Nanoparticle: Fastest Tool for Onsite Monitoring of Pesticides

Anand Besekar*[1, 2], Rasleen Kaur[1], Priya Katiyar[1], Anita Bhoi[1], Lakshita Dewangan[2], Manmohan L Satnami[2] and S Keshavkant[1]

[1]School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur 492 010, Chhattisgarh, India

[2]School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 492 010, Chhattisgarh, India

Abstract

Chemical pesticides are the large heterogeneous compounds which are employed in the modern agriculture. Paraoxon belongs to the class of organophosphate pesticides which has been used extensively in the agricultural fields. The overuse of pesticides results in the harmful impact over the ecological system and human health. Paraoxon is a non-degradable pesticide but can be transformed in the environment by hydrolysis/ photolysis thereby producing severely harmful chemicals. The paraoxon is noticeably recognized to inactivate the catalytic activity of the enzyme acetylcholinesterase. Nanoparticles (NPs) of various metals are largely reported to be loaded with enormous typical properties and a good stability. In line, gold NPs (AuNPs) are one of the most stable NPs that can been prepared following various techniques in different shapes and structures. These have been displayed best applicability in various aspects owing to their simple preparation, stability, smooth functionalization and remarkable color modifications. The red color of the well-dispersed AuNPs changes into blue coloration upon aggregation. Based on this, AuNPs have been effectively utilized for the detection of many pollutants present in the environment. In the present study, a change in the color of the AuNPs from red to slight black have been observed in presence of paraoxon, and was triggered by the addition of sodium chloride. The technique evolved is quite simple and does not require any expensive chemicals or instruments. The change in color was very rapid and was observed by the bare eye. Thus, this colorimetric technique may probably be utilized for onsite monitoring of pesticides.

Graphical abstract

doi.org/10.1002/cnma.202200056

CHEMNANOMAT
Research Article

www.chemnanomat.org

Honeycomb Boron Carbon Nitride as High-Performance Anode Material for Li-Ion Batteries

Indrapal Karbhal,[a, b] Vikash Chaturvedi,[a, b] Apurva Patrike,[a, b] Poonam Yadav,[a, b] and Manjusha V. Shelke*[a, b]

Abstract: 3D Porous carbon-based materials are well known for their excellent mechanical and electrochemical properties for various energy storage applications including Li-ion Battery (LIB) anodes. However, their commercial application is limited due to their low theoretical specific capacity. Heteroatom doping in carbonaceous networks proved an efficient way to modify the surface properties, which considerably improves the Li intake capacity and Li diffusion in porous carbon materials. In this work, we have synthesized 3D honeycomb boron carbon nitride (HBCN) from boric acid, glucose, and cyanamide. Silica nanoparticles (SiO_2 NPs) are used as structure-directing agents to replicate well-organized honeycomb structures. HBCN possesses a high specific surface area (SSA) of ~597 $m^2 g^{-1}$, with a uniform porosity distribution, low charge transfer resistance, and steady Li flux. When analyzed as an anode material for LIB, HBCN demonstrated an excellent specific capacity of ~652 $mAhg^{-1}$ and 408 $mAhg^{-1}$ at an input current density of 100 mAg^{-1} and 1 Ag^{-1} respectively and an energy density of 227 $Wh\,kg^{-1}$ at 1 C rate in a full cell LIB. These results indicate that the doping of B and N hetero atoms is significantly advantageous for LIBs application.

Introduction

The rechargeable Li-ion Battery (LIB) is the most extensively used energy storage system for consumer electronics applications due to its compact size, high energy density, and sufficiently long cycle life.[1] LIBs hold the potential to replace petroleum as a primary fuel in the automotive sector and are considered the most promising energy storage system for the next-generation hybrid electric vehicles (HEVs). The increased demands of high energy density, high capacity, low weight, low cost, and longer lifespan are achieved by the vital selection of electrode materials.[2] Graphite, being the state-of-the-art anode material for LIB, still faces problems to satisfy the ever-increasing energy/power density requirements due to its limited theoretical capacity (372 $mAhg^{-1}$). Hence, to achieve high energy demands, significant efforts have been employed for the development of alternate carbon-based anode chemistries, due to their robust architectural stability and superior electrochemical behavior.[3] Properties, such as unique structural morphology, large pore volume, excellent mechanical and thermal stability, less expensive with easier availability, etc. makes these carbon materials an obvious choice for designing electrode for LIBs and several other applications.[4-8] Moreover, systematic doping of heteroatoms like Boron (B), Nitrogen (N), Phosphorous (P), Sulfur (S), and Fluorine (F) in the carbon matrix can potentially tune the surface, electronic, and diffusion properties of carbon materials to enhance the theoretical limits on specific capacity.[9-12] N doping in the carbonaceous framework has been most comprehensively studied and resulted in a significant enhancement in the electrochemical behavior of graphitic and porous carbon. N atoms generally bond with carbon atoms with three common bonding configurations named pyridinic N, pyrrolic N, and graphitic N in the carbon matrix replacing carbon.[13,14] Similarly, Boron is an equally important dopant that is known to induce the complementary electronic properties to those of Nitrogen leading to specific application purposes.[15] Combined doping of N and B is also helpful in achieving high doping efficiency in a synergetic manner.[16,17] Boron carbon nitride (BCN) is an intermediate of semi-metallic graphene and insulating boron nitride (BN). BCN has found a place in several applications such as neutron absorbers, catalysts, and energy storage devices. BCN-based porous carbon materials are frequently reported as excellent supercapacitor electrodes due to the presence of both electrophilic and nucleophilic centers.[18,19] The presence of these active centers plays a key role to enhance the specific functionalities of these materials according to desired applications. Combined effects of heteroatom doping, porous carbon architecture, excellent charge transfer and ion diffusion properties of the doped surface, and higher defect density are expected to boost the electrochemical behavior of B, N doped carbon. BCN has been synthesized in various structural forms right from zero-dimensional (0 D),[20,21] 1 D,[22-24] and 2 D[25] in various literature for a range of applications. Interestingly, 3D BCN with porous morphology and controlled carbonaceous architecture has been reported scarcely in the literature.

Although it is a great challenge to design a 3D porous morphology with a ternary B

[a] Dr. I. Karbhal, V. Chaturvedi, A. Patrike, Dr. P. Yadav, Dr. M. V. Shelke
Physical and Materials Chemistry Division
CSIR-National Chemical Laboratory,
Pune-411008, MH (India)
E-mail: mv.shelke@ncl.res.in

[b] Dr. I. Karbhal, V. Chaturvedi, A. Patrike, Dr. P. Yadav, Dr. M. V. Shelke
Academy of Scientific and Innovative Research (AcSIR),
Ghaziabad-201002, UP (India)

Supporting information for this article is available on the WWW under https://doi.org/10.1002/cnma.202200056

Carbon Trends 15 (2023) 100248

Contents lists available at ScienceDirect

Carbon Trends

journal homepage: www.elsevier.com/locate/cartre

Nitrogen and Sulphur co-doped Graphene: A Robust Material for Methylene Blue Removal

Shubhra Sinha[a], Indrapal Karbhal[a,*], Manas Kanti Deb[a,*], Anushree Saha[a], Rajiv Nayan[a], Ramsingh Kurrey[a], Shamsh Pervez[a], Kallol K. Ghosh[a], Santosh Singh Thakur[b], Manish K. Rai[a], Manmohan L. Satnami[a], Kamlesh Shrivas[a]

[a] School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur, (C.G.) 492010, India
[b] Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.) 495009, India

ARTICLE INFO

Keywords:
Graphene
Adsorption
Doping
Methylene blue and removal

ABSTRACT

N, S co-doped graphene (NSG) has been synthesized by using graphene oxide, cyanamide and sodium sulphide as a source of C, N and S respectively. Due to its excellent electronic properties and stability, NSG has been used as an adsorbent for methylene blue (MB) removal from aqueous solution. Adsorption efficiencies of Graphene, N-doped graphene, S-doped graphene and NSG were compared during the study and it was found that NSG was the most efficient material for the adsorption of MB. The study was carried out in the UV-visible region by observing the changes in absorbance. NSG has excellent properties to adsorb the MB dye with a removal efficiency of 93.76±0.2%. Additionally, desorption studies were also carried out using 0.1 M cetylpyridinium chloride as cationic surfactant and the desorption% was found to be 50.28±0.1%, signifying its reusability as an adsorbent. This indicates that NSG opens a new window for the design of heteroatom-doped carbon material as well as its application in the adsorption studies. Accordingly, the synthesized material will be employed for wastewater treatment as a reusable adsorbent of MB in the near future with high efficiency and appreciable stability. In addition, the material has several other future applications such as electrode material for supercapacitor battery, sensor, adsorbent for metal ions and biomolecules, etc.

1. Introduction

In the recent past, heteroatom (N, P, B and S) doping on graphene and its budding application opportunities have attained great attention. It is noteworthy that chemical doping helps to modify the properties of graphene and unlocks various potential features that have widespread applications like water purification, energy storage, biomarker, catalyst and many more. It is seen that in the case of undoped graphene, the antibonding (π^*) and bonding (π) orbitals (which make up its conduction and valence bands respectively) are degenerate. Furthermore, it is remarkable that supreme, undoped graphene is chemically inert in nature. This is because, its delocalized π system tightly binds and passivates its unpaired electrons, which hinder its certain properties like reactivity and absorptivity. Providentially, doping on graphene with heteroatoms can confer it with plentiful active sites. In addition, its adaptable nature allows it to be used as a part of composite materials since chemical modifications facilitate favourable adjustment of its surface properties [1–3]. The dopant atoms exert local chemical changes in the conventional structure of graphene, thereby, improving its electrical and thermal conductivities and also its charge carrier densities. These chemical treatments eventually cause various structural defects and the formation of new functional groups on graphene. Hence, doping on graphene with heteroatoms has eventually opened up new opportunities in the field of dye removal and various other fields [4–6].

However, it is worth mentioning that if pure catalysts are employed for the decomposition of such stubborn dyes, then it would require a longer reaction time and larger reactor volume to achieve an acceptable amount of adsorption. Therefore, doping can be employed as an efficient alternative approach to enhance the catalytic property of catalysts and modulate their optical and other properties [7,8]. Among various heteroatoms, nitrogen and sulphur are two of the most commonly used dopants in the case of graphene and its derived materials due the presence of active lone pair of electrons in nitrogen and sulphur [9].

Methylene blue (MB), which is also known as methylthioninium chloride, is a synthetic basic dye. It is an organic chloride salt that has 3,7-bis(dimethylamino)phenothiazine-5-ium as the counter ion (Fig. 1).

* Corresponding authors.
E-mail addresses: ikarbhal@gmail.com (I. Karbhal), debmanas@yahoo.com (M.K. Deb).

https://doi.org/10.1016/j.cartre.2023.100248
Received 11 October 2022; Received in revised form 12 December 2022; Accepted 14 January 2023

ACS APPLIED BIO MATERIALS

www.acsabm.org

Article

β-Cyclodextrin Stabilized Nanoceria for Hydrolytic Cleavage of Paraoxon in Aqueous and Cationic Micellar Media

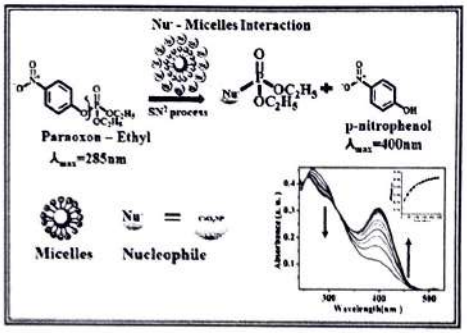
Pinki Miri, Indrapal Karbhal, Manmohan L. Satnami,* Vinod K. Jena, and Sanjay Ghosh*

Cite This: *ACS Appl. Bio Mater.* 2023, 6, 1488−1494

Read Online

ACCESS | Metrics & More | Article Recommendations | Supporting Information

ABSTRACT: Beta-cyclodextrin (β-CD) stabilized cerium oxide nanoparticles (β-CD@CeO_2 NPs) were synthesized through a hydrothermal route. The electronic properties, surface functional group, surface composition, size, and morphologies of the as-synthesized β-CD@CeO_2 NPs were characterized using UV−visible spectroscopy, FTIR analysis, high resolution X-ray photoelectron spectroscopy (HRXPS), high resolution transmission electron microscopy (HRTEM), and field emission scanning electron microscopy (FESEM). The pH-dependent variation of the ζ-potential of β-CD@CeO_2 NPs and the catalytic activity of the NPs for the hydrolysis of paraoxon were investigated. The observed pseudo-first-order rate constant (k_{obs}) for the hydrolysis of paraoxon is increased with increasing pH and the ζ-potential of β-CD@CeO_2 NPs. The kinetics and mechanism of hydrolysis of paraoxon in the aqueous and cationic micellar media have been discussed.



KEYWORDS: *organophosphorus pesticides, paraoxon, nanoceria, hydrolytic cleavage, pH-dependent reactions, cationic surfactant, micellar catalysis*

1. INTRODUCTION

Neurotransmission activator enzyme acetylcholinesterase (AChE), which influences the metabolism of acetylcholine (ACh), is an important regulator in the brain for the continuous function of the body.[1] Organophosphorus (OPs) compounds are the most popular nerve agents.[2,3] They inhibit AChE activity through phosphorylation. The accumulation of acetylcholine on the neuromuscular junctions and synaptic space cause cholinergic crisis and dysfunction of the muscles needed for breathing and stopping the heartbeat. Therefore, it is essential to dispose of the organophosphorus compounds safely. In agriculture, some of the notable OP pesticides such as chlorpyriphos, dichlorvos, phosmet, ethyl paraoxon, methyl parathion, and malathion are widely used for "pest" destruction.[4] Previously, different types of enzymes[5] and organic nucleophile[6] have been used for degradation of these toxic OP compounds. A metal-based nanoparticle alternative of nanozymes has contributed immensely to this field of research due to its characteristic properties such as a nano size range ~1−100 nm, specific surface properties, easy availability, and cost effectiveness as compared to the organophosphatase enzymes and organic nucleophiles.

Lanthanide series elements, especially cerium ion, which is a hard acid in nature, have a high affinity to interact with oppositively charged groups such as phosphate. In comparison to metal oxides[7] and metal−organic frameworks,[8,9] the oxide form of cerium (CeO_2) is a more attractive agent due to its applications in photocatalysis, water splitting, and catalytic conversion.[10−12] Cerium oxide (CeO_2) in the nanoscale range is applicable in many areas such as in the agriculture field for crop improvement and crop stress tolerance,[13] and in the biomedical field as a theragnostic agent for cancer treatment,[14] as a bioscaffold,[15] and for drug and gene delivery.[16] The occurrence of two ionic valencies (Ce^{3+}/Ce^{4+}) on the active sites of nanoceria is responsible for the oxygen vacancy generation on the surface, which facilitates the phosphohydrolase activity of CeO_2 NPs.[17−20] Because of their ionic valency state, they behave as radical scavengers.[21] Nanoceria exhibit pH-dependent variation of surface charges (negative, positive, or neutral) and other specific properties[22] like homogenization, dispersion, and stabilization in aqueous solutions, which help in its application as oxidase,[23] catalase,[24] biomolecule adsorbent,[25] sensors,[26,27] etc. Recent advancements in research have proven the enzyme mimetic like activity and catalytic phosphorylation activity[28] of CeO_2 NPs with several biomolecules such as DNA, RNA, nucleic acid, and peptides.[29−31]

Received: December 13, 2022
Accepted: March 13, 2023
Published: March 20, 2023

https://doi.org/10.1021/acsabm.2c01030
ACS Appl. Bio Mater. 2023, 6, 1488−1494

ADVANCED MATERIALS INTERFACES
www.advmatinterfaces.de

Template Directed Synthesis of Boron Carbon Nitride Nanotubes (BCN-NTs) and Their Evaluation for Energy Storage Properties

*Indrapal Karbhal, Vikash Chaturvedi, Poonam Yadav, Apurva Patrike, and Manjusha V. Shelke**

A unique approach has been applied for the synthesis of 1D boron carbon nitride nanotubes (BCN-NTs) using MnO_2 nanowires as templates. BCN-NTs have been evaluated in Na-ion batteries, Li-ion batteries, and supercapacitors as electrode material and exhibited excellent and stable electrochemical performance. BCN-NTs as an anode for Na-ion battery has been shown to be highly stable up to 3000 cycles with capacity retention of 95 mAh g^{-1}, at a high current density of 1 A g^{-1}. In the case of the Li-ion battery, these BCN-NTs show a specific capacity of 563 mAh g^{-1} at a current density of 50 mA g^{-1}. Finally, when used as an electrode for a supercapacitor, BCN-NTs display a specific capacity of 221 F g^{-1} at a current density of 3 A g^{-1} and 168 F g^{-1} even at a very high current density of 30 A g^{-1} exemplifying the excellent rate performance. The multifunctionality and stable performance of BCN-NTs among various electrochemical energy storage systems highlight the robustness of the material and make it an excellent candidate for scalable production and commercialization.

1. Introduction

A surge in demand for clean and sustainable energy storage devices has presented the need for the development of low-cost, ubiquitous, and marvellously engineered electrode materials. Carbons, metals, metal oxides, chalcogenides, and conducting polymers are some of the materials that are frequently used as an electrode for electrochemical charge storage.[1,2–4] Metal oxides and chalcogenides have very high theoretical specific capacity but they lose their capacity gradually during cycling due to their excessive volume expansion and pulverization in addition to low conductivity.[5] Alloying-type metal electrodes also face the issues of agglomeration and capacity fading with cycling.[6]

Carbon-based nanomaterials such as graphite, carbon nanotubes (CNT), Graphene, and porous carbon are widely accepted as durable electrode materials in electrochemical devices due to excellent chemical stability, good electrical conductivity, widespread availability, and electrochemical stability under harsh conditions.[7–12] They usually possess high surface area but the specific capacities of these materials are often not very high due to inherent inferior theoretical capacity values. Interestingly, heteroatom-doped carbons like Nitrogen-, Sulphur-, Fluorine-, Boron- doped carbons can have additional functionalities and invariably lift the limits on charge storage capacities.[11,13] Few-layered boron carbon nitride (BCN) nanosheets, as analogues of graphene, have shown superior Li^+ storage capacities because of the polarity of B—N bonds.[14] The high density of >B—N< and ≡C—N< groups ensures a high concentration of redox centres for reaction with Li^+ ions, thus ensuring higher charge storage capacity.[15] Additionally, dimensionality control is a very important way to engineer carbon-based materials. 1D, 2D, and 3D carbon materials possess an unusual set of properties that are required for the development of electrode materials used in different applications. Especially, 1D nanomaterials are of great interest because of their high L/D ratio (aspect ratio) and mechanical robustness which shortens the diffusion path length and provides good stress tolerance.[16]

The nanotube morphology is advantageous because Na^+/Li^+ ions can diffuse into sites either on the outer or the inner surface of hollow boron carbon nitride nanotubes (BCN-NTs). Also, Na^+/Li^+ ions can be inserted within the BCN layers of BCN-NTs.[14,17] These properties such as high conductivity, doping, and dimensionality tuning make 1D-doped CNTs one of the most interesting electrode materials for energy storage applications.

BCN has been synthesized by various methods as discussed in previous reports.[18,19,20] In brief, Shelimov and Mokovits reported the first synthesis of arrays of C/BN/C using acetylene and trichlorobenzene over an anodic alumina template via pyrolysis. BCN-NTs grown by bias-assisted hot-filament method from B_2H_6,

I. Karbhal, V. Chaturvedi, P. Yadav, A. Patrike, M. V. Shelke
Physical and Materials Chemistry Division
CSIR-National Chemical Laboratory
Pune, MH 411008, India
E-mail: mv.shelke@ncl.res.in

I. Karbhal, V. Chaturvedi, P. Yadav, A. Patrike, M. V. Shelke
Academy of Scientific and Innovative Research (AcSIR)
Ghaziabad, UP 201002, India

The ORCID identification number(s) for the author(s) of this article can be found under https://doi.org/10.1002/admi.202201560.

DOI: 10.1002/admi.202201560

An Efficient Cluster-Based Feature Selection and Classification Framework for Student Dropout Prediction

PDF

Keywords:
MOOC dropout prediction; MOOC data; KDD dataset; machine learning algorithm.

Anil Kumar Tiwari
Disha College, Raipur (CG), India.

Sanjay Kumar
S.O.S. in Computer Science and IT, Pt Ravishankar Shukla University, Raipur(CG), India.

Abstract

Massive Open Online Courses (MOOC) is an extensive way of providing online education to the students all over the world. According to statistics, this educational system has millions of students enrolled in hundreds of courses across a variety of activities. Since its inception, MOOC has faced a number of issues, one of which is known as the "student dropout prediction accuracy," which is also a significant difference between traditional teaching and MOOC. As a result of this fact, MOOC's overall performance has a negative impact on the true purpose of distance learning. In MOOCs, however, the gap between course registration and course completion is quite large. On the plus side, emerging technologies have opened up several opportunities for students to receive education online; however, due to a variety of factors, the dropout rate of online students is higher than that of traditional school students. The goal of this study is to better understand and predict the MOOC dropout rate. The multiple models and evaluation metrics generating variety of results as extracted from literature review. In this model, a hybrid cluster based feature selection model is implemented in order to optimize the class prediction. In this model, a hybrid cluster based metaheuristic model is designed and implemented on the classification problem.

Issue

Vol 21, No 1 (2022)

Section

Articles

Energy-Efficient Hybrid Routing Protocol to Extend the Network Lifetime in IoT Applications

Jyoti Sharma, Surendra Kumar Patel, V. K. Patle

PDF

Issue
Vol. 71 No. 3s (2022): Special Issue on Mathematical Computing and Engineering Artificial Intelligence

Section
Articles

Abstract

A Wireless Sensor Network (WSN) is made up of several inexpensive, low-power, compact sensor nodes that are densely placed across the monitoring area. Wireless connection creates a multi-hop wireless network system. WSN is particularly well suited for deployment in harsh environments and remote monitoring locations that are not suitable for personnel. It has significant advantages like a large coverage area and broad application prospects in the fields of military, environmental monitoring, industrial control, and urban transportation. IoT-enabled networks, however, suffer a variety of difficulties because of the enormous heterogeneous data generated by many sensing devices, including long communication delays, limited throughput, and short network lifetimes. In this study, a hybrid cluster-based routing protocol model is suggested that makes use of the advantages of both butterfly and particle swarm optimization methods. The suggested approach splits the network into many clusters and chooses the best node as the cluster leader to exacerbate the network's premature demise. The typical cluster-based routing protocols PSO and BOA are assessed using simulation results in terms of the quantity of alive nodes, throughput, and remaining energy of the nodes.

Downloads

Copyright Transfer Form

Paper Template

Important Links

Home

Aims and Scope

Paper Topics

Call for Papers

Instructions for Authors

Archive

Download

Ethics & Policies

Publication Ethics and Publication Malpractice Statement

Peer Review Policy

Plagiarism Policy

Copyright, Grants and Ownership Declaration

Refund Policy

Open Access Overview

Open Access License

Permissions

Indexed by Scopus

0.2 2021 CiteScore

1st percentile

Powered by Scopus

Google Scholar

Information

For Readers

For Authors

For Librarians

Vol.65: e22210559, 2022
https://doi.org/10.1590/1678-4324-2022210559
ISSN 1678-4324 Online Edition

Article - Engineering, Technology and Techniques

Epileptic Seizure Detection Using Deep Learning Based Long Short-Term Memory Networks and Time-Frequency Analysis: a Comparative Investigation in Machine Learning Paradigm

Sunandan Mandal[1]
https://orcid.org/0000-0001-5461-7637

Bikesh Kumar Singh[2]*
https://orcid.org/0000-0002-5052-9768

Kavita Thakur[1]
https://orcid.org/0000-0001-7570-1694

[1]Pandit Ravishankar Shukla University, School of Studies in Electronics and Photonics, Raipur, Chhattisgarh, India; [2]National Institute of Technology, Department of Biomedical Engineering, Raipur, Chhattisgarh, India.

Editor-in-Chief: Alexandre Rasi Aoki
Associate Editor: Fabio Alessandro Guerra

Received: 29-Aug-2021; Accepted: 05-Nov-2021.

*Correspondence: bsingh.bme@nitrr.ac.in; Tel.: +91-9826469522 (B. K. S.)

HIGHLIGHTS

- A hybrid approach using time frequency analysis and deep learning for risk stratification of epileptic seizure is proposed.
- An extensive comparative study of various machine learning and feature selection techniques is conducted.
- Implemented andevaluatedthedeep learning based long short-term memory networks.

Abstract: Epilepsy is a noncontagious brain abnormality, which causes electrical distraction and strains the neural system. Generally, epilepsy is treated and diagnosed through continuous examination and interpretation of the electroencephalography (EEG) signals. This is a very time-consuming and tedious job. Further, it is subjected to observational errors and observer variability. Hence, the development of an efficient automatic alarm system to recognize epileptic seizure signals is of important concern. The objectives of the present study are to investigate deep learning based long short term memory (LSTM) networks for the classification of epileptic EEG signals using time-frequency analysis. Additionally, a comparative investigation is carried out to evaluate the various state-of-the-art feature selection and classification models for automatic classification of EEG signals for Epilepsy detection. Features based on statistics, entropy, and fractal were extracted from both the time domain and frequency domain. The extracted features were supplied to LSTM networks and traditional machine learning models for epileptic EEG classification. High classification accuracy of 100% (under hold out and 10-fold protocol) and 99.80% (under 10-fold protocol) is achieved by the proposed LSTM strategy followed by the Back Propagation Artificial Neural network (BPANN) which achieves 99.6% classification accuracy when all the 150 EEG biomarkers were used as input to the classifier

Study of the Enhanced Efficiency of Crystalline Silicon Solar Cells by Optimizing Anti Reflecting Coating using PC1D Simulation

Mohnish Kumar Sahu, Naman Shukla*, Sanjay Tiwari

School of Studies in Electronics and Photonics, Pt. Ravishankar Shukla University, Raipur

***Corresponding Author:** naman.shukla43@gmail.com

Abstract:

In this paper, simulation of a mono crystalline silicon solar cell was done using PC1D software. The impact of different solar cell parameters, with their effects on power and efficiency, has been investigated. It is seen that the textured surface reduces reflection and increases the efficiency of the solar cell at least 2–3%. From the simulation, it is seen that the optimum value of p-type doping concentration 1×10^{16} cm^{-3}, n-type doping concentration 5×10^{18} cm with pyramid height of 2–3 μm and equal angles of 54.74 degrees produces the best result in simulation. An anti-reflective coating with a refractive index of 1.38 and a thickness of 84 nm is considered optimal. By optimizing the effective parameters, a solar cell with an efficiency of 24.45% was achieved through simulation. For a p-type mono crystalline silicon wafer, with an area of 10×10 cm^2 and a thickness of 200 μm, initial simulation shows a 24.45% efficient solar cell.

Keywords*:* Anti reflection coating, c-Si Solar Cell, Doping Concentration, Efficiency, PC1D.

Introduction

Anti-reflection coatings minimize the reflection of one or many wavelengths and are typically used on the surface of lenses so that small amount of light is lost. A simple coating can be designed to minimize the reflection on an interface between two materials by providing an extra material for light to interact with absorption layer. This can reduce the total reflection coefficient of the system by having light reflect from two interfaces where each interface has a smaller difference in refraction indices than the original interface. This type of coating is an anti-reflection coating, and the optimum refractive index of the coating (n_c) to minimize the total reflection coefficient is given by the geometric mean of the two materials that made up the original interface. In the case of air and glass, the optimum antireflective coating would have a refractive index of approximately 1.23. No real material has this ideal index, but magnesium fluoride (MgF_2) is often used because of its refractive index (1.38) which is close to the ideal value.

Nowadays, not only the solar cells have an anti-reflective coating, but such a coating can also be used on the glass surface (substrate) of solar modules. Anti-reflective coatings on the glass of the solar modules improve light transmission and thus increase the overall efficiency of the PV module. Another advantage is that the glare from the glass will get reduced. This allows the panels to blend in more easily with its surrounding. Also, it clears the path for installations nears airports (a panel without anti-reflective coating might blind a pilot). PC1D is commercially available software most commonly used for solar cell modeling (PVEducation, 2009). This software is currently used by many companies and universities such as the University of New South Wales, Australia. Here the PC1D version 5.9 has been used to simulate an energy efficient mono crystalline silicon solar cell. The simulation also gives insight about the range and impact

 DOI: 10.52228/JRUB.2023-35-2-1

International Journal of Advanced Educational Research
www.educationjournal.org
ISSN: 2455-6157
Received: 26-11-2022, Accepted: 12-12-2022, Published: 28-12-2022
Volume 7, Issue 2, 2022, Page No. 165-176

Assessment of industrial noise pollution in the Raipur region

Shobhana Ramteke[1], Bharat Lal Sahu[2]*

[1] School of Studies in Environmental Science, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, India
[2] Department of Chemistry, Guru Ghasidas Central University, Bilaspur, Chhattisgarh, India

Abstract
A study of noise characteristics in some selected industrial area in Raipur region has been carried out. The study involves physical measurement of the noise levels using digital sound level meter and a social survey was conducted using questionnaire. Also, those living in the vicinity of the sawmill factories are particularly at high risk of excess noise exposure. Proper regulation should be put in place by both State and Local Governments and Industries should be located in designated non-residential area. Sound Intensity Modeling is been evaluated for all the industrial area and it is found that high Intensity of noise is found in all the area with various health issues. It is concluded that a risk of excess noise exposure exists among all the workers due to the very high noise levels found in this study.

Keywords: environmental toxicity, distribution, noise pollution, public health, modelling

Introduction

Environmental noise is currently becoming one of the most dominant types of environmental pollution. The effects of noise closely correlate with quality of life especially regarding the physical and psychological health of inhabitants, social and economic costs, thus impacting the sustainable development of a country [1]. Environmental noise management, therefore, is one of the most exigent tasks for environmental pollution management. The management of noise need to be developed in a comprehensive, integrative and cross-sectorial way, and appropriate methods and approaches for the management of noise impacts need to be found to deal with them in the most effective and sustainable manner at different governance levels, including national level that takes into account not only the requirements of the unions the country is a part of but also finds tailor made approaches [2-4].

Noise pollution is recognized as a major problem for the quality of life in urban areas all over the world. Because of the increase in the number of cars and industrialization, noise pollution has also increased. Noise in cities, especially along main arteries, has reached up disturbing levels [5]. Residences far from noise sources and near silent secondary roads are currently very popular. People prefer to live in places far from noisy urban areas [6]. The unit of noise is decibel, one-tenth of a bell and denotes as d(B), however the monitoring unit is considered as dB(A) Leq denotes the time weighted average 'A' of the level of sound in decibels on scale A and it has been found related to human hearing [7-9]. Thus in, dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear [10]. The unit of frequency is hertz (Hz) and is defined as the number of compressions and rarefactions per unit time (sec.). Human hearing is sensitive to frequencies in the range of about 20-20,000 Hz (the audio frequency range) [11-20]. Sound pressure is used as the fundamental measure of sound (amplitude) as it is measurable directly by any standard instruments. The weakest sound pressure disturbance that can be detected by an "average" person at 1,000Hz has been found to be 20 μN/m2 and the largest 107 μN/m2 [21]. Because of such a wide range, the use of a linear pressure scale has been found to be non-scientific. It has been found convenient to employ sound pressure level, a quality, which is proportional to the logarithm of sound pressure. By this, the sound pressure range of interest is compressed between 0 to 130 Db [22-25].

Experimental

Study area

The Raipur city is one of most populated cities in India and it is a capital city of Chhattisgarh, state. A survey has been conducted at different Industrial locations i.e (Urla, Siltara, Birgaon, Bhanpuri, Sarona-sankara, Hirapur and Tilda) for one month i.e. at various location and an industrial corridor to assess ambient noise levels. Noise Intensity was monitored from different Industrial area such as Tilda 47 locations., Hirapur 17 locations., Bhanpuri 34 locations., Birgaon 13 locations., Urla 26 locations., Siltara 47 locations and Sarona 21 locations See. Figure 1.

Head
S.O.S. in Environmental Science
Pt. Ravishankar Shukla University
Raipur (C.G.) 492 010

International Journal of Advanced Scientific Research
www.allscientificjournal.com
ISSN: 2456-0421
Received: 25-11-2022; Accepted: 12-12-2022; Published: 27-12-2022
Volume 7, Issue 2, 2022, Page No. 85-98

Determination of carbon monoxide (CO) concentration and emission from various traffic vehicles of Raipur region

Shobhana Ramteke[1], Bharat Lal Sahu[2*]
[1] School of Studies in Environmental Science, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, India
[2] Department of Chemistry, Guru Ghasidas Central University, Bilaspur, Chhattisgarh, India

Abstract
The increase of traffic flow in cities causes traffic congestion and accidents as well as air pollution. Traffic problems have attracted the interest of many researchers from the perspective of theory and engineering. In order to provide a simple and practical method for measuring the exhaust emission and assessing the effect of pollution control, a model is based on the relationship between traffic flow and vehicle exhaust emission under a certain level of road capacity constraints. In the proposed model, the hydrocarbons (HC), carbon monoxide (CO), and nitrogen oxides (NO) are considered as the indexes of total exhaust emission, and the speed is used as an intermediate variable. To verify the rationality and practicality of the model, a case study for Beijing, China, is provided in which the effects of taxi fare regulation and the specific vehicle emission reduction policy are analyzed.

Keywords: health effects, carbon monoxide, traffic vehicles

Introduction
Carbon monoxide (CO) is a tasteless, odorless and colorless gas. It is a by-product of partial combustion of organic compounds [1]. Although general fires, charcoal stove emissions, LPG fueled portable heater emissions account for the majority of reported CO poisoning fatalities, with about one third of CO poisoning cases resulting in death stem from gasoline motor exhaust emissions [2]. These cases are often associated with malfunctioning or clogged motor vehicle exhaust systems but also, to a lesser extent, with CO induced suicide attempts. In addition, tobacco products consumption is considered a significant source of CO poisoning in humans. The negative impact of urban road traffic is mainly on-air quality [3], ecosystem, and noise level [4]. Due to the continuing increase of motor vehicles, human health and environment have been severely impacted. According to the classification of air pollutant sources in urban area, motor vehicle emission accounts for more than 80% of the air pollution in major cities [5]. The statistics of Beijing show that the level of carbon monoxide and nitrogen oxides exceeds national standard even in the city's fourth and fifth ring roads where the average speed of vehicles is high. Since the concept of sustainable development has been adopted into the theory and methods of urban transport systems planning, the coordination between transportation development and urban environment becomes the focus of the urban transportation research in the 21st century. In recent years; many scholars have studied vehicle exhaust emission for environment protection [6-10]. The lethal consequences of CO in engine exhaust is tragically illustrated by the hundreds of persons who die each year from carbon monoxide poisoning caused by a running vehicle inside a closed garage. Others die or become ill in homes with attached garages, while stranded in their car, or while driving or riding in a vehicle with a defective exhaust system [11-14]. Motor vehicle emissions standards stated that all vehicles produced after the exploit of norms have to be compliant with the regulations. At present, Bharat Stage IV (BS IV) parallel to Euro IV regulations since April 1st, 2010 is applicable for various types of vehicles; India has recognized limits on CO exposures (at idle) for motorcycles, cars and innovative emission standards for gasoline-fueled cars took effective in 1991 [15]. The automobile emissions are affected by driving pattern; overcrowding, temperature, traffic speed, vehicle's engine conditions and emissions control equipment and its maintenance [16-20]. EPA and WHO has recommended exposure of ambient air quality guideline values for CO at 9 ppm and 25 ppm as an 8 h and 1 h time-weighted avg. concentration respectively. The exhaust pollutants regulations of CO emissions from various countries is represented in India as two wheelers as 0.5gm/km, Four wheelers (Petrol engine) 1.25 gm/km, Four wheelers (Diesel engine) 1.00 gm/km, Six wheelers (Petrol engine) 2.20 gm/km and Six Wheelers (Diesel engine) 2.20 gm/km. [21-25].

Materials and Methods
Study area
The traffic vehicular, emissions generate significant amounts of particulates in ambient air of Raipur city of India, causing climate, environmental and health impacts [26]. Raipur (21°23' N, 81.63E) is a capital of

International Journal of Innovative Research in Sciences and Engineering Studies (IJIRSES)

www.ijirses.com

ISSN: 2583-1658 | Volume: 2 Issue: 6 | 2022

Hydroxychloroquine or Chloroquine as accessible weapon to fight against COVID-19 pandemic

Shobhana Ramteke[a], Bharat Lal Sahu[b]*

[a]Scientist C, Integrated Regional Office, Ministry of Environment, Forest & Climate Change, New Raipur, CG, India

[b]Assistant Professor, Deaprtment of Chemistry, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur, CG, India

Abstract: *No medications are at present affirmed for Coronavirus Disease-2019 (COVID-19), albeit some have been attempted. Taking into account late investigations and conversation on chloroquine (CQ) and hydroxychloroquine (HCQ), we intended to survey existing writing and important sites concerning these medications and COVID-19, antagonistic impacts identified with drugs, and related rules.The exact instrumental activities of CQ and HCQ against SARS-CoV-2 isn't seen, however, is likely multifactorial: Inhibition of SARS-CoV-2 viral passage by CQ utilizing impedance with the connection of the ganglioside-restricting space at the tip of the N-terminal area of the SARS-CoV-2 spike with the ACE-2 receptor and hindrance of pH-subordinate viral molecule endocytosis through the rise of endosomal pH by the powerless base CQ.In this review regarding viruses, for reasons presumably incompletely indistinguishable including alkalinization by CQ of the phagolysosome, a few investigations have demonstrated the adequacy of this atom, including against coronaviruses among which is the SARS-related coronavirus.CQ and HCQ have comparative properties and movement, yet the generally lower harmfulness profile with HCQ has driven most specialists to suggest HCQ over CQ while considering treatment of SARS-CoV-2 with one of these operators.*

Keywords: *COVID-19, chloroquine, hydroxychloroquine*

1. Introduction

The episode of COVID-19 brought about by the extreme intense respiratory disorder coronavirus 2 (SARS-CoV-2/2019-nCoV) represents a genuine danger to worldwide general wellbeing and nearby economies. According to information accessible on different sites for COVID-19 diseases around the world, the cases are expanding exponentially. Such immense quantities of tainted and dead individuals require a critical interest of compelling, accessible, and reasonable medications to control and reduce the plague. The World Health Organization (WHO) proclaimed the Coronavirus disease (COVID-19) a pandemic on March 11, 2020. Until now, there is an earnest requirement for compelling medications against SARS-CoV-2. CQ and HCQ have been appeared to repress SARS-CoV-2 in vitro, and HCQ appears to be more successful than CQ [1,2]. CQ with the formula (N4-(7-Chloro-4-quinolinyl)-N1,N1-diethyl-1,4-pentanediamine) has some time to be utilized and to treat intestinal sickness and amebiasis. Be that as it may, Plasmodium falciparum created boundless protection from it. In the previous years, because of inconsistent usage of CQ in clinical practice, its creation and market flexibly were extraordinarily decreased, in any event in China. The pandemic COVID-19 has pushed the worldwide social insurance framework to an emergency and added up to a tremendous monetary weight. Various medications for prophylaxis against COVID-19 including CQ and HCQ have been attempted. CQ is a prescription with a long history as an enemy of an intestinal sickness operator. Late intrigue was produced for the potential utilization of CQ for people with COVID-19 dependent on in vitro information that showed wide antiviral properties, including action against SARS-CoV-2. This potential has not been borne out in creature preliminaries and current clinical information is missing in regards to the treatment of COVID-19 disease with CQ. CQ and HCQ share a comparative instrument of activity; however accessible in vitro information shows that HCQ has a fundamentally more prominent intensity against SARS-CoV-2 than CQ, in light of its essentially lower powerful focus (EC50) esteem contrasted and HCQ [3-4].

Over a billion Indians as of now remain at the incline of a monstrous increment in instances of COVID-19. The Indian Council of Medical Research, (ICMR) under the Ministry of Health and Family Welfare, has suggested the chemoprophylaxis with HCQ (400 mg twice on day 1, at that point 400 mg once per week from that point) for asymptomatic human services laborers treating patients with suspected or affirmed COVID-19, and for asymptomatic family unit contacts of affirmed cases [5]. The archive expresses "its utilization in prophylaxis is gotten from accessible proof of advantage as treatment and bolstered by preclinical information". Albeit some in-vitro proof backings the antiviral action of HCQ and its antecedent CQ, there is no companion looked into a distribution that assesses either medicate for presentation prophylaxis of SARS-

SSRG International Journal of Applied Chemistry
ISSN: 2393-9133

Original Article

Distribution, Water Soluble ions, Monitoring of Indoor Particulate Matter PM_{10}, $PM_{10-2.5}$, CO and CO_2 during Burning of Dhoop Samples

Shobhana Ramteke[1], Bharat Lal Sahu[2]

[1]*School of Studies in Environmental Science, Pt. Ravishankar Shukla University, Raipur, CG, India*
[2]*Department of Chemistry, Guru Ghasidas Central University, Bilaspur, CG, India*

Received: 23 October 2022 Revised: 01 December 2022 Accepted: 13 December 2022 Published: 30 December 2022

Abstract - *Incenses, mosquitoes, dhoop, and other indoor combustion sources are frequently employed for aesthetic and religious purposes in a variety of indoor and outdoor contexts. Due to particulate matter exposure from inhaling the smoke produced by the combustion, there is a risk to one's health (PM). Monitoring of PM (PM_{10}, $PM_{2.5}$, and PM_1) levels during the preparation, lighting, and extinguishing of incense (agarbatti and dhoop) and the use of a mosquito coil in an enclosed space. The amount of carbon dioxide and carbon monoxide in the exhaust and how indoor pollution affects their health.*

Keywords - *Droop, PM_{10}, Inorganic ions, Source apportionment.*

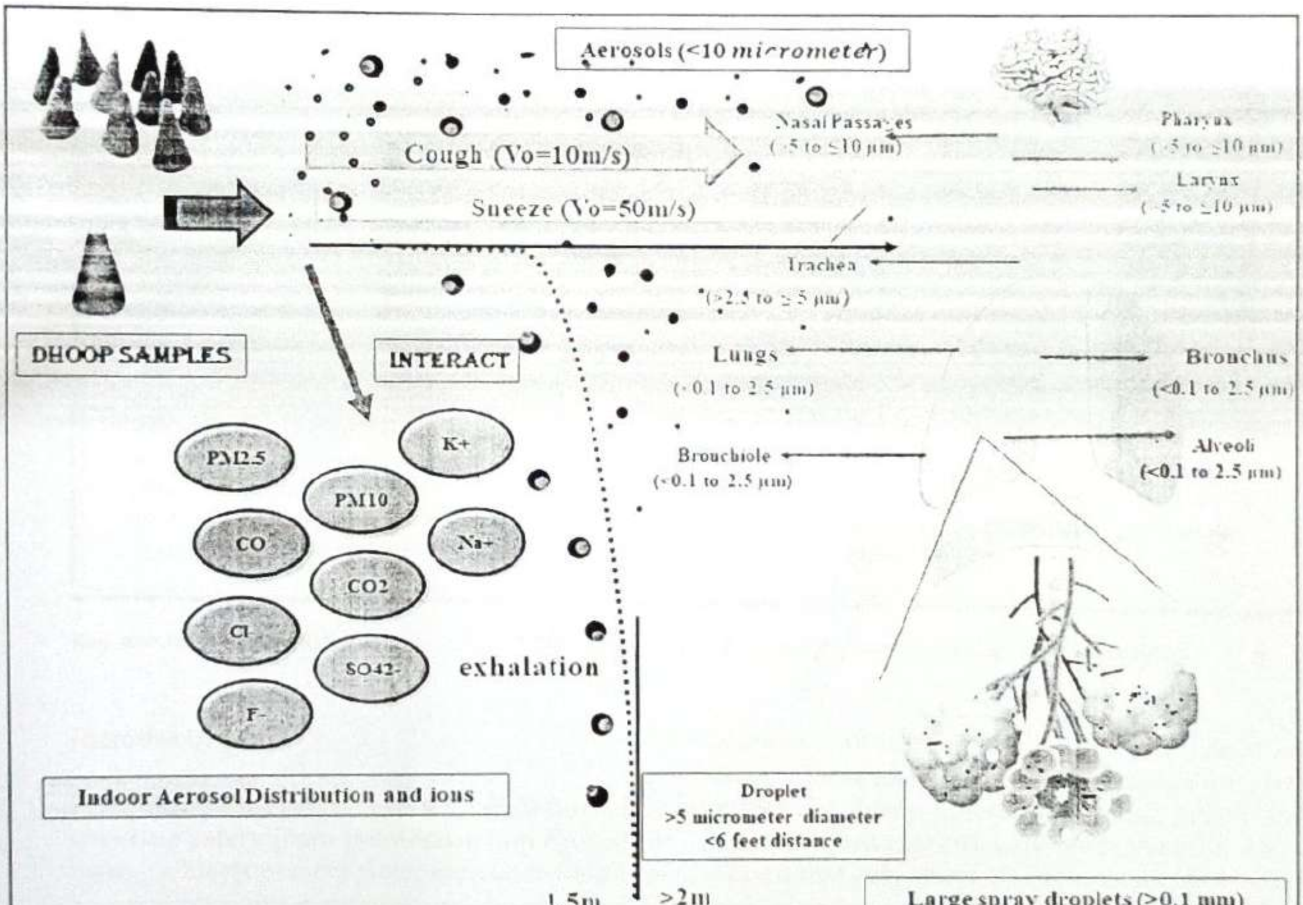


Fig. 1 Graphical Abstract

Eco. Env. & Cons. 29 (January Suppl. Issue) : 2023, pp. (S12-S19)
Copyright@ EM International
ISSN 0971–765X

Detection of Azoxystrobin in Environmental Samples by using Ftir Spectroscopic Method

Ajay Kumar Sahu[1]*, Bharat Lal Sahu[2]*, Shobhana Ramteke[3], Yaman Kumar Sahu[1], Manoj Kumar Banjare[4], Manish Kumar Rai[1] and Joyce Rai[5]

[1]*School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 492 010, Chhattisgarh, India*
[2]*Department of Chemistry Guru Ghasidas Central University Bilaspur CG 495 009, India*
[3]*Integrated Regional office, Govt of India, Ministry of Environment, Forests and Climate Change, Aranya Bhawan, Naya Raipur 492 002, CG, India*
[4]*MATS School of Sciences, MATS University, Pagaria Complex, Pandri, Raipur 492 004, C.G., India*
[5]*Chhattisgarh Council of Science and Technology, Raipur, Chhattisgarh 492 014, India*

(Received 2 May, 2022; Accepted 4 July, 2022)

ABSTRACT

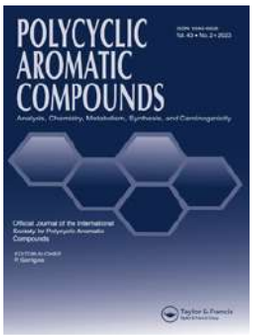
A new UV-Visible spectrophotometric method for determination of fungicide azoxysrtobin was developed The method is based on the bromination of azoxystrobin to form dibromoazoxystrobin which react with Potassium iodide, Potassium iodate mixture in the presence of leucomalachite green (LMG) to form a bluish green colored complex. Characterization was done for the synthesis of bluish green colored complex by using UV-Vis spectrophotometer and FTIR methods. As a result, the UV-Visible absorption spectrum was observed at 615 nm. The limits of detection and limits of quantification were observed at 0.0019 µg ml^{-1} and 0.0059 µg ml^{-1} respectively. We have also studied the conformational and functional group (such as most characteristic band of O-H stretching frequency observed at 3346.49 cm^{-1}, Bonding N-H symmetrical is 1645.50 cm^{-1}, C=C bending is 691.07 cm^{-1}, Symmetrical stretching C-N is 1493.13 cm^{-1} and 1404.70 cm^{-1}, C-C stretching and other vibrational is 1059.74 cm^{-1}). Involved in the complexation between azoxystrobin and bromination by FTIR method. This developed method has been successfully applied for the detection of azoxystrobin in various environmental samples. Beer's law obeyed over the concentration range of 0.5-13 µg mL^{-1} in final solution volume of 10 ml. The reproducibility assessed by carrying out seven days replicate analysis of a solution containing 5 µg ml^{-1} of azoxystrobin in a final solution of 10 ml.. The molar absorptivity of the colour system is 1.936×10^{6} L. mol^{-1} cm^{-1} and Sandell's sensitivity is 0.800×10^{-4} µg cm^{-2}. The relative standard deviation (RSD) for the absorbance value was found to be 1.9%. The suggested method is free from the interference of other toxicant agents. The analytical parameters were optimized and the method was applied to the determination of azoxystrobin in water, soil and food samples.

Key words : UV-Visible Spectrophotometer, FTIR, Azoxystrobin, Bromination and Leucomalachite green (LMG)

Introduction

Pesticides are the major basis with signicant role in ensuring safety from the destruction caused by many pests. At present time, the viable food production can't achieved without the vital role of pesticides. Pesticides are applied directly on the plants which are able to determine for long time in vegetables. When pesticides are use in the field, it is assessed that only about 1% of the pesticide is able to

*Corresponding author's email: ajaykumar.as50@gmail.com, bharatred007@gmail.com



Polycyclic Aromatic Compounds

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/gpol20

Distribution, Variations, Fate and Sources of Polycyclic Aromatic Hydrocarbons and Carbon in Particulate Matter, Road Dust, and Sediments in Central India

Yogita Nayak, Suryakant Chakradhari, Khageshwar Singh Patel, Raj Kishore Patel, Sema Yurdakul, Harald Saathoff & Pablo Martín-Ramos

To cite this article: Yogita Nayak, Suryakant Chakradhari, Khageshwar Singh Patel, Raj Kishore Patel, Sema Yurdakul, Harald Saathoff & Pablo Martín-Ramos (2023) Distribution, Variations, Fate and Sources of Polycyclic Aromatic Hydrocarbons and Carbon in Particulate Matter, Road Dust, and Sediments in Central India, Polycyclic Aromatic Compounds, 43:2, 1309-1331, DOI: 10.1080/10406638.2022.2026991

To link to this article: https://doi.org/10.1080/10406638.2022.2026991

molecules

MDPI

Article

Evaluation of Selected Medicinal, Timber and Ornamental Legume Species' Seed Oils as Sources of Bioactive Lipophilic Compounds

Anna Grygier [1], Suryakant Chakradhari [2], Katarzyna Ratusz [3], Magdalena Rudzińska [1], Khageshwar Singh Patel [4], Danija Lazdiņa [5], Dalija Segliņa [5] and Pawel Górnaś [5,*]

1 Faculty of Food Science and Nutrition, Institute of Food Technology of Plant Origin, Poznań University of Life Sciences, Wojska Polskiego 31, 60-624 Poznań, Poland
2 School of Studies in Chemistry/Environmental Science, Pt. Ravishankar Shukla University, Raipur 492010, CG, India
3 Division of Fats and Oils Technology, Department of Food Technology, Institute of Food Science, Warsaw University of Life Sciences, Nowoursynowska 159c, 02-776 Warsaw, Poland
4 Department of Applied Sciences, Amity University, State Highway 9, Raipur Baloda-Bazar Road, Tilda, Raipur 493225, CG, India
5 Institute of Horticulture, Graudu 1, LV-3701 Dobele, Latvia
* Correspondence: pawel.gornas@llu.lv

Abstract: Bioactive lipophilic compounds were investigated in 14 leguminous tree species of timber, agroforestry, medicinal or ornamental use but little industrial significance to elucidate their potential in food additive and supplement production. The tree species investigated were: *Acacia auriculiformis*, *Acacia concinna*, *Albizia lebbeck*, *Albizia odoratissima*, *Bauhinia racemosa*, *Cassia fistula*, *Dalbergia latifolia*, *Delonix regia*, *Entada phaseoloides*, *Hardwickia binata*, *Peltophorum pterocarpum*, *Senegalia catechu*, *Sesbania sesban* and *Vachellia nilotica*. The hexane-extracted oils of ripe seeds were chromatographically analysed for their fatty acid composition (GC-MS), tocochromanol (RP-HPLC/FLD), squalene and sterol (GC-FID) content. A spectrophotometrical method was used to determine total carotenoid content. The results showed generally low oil yield (1.75–17.53%), the highest was from *H. binata*. Linoleic acid constituted the largest proportion in all samples (40.78 to 62.28% of total fatty acids), followed by oleic (14.57–34.30%) and palmitic (5.14–23.04%) acid. The total tocochromanol content ranged from 100.3 to 367.6 mg 100 g^{-1} oil. *D. regia* was the richest and the only to contain significant amount of tocotrienols while other oils contained almost exclusively tocopherols, dominated by either α-tocopherol or γ-tocopherol. The total carotenoid content was highest in *A. auriculiformis* (23.77 mg 100 g^{-1}), *S. sesban* (23.57 mg 100 g^{-1}) and *A. odoratissima* (20.37 mg 100 g^{-1}), and ranged from 0.7 to 23.7 mg 100 g^{-1} oil. The total sterol content ranged from 240.84 to 2543 mg 100 g^{-1}; *A. concinna* seed oil was the richest by a wide margin; however, its oil yield was very low (1.75%). Either β-sitosterol or Δ5-stigmasterol dominated the sterol fraction. Only *C. fistula* oil contained a significant amount of squalene (303.1 mg 100 g^{-1}) but was limited by the low oil yield as an industrial source of squalene. In conclusion, *A. auriculiformis* seeds may hold potential for the production of carotenoid-rich oil, and *H. binata* seed oil has relatively high yield and tocopherol content, marking it as a potential source of these compounds.

Keywords: Fabaceae; Leguminosae; phytostanol; bean; tocochromanol

Citation: Grygier, A.; Chakradhari, S.; Ratusz, K.; Rudzińska, M.; Patel, K.S.; Lazdiņa, D.; Segliņa, D.; Górnaś, P. Evaluation of Selected Medicinal, Timber and Ornamental Legume Species' Seed Oils as Sources of Bioactive Lipophilic Compounds. *Molecules* **2023**, *28*, 3994. https://doi.org/10.3390/molecules28103994

Academic Editor: Jason Tze Cheng Tzen

Received: 14 March 2023
Revised: 25 April 2023
Accepted: 4 May 2023
Published: 9 May 2023

1. Introduction

Plant seeds contain various biologically active substances, including lipophilic substances such as phytosterols, tocochromanols and carotenoids, and are major sources of these micronutrients in the diet. Legume seeds tend to have low oil content; exceptions to this include soy, peanuts and *Pongamia pinnata*; however, low oil content does not exempt

molecules

MDPI

Article

Comparative Analysis of Traditional Oriental Herbal Fruits as Potential Sources of Polyphenols and Minerals for Nutritional Supplements

José Javier Quesada-Granados [1], José Ángel Rufián-Henares [1,2,*], Suryakant Chakradhari [3], Pravin Kumar Sahu [3], Yaman Kumar Sahu [4] and Khageshwar Singh Patel [4]

1 Departamento de Nutrición y Bromatología, Instituto de Nutrición y Tecnología de los Alimentos (INYTA), Universidad de Granada, 18071 Granada, Spain
2 Centro de Investigación Biomédica, Instituto de Investigación Biosanitaria ibs.GRANADA, Universidad de Granada, 18071 Granada, Spain
3 School of Studies in Environmental Science, Pt. Ravishankar Shukla University, Raipur 492010, India
4 School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur 492010, India
* Correspondence: jarufian@ugr.es; Tel.: +34-958-242-841

Abstract: There are a plethora of plant species in India, which have been widely used in vegetable dishes, soups, desserts and herbal medicine. In addition to these traditional uses, today there is the extra possibility of also being able to use these plants in the nutritional supplements industry due to their favorable antioxidant and mineral composition. In this sense, thirteen vegetable species—*Chamania lanzan*, *Ziziphus mauritiana*, *Nilumbo nucifera*, *Terminalia catappa*, *Terminalia arjuna*, *Terminalia bellirica*, *Terminalia chebula*, *Lagenaria siceraria*, *Luffa aegyptiaca*, *Praecitrullus fistulosus*, *Benincasa hispida*, *Citrullus lanatus* var. lanatus and *Cucurbita maxima*—have been analyzed. In this paper we discuss the distribution of polyphenols and minerals (Na, K, Mg, Ca, Al, P, S, Cr, Mn, Fe, Cu, Zn, Mo, As and Pb) in different seed parts (the rhizome, pericarp, carpel, seed coat and kernel) of the above species and their possible use in the nutritional supplements industry. The concentrations of total polyphenols, flavonoids and minerals ranged from 407 to 3144 mg rutin hydrate/100 g, 24 to 3070 mg quercetin/100 g and 1433 to 7928 mg/100 g, respectively. K, Ca, P and S were abundant in these herbal fruits. In two species of herbal fruits, *Terminalia arjuna* and *Terminalia chebula*, only part of the seed structure was suitable for use in nutritional supplements.

Keywords: herbal seeds; fruit seeds; polyphenols; minerals; nutritional supplements

Citation: Quesada-Granados, J.J.; Rufián-Henares, J.Á.; Chakradhari, S.; Sahu, P.K.; Sahu, Y.K.; Patel, K.S. Comparative Analysis of Traditional Oriental Herbal Fruits as Potential Sources of Polyphenols and Minerals for Nutritional Supplements. *Molecules* **2023**, *28*, 2682. https://doi.org/10.3390/molecules28062682

Academic Editors: Sylwia Mildner-Szkudlarz and Aldona Sobota

Received: 28 January 2023
Revised: 10 March 2023
Accepted: 13 March 2023
Published: 16 March 2023

1. Introduction

Seeds contain vital nutrients and ultra-trace elements, which reduce the risk of cardiovascular disease and diabetes [1] and promote different healthy functions in human beings [2,3]. Many plants also contain polyphenols and flavonoids with strong antioxidant and disease-preventing properties, and could be valuable sources of these compounds in the preparation of nutritional supplements [4–7].

Ziziphus mauritiana (as *Ziziphus jujuba* (L.) Gaertn., and *Ziziphus jujuba* (L.) Lam.) is widely cultivated, especially in southeastern Asia, as a commercial crop [8]. The fruit is eaten raw or preserved and its seeds contain a number of medically active compounds, including saponins, triterpenes, flavonoids and alkaloids. It is hypnotic, narcotic, sedative, stomachic and tonic, and is used internally in the treatment of palpitations, insomnia, nervous exhaustion, night sweats and excessive perspiration [9]. *Buchanania lanzan* is a medium-sized deciduous tree with edible fruits and seed kernels. Its seed kernel and extracted kernel oil are used in the preparation of several Indian dishes and are a potential source of phytochemicals, tocopherols and essential fatty acids including oleic, linoleic and linolenic acid [10].

IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 8, Dec 2022

Digital Soil Mapping of Maniyari Basin for Sustainable Cultivation using Geospatial Techniques

Dipak Bej, N. K. Baghmar

Ph.D. Scholar, SoS in Geography, Pt. Ravishankar Shukla University, Raipur

Retd. Prof. and Head, SoS in Geography, Pt. Ravishankar Shukla University, Raipur

Corresponding author email: bejdipak@gmail.com

ABSTRACT: Digital Soil Mapping (DSM) now a days is very popular rather than conventional soil map, it is an important tool in soil survey and sustainable agriculture planning. The spatial distribution of per pixel soil information by the use of soil samples laboratory observations data. Ninety soil samples were collected at a depth of 0–50 cm from various Physiography land units in the Maniyari basin, Chhattisgarh, India. This Physiographic landscape unit was made with the help of on the basis of slope percentage and Landuse Landcover as well as Physiography. Sentinal 2 satellite data with 10 m. and Aster DEM with 30 m. resolution has been used to prepare the digital soil map. Mainly four Landuse Landcover classes have been accounted to incorporate with five topographic classes to prepare physiographic units. Soil samples were analyzed to determine the Macro (N, P, and K), Micro (Fe, Zn, Cu, Mn, S and Br) Nutrients and Some Physico (Texture, Bulk density, depth) Chemical Properties (pH, EC and OC). Six textural classes identified were sandy clay loam and sandy clay, clay, clay loam, loam, sandy loam. The bulk density, depth varied from 1.08 to 1.8 Mg m-3, 14 to 90 cm. respectively. The pH, EC, OC are varied from 5 to 8.36, 0.1 to 1.2 ds/m, 0.03 to 1.47 respectively. Nitrogen (N), Phosphorus (P), Potassium(K) varied from 125 to 476 kg/ha., 4.44 to 77.78 kg/ha, 79.6 to 504 kg/ha Respectively. The digital soil database along with all properties are called physiographic soil map. Spatial distribution mapping of all properties and nutrients has been prepared with the help of Kriging and Inverse distance weightage interpolation method and finally prepared a soil map which will help to selection crop and get best sustainable cultivation.

Keyword: Soil Nutrients, Digital soil map, Kriging interpolation, Geographical Information System.

INTRODUCTION

The compilation of geographically referenced soil databases based on quantitative correlations between spatially distributed environmental data which taken from the field and measurements made on laboratory, is referred to as digital soil mapping. (McBratney et al.,2003). The digital soil map is a raster based map which composed of 2-dimensional cells (grid) in which each pixel has a spatial location and contains soil physical and chemical parameter and nutrients. Digital soil maps illustrate the spatial distribution of soil classes or properties and can document the uncertainty of the soil prediction. Digital soil mapping better captures observed spatial variability and reduces the need to aggregate soil types based on a set mapping scale (Zhu et al.,

IJFANS INTERNATIONAL JOURNAL OF FOOD AND NUTRITIONAL SCIENCES

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 8, Dec 2022

Agricultural Land Suitability Analysis for Rihand River Basin of Chhattisgarh State: Using Remote Sensing and Geographical Information System

Baburam Mandal

S.o.S in Geography, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, 492010

Corresponding author Mail id: baburamiirs2012@gmail.com

ABSTRACT:

The Land suitability analysis is one of the best techniques for the evaluation of soil quality for a particular study area. This technique was first developed by the Food and Agriculture Organization of the United Nations (UN-FAO). It is possible to evaluate the land based on different periodic conditions. The use of modern techniques, such as Remote Sensing and Geospatial Technique, helped the categorize land suitability assessments. In the present study, Rihand river basin areas were categorized according to the land suitability for defined land uses using the method of land suitability classification. The Land Suitability Analysis is one the most useful application for land use planning and sustainable resource management. The land suitability analysis of the Rihand river basin has been carried out in different classes to better understand land. The suitability of land has been categorized as S1 (highly suitable - no significant limitations), S2 (moderately suitable - having few limitations), S3 (marginally suitable - having most of the limitations), N1 (presently not suitable, but potentially is suitable for futures; uneconomical for land use), and N2 (permanently is not suitable). These suitability classes are refers to the effects of the individual land qualities on the engendering of the different crops.

Keywords: *Rihand River Basin, Soil Prosperities, Land Suitability, LULC.*

INTRODUCTION

The land Suitability is assessed considering the rational cropping system, for the evaluation of soil quality for a particular study area (FAO, 1976). The suitability is the function of soil quality assessments for different crop practices and land characteristics. This is one of the important measurements, of how well the soil qualities of a particular land unit match the

Research Paper

PRINT ISSN 2319-1775 e-ISSN 2320-7876, www.ijfans.org
Volume.11, Issue13, Nov- 2022

UGC CARE Listed (Group -I) Journal

Land Transformation Analysis of Siliguri City using Remote Sensing and GIS techniques

Sukhendu Jana[1], Dr. (Mrs.) Uma Gole[2]

[1]Research Scholar, S.o.S in Geography, Pt. Ravishankar Shukla University
[2] Prof. & Head S.o.S in Geography, Pt. Ravishankar Shukla University, Raipur

Abstract

During past four decades, Siliguri city has attracted a large number of population due to economic hub of the entire north Bengal, which led to the rapid transformation of its LULC pattern. Therefore, this study is aimed to analyse the LULC changes during 1991 to 2021 by giving special emphasize on built up transformation. The Landsat TM, ETM and LISS IV data has been used for the LULC classification of the Siliguri city. Modified Maximum Likelihood Classifier approach has been adopted to generate the classified image. From the analysis it is found that there is a drastic change in built-up 1254.54 percent in respect to 1991. While teagarden, agriculture land and waterbody declined by -90.06, -97.17 and -88.76 percent, respectively. These changes are harmful for the ecological balance of the city surrounding. It can further impact on the city's sustainable development.

Keywords: Land Use Land Cover (LULC), Built-up, Maximum Likelihood Classifier, Urban expansion.

Introduction

As per the World Bank report 2009, Secondary cities have tremendous potential for upgrading the regional and national Development (World Bank., 2009). In this report significance of medium sized class 1 cities has been given more importance for the betterment of world economy. Historically South and South East Asia has the highest population concentration. In the last few decades, mainly second half of the last century rapid growth of urban population has led to the speculation of urban explosion in this region . On the other hand, the population growth of the developed countries almost stagnant because they already passed the phage. It is worth mentioning that their rate of urban growth also stagnant. Among the Asian countries India and China alone will account for more than 64% of the overall growth of urban populations in Asia and a 42% share of global urban population growth from 2005 to 2025(Sankhe et al., 2011). India with a total urban population of 377 million as per 2011 census, the second largest in the world after China and expected to increase up to 590 million by 2031. According to 2011 census between 2001 and 2011, 92 million people were added to the urban population, the largest decadal increase in the last one hundred years, and for the first time, the net addition to urban population exceeded that of the rural population (Shaw, 2018). Urbanization is a process whereby productive agricultural lands, forests, surface water bodies and groundwater prospects are being irretrievably lost((Pathan et al., 1991). In India, unprecedented population growth coupled with unplanned developmental activities has resulted in urbanization, which lacks infrastructure facilities(Sudhira, Ramachandra, & Jagadish, 2004). Development of new urban areas and expansion of existing cities is inevitable as it is an essential part of sustainable economy but uncontrolled and haphazard urban growth may raise serious problems related to environmental pollution, changes in urban micro climate, loss of biodiversity and ecological balance, human and traffic congestion and moreover quality of urban life (Dutta & Rahman, 2017). Physical expansion of the city, population growth induce land cover change and land transformation are natural process we can't stopped the transformation. It can be regulated trough proper planning and management. The urbanization in India is resulting tremendous changes at ground level which are not given due attention in the discourse of planning, development, administration and policy making. One such area that did not receive much attention is the development, planning and governance is 'urban fringe', (Nallathiga, Taneja, Gupta, & Gangal, 2018) as the city grows to the periphery, many geographical changes at the urban periphery are associated with the transfer of land from rural to urban purpose. The current trend of spatial urban growth in almost all Indian cities has a haphazard pattern, particularly along the urban-rural fringe(Farooq & Ahmad, 2008)

Uttar Pradesh Geographical Journal
Vol. 27, 2022
R.N.I. No. UPBIL/1996/7631
I.S.S.N. - 0975-4903

दुर्ग–भिलाई नगरों के कार्यशील महिलाओं की कार्यिक दशा का स्थानिक एवं कालिक विश्लेषण

शिवेन्द्र बहादुर

शोध सारांश

प्रस्तुत अध्ययन का मुख्य उद्देश्य, छत्तीसगढ़ राज्य के दुर्ग–भिलाई नगरों के कार्यशील महिलाओं की कार्यिक दशा का स्थानिक एवं कालिक विश्लेषण करना है। यह अध्ययन पूर्णतः प्राथमिक आँकड़ों पर आधारित है। इन नगरों की कार्यशील महिलाओं के विस्तृत अध्ययन हेतु उद्देश्य पूर्ण दैव निदर्शन विधि के आधार पर विभिन्न कार्यों में संलग्न कार्यशील महिलाओं से संबंधित जानकारियाँ साक्षात्कार एवं अनुसूची के माध्यम से प्राप्त की गई। कार्यशील महिलाओं से संबंधित जानकारी उसके कार्यस्थल यथा– शासकीय एवं अशासकीय कार्यालय, शिक्षण संस्थानों, अस्पताल, दुकानों, निर्माण स्थलों, गंदी बस्तियों में जा कर प्राप्त की गई। इस प्रकार दोनों नगरों से कुल 1202 कार्यशील महिलाओं से जानकारी प्राप्त कर अध्ययन की विषय–वस्तु के आधार पर उनकी कार्यिक दशा का स्थानिक एवं कालिक विश्लेषण किया गया है।

शब्द कुंजी : दुर्ग–भिलाई नगर, कार्यशील महिला, कार्यिक दशा, स्थानिक एवं कालिक विश्लेषण।

प्रस्तावना

वर्तमान परिवेश में नगरीय क्षेत्रों में महिलाओं की कार्यिक सहभागिता के लिए पारिवारिक परिवेश विशेषकर उनकी सामाजिक–आर्थिक दशा विशेष उत्प्रेरक कारक रहे हैं, तथापि उनकी उच्च शैक्षणिक एवं व्यावसायिक योग्यता तथा प्रशिक्षण न केवल कार्यिक गुणवत्ता में वृद्धि के उत्प्रेरक कारक बने, अपितु महिलाओं की आर्थिक आत्मनिर्भरता का मार्ग भी प्रशस्त किया। महिलाओं की कार्यिक सहभागिता से उनकी सामाजिक प्रतिष्ठा में जहाँ वृद्धि हुई, वहीं उनके व्यक्तित्व के विकास को नई दिशा मिली। दुर्ग–भिलाई नगर में शिक्षा का स्तर उच्च होने के कारण आर्थिक रूप से स्वतंत्र एवं अपनी व्यक्तिगत प्रतिष्ठा कायम करने के उद्देश्य से क्रियाशील होने वाली महिलाओं की संख्या में वृद्धि हुई है, तथापि महिलाओं की कार्यिक दशाओं में स्थानिक–कालिक संदर्भ में पर्याप्त भिन्नताएँ परिलक्षित हुई हैं। अस्तु, दुर्ग–भिलाई नगरों के कार्यशील महिलाओं की कार्यिक दशा का विश्लेषण विशेष महत्व रखता है।

अध्ययन का उद्देश्य

प्रस्तुत अध्ययन का मुख्य उद्देश्य, छत्तीसगढ़ राज्य के दुर्ग – भिलाई नगरों की कार्यशील महिलाओं की कार्यिक दशा का स्थानिक एवं कालिक विश्लेषण करना है।

अध्ययन क्षेत्र

दुर्ग नगर छत्तीसगढ़ का प्रमुख व्यापारिक एवं वाणिज्यिक नगर है तथा भिलाई नगर एक औद्योगिक नगर है। दुर्ग नगर के विकास में भिलाई औद्योगिक नगर की निकटता का महत्वपूर्ण योगदान रहा है। इसीलिए इन्हें छत्तीसगढ़ का एक मात्र जुड़वा नगर कहा जाता है। दुर्ग नगर जिले का प्रशासनिक केन्द्र एवं मुख्यालय है। भिलाई नगर का विकास भिलाई ग्राम से हुआ जो नगर के उत्तरी भाग में स्थित है। वर्ष 1956 में लौह इस्पात संयंत्र की स्थापना के पूर्व तक भिलाई एक छोटा ग्राम था परन्तु लौह इस्पात संयंत्र की स्थापना के बाद भिलाई नगर का विकास

शिवेन्द्र बहादुर, शोध छात्र, भूगोल अध्ययनशाला, पं.रविशंकर शुक्ल विश्वविद्यालय रायपुर (छ.ग.)
E-Mail: shivendrakorar@gmail.com

JOURNAL OF COASTAL SCIENCES

Journal homepage: www.jcsonline.co.nr

ISSN: 2348 – 6740 Volume 9 Issue No. 2 - 2022 Pages 1-8

Impact of Crab Burrowing Activity on Beach Sedimentary Textural Distribution and Beach Sustainability at Kanthi Coast, India

Nayan Dey[1], Payel Das[2], Purnima Shukla[3], Uma Gole[4], Suresh Chand Rai[5], Ashis Sarkar[6]

1 1.SoS in Geography, Pt. Ravishankar Shukla University, Raipur, India
2.Department of Geography, Rabindra Bharati University, Kolkata, India
3.Department of Geography, Durga Mahavidyalaya, Raipur, India
4.SoS in Geography, Pt. Ravishankar Shukla University, Raipur, India
5.Department of Geography, Delhi School of Economics, University of Delhi, India
6.Department of Geography, Presidency University, Kolkata, India

ABSTRACT

A coastal beach is the most dynamic field in the world. Being the transition zone between land and sea, the beach is a coastal landform facing the open sea and it is a gently sloping flat plain between low water lines of spring tide to the upper limit of wave action. It could be defined as a sloppy sand platform towards the sea. About 45 km long Kanthi coast stretches from the mouth of the tidal river Rasulpur in the east to the mouth of Subarnarekha River in the west. Kanthi Coast is associated with seven beaches, viz. Junput Beach, Shoula Beach, Mandarbani Beach, Tajpur Beach, Shankarpur Beach, Digha Beach and Talsari Beach from east to west. Beach is shaped by the coastal wave. Wave is the source of energy that dissipates on the beach. Sediment textural distribution influences the work of waves on the beach. Burrowing activity by the crab is governed the beach sediment textural distribution. In this research work, it has been observed that crab-burrowing activity pronounced mean sediment grain size and pronounced the sediment movement by the marine agents. To trace the said things mean grain size assessment by Folk and Ward method (1957) and sediment transportation model of Inman and Bagnold (1963) and the model of Bagnold (1941) are used. It has been examined that the crab burrowing activity on the beach is very important for the beach environment. But the crab habitat in the study area is under threat for unscientific tourism development that directly influences beach health.

ARTICLE INFO

Received
08 March 2022
Accepted
05 March 2023
Available online
21 June 2023

Keywords
Crab Burrowing Activity, Sediment Texture, Sediment Transportation Marine Agents, Beach Health

*Corresponding author, E-mail address: dey.navanrbu@gmail.com

AUTHORS' DECLARATION
The current paper is a collaborative work and it has been approved by all the authors.

1. Introduction

Beach morphodynamics refers to the dynamic interactions between wave shoaling and breaking processes and bed response across a range of time-space scales (Short and Jackson 2013, p. 107). Beach health depends on beach sustainability. Beach sustainability is a balance between erosional and depositional work. The driving force behind almost all coastal processes is the waves (Pethick, 1984; Dey and Shukla, March 2019a). The impact of waves on a beach is pronounced by the beach sedimentary textural distribution that is furnished by the burrowing activity of crabs. Human impacts have become the major force shaping ecosystems globally over the past century (Gul and Griffen 2018). Crabs have been widely used as bio-indicator species for management and conservation purposes. Crab population densities and individual sizes decline dramatically under human pressure (Gul and Griffen 2018). The said research work is examined the impact of crab burrowing activity on beach health. The research paper is traced that crabs spatial distribution controls the beaches of the Kanthi coast. Further, this spatial distribution is influenced to the sediment size distribution and mobilisation of a beach. Crabs create deep, steep and small burrows also influenced to physical characteristics of the beach. Coastal ecosystems are highly preferred regions due to their valuable services (Davenport and Davenport 2006; McLachlan and Brown 2006). Currently, human populations in coastal areas are growing faster than in other non-coastal regions (Davenport and Davenport 2006) for recreation and tourism. While recreation and tourism provide a socio-economic boost (James 2000; Schlacher *et al.* 2007, Lucrezi and Schlacher 2010), they cause important ecological issues (Wolcott and Wolcott 1984) such as alteration in natural habitats, declines in biodiversity and increase in pollution (Halpern *et al.* 2008), which can cause either reversible or irreversible damage in coastal ecosystems (McLachlan and Brown 2006; Defeo et. al. 2009; Gul and Griffen 2018). The purpose of this study was to investigate how crab burrowing activity impacts beach sustainability.

2. Study Area

Kanthi (formerly known as Kendua) coast is about 45 km long which is stretching from the mouth of Subarnarekha River in West to Mouth of Rasulpur River in the east (Dey and Shukla February 2019; Dey and Shukla, September 2019; Dey *et al.* 2022). The northern

3.4.5

International Journal of Applied Social Science
Volume 9 (11 & 12), November & December (2022) : 365-373
Received : 10.10.2022; Revised : 25.10.2022; Accepted : 10.11.2022

RESEARCH PAPER
ISSN : 2394-1405
DOI: 10.36537/IJASS/9.11&12/365-373

Land Use /Land Cover and Change detection using Geospatial Data in Surguja Division of Chhattisgarh, India

JYOTI SAHU[1]* AND UMA GOLE[2]
[1]Research Scholar and [2]Professor
School of Studies in Geography, Pt. Ravishankar Shukla University, Raipur (C.G) India

ABSTRACT

Mapping of an area's land use and cover (LULC) contains details that viewers can use to understand the current landscape. Information on land use and land cover (LULC) is essential for the selection, planning, and implementation of management techniques to meet the population's rising demand for basic human needs. This paper illustrates land use and land cover change detection using geospatial data in Surguja Division, Chhattisgarh, India, with the help of an integrated approach of geographic information systems (GIS) and remote sensing. The study is an attempt to monitor changes in land use and land cover in the Surguja division. According to the Land Use/Land Cover Classification developed by the National Remote Sensing Centre (NRSC) and Indian Space Research Organization (ISRO), the land use in the study area is divided into 5 Level I classes and 11 Level II classes. According to hierarchical classification, the forest is the most important LULC category in the Surguja division area, covering 15746.53 km² (59.57%), followed by agricultural land, wastelands, built-up land, and water bodies, which account for 9916.62 km² (37.52%), 1217.91 km² (4.60%), 3 km² (8.42%), and 14.03 km² (3.61%), respectively. The study concludes that in the study area, forest land contributed the highest amount of land cover (58.55%), while the least was contributed by water bodies (3.61%), and shows a significant impact of urbanization on the ecosystem.

Key Words : Remote Sensing, GIS, Land use/Land Cover, Surguja Division

INTRODUCTION

The term "Land Use/Land Cover" (LULC) often refers to the classification of human activities and natural elements on the landscape throughout a specified time period using recognized scientific and statistical methods of analysis of various source materials. Several other classification systems can be used to classify it. Built-up or urban land, agricultural land, forest land, and many other types of land are examples of LULC components. Wide-ranging uses for LULC (Ghosh *et al.*, 1996) maps include natural resource management, baseline mapping for GIS input, legal borders for tax and property evaluation, and many more. Without the aid of additional geographic information, LULC mapping is not feasible (Reddy, 2001). The earth's surface's physical material is known as the land cover (Haines, 2009). The concept of "land use" refers to how people use the land for socio-economic purposes. A society's social and economic development is completely correlated with its rate of expansion. This is the main justification behind socioeconomic surveys. In this type of research, both spatial and non-spatial datasets are utilized. At the local, regional, and national levels, the planning, management, and monitoring of programs significantly depend on LULC maps. This type of information helps in our understanding of various aspects of land use and is essential in the development of the policies and programs required for planning. To maintain sustainable development, it is important to monitor the changing trends in land use and land cover throughout time (Arveti *et al.*, 2016). In order to ensure sustainable urban development and avoid the random growth of towns and cities, authorities participating in urban development must create these planning models

How to cite this Article: Sahu, Jyoti and Gole, Uma (2022). Land Use /Land Cover and Change detection using Geospatial Data in Surguja Division of Chhattisgarh, India. *Internat. J. Appl. Soc. Sci.*, **9** (11 &12) : 365-373.

International Journal of Applied Social Science
Volume 9 (11 & 12), November & December (2022) : 379-384
Received : 14.10.2022; Revised : 29.10.2022; Accepted : 14.11.2022

RESEARCH PAPER
ISSN : 2394-1405
DOI: 10.36537/IJASS/9.11&12/379-384

Assessment of Basic Amenities in the Sub-urban Area of Siliguri Municipal Corporation

UMA GOLE[1] AND SUKHENDU JANA*[2]
[1]Professor and [2]Research Scholar
School of Studies in Geography, Pt. Ravishankar Shukla University, Raipur (C.G.) India

ABSTRACT

Basic Amenities are the most neglected part of the sub urban area. Administrative difference between to civic body leads to such difference. In this study one attempt has been made to understand the condition of basic amenities of the area which is located within the four km buffer form the Siliguri Municipality Corporation. Remote sensing and GIS technique computation of built up has been used to identify the area. Primary database has been generated with the help of a well-designed schedule cum questionnaire. 422 household has been selected for the primary survey. In this study it is found that basic amenities of this area is in pathetic condition. SPSS is used for the computation of data and make the relationship between two variable and excel was used for making the graph and chart. One attempt has been made to figure out the Satisfaction level of the respondent towards the availability of basic amenities by using the five point scale. It is found that most of the people are not satisfied with present services.

Key Words : Basic Amenities, Suburb, Primary survey, Siliguri Municipal Corporation

INTRODUCTION

Before starting the discussion on basic services of Siliguri city suburb let understand the concept of basic services. Services like sanitation facilities, drinking water, electricity, waste management, connectivity education, health services etc. which required to continue our life called basic services (Ghosh *et al.*, 1995). We are familiar with the term Urban Basic Services, because there is lot of schemes are available in the name of urban services.

In case of urban area there is lot of scheme in the name of urban basic services. But in the rural area there is no such define programme. As the suburb of the city basically comes under the jurisdiction of panchayat so designated schemes are absent there. Rapid urbanisation pool people towards city, many times it is notice that people who cannot afford the residence in city they started staying city outskirt (Sudhira *et al.*, 2003). On the other hand those who not want to stay congested area of city came to the city periphery for the better living condition. In both the cases changes took place in the condition of city periphery (Ramachandra *et al.*, 2013). When this thing happen intensely it put pressure on the existing infrastructure of that area (Banu and Fazal, 2016). We can see many times these area are included with the main city but at that time there services infrastructure cannot be changed. The provision of suitable housing with essential amenities such as water supply, drainage, connectivity plays a significant role in the economic and social development goals of less developed nations such as India (Fazal, 2013).

METHODOLOGY

Area chosen for the survey Selection of the surveyed village and house hold:

In the first step a buffer of 4 Km from the Siliguri Municipal Corporation (SMC) boundary has been created. In the next step built up change of this area monitored. Primarily growth prone surrounding area has been demarked. In the next step connectivity and future

How to cite this Article: Gole, Uma and Jana, Sukhendu (2022). Assessment of Basic Amenities in the Sub-urban Area of Siliguri Municipal Corporation. *Internat. J. Appl. Soc. Sci.*, 9 (11 &12) : 379-384.

RESEARCH PAPER

RESEARCH REVIEW International Journal of Multidisciplinary
e-ISSN: 2455-3085 | Vol.08 | No.03 | March 2023 | pp. 219-226
Double-Blind Peer Reviewed/ Refereed Journal

Study of urban sprawl of Siliguri city

[1]Dr. Uma Gole and *[2]Sukhendu Jana

[1]*Professor, Pt. Ravishankar Shukla University, Raipur*
[2]*Research Scholar, Pt. Ravishankar Shukla University, Raipur*

Abstract

During past four decades, Siliguri city has drew a lot of people. In this four-decade Siliguri city convert into an important economic centre of the entire north Bengal, as a result land use land cover distribution of the city changed rapidly. This study aims to identify the pattern and analyse the urban growth of the city from 1991 to 2021 by giving special emphasize on built up growth. The Landsat TM, ETM and LISS IV data has been used for determine the built-up growth of the Siliguri city. Modified Maximum Likelihood Classifier approach has been adopted to classify the satellite image. From the analysis it is found that there is a drastic change in built-up 1254.54 percent in respect to 1991. The sprawl has been measured using Shannon's entropy. These changes are harmful for the ecological balance of the city surrounding. It can further influence the city's sustainable development conditions.

Keywords: *Built-up, Land Use Land Cover (LULC), Maximum Likelihood Classifier, Urban expansion.*

Article Publication

Published Online: 14-Mar-2023

***Author's Correspondence**

Sukhendu Jana

Research Scholar, Pt. Ravishankar Shukla University, Raipur

sukhendu.jana53[at]gmail.com

10.31305/rrijm.2023.v08.n03.026

Introduction

As per the World Bank report 2009, economic activities of secondary cities provide enormous opportunity to change the status of the region which will finally help to the national development (World Bank., 2009). Significance of medium sized class 1 cities has been given more importance in this report for the upliftment of world economy. The highest population density historically has been found in South and South-East Asia. The fast urban population expansion in the last few decades, particularly in the second half of the 20th century, has sparked fears of an urban explosion in this area. On the other hand, the population growth of the developed countries almost stagnant because they already passed the phase. It is worth mentioning that their rate of urban growth also stagnant. Among the Asian countries India and China combinedly share more than 64% of the overall growth of urban populations in Asia and in respect to global urban population a massive 42% of urban population growth recorded from 2005 to 2025(Sankhe et al., 2011). As per 2011 census India has the second major urban population in the world after China with 377 million urban population, by 2031 that is projected to reach 590 million. The highest decadal rise in the last hundred years occurred between 2001 and 2011, when 92 million people moved

Adoption of New Dimensions in Agriculture and Food Security With Special Reference to Jashpur District

Eastern Geographer
Vol. XXV, No. 1, January, 2019, pp. 188-194
ISSN 0973 - 7642

Dr. (Mrs.) Uma Gole

Abstract

With the implementation of Green Revolution in the 1960s Indian Agriculture has seen many reforms and developments in terms of land reforms, improved seeds, chemical fertilizers, pesticides. The crux of agricultural development is ever evolving technology and innovations; but its adoption depends on information, access, affordability and applicability. The implementation of new technologies and machinery has not only raised the productivity but have also facilitated in the spread of agriculture but still there are regions and population in need of food aids for their sustainment. Present study attempts to recognize the adoption of new dimensions in agriculture and its relationship with food security with Jashpur district as a sample unit.

Keywords: Agricultural Adoption, Food Security, Hunger Index, Jashpur District.

Introduction

Adoption in agrarian context refers to the process by which a new idea or technology is implemented in practice by the farmers with the sole purpose of increasing the quality and quantity of their produces. For increase in production and productivity, a type of system has been created where by the help of agricultural new dimension, methods, investment and scientific institutions formed and the techniques are applied in it; that can be termed as development (S.K. Sharma, 1988). Three-fourth part of the population in the world live in rural areas and their primary livelihood is agriculture. Hunger and child malnutrition is more seen in rural areas as compared to the urban areas. Keeping these facts in mind, the new agricultural dimension, food security and hunger are the important aspects in the Jashpur district of Chhattisgarh.

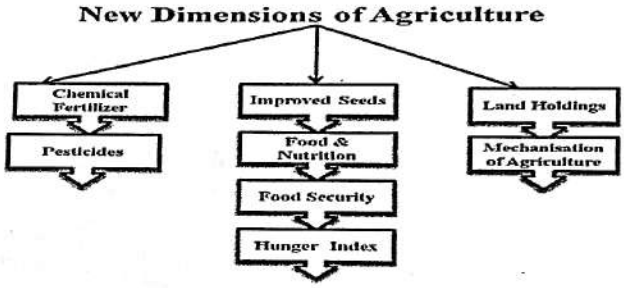


Fig.1

Objectives

1. To study the indulgence in modern Dimensions of Agriculture in the study area.
2. To analyze the Food Availability and Food Security Conditions in Monetary Value through the evaluation of Food Production by Tribal farmers.
3. To derive the Hunger Index for the sample population.

Sources of Data and Methodology

Present study is based on primary and secondary data. From each of the 8 development blocks

Dr. (Mrs.) Uma Gole, Professor, S.o.S. in Geography, Pt. Ravishankar Shukla University Raipur, C.G.
Email: umagole@rediffmail.com

Precambrian Research 391 (2023) 107040

Contents lists available at ScienceDirect

Precambrian Research

journal homepage: www.elsevier.com/locate/precamres

Insights into the petrogenetic evolution of the Khallari layered intrusion and coeval granites of the Paleoproterozoic Dongargarh Supergroup, Bastar Craton, India

M.P. Manu Prasanth [a,*], Alora Sweta Padma Sharma [b], M. Santosh [c,d], Cheng-Xue Yang [c], K.R. Hari [e]

[a] Institute of Earth Sciences, Academia Sinica, Taipei 11529, Taiwan
[b] Department of Earth Sciences, Sambalpur University, Sambalpur, Odisha, India
[c] School of Earth Sciences and Resources, China University of Geosciences Beijing, 29 Xueyuan Road, Beijing 100083, China
[d] Department of Earth Sciences, School of Physical Sciences, The University of Adelaide, South Australia 5005, Australia
[e] School of Studies in Geology and Water Resource Management, Pt. Ravishankar Shukla University, Raipur, India

ARTICLE INFO

Keywords:
Gabbro
Anorthosite
Paleoproterozoic
Granite
Layered intrusion

ABSTRACT

Several layered igneous complexes around the globe host ultramafic-mafic lithologies at the base to more evolved lithologies at the roof sections. In this study, we report U-Pb zircon ages and geochemistry of Paleoproterozoic granites and Khallari layered intrusion from the Dongargarh Supergroup of Bastar craton, central India. The Khallari layered intrusion hosts pyroxenites at the base to more evolved lithologies including gabbro, layered gabbro and anorthositic gabbros towards the roof section of the magma chamber. The estimated weighted mean U-Pb zircon ages of granites (2443 ± 13 Ma) and layered intrusion (2494 ± 19 Ma and 2469.2 ± 5.2 Ma) are in conjunction with the major Siderian crust building peak identified at the craton. The granitic plutons of the Dongargarh Supergroup are chemically similar to post-collisional/anorogenic granitic rocks, in which the rapakivi granites exhibit a fractional crystallization relation with the Khallari layered intrusion. The Dongargarh granites and enclaves were derived by a combination of fractional crystallization and mixing of partial melts from the pre-existing crust of the Bastar craton. Petrogenetic modeling indicates Khallari layered intrusion is formed by the fractional crystallization of lithospheric mantle melt followed by crystal accumulation. The parental melt also experienced localized crustal contamination (up to 10%) during its evolution. The layered intrusion and the granites formed in a post-collisional rift setting where magmatism postdates the proposed subduction and collisional orogenesis at 2.5 Ga involves cratonic domains of Eastern and Western Bastar cratons.

1. Introduction

Layered-mafic ultramafic intrusions are among the largest magmatic complexes on earth; however, their petrogenesis remains debated (Cawthorn, 1996; Charlier et al., 2015). Though layered igneous suites have been investigated for several decades, no single model can completely explain the complexity of their magmatic characteristics (Smith and Maier, 2021; Yao et al., 2021). From studies on the major layered intrusions, a wide range of magmatic layers and cryptic layering features have been identified, hence it is unlikely that a single layer-forming process can explain all the features of layered igneous complexes (Irvine, 1987; Charlier et al., 2015). Most layered igneous suites are formed through multiple injections of mantle-derived magma emplaced into the crust over a short period (<1 myr) (Zeh et al., 2015). The magmas of the layered intrusions are originally sourced from the mantle, likely via lithospheric and/or sub-lithospheric upwellings and interacted with the overriding lithosphere during its ascent and emplacement on crust. Multiple magma pulses from the mantle to the crust result in different magmatic layers and zones, that exhibit complex macroscopic and microscopic and compositional layering, which manifest various petrogenetic processes such as magmatic differentiation, cumulate formation, and/or crustal contamination (Cawthorn, 1996; Charlier et al., 2015; Maier et al., 2000). However, the physical attributes of the layered intrusions, like their form, associated magmatic

* Corresponding author.
E-mail address: manu@earth.sinica.edu.tw (M.P. Manu Prasanth).

https://doi.org/10.1016/j.precamres.2023.107040
Received 5 October 2022; Received in revised form 21 February 2023; Accepted 24 March 2023
Available online 5 May 2023

criterion - III

3.4.5

frontiers | Frontiers in Earth Science

TYPE Correction
PUBLISHED 08 March 2023
DOI 10.3389/feart.2023.1173153

OPEN ACCESS

APPROVED BY
Frontiers Editorial Office,
Frontiers Media SA, Switzerland

*CORRESPONDENCE
M. P. Manu Prasanth,
manu@earth.sinica.edu.tw

SPECIALTY SECTION
This article was submitted to Petrology, a section of the journal Frontiers in Earth Science

RECEIVED 24 February 2023
ACCEPTED 27 February 2023
PUBLISHED 08 March 2023

CITATION
Manu Prasanth MP, Pang K-N, Hari KR, Sahoo BB, Ravindran A and Iizuka Y (2023), Corrigendum: Geochemistry of Precambrian dyke swarms in the Singhbhum craton, India: Implications for recycled crustal components in the mantle source.
Front. Earth Sci. 11:1173153.
doi: 10.3389/feart.2023.1173153

Corrigendum: Geochemistry of Precambrian dyke swarms in the Singhbhum craton, India: Implications for recycled crustal components in the mantle source

M. P. Manu Prasanth[1]*, Kwan-Nang Pang[1], K. R. Hari[2], Bibhuti Bhusan Sahoo[2,3], Arathy Ravindran[4,5] and Yoshiyuki Iizuka[1]

[1]Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan, [2]School of Studies in Geology and Water Resource Management, Pt. Ravishankar Shukla University, Raipur, India, [3]Central Ground Water Board (CGWB), Northeastern region, Guwahati, India, [4]Institute of Geochemistry and Petrology, ETH Zurich, Zurich, Switzerland, [5]Institute of Geological Sciences, University of Bern, Zurich, Switzerland

KEYWORDS

precambrian, singhbhum craton (India), dyke swarms, mantle melting, crustal recycling

A Corrigendum on
Geochemistry of Precambrian dyke swarms in the Singhbhum craton, India: Implications for recycled crustal components in the mantle source

by Manu Prasanth M. P., Pang K-N, Hari K. R., Sahoo B. B., Ravindran A and Iizuka Y (2023). Front. Earth Sci. 10:1092823. doi: 10.3389/feart.2022.1092823

In the published article, the **Funding** source was not mentioned. The correct **Funding** statement appears below.

Funding

Financial support from the National Science and Technology Council, Taiwan (111-2116-M-001-031 to K-NP) is acknowledged.

The authors apologize for this error and state that this does not change the scientific conclusions of the article in any way. The original article has been updated.

Publisher's note

frontiers | Frontiers in Earth Science

TYPE Original Research
PUBLISHED 11 January 2023
DOI 10.3389/feart.2022.1092823

OPEN ACCESS

EDITED BY
Shenghong Yang,
University of Oulu, Finland

REVIEWED BY
Wei Wang,
China University of Geosciences Wuhan, China
Gaoxue Yang,
Chang'an University, China

*CORRESPONDENCE
M. P. Manu Prasanth,
manu@earth.sinica.edu.tw

SPECIALTY SECTION
This article was submitted to Petrology, a section of the journal Frontiers in Earth Science

RECEIVED 08 November 2022
ACCEPTED 28 December 2022
PUBLISHED 11 January 2023

CITATION
Manu Prasanth MP, Pang K-N, Hari KR, Sahoo BB, Ravindran A and Iizuka Y (2023). Geochemistry of precambrian dyke swarms in the singhbhum craton, India: Implications for recycled crustal components in the mantle source. *Front. Earth Sci.* 10:1092823. doi: 10.3389/feart.2022.1092823

Geochemistry of precambrian dyke swarms in the singhbhum craton, India: Implications for recycled crustal components in the mantle source

M. P. Manu Prasanth[1]*, Kwan-Nang Pang[1], K. R. Hari[2], Bibhuti Bhusan Sahoo[2,3], Arathy Ravindran[4,5] and Yoshiyuki Iizuka[1]

[1]Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan, [2]School of Studies in Geology and Water Resource Management, Pt. Ravishankar Shukla University, Raipur, India, [3]Central Ground Water Board (CGWB), Northeastern region, Guwahati, India, [4]Institute of Geochemistry and Petrology, ETH Zurich, Zurich, Switzerland, [5]Institute of Geological Sciences, University of Bern, Zurich, Switzerland

The Singhbhum craton, eastern India records multiple stages of emplacement of Precambrian dyke swarms with contrasting petrogenetic models proposed for their formation. In this study, we document elemental and Sr-Nd isotopic data for three major dyke swarms in the southern part of the craton, including the ca. 2.7 Ga Ghatgaon dyke swarm, the Early Proterozoic Keonjhar dyke swarm and the ca. 1.76 Ga Pipilia dyke swarm. Dyke compositions are dominated by basalt and basaltic andesite with minor andesite, showing trace element signatures typical of continental crustal rocks. Age-corrected Nd isotopic data for Ghatgaon (ε_{Ndt} = −4.8 to + 4.6), Keonjhar (ε_{Ndt} = −11.9 to + 3.8), and Pipilia (a single sample with ε_{Ndt} = −8.8) dyke swarms display substantial variations. The lack of magma compositions that could indicate the presence of elevated mantle potential temperature among the rocks suggests melting regime was likely similar to the ambient mantle. The Dy/Yb and Dy/Dy* systematics of the rocks indicates melting occurred between spinel-stable depths and the spinel-garnet transition zone. The dominantly mafic compositions of the rocks and ubiquitous continental crustal trace element signature are best explained by peridotite source with recycled crustal components, probably in the form of pyroxenites. Our new Nd isotopic data, which argue against any simple secular evolution trend invoked in previous studies, indicate that crustal recycling was likely an episodic phenomenon rather than a discrete, single-stage process since the Archean. Geochemical modelling indicates that a sublithospheric mantle source with (10% or less) recycled crustal components satisfactorily explains the trace element variations of the dyke swarms.

KEYWORDS

precambrian, singhbhum craton (India), dyke swarms, mantle melting, crustal recycling

1 Introduction

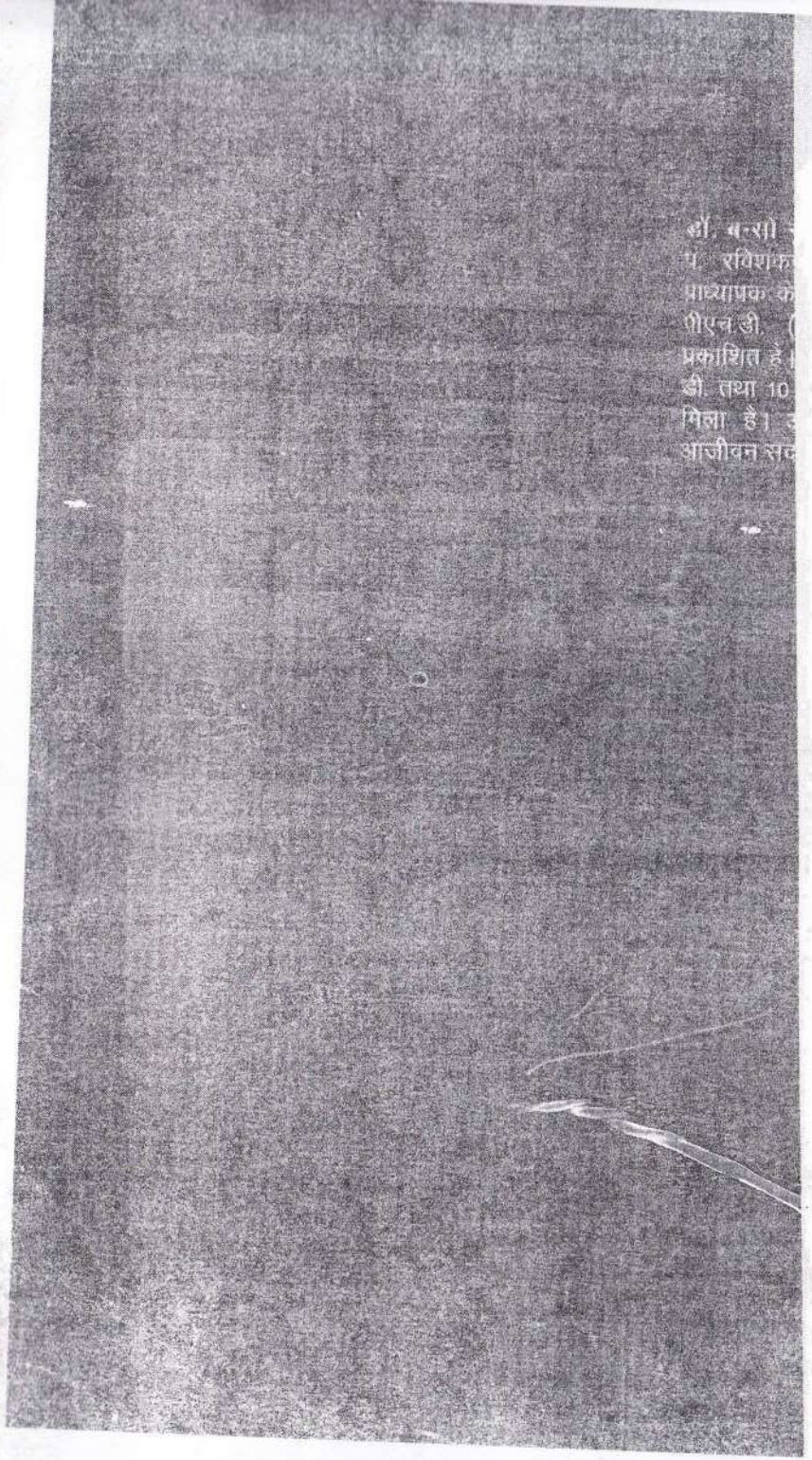
Giant radiating dyke swarms represent conspicuous extensional structures that are widespread throughout Archean cratons and have been commonly used to reconstruct the rifting history of cratonic blocks (Wilson, 1990; Bleeker and Ernst, 2006; Söderlund et al., 2010). For example, geochronologic and paleomagnetic data for Neoarchean-Paleoproterozoic dyke swarms led to the identification and characterization of several distinct, transient, late Archean super cratons (e.g., Scalvia, Superia and Vaalbara). Although by no means universal, giant

Azadi Ka Amrit Mahotsav

REVISITING HISTORY

(Essays in Honour of Prof. Abha Rupendra Pal)

Prof. Ashok Kumar Patnaik
Dr. Dishwar Nath Khute
Dr. Banso Nuruti



Price : Rs. 2995/-

First Edition : 2023

ISBN : 978-93-91214-74-6

Publisher:

SHIVALIK PRAKASHAN
4648/21, Ansari Road, Daryaganj
Delhi-110 002
Phone : 011-42351161
Mob. : +91-9811693579
E-mail : shivalikprakashan@gmail.com

International Branch :
64, Grant Boulevard, Dundas
Ontario, Canada L9H 4M1

Published in India

Published by Virendra Tiwari for Shivalik Prakashan, 4648/21, Ansari Road, Daryaganj, Delhi-110007. Type Setting Friends Graphics and Printed by R.K. Offset Printers, Delhi.

REVISITING HISTORY
(ESSAYS IN HONOUR OF PROF. ABHA RUPENDRA PAL)

Editors : Prof. Ashok Kumar Patnaik, Dr. Vishwar Nath Khule
Dr. Banso Nuruti

8

बस्तर रियासत की जमीदारीं व्यवस्था (1854 ई.–1947 ई.) एक ऐतिहासिक अध्ययन

डॉ. ईश्वर नाथ खुटे

सारांश

बस्तर रियासत में जमींदारियों का इतिहास अत्यंत प्राचीन है। नल वंश के समय बस्तर में सामन्त प्रथा प्रचलित थी, नागवंश के समय में केंद्रीय सत्ता के अभाव में छोटे–छोटे राज्य थे जिन्हें गढ़ कहा जाता था। बाद में काकतीय वंश के राजाओं ने इन छोटे–छोटे राजाओं को परास्त कर अपने साम्राज्य में सम्मिलित किया तथा साम्राज्य को जमींदारियों में विभक्त किया। अन्नमदेव के समय 12 जमींदारियां थी–भेज्जी, चिन्तलनार, कोतपल्ली–पामेड़, सुकमा, फुतकेल, भोपालपट्टनम, कुटरू, भैरमगढ़, तोयनार, गुदमा, नयमेर तथा परलकोट। 1910 ई. तक इनमें केवल भोपालपट्टनम, कुटरू, चिन्तलनार, फुतकेल, कोतपल्ली, सुकमा व परलकोट जमींदारी का ही इतिहास मिलता है तथा 1938–1947 ई. के मध्य केवल भोपालपट्टनम, सुकमा, कुटरू व कोतापल्ली पामेड जमींदारी की ही सत्ता थी।

शब्द कुंजी:– रियासत, जमींदार, गढ़, अबूझमाड़, वैलाडीला, उवारीदार, सनद, मशालची, जिया, तालुकेदार, मुकासा, नरबलि।

बस्तर का सामान्य परिचय –स्थिति, विस्तार एवं सीमाएँ

अंग्रेजी साम्राज्य के अंतर्गत एक सामंतीय राज्य के रूप में बस्तर 17048′ से 20014′ उत्तरी अक्षांश और 80015′ से 8201′ पूर्वी देशांश के मध्य स्थित था। बस्तर का क्षेत्रफल 13062 वर्गमील था, जो कि देश की चौथी बड़ी क्षेत्रफल वाली रियासत थी। उत्तर से दक्षिण तक लंबाई 183 कि.मी. तथा पूर्व से पश्चिम तक अधिकतम चौड़ाई 205 कि.मी. थी।[1] बस्तर रियासत के उत्तर में कांकेर रियासत एवं रायपुर जिला, पूर्व में जैपुर (उड़ीसा), दक्षिण में भद्राचलम तालुका और पश्चिम में चांदा जिला तथा हैदराबाद का निजाम राज्य विद्यमान था।[2] भारत की स्वतंत्रता प्राप्ति के बाद 1 जनवरी 1948 ई. को बस्तर तथा कांकेर रियासत को मिलाकर नये बस्तर जिला का निर्माण किया गया तथा कुछ समय के

REVISITING HISTORY

(Essays in Honour of [illegible])

Prof. Ashok Kumar [illegible]
Dr. Dishwar Nath [illegible]
Dr. Banso Nuruti

Price : Rs. 2995/-

First Edition : 2023

ISBN : 978-93-91214-74-6

Publisher:

SHIVALIK PRAKASHAN
4648/21, Ansari Road, Daryaganj
Delhi-110 002
Phone : 011-42351161
Mob. : +91-9811693579
E-mail : shivalikprakashan@gmail.com

International Branch :
64, Grant Boulevard, Dundas
Ontario, Canada L9H 4M1

Published in India

Published by Virendra Tewari for Shivalik Prakashan, 4648/21, Ansari Road, Dar[illegible] Delhi-110007. Type Setting Friends Graphics and Printed [illegible] Printers, Delhi.

[illegible] HISTORY

(ESSAYS [illegible] OF. ABHA RUPENDRA PAL)

Editors : Prof. [illegible] Malik, Dr. Dishwar Nath Kh[illegible]
[illegible] Nuruti

Narendra Pal)

Women in National
Women studies Pt.

सशक्तीकरण: भारतीय
दृष्टि अनुसंधान केन्द्र,

सशक्तीकरण, पूर्वोक्त, पृ. 73.

2008, पृ. 98.

National Development
ce, Pt. Ravishanker

सशक्तीकरण, पूर्वोक्त,

Women in National

सशक्तीकरण, पूर्वोक्त,

में नारी (संक्षेपिका)
पृ. 37.

40

ब्रिटिश कालीन छत्तीसगढ़ की प्रशासनिक व्यवस्था

अदिति श्रीवास्तव एवं डॉ.डी. एन. खुटे

सारांश

1818 ई. के पूर्व छत्तीसगढ़ पर भोंसलो का राज्य था, परन्तु इस क्षेत्र को जो महत्व या आत्मीयता मिलनी चाहिए थी, नागपुर से दूर होने के कारण भोंसले से वह इसे न मिल सकी। इसलिए छत्तीसगढ़ अपने आपको उपेक्षित अनुभव कर रहा था। ऐसे समय पर सन् 1818 में अंग्रेजो ने नागपुर के राज्य पर अपना नियंत्रण स्थापित किया। इस नियंत्रण के कारण न केवल नागपुर राज्य में ही अपितु छत्तीसगढ़ की राजनीति मे भी प्रारंभ मे एक गतिशील विकास परिलक्षित हुआ।

यह स्पश्ट है कि अंग्रेजो के आगमन के पूर्व छत्तीसगढ़ की दशा एक उपेक्षित तथा शासित प्रदेश के रूप थी। अंग्रेजो के आते ही इस ओर कुछ ऐसी बाते हुई कि यहां की जनता को ऐसा प्रतीत हुआ कि देशी शासन की अपेक्षा विदेशी शासन अधिक सुखकर होगा। यहां के वासियो के मानस में भावी सुख की यह आशा इतनी बलवती हो गयी कि यहां के लोक – साहित्य मे इस शासन की प्रशंसा मे कुछ बाते कही जाने लगी। इतिहासकार सरदेसाई के अनुसार भारत वर्श में अंग्रेजी शासन अनेक दृश्टियो से महत्वपूर्ण था। ब्रिटिश शासनकाल के छत्तीसगढ़ के सबंध में भी यह सत्य चरितार्थ होता है, क्योंकि इस अर्वाध में यहां के शासन में व्यवस्था, नियम और शांति का सूत्रपात हुआ। इसके पूर्व शासन में इन बातो के लिए कोई स्थान न था।

शब्द कुंजी :– परिलक्षित,उपेक्षित,अर्वाध, दुर्देव,आनुवांशिक,अप्रत्याशित,सुदृढ, अधीक्षक, आंशिक, साम्राज्यवादी, सादृश्य, दण्डशास्त्र, सादृश्य, मासिकविवरण, प्रशिक्षित, परोक्ष, सम्बध्द, संरक्षकता, सर्वेक्षण, विनिमय,हस्तक्षेप।

उद्देश्य

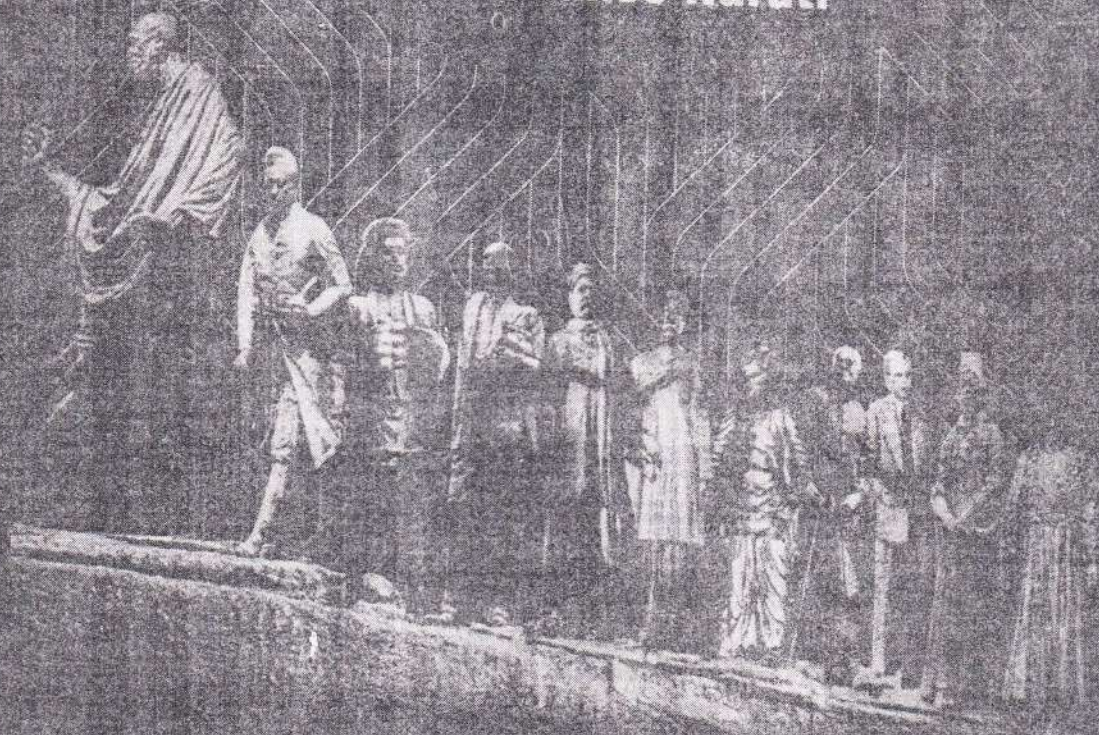
- ब्रिटिशकालीन छत्तीसगढ़ के प्रशासनिक ढांचे का अध्ययन करना।
- ब्रिटिशकालीन छत्तीसगढ़ की प्रशासनिक व्यवस्था का अध्ययन करना।

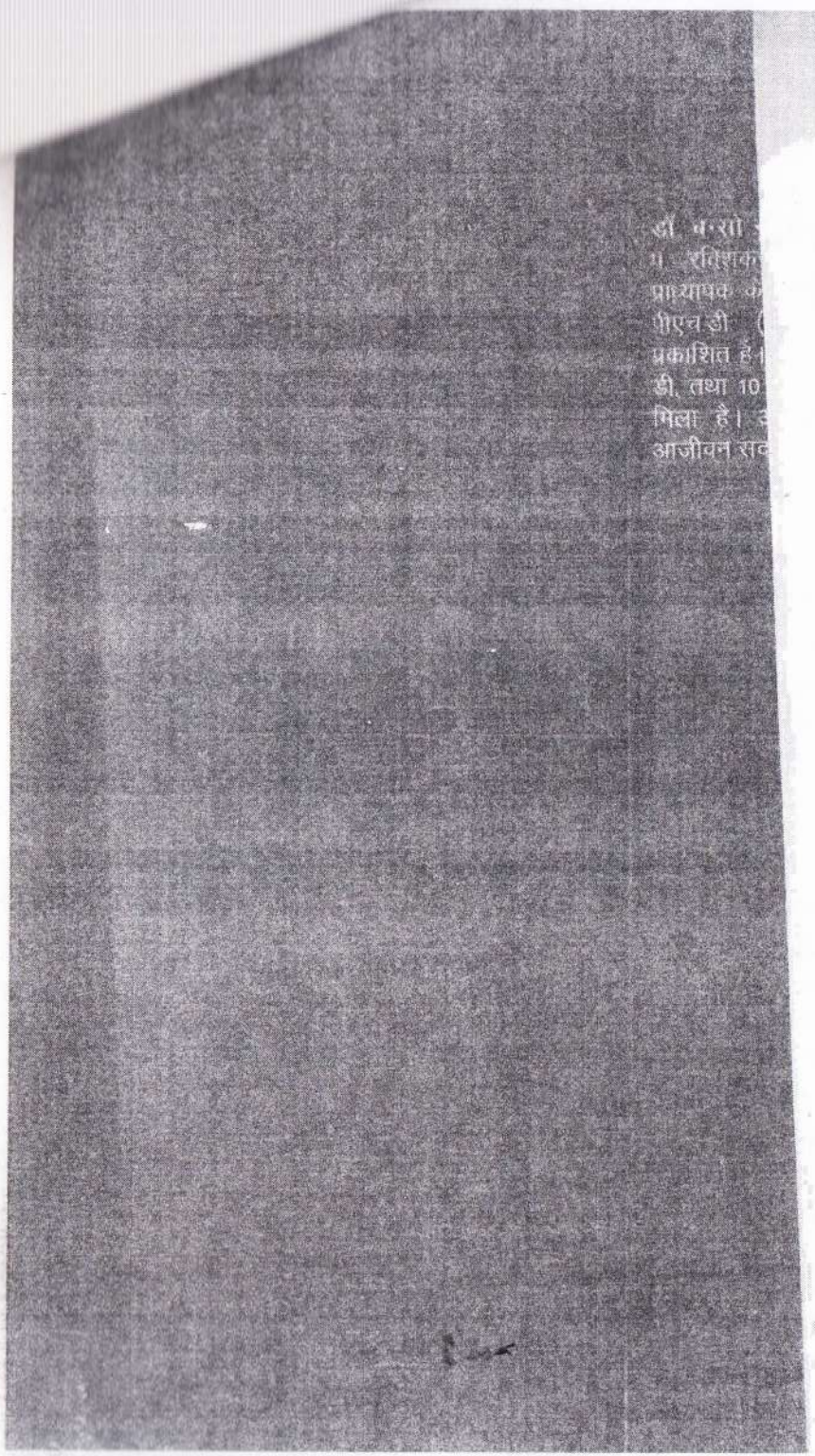
Azadi Ka Amrit Mahotsav

REVISITING HISTORY

(Essays in Honour of Prof. Abha Rupendra Pal)

Prof. Ashok Kumar Patnaik
Dr. Dishwar Nath Khute
Dr. Banso Nuruti





Price : Rs. 2995/-

First Edition : 2023

ISBN : 978-93-91214-74-6

Publisher:

SHIVALIK PRAKASHAN
4648/21, Ansari Road, Daryaganj
Delhi-110 002
Phone : 011-42351161
Mob. : +91-9811693579
E-mail : shivalikprakashan@gmail.com

International Branch :
64, Grant Boulevard, Dundas
Ontario, Canada L9H 4M1

Published in India

Published by Virendra Tiwari for Shivalik Prakashan, 4648/21, Ansari Road, Daryaganj, Delhi-110007. Type Setting Friends Graphics and Printed by R.K. Offset Printers, Delhi.

REVISITING HISTORY
(ESSAYS IN HONOUR OF PROF. ABHA RUPENDRA PAL)

Editors : **Prof. Ashok Kumar Patnaik, Dr. Dishwar Nath Khuta**
Dr. Banso Nuruti

44

महात्मा गांधी के विचारों पर आधारित महिलाओं की सामाजिक भूमिका

ममता ध्रुव एवं डॉ. डी. एन. खुटे

सारांश

नारी भारतीय समाज में माँ के रूप में चिरकाल से स्थापित है। शास्त्रों में नारी का स्थान पुजनीय है। पुरूश प्रधान भारतीय समाज में नारी उत्थान के लिये समय–समय पर अनेकों महापुरूशों ने प्रयत्य किए है। महात्मा गांधीजी आधुनिक समय में ऐसे ही महापुरूष हुए है जिन्होंने नारी उत्थान के कार्यों में अपना महत्वपूर्ण योगदान दिया है। पुरूष प्रधान समाज में वंश वृद्धि और पुत्र प्राप्ती की कामना में इतना अंधा हो जाता है कि वे भूल जाता है कि उसी पुरूश की उत्पत्ति का माध्यम नारी ही है। गांधीजी अपने पूरे जीवन में नारी सुधार के लिए आंदोलनरत रहे। गांधीजी पुरूष और नारी के सामान अधिकारों के पक्षधर रहे। वह दहेज प्रथा के विरोधी थे उनके विचार में धन के लालच में किया गया विवाह, विवाह नहीं होता यह एक कुकृत्य है और दहेज मांगने वाले हर व्यक्ति को विवाह के अयोग्य करार कर देना चाहिए। वे नारी शिक्षा, स्वतंत्रता, समानता के अधिकार देने की हमेशा वकालत करते रहे। गांधीजी के शब्दों में नारी ईश्वर यानि परमात्मा की सर्वोत्कृष्ट कृति है। वह अहिंसा की अवतार है तथा अपने धार्मिक आग्रहों के परिप्रेक्ष्य में पुरूष जाति से कोसों आगे है। हमारी संस्कृति के आयाम बहुत अद्भुत है। जहां एक और नारी को पूजनीय और ममतामयी माना जाता है वहीं दूसरी ओर उसे भोग्या भी समझा जाता है। मानवता के लिए शर्मनाक स्थिति तब बन जाती है जब उसे इंसान ही नहीं समझा जाता। नारी के आजाद अस्तित्व को भी नकार दिया जाता है। गांधीजी ने स्त्रियों की इस स्थिति का गहन आंकलन किया। गांधीजी का कहना था पुत्र प्राप्ती के लिए हम इतने नेत्रहीन हो जाते है और यह भी भूल जाते है कि पुत्र की पैदायशी के लिए सबसे अहम योगदान स्त्री का ही होता है। महात्मा गांधीजी अपने पूरे आंदोलन स्त्रियों के सुधार की बात करते है।

भूमिका

वर्तमान समय में अनगिनत महिलाओं ने योग्यता के बल पर विश्व स्तर पर अपनी पहचान

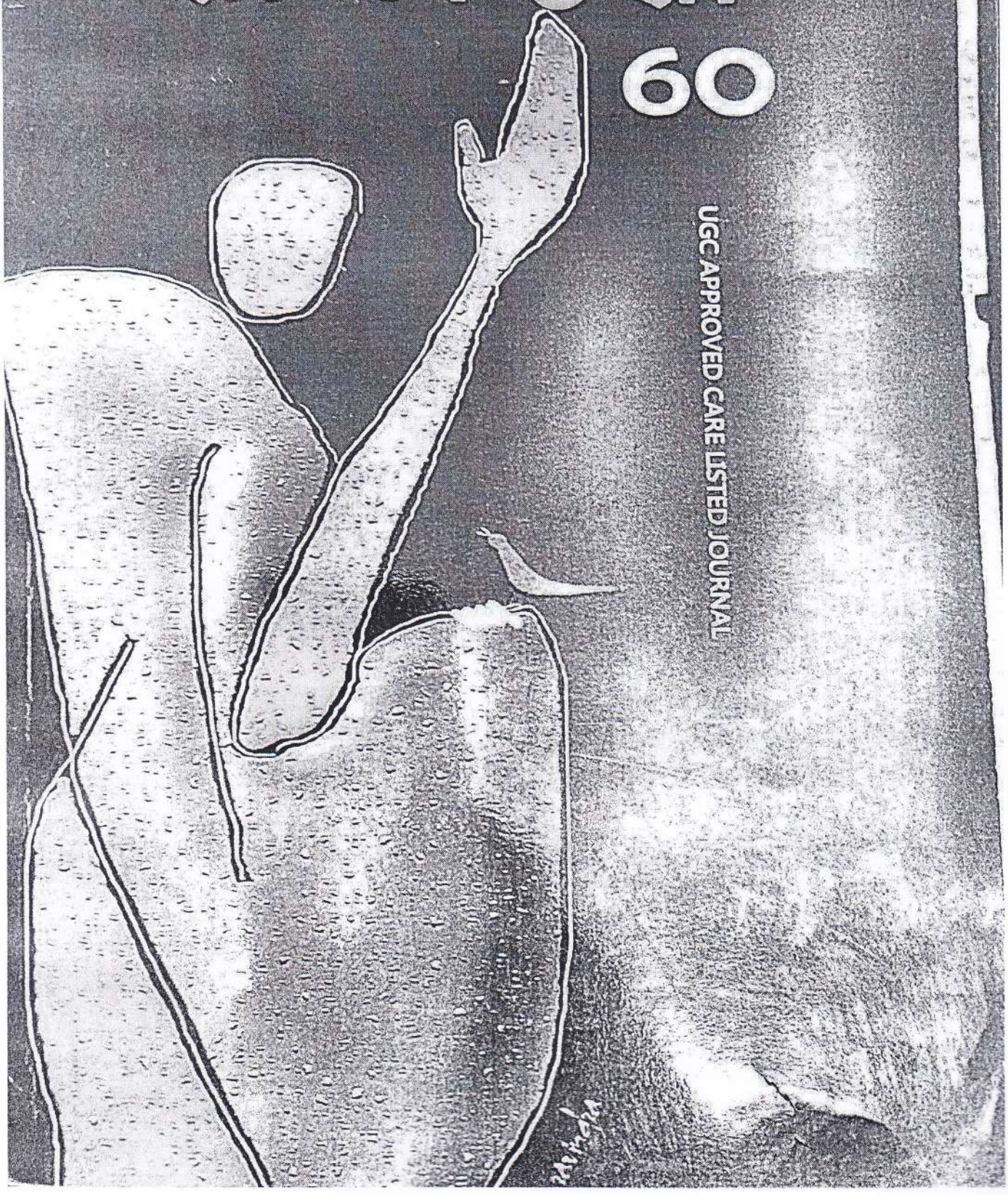
संपादक
डॉ. गिरिराजशरण अग्रवाल
डॉ. मीना अग्रवाल

ISSN 0975-735X

शोध दिशा

60

UGC APPROVED CARE LISTED JOURNAL



उन्नीसवीं शताब्दी में छत्तीसगढ़ की मराठाकालीन सामाजिक स्थिति : एक अध्ययन

ममता ध्रुव, शोधार्थी
डॉ० डिश्वर नाथ खुटे, शोध निर्देशक, इतिहास अध्ययनशाला
पं० रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ०ग०)

छत्तीसगढ़ वर्षों की राजनीतिक उथल-पुथल तथा ऐतिहासिक और राजनीतिक परिवर्तनों के बावजूद आज भी अपनी प्राचीन परंपराओं को अक्षुण्ण बनाए रखा है। यहाँ अरण्यक और अर्द्धनगरीय सभ्यताओं के विकास का स्पष्ट इतिहास दिखाई देता है। अरण्यक सभ्यता के रूप में जनजातियों की अनोखी रीति-नीति दिखाई पड़ती है। वहीं अर्द्धनगरीय सभ्यता उन लोगों में दिखाई देती है, जो अन्य प्रांतों से आकर यहाँ निवास करने लगे प्रदेशवासी प्रकृति की अनुकंपा प्राप्त करने के लिए अनेक देवी-देवताओं की पूजा-अर्चना करते रहे हैं। उन्नीसवीं शताब्दी में भी लोग स्वभाव से सरल, कृतज्ञ, सहिष्णु एवं उदार होते थे। शिक्षा तथा जागरूकता का अभाव था। यह पिछड़ापन आज भी परिलक्षित होता है। छत्तीसगढ़ में यद्यपि वर्ण-व्यवस्था का प्रचलन उन्नीसवीं शताब्दी में भी था तथापि उनमें कट्टरता का अंश कम है। आदिवासी सभ्यता के प्रभाव से मैदानी क्षेत्रों का समाज भी अछूता न रहा और तंत्र-मंत्र संबंधी कृत्यों के लिए संपूर्ण छत्तीसगढ़ एक ही प्रकार की मान्यता वाला क्षेत्र बन गया। अंधविश्वास का बोलबाला था। कभी-कभी तो यह भावना पराकाष्ठा को पहुँच जाती थी और उच्चाटन सम्मोहन, वशीकरण आदि विद्याओं में निपुण व्यक्तियों को ग्राम-बहिष्कार, शारीरिक यातना, कभी-कभी प्राण-दंड भी भोगना पड़ता था।

प्राचीनकाल में भी गाँवों में निवास करने वाले लोगों की आजीविका प्रायः कृषि पर ही निर्भर होती थी। अर्थव्यवस्था में सभी वर्गों के बीच सहकारिता की भावना होती थी। कुम्हार, खाती, लुहार, नाई, धोबी, आदि को विशेष अवसरों पर यथेष्ट सम्मान मिलता था तथा समाज में यथासंभव समानता का व्यवहार किया जाता था। ब्रिटिश शासन के पूर्व छत्तीसगढ़ की सामाजिक स्थिति का उल्लेख अँग्रेजी अभिलेखों में भी प्राप्त होता है। छत्तीसगढ़ की सामाजिकी को प्रकाशित करने वाले अभिलेख अध्ययन की दृष्टि से महत्त्वपूर्ण हैं।

छत्तीसगढ़ के इतिहास में 10वीं शताब्दी से लेकर 18वीं शताब्दी तक कलचुरि राजवंश सत्ता में रही। प्राचीन राजवंशों में कलचूरियों का इतिहास भी अभीष्ट रहा और 1742 ई० में सत्ता का सूर्यास्त हो गया तथा नागपुर से चलने वाले मराठों के अधीन भांसलों का प्रभुत्व स्थापित हो गया। रघुजी भांसले-प्रथम, मराठों का साहसी एवं महत्त्वाकांक्षी सरदार था, वह अन्य मराठा सरदारों होल्कर, सिंधिया, गायकवाड़ की भाँति अपने प्रभाव एवं विस्तार के लिए प्रयत्नशील था।

नागपुर के राजा रघुजी भोंसले ने अपने चारों पुत्रों के मध्य भोंसला राज्य का बँटवारा कर दिया। छत्तीसगढ़ प्रदेश उसके छोटे पुत्र बिंबाजी भोंसले को प्राप्त हुआ था।[2] 1755 ई० में रघुजी भोंसले की मृत्यु के बाद छत्तीसगढ़ में मराठों के प्रतिनिधि शासन का आरंभ हुआ। बिंबाजी 1758

ISSN 0975-735X

ISSN 0975-119X

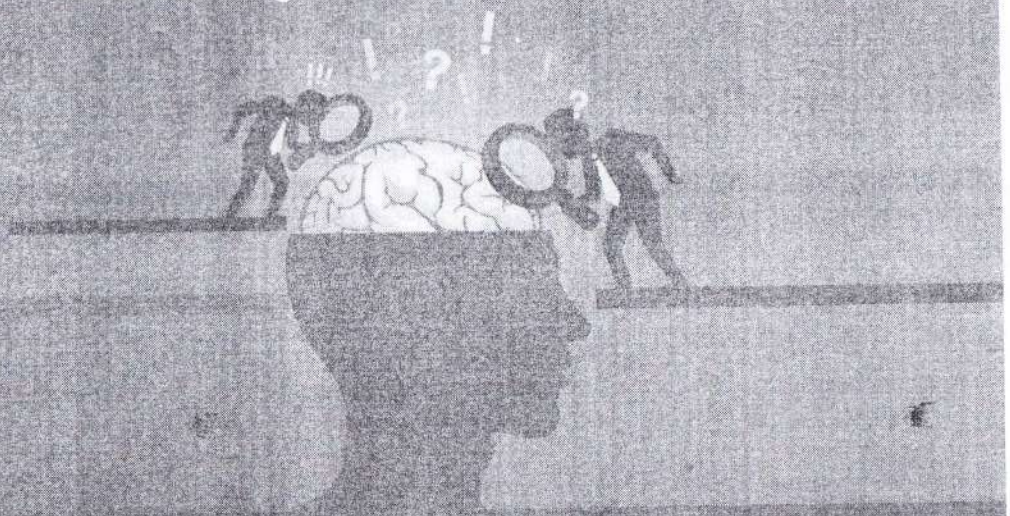
UGC-CARE GROUP I LISTED

वर्ष 13 अंक 1 जनवरी-फरवरी 2021

दृष्टिकोण

कला, मानविकी एवं वाणिज्य की मानक शोध पत्रिका

India's Leading Refereed Hindi Language Journal



IMPACT FACTOR : 5.051

मराठा कालीन छत्तीसगढ़ की सामाजिक स्थिति का ऐतिहासिक पुनरावलोकन (सन 1741 से 1818)

डॉ० डिश्वर नाथ खुटे

शोध निर्देशक, इतिहास अध्ययन शाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छत्तीसगढ़)

ममता ध्रुव

शोधार्थी, इतिहास अध्ययन शाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छत्तीसगढ़)

सारांश-

छत्तीसगढ़ में अरण्यक तथा अर्ध-नागरिक सभ्यताएं एक साथ पाई जाती थी। अरण्यक सभ्यता के रूप में हमें आदिवासियों की अनोखी रीति-नीति दिखलाई पड़ती है। अर्ध-नागरिक सभ्यता के उन लोगों में दिखाई पड़ती है, जो यहां मैदानी क्षेत्र में दूसरे प्रदेश से आकर रहने लगे हैं। परिणामत: यहां की सभ्यता को मिश्रित सभ्यता कहा जा सकता है। अपनी इन्हीं भौगोलिक विशेषताओं के कारण छत्तीसगढ़ अपने में अनेक संस्कृतियों का पोषण कर उन्हें बनाये रखने में सफल रहा है।

सामान्यत: आधुनिकतम सभ्यता इस क्षेत्र से प्राय: दूर ही रही है। कारण यह है कि इस भौगोलिक रचना ने इसके सामाजिक जीवन को बहुत अधिक प्रभावित किया है। यहां के लोग प्रकृति पर ही निर्भर रहते हैं और प्रकृति की अनुकम्पा प्राप्त करने के लिये अनेक देवी-देवताओं की आराधना-अर्चना करते रहे हैं। समय-समय पर जो अन्य लोग (इस क्षेत्र के बाहर के लोग) यहां आये उनका प्रभाव भी यहां के निवासियों के जीवन पर पड़ा है।

लोग स्वभाव से सरल, उदार, कृतज्ञ और सहिष्णु होते थे। शिक्षा की कमी एवं शासकों की उपेक्षा के कारण यहां के जीवन में विशेष विकास या सुधार सैकड़ों वर्षों तक नहीं हो सका था और बहुत कुछ सीमा में यह पिछड़ापन आज भी अपने पूर्ण रूप से विद्यमान है। छत्तीसगढ़ में यद्यपि वर्ण-व्यवस्था प्रचलित थी तथापि उनमें कट्टरता कम थी। ब्राह्मण लोग पूजनीय माने जाते थे। क्षत्रिय और वैश्य भी समान आदर के अधिकारी थे।

छुआछूत का भी अधिक प्रचार नहीं था। इसके विपरीत समय-समय पर जादू-टोने आदि के व्यभिचार-कृत्यों में शूद्र-वर्ग को जो इसमें निष्णात माने जाते थे बहुत आदर प्राप्त होता था। बैगा, गुनिया आदि लोगों का समाज में सम्मान होता था। आदिवासी क्षेत्रों 565 में तो इनका महत्त्वपूर्ण स्थान था। आदिवासी सभ्यता का प्रभाव मैदानी सभ्यता पर भी पड़ा। इसलिए तन्त्र-मन्त्र सम्बन्धी कृत्यों के लिये सम्पूर्ण छत्तीसगढ़ एक ही प्रकार की मान्यता वाला क्षेत्र बन गया। अन्ध-विश्वास का यहां महत्त्वपूर्ण स्थान रहा है। कभी-कभी तो यह भावना पराकाष्ठा को पहुंच जाती थी और वशीकरण, उच्चाटन आदि विद्याओं में निपुण व्यक्तियों को ग्राम-बहिष्कार शारीरिक यातना और कभी-कभी प्राण-दण्ड की सजा का भी भाजन होना पड़ता था। वर्तमानकाल की ही तरह आलोच्य काल में भी छत्तीसगढ़ के गाँवों के लोग प्राय: कृषि कार्य करते थे। इस कार्य में सभी वर्गों के लोगों में सहयोग एवं सहकारिता की भावना होती थी।

विशिष्ट धंधा करने वाले लोगों को समाज में विशेष सम्मान प्राप्त होता था। लुहार, नाई, धोबी, कुम्हार और कहार आदि को अवसर के अनुकूल अभीष्ट सम्मान मिलता था। यहां के समाज में यथा सम्भव समानता का व्यवहार किया जाता था। अंग्रेजों के आगमन के पूर्व छत्तीसगढ़ की सामाजिक दशा का उल्लेख अंग्रेजी अभिलेखों में भी मिलता है।

शब्द कुंजी-वेशभूषा, रीति, रिवाज, भाषा, प्रकृतिवाद, धर्म, संस्कार, जनजाति, सहकारिता, सभ्यता।

उद्देश्य-

इस अध्ययन का लगातार बदलती राजनीति के दौर में मराठा कालीन शासन व्यवस्था का छत्तीसगढ़ की सामाजिक स्थिति पर पड़ने वाले प्रभाव का अध्ययन करना। पाश्चात्य सभ्यता व संस्कृति के आगमन से छत्तीसगढ़ के सामाजिक एवं आर्थिक ढांचे में आमूल-चूल परिवर्तन होने लगे। शोधार्थी की इस विषय पर अध्ययन करने के पीछे निहित उद्देश्य उस काल के लोगों के आचार, विचार, पहनावा, भाषा, व्यवहार व शिष्टाचार में पड़ने वाले प्रभाव का अध्ययन करना है।

ISSN 0975-119X

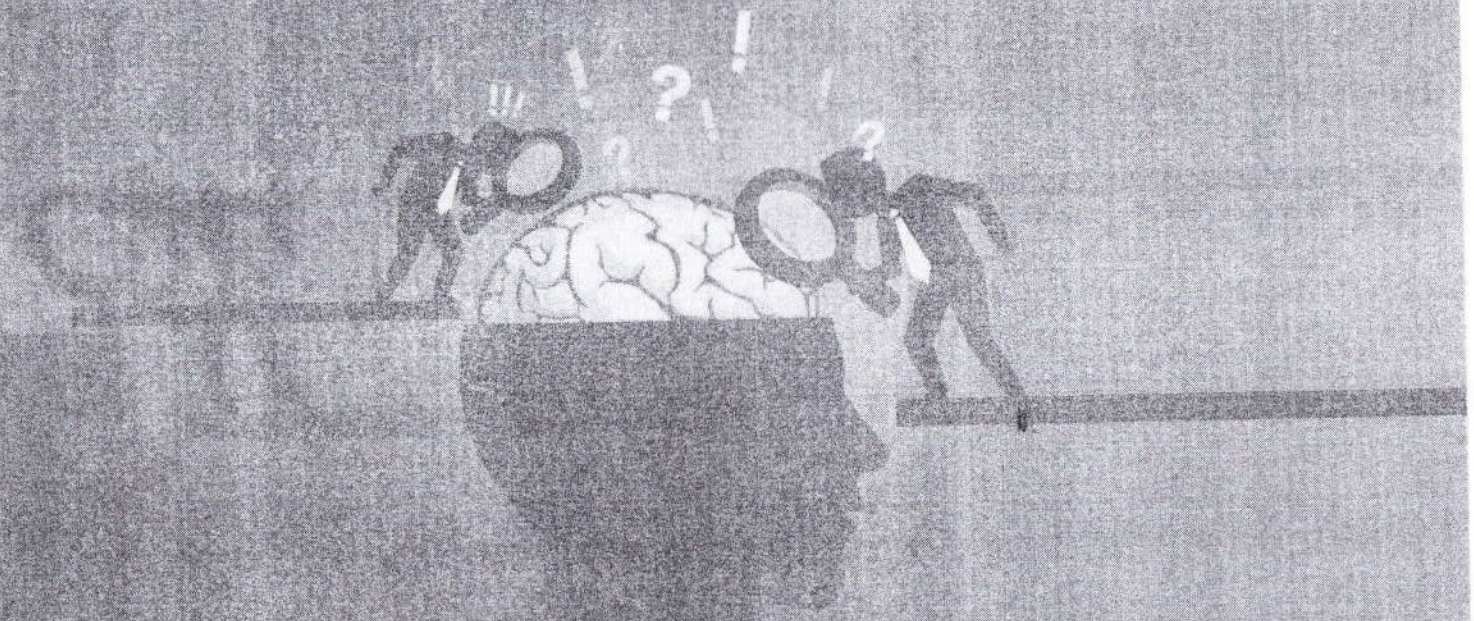
UGC-CARE GROUP I LISTED

वर्ष 13 अंक 1 जनवरी-फरवरी 2021

दृष्टिकोण

कला, मानविकी एवं वाणिज्य की मानक शोध पत्रिका

India's Leading Refereed Hindi Language Journal



IMPACT FACTOR 5.051

बस्तर में आदिवासियों का परलकोट विद्रोह: एक ऐतिहासिक पुनरावलोकन

डॉ० डिश्वर नाथ खुटे

शोध निर्देशक, इतिहास अध्ययनशाला, पं. रविशंकर शुक्ल विश्वविद्यालय रायपुर छत्तीसगढ़

ईश्वर लाल

शोधार्थी, इतिहास अध्ययनशाला, पं. रविशंकर शुक्ल विश्वविद्यालय रायपुर छत्तीसगढ़

सारांश:-

बस्तर के आदिवासी भी संपूर्ण विश्व के आदिवासियों की भांति अपनी मातृभूमि से अत्यधिक लगाव रखते हैं। वे स्वयं को प्रकृति की संतान मानते हैं तथा प्राकृतिक संसाधनों की सुरक्षा को अपना दायित्व स्वीकार करते हैं। इन आदिवासियों की अपनी सांस्कृतिक परम्पराएं हैं तथा वे स्वतंत्र जीवन शैली के समर्थक रहे हैं।

अंग्रेजी शासन के विरूद्ध बस्तर के आदिवासी विद्रोहों का मूल आधार अपने सांस्कृतिक विरासत की रक्षा करना था। बस्तर अंचल के अलग-अलग स्थानों में लगातार अनेक विद्रोह होते रहे जिसमें आदिवासियों का ध्येय निजी स्वतंत्रता और अपने भौगोलिक प्रदेश की रक्षा करना था जहां वे किसी अन्य की उपस्थिति को स्वीकार नही करते, अपने उस प्राकृतिक संपदा की सुरक्षा करना था जिसके समक्ष वे अपनी भूमिका संरक्षक के रूप में देखते हैं। बाहरी शासकों के उस शोषण का विरोध करना था जिसके द्वारा उनकी निजता एवं संपत्ति दोनों को निर्यातित करने का प्रयास किया जा रहा था।

व्यापारी, अंग्रेज अधिकारी, सैनिक, यात्री तथा सभी ऐसे लोग जिनका प्रत्यक्ष भुस्थैतिक संबध बस्तर की धरती से नही रहा हो उन लोगों से बस्तर के आदिवासियों का तीव्र वैचारिक मतभेद था। बस्तरवासी इन्हे बाहरी मानते थे तथा सभी बाहरी लोगों के लिए उनके व्दारा "दीकू" जैसे संप्रत्यय का प्रयोग करते थे। दीकूओं की उपस्थिति से आदिवासी अपनी मातृभूमि संस्कृति तथा संसाधनों की सुरक्षा के प्रति असहज महसूस करते थे तथा इनको सुरक्षित और संरक्षित करने के लिए आदिवासी सदैव अपने स्वजातिय समूहों में अपने पारम्परिक अस्त्र शस्त्रों के व्दारा बाहरी लोगों के विरूद्ध संघर्ष करते रहते थे।

आदिवासी संस्कृति की धरती बस्तर में 1774 ई. के हल्बा विद्रोह से आरंभ होकर 1921 ई. में परलकोट में घटित मधुमक्खी विद्रोह तक की सभी घटनाएं स्थानीय आदिवासी बनाम बाहरी के वैचारिक परिप्रेक्ष्य में ही लड़े जाते रहे हैं। उनमें अपनी संस्कृति की रक्षा करने की भावना थी जिस पर बाहरी हस्तक्षेप को वे कदापि स्वीकार नही करते तथा अपने प्राकृतिक स्वतंत्रता को बनाये रखने की उनकी वह भावना जहां अपने परिवेश में अपने लिए आवश्यक नियम वे स्वयं बनाते हैं। बस्तर के आदिवासियों ने शोषण के खिलाफ अपना आवाज बुलंद किया और अपने तीर-कमान, तलवार, कुल्हाड़ी आदि जैसे पारम्परिक शस्त्रों से विरोधियों का डटकर मुकाबला किया तथा मृत्यु तक का आलिंगन कर लिया।

शब्द कुंजी - आदिवासी, विद्रोह, शोषण, राष्ट्रप्रेम, संस्कृति, तीर-कमान, अंग्रेज, स्वतंत्रता, दीकू।

शोध का उद्देश्य -

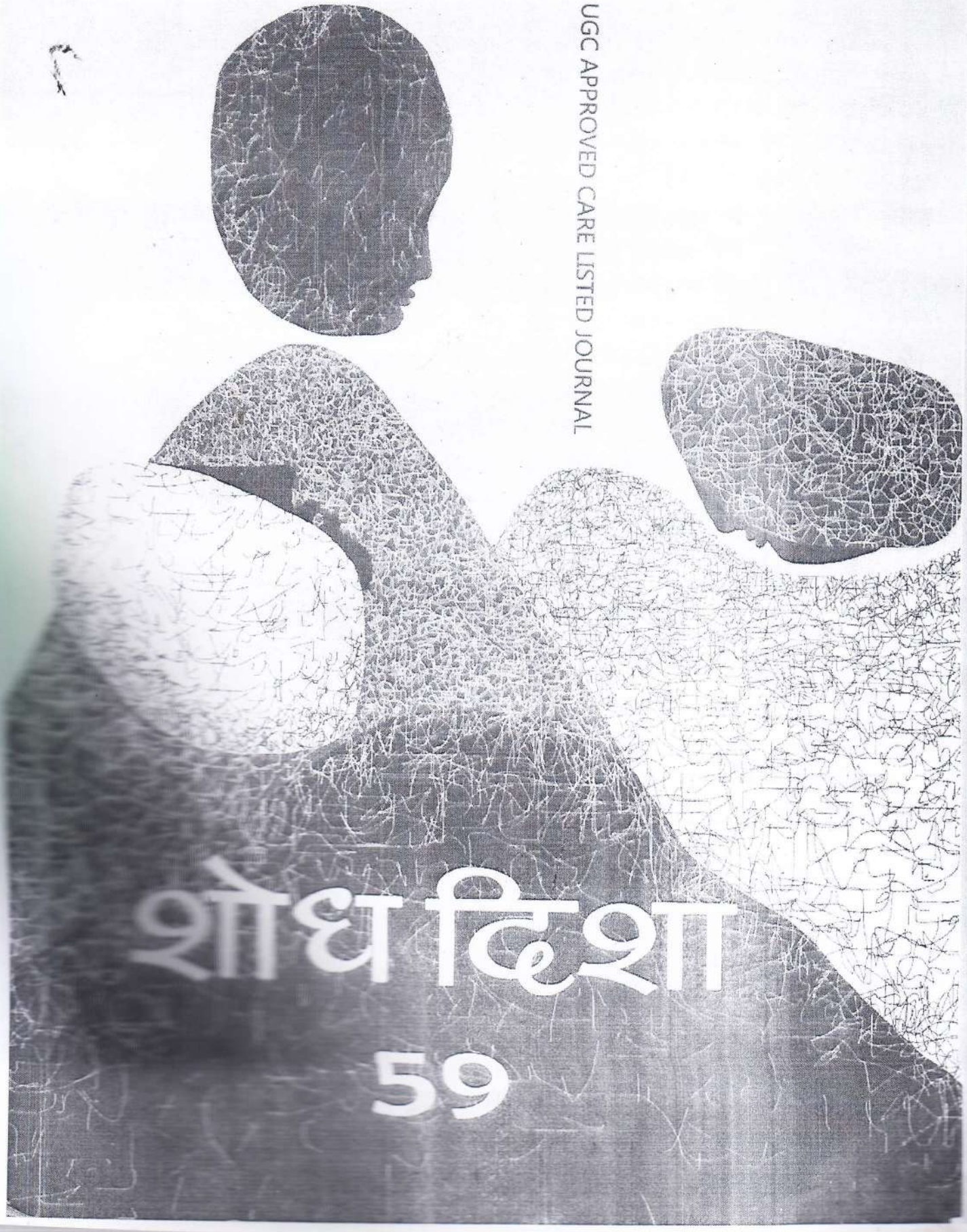
प्रस्तुत शोध पत्र के अध्ययन से बस्तर के आदिवासी विद्रोहों में निहित आदिवासियों के विचारों एवं दृष्टिकोण की जानकारी प्राप्त करने में सहायता प्राप्त होगी। यह अध्ययन औपनिवेशिक भारत में आदिवासियों के विद्रोहों से संलग्न वैचारिक तथा भावनात्मक तथ्यों का रहस्य उद्घाटित करेगा। तत्कालिन मराठा तथा ब्रीटिश शासन की जनविरोधी नीतियों की जानकारी प्राप्त होगी।

उन्नीसवीं शताब्दी में बस्तर में आदिवासियों ने अंग्रेजों के विरूद्ध लगातार विद्रोह किये जहां उनके संघर्षों का मूल आधार प्रकृति प्रेम, स्वतंत्र प्रियता, संस्कृति एवं प्राकृतिक संसाधनों की सुरक्षा तथा अपनी मातृभूमि से जुड़ी क्षेत्रीय भावना रही है। उन्नीसवीं शताब्दी में बस्तर के आदिवासी विद्रोहों में प्रमुख परलकोट विद्रोह के स्वरूप का अध्ययन तथा इन विद्रोहों के मूल में छुपे उनके भावनात्मक एवं वैचारिक दृष्टिकोण का रहस्योद्घाटन आवश्यक है जिससे उनके दार्शनिक पक्ष से संबंध रखने वाले नवीन तथ्यों और जानकारियों को सामने लाया जा सके।

संपादक
डॉ. गिरिराजशरण अग्रवाल
डॉ. मीना अग्रवाल

ISSN 0975-735X

UGC APPROVED CARE LISTED JOURNAL



शोध दिशा

59

मुरिया जनजाति की काष्ठकला
(बस्तर के विशेष संदर्भ में)

डॉ॰ बंसो नुरूटी, शोध निर्देशक
पुरोहित कुमार सोरी, शोधार्थी

जनजातियाँ कला की दृष्टि से विश्व में अपनी एक अलग विशिष्ट पहचान रखती हैं। यद्यपि वे लोग विज्ञान एवं प्रौद्योगिकी की बारीकियों को नहीं जानते परंतु इसका तात्पर्य यह नहीं है कि उनकी कला में विशिष्टता नहीं है। जनजातियों की कला उनकी भौगोलिक वातावरण तथा पर्यावरण से प्रभावित होती है, जिससे उनकी कला को प्रेरणा मिलती है।

ई॰आर॰ लीच के अनुसार, 'जनजातीय लोग कला की वस्तुओं का उपयोग धार्मिक उत्सवों, निजी वस्तुओं की सजावट तथा मृत पूर्वजों की याद में स्मारक इत्यादि बनाने हेतु करते थे। इनकी कला धार्मिक तथा धर्मनिरपेक्ष होने के साथ-साथ उपयोगितावादी तथा आलंकारिक दोनों होती है अर्थात् इनकी कला शुद्ध रूप से कलात्मक होती है।'[1]

मुरिया जनजाति के लोग अपनी आवश्यकतानुरूप प्रत्येक काष्ठवस्तु का निर्माण स्वयं करते हैं। परंपरागत रूप से मुरिया जनजाति लकड़ी की बनी वस्तुओं को अपनी जीवन पद्धति में समाहित करती रही है इसलिए मुरिया जनजीवन में काष्ठ निर्मित प्रत्येक वस्तु में सौंदर्य और अलंकरण का सार परिलक्षित होता है। इस कला में विभिन्न रूपाकारों को अपनी कला प्रदर्शन की सुविधा और स्वतंत्रता है इसलिए काष्ट पर मुरिया की स्मृति और स्वप्न भी अंकित होते हैं। बस्तर की काष्ठ शिल्पकला मुरिया जनजाति की आदिम कला का अद्वितीय उदाहरण है।[2]

बस्तर में काष्ठकला का प्रचलन आदिकाल से है। मानव ने पत्थर के बाद लकड़ी को सबसे पहले अपनी सुरक्षा के लिए अपनाया। हथियार के रूप में वही लकड़ी धीरे-धीरे जीवनयापन का प्रमुख अंग बनती गई। जिस पर उसने सुंदर बेल-बूटे, फूल-पत्तियाँ आदि कलाकृतियाँ उकेरीं और हथियार में लगा रहनेवाला यह लकड़ी का बेत उनकी कलात्मक अभिरुचि बन गई।[3]

काष्ठकला की परंपरा बहुत प्राचीन और समृद्ध है। लकड़ी ने विभिन्न रूपाकारों को उतारने की कोशिश मनुष्य ने आदिम युग से शुरू कर दी थी। प्राचीनकाल से ही लकड़ी (काष्ठ) का उपयोग सामान्य घरों के निर्माण के साथ-साथ विशालतम भवनों के निर्माण में होता रहा है। कौटिल्य के अर्थशास्त्र के अध्ययन से पता चलता है कि पाटलीपुत्र के मौर्यकालीन राजप्रासाद का निर्माण लकड़ियों से ही हुआ था। इस तथ्य की पुष्टि पुरातत्त्व विभाग कि खुदाई के दौरान वर्तमान पटना शहर के पास लकड़ी के राजप्रासाद के अवशेष मिलने से हुई है। काष्ठकला का इतिहास आज से लगभग 3500 वर्ष पुराना है। ऋग्वेदकाल के पहले से ही भारतीयों को काष्ठकला का ज्ञान था। वर्तमान बस्तर संभाग के जनजातीय लोगों ने आज भी काष्ठकला के महत्त्व को सँजोए रखा है। संपूर्ण बस्तर संभाग के विभिन्न क्षेत्रों में रहनेवाले जनजातीय समूह जैसे कि गोंड, मुरिया, माड़िया, भतरा, धुरवा, हल्बा एवं परजा जाति के लोग विभिन्न प्रकार के आर्थिक क्रियाकलापों में

 ISSN 0975-735X

E- ISSN 2582-5429
AMRJ
Akshara Multidisciplinary Research Journal
Single Blind Peer Reviewed & Refereed International Research Journal
April 2023 Special Issue 08 Volume IV SJIF Impact- 5.67

Akshara Multidisciplinary Research Journal

Peer-Reviewed & Refereed International Research Journal

April 2023

Special Issue 08 Volume IV

The History & Culture of India

Guest Editor

Dr. Pankaj Singh
Assistant Professor, History
Dr. Harisingh Gour Vishwavidyalaya Sagar
Madhya Pradesh

Dr. M. C. Arya
Assistant Professor, History
Govt Degree College Doshapani, Nainital
Uttarakhand

Akshara Publication
Plot No 143 Professors colony,
Near Biyani School, Jamner Road. Bhusawal Dist Jalgaon Maharashtra 425201

E- ISSN 2582-5429
Akshara Multidisciplinary Research Journal
Single Blind Peer Reviewed & Refereed International Research Journal
AMRJ
April 2023 Special Issue 08 Volume IV SJIF Impact- 5.67

14

माड़िया जनजाति के जनजीवन में लोककथा का महत्व

डॉ. बंसो नुरूटी
सहायक प्राध्यापक इतिहास अध्ययन शाला
पं. रविशंकर विश्वविद्यालय, छत्तीसगढ।

सारांश :

विश्व एवं भारत के विभिन्न क्षेत्रों में आदिवासी समुदाय के लोग बडी संख्या में निवास करते हैं। पृथक– पृथक क्षेत्रों में निवास करने वाले भिन्न–भिन्न संस्कृति के लोगों की हजारों ऐसी मान्यताएं है। आदिवासी समुदाय की देवी–देवता एक बडी संख्या में नजर आते है जो इन्हें दुख के समय सुख शांति प्रदान करते हैं। वे प्रकृति के गोद में रात–दिन रचे बसे हैं। और खाली समय में वे अपने परिवार के साथ मनोरंजन करते हुए जीवन की विषमताओं को दूर करने के लिए कथा, कहावतें, लोकनृत्य, गीत इत्यादि को सुनाकर सहयोगियों का मनोरंजन करते रहते हैं। लोक जीवन में लोक कथा का अत्यंत ही महत्व है। इसके संरक्षण एवं अनुशीलन के द्वारा लोककथा का विकास किया जा सकता है। लोककथा में धर्म , समाज, सदाचार आदि बातों का समावेश मिलता है। इसके अतिरिक्त लोककथा के द्वारा स्थानीय इतिहास एवं भूगोल संबंधी जानकारी मिलती हैं। लोककथा में अधिक मात्रा में मौखिक ऐतिहासिक तथ्य पाये जाते हैं। जिसके माध्यम से आंचलिक एवं राष्ट्रीय स्तर की ऐतिहासिक घटनाओं को क्रमबद्ध करने में सहायता मिलती है। विभिन्न क्षेत्रों के लोक गीतों द्वारा वहॉ के स्वर्णिमय अतीत , उद्योग, व्यापार–व्यावसाय, आर्थिक दशा आदि की जानकारी मिलती है।

शब्द कुंजी : लोककथा ,ऐतिहासिक, मौखिक, भारतीय समाज, प्रकृति, संरक्षण।

भूमिका :

लोक कथाएं तथा गीत आदिवासियों के सुख–दुख आदि को दर्शाते है। यह व्यंग्य और कौतुहल से परिपूर्ण होती है। यह कथाएं दैनिक जीवन के सहचार्य के रूप में जैसे कि वृक्ष, पुष्प, पशु–पक्षी, नदी–नालें, छोटे–बडे पर्वत उनकी कथाओं का अभिन्न अंग बन गये हैं। यह लोक कथायें आदिवासी समुदाय के लोगों के अभिव्यक्ति का महत्वपूर्ण अंग है। जितना इतिहास पुराना है, उतनी ही उनकी कहानियां भी पुरानी हैं। उनकी लोककथाओं में संस्कृति का संरंक्षण ही नहीं हुआ बल्कि यह लोक संस्कृति का संवाहक के रूप में भी काम करते आ रही हैं। यह एक पीढ़ी से दूसरी पीढ़ी तक लोकज्ञान पहुंचाने का कार्य करती है। इसका माध्यम मौखिक होने के कारण जिसमें कुछ पुराने अंश छुट जाते हैं। और कई बार नये अंश जुड़ भी जाते हैं। इसीलिए लोककथाओं में परिवर्तन देखने को मिलता है। समय और परिवेश के साथ–साथ मनुष्य जीवन में भी परिवर्तन अनिवार्य हो जाता है । जिसका प्रभाव लोक कथाओं में भी दिखाई देता है। जैसे कि – किसी दादी ने अपने पोते को उसके बचपन में कहानी सुनाई हो वह पोता बुढ़ा हो जाने के बाद उस कहानी को ठीक उसी तरह नहीं सुनायेगा जैसे कि उसके दादी ने उसे सुनाई थी। यह मौखिक परंपरा की विशेषता है। यह मनोरंजन के साथ–साथ जातीय एवं सामाजिक रीति–रिवाजों को जीवित रखा है। तथा धार्मिक विश्वासों को अधिक प्रभावशील बनाया है। देवी–देवता विषयक धारणाओं को बलवती बनाने में इन कथाओं का योगदान सदा स्मरणीय होगा।[1]

लोक कथाओं की भाषा–शैली सरल एवं प्रवाहमयी होती है। आदिवासियों की कई बोलियाँ हैं। मूल बोली में कही गई ये कथाएँ बड़ी रोचक और कर्ण–प्रिय लगती हैं। इनके माध्यम से आदिवासियों की संस्कृति एवं सभ्यता को समझने में सरलता हुई है।[2]

उत्पत्ति

कथा शब्द संस्कृत के कथ धातु से बना है। जिसका अभिप्राय कहने के अर्थ के रूप में होता है। ''कथा'' शब्द के लिए ही प्रयुक्त होने वाला 'कहानी' शब्द कथा का ही अपभ्रंश है। कथा शब्द के भाव को 'आख्यान' एवं 'आख्यायिका' शब्दों में देखने मिलता है। आख्यान एवं आख्यायिका शब्द साहित्य से संबंधित हैं। जबकि कथा शब्द साहित्य और लोक साहित्य में उभयनिष्ठ हैं।[3] लोक कथाओं की उत्पत्ति के विषय में विद्वानों ने विभिन्न मत प्रस्तुत किये हैं। लेकिन कल्पना और अनुमान के आधिक्य के कारण किसी एक मत को पूर्ण रूप से स्वीकार नहीं किया जा सकता है। मौखिक परम्परा में होने के कारण लोक कथा का कोई

75
Azadi Ka
Amrit Mahotsav

REVISITING HISTORY

(Essays in Honour of Prof. Abha Rupendra Pati)

Prof. Ashok Kumar Patnaik
Dr. Dishwar Nath Khute
Dr. Banso Nuruti

9

मध्यकालीन भारत में मुस्लिम महिलाओं की स्थिति

डॉ. बन्सी पुरूटी

भूमिका

किसी भी देश की मौलिक एकता का संबंध इस देश के सांस्कृतिक मूल्यों तथा विकास से होता है। विविधताओं में एकता उत्पन्न करना संस्कृति का एक विशेष गुण होता है। किसी देश की एकता से हमारा तात्पर्य होता है कि उस देश के मूल्यों, विश्वासों, आध्यात्मिक विचारों, परम्पराओं, एवं व्यवहार आदि के संबंध में विचार करना। किसी भी राष्ट्र की एकता तब तक जीवित रहती है जब तक उस राष्ट्र की संस्कृति अपने आदर्शों में बंधी रहती है। जिसमें हम एक हैं की भावना निहित होती है। भारतीय संस्कृति ने इसी मौलिक एकता के कारण ही हजारों वर्षों तक अपने अस्तित्व को बनाए रखा है। यद्यपि भारत में विभिन्न प्रकार के धर्म को मानने वाले जातियों के लोग निवास करते हैं।

स्त्री और पुरूष समाज रूपी गाड़ी के दो पहिये के समान हैं, इनमें से अगर कोई कमजोर हो जाए तो समाज का संतुलन बिगड़ जाता है। किसी भी देश, समाज में नारी की स्थिति कैसी है, वह समाज की प्रगति का सूचक है। प्राचीन काल में महिलाओं को जीवन के प्रत्येक क्षेत्र में जैसे सम्पत्ति ,राजनीतिक, सांस्कृतिक, आर्थिक वैवाहिक आदि सभी अधिकार प्राप्त थे।[1] स्त्री पुरूष की अर्द्धांगिनी मानी गई थी।[2]इस दृष्टि से प्राचीन भारत में नारी की स्थिति श्रेष्ठ कही जा सकती है, उनमें पर्दा प्रथा, बाल विवाह, दहेज जैसी कुप्रथाएँ प्रवेश नहीं की थीं। वे स्वतंत्रता पूर्वक राजनीतिक, सामाजिक कार्य व धर्म--साहित्य के क्षेत्र में हिस्सा लेती थी।[3] उन्हें शिक्षा प्राप्त करने का अधिकार था। प्राचीन काल की कुछ विदुषी महिलाएं जैसे घोषा, लोपा, अपाला आदि हैं। महिलाओं की स्थिति अच्छी होने के बावजूद भी उन्हें पुरूषों के नियन्त्रण में रहना पड़ता था। उसका मुख्य कार्य पुरूष की सेवा करना और जीवन के प्रत्येक चरण में उस पर निर्भर रहना समझा जाता था। हिन्दुओं के धार्मिक दृष्टिकोण के अनुसार लड़की का जन्म पिता के बुरे कर्मों का फल माना जाता है।[4]

हिन्दू परिवारों के समान ही भारत में मुस्लिम महिलाओं की स्थिति भी अच्छी नहीं थी। मुस्लिम अभी भी प्राचीन ईरानी व अरबी परम्पराओं का अनुकरण किया जा रहा था, जो महिलाओं

ISSN : 0025-0422

JOURNAL
OF
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

सत्यं शिवं सुन्दरम्

Estd. 1949

Accredited Grade 'A' by NAAC

(SCIENCE & TECHNOLOGY)

VADODARA

2022

सत्यं शिवं सुन्दरम्
Estd. 1949

Journal of
The Maharaja Sayajirao University of Baroda

Certificate of Publication

Certificate of publication for the article titled:

A CRITICAL STUDY OF FREEDOM OF PRESS UNDER ARTICLE 19 (1) (A) AND ARTICLE 32 OF THE CONSTITUTION OF INDIA

Authored by

Dr. Venudhar Routiya

Assistant Professor, School of Studies in Law, Pt. Ravishankar Shukla University, Raipur (C.G.)

Volume No. 56 No. 8 -2022

in

Journal of The Maharaja Sayajirao University of Baroda

ISSN : 0025-0422

(UGC CARE Group I Journal)

MSU of Baroda

Editor
Journal MSU of Baroda

CONTENTS

ISSN : 0025-0422

JOURNAL
OF
THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

सत्यं शिवं सुन्दरम्

Estd. 1949

Accredited Grade 'A' by NAAC

(SCIENCE & TECHNOLOGY)

VADODARA

2022

Self Attested

CONTENTS

Self Attested

ANVESAK
ISSN : 0378 – 4568

Self Attested

UGC Care Group 1 Journal

A CASE STUDY OF MEDIA TRIAL IN INDIA: WITH SPECIAL REFERENCE TO AD- JUDICATURE OF SUPREME COURT AND HIGH COURTS

Nabee Khan
Ph.D. Scholar (Law), School of Studies in Law, Pt. Ravishankar Shukla University, Raipur (C.G.)

Dr. Venudhar Routiya
Assistant Professor, School of Studies in Law, Pt. Ravishankar Shukla University, Raipur (C.G.)

"The judiciary mandates social interest and non-interference in various spheres of society. Media intervention is neither desirable nor tolerable".

-M. P. Lohia Vs. State of West Bengal[1] -

This statement is based on the concept of media trial. In this case, the subordinate court refused the anticipatory bail of the accused. In this regard, the judges of the Supreme Court of India expressed that it is not justified to file a special petition against the decision of the subordinate court on the basis of media trial and expect justice.

INTRODUCTION:

The main objective of freedom of media is to inform the people about the happenings in the society through communication, so that public awareness is created among the people. However, the role of the media in reporting the criminal cases, in particular, is often criticized these days. The media sometimes goes out of its jurisdiction and starts interfering in the functioning of the court, then the question arises in the mind whether the media should stop reporting such criminal cases, which directly or indirectly interfere with the powers of the court?

The logic of this important question is that the media has begun to function as a public court. It now conducts parallel trials with the court. It fails to recognize the difference between an accused who is presumed innocent till proven guilty and a convict whose guilt is proved beyond reasonable doubt. Trial by media generally refers to a practice where the media starts its own investigation and creates a public opinion against the accused even before the trial begins. As such, it prejudices the trial thereby infringing the right of the accused to a fair trial.[2] Thus, an accused that should be presumed innocent until proven guilty is now presumed guilty, thereby violating his rights.

The impact and growth of electronic media in our country over the past ten years has changed the entire perception of reporting and its associated responsibilities. Where on the one hand the media has well expressed the pros and cons of social issues? There are also incidents

[1] A.I.R. 2005 S.C. 790
[2] Justice M. Jagannadha Rao, Chairman of Law Commission of India, 200th Report on Trial by Media, Free Speech and Fair Trial under Criminal Procedure Code, 1973, August 2006, pp. 13.

RELEVANCE OF PESA ACT IN THE LIFE OF TRIBAL COMMUNITY: AN ANALYTICAL STUDY (WITH SPECIAL REFERENCE TO CHHATTISGARH STATE PESA ACT 2022)

Dr. Alekh Kumar Sahu[*]

Abstract:

The Panchayats (Extension to Scheduled Areas) Act, commonly known as the PESA Act, is a crucial legislation that aims to empower and protect the rights of tribal communities residing in scheduled areas in India. This study examines the relevance of the PESA Act in the life of tribal communities, with a special focus on the Chhattisgarh State PESA Act of 2022. Through an analytical approach, the study explores the impact and effectiveness of the PESA Act in promoting self-governance, protecting customary rights, and ensuring the socio-economic development of tribal communities in Chhattisgarh. The study employs a comprehensive review of existing literature, including research articles, reports, and case studies, to analyze the relevance of the PESA Act in the context of Chhattisgarh. It examines the provisions of the Chhattisgarh State PESA Act of 2022, comparing them to the national PESA Act of 1996, to identify any specific modifications or enhancements made in the state legislation. Furthermore, the study investigates the implementation of the PESA Act in Chhattisgarh, assessing the progress made in establishing and strengthening gram sabhas, the primary decision-making bodies, and examining the extent to which tribal communities have been able to exercise self-governance and participate in local development processes. this research contributes to a deeper understanding of the specific provisions and modifications made at the state level and assesses the overall relevance of the PESA Act in the life of tribal communities.

Keywords: self-governance, customary rights, gram sabhas, PESA.

Introduction:

Indigenous Peoples are inheritors and practitioners of unique cultures and ways of relating to people and the environment. They have retained social, cultural, economic and political characteristics that are distinct from those of the dominant societies in which they live. Despite their cultural differences, Indigenous Peoples from around the world share common problems related to the protection of their rights as distinct peoples.

Indigenous Peoples have sought recognition of their identities, way of life and their right to traditional lands, territories and natural resources for years, yet throughout history , their rights have always been violated. Indigenous Peoples today, are arguably among the most disadvantaged and vulnerable groups of people in the world. Tribals and forest are synonymous and one cannot be separated from the other. They have emotional, psychological, and cultural attachments with the forest and have always lived in the forest. Before the British came in the ruling princes had rights over the forest and in far- flung areas. The tribals lived on forest produce and also by cultivating parts of the forest area. Over the centuries, the tribals were driven into the hills and forests by people who came from the North an took possession of the fertile lands in the river valleys.

The Englishmen brought in the Indian Forest Act 1927 , taking away the inherent rights of the tribal people. With one legislative stroke, the tribals became trespassers on their own land and became victims of externally motivated systems of forest management that directly violated various facets of their economic and cultural survival. The final act of atrocity on a largely unsuspecting population was the imposition of an alien judicial system and "law and order" machinery that subjugated them, further compounding their vulnerability and subservience. After independence these rights got transferred to state governments. In the process the inherent rights of the tribals and forest-dwellers got restricted to nistari rights – the right to free grazing and fuel wood – while rights over timber and non-timber produce remained with the state government. Over the years, the unholy nexus between the forest contractors and representatives of the government, for the incentive of getting tribal votes, encouraged large scale felling of forests. Consequently, in 1980 by enacting the Forest Conservation Act, the Government of India took away the rights of state governments to convert forest land for non-forest use. The state government now had to seek permission from the Government of India for any development work within the forest area. The new rules “Forest (Conservation) Rules 2022” state that a project, once approved by the FAC, will then be passed on to the

[*] **Assistant professor, school of studies in Law,Pt. Ravishankar Shukla University Raipur, Chhattisgarh**

EMPOWERING INDIGENOUS COMMUNITIES: A COMPREHENSIVE STUDY ON INDIAN TRIBAL RIGHTS AND PATHWAYS TO SOCIAL JUSTICE

Dr. Alekh Kumar Sahu*

Abstract

This research paper aims to provide a comprehensive analysis of Indian tribal rights and explore pathways to social justice for indigenous communities in India. Indigenous communities, often referred to as tribal or Adivasi communities, have a long history of marginalization, discrimination, and dispossession of their ancestral lands and resources. This study investigates the legal frameworks, policies, and socio-cultural factors that shape the rights and status of indigenous communities in India. The research begins by examining the historical context of indigenous communities in India, shedding light on the legacy of colonialism, land encroachments, and cultural assimilation policies that have adversely impacted these communities. It delves into the constitutional provisions and international legal instruments that safeguard the rights of indigenous peoples, focusing on the specific legal protections available to Indian tribes. The research also investigates the implementation and effectiveness of these legal frameworks in ensuring the empowerment and social justice of indigenous communities. Moreover, this study explores the socio-economic challenges faced by indigenous communities, including poverty, lack of access to education, healthcare, and basic amenities. It analyzes the socio-cultural factors contributing to the marginalization of indigenous communities, such as cultural erasure, stereotypes, and limited political representation. The research further investigates the role of grassroots movements, civil society organizations, and governmental initiatives in promoting the rights and well-being of indigenous communities. Finally, this paper identifies potential pathways to social justice and empowerment for indigenous communities in India. It examines successful models of community-led development, sustainable resource management, and inclusive governance that have led to positive outcomes for indigenous populations. It also highlights the importance of participatory approaches, community engagement, and cultural preservation in fostering social justice for indigenous communities. By providing a comprehensive understanding of Indian tribal rights and pathways to social justice, this research aims to contribute to the ongoing discourse on indigenous rights and support efforts to empower and uplift indigenous communities in India. It calls for policy reforms, awareness campaigns, and inclusive initiatives to address the systemic challenges faced by indigenous communities and promote their full and equal participation in Indian society.

Keywords: Discrimination, Social Justice, Marginalization, Indigenous.

Introduction:

In the diverse tapestry of Indian society, indigenous communities have long stood as custodians of rich cultural heritage, traditional wisdom, and unique ways of life. These communities, often referred to as tribes or indigenous peoples, have faced historical injustices, marginalization, and the violation of their rights. It is imperative to undertake a comprehensive study that delves into the intricate dynamics of Indian tribal rights, aiming to empower these communities and pave the way for social justice.

The research topic, "Empowering Indigenous Communities: A Comprehensive Study on Indian Tribal Rights and Pathways to Social Justice," seeks to shed light on the challenges faced by indigenous communities in India and explore effective strategies to enhance their rights and overall well-being. By analyzing historical and contemporary contexts, policy frameworks, and socio-cultural dynamics, this study aims to contribute to the ongoing discourse on tribal rights and social justice in India.

This research will address key themes, such as land rights, natural resource management, access to education and healthcare, cultural preservation, and political representation. By examining these interrelated aspects, we can better understand the complexities of indigenous communities' struggles and identify pathways for their empowerment.

DEFINATION OF INDIGENOUS PEOPLE :

The term "indigenous people" refers to distinct ethnic or cultural groups that are native to a particular region or territory and have a historical connection to the land they inhabit. Indigenous peoples are often characterized by their ancestral ties to the land, unique cultural traditions, languages, and social structures that have evolved over generations.

* **Assistant professor, school of studies in Law,Pt. Ravishankar Shukla University Raipur, Chhattisgarh**

State Surveillance and Corporate Surveillance

Priya Rao
Assistant Professor, S.O.S. In Law, Pt. Ravishankar Shukla University, Raipur CG India.
*Corresponding Author E-mail: **profpriyarao79@gmail.com**

ABSTRACT:
This Research Paper focuses on and deals with the various aspects of Surveillance in India and Internationally. The paper mainly focuses on the State of Surveillance in India and the laws revolving around it as well as the evolution of the Fundamental Right to Privacy in India. The concept of surveillance is divided into two sections of State Surveillance and Corporate Surveillance. It discusses the duty and the Liability of each concerning the Right to Privacy. The Paper also compares India's Privacy and Surveillance policy with The United States of America and The United Arab Emirates. The United States of America dramatically changed its Surveillance Policy after the terrorist attack of 9/11. The United Arab Emirates envisages a more liberal and comprehensive approach towards Surveillance in their State. It gives the detailed comparison between the laws of these three nations and the vices and virtues of these laws of each nation. The advantages and the disadvantages of surveillance are analysed on various aspects and with an international perspective. This paper attempt to give a comprehensive idea of Surveillance and its impact on the people as well as in the international level due to the fast-pacing globalization.

KEYWORDS: State Surveillance, Corporate Surveillance, India, USA, UAE.

INTRODUCTION:

The Surveillance Laws in India started with the enactment of The Telegraph Act, 1885 on 1st October 1885. This Law was responsible for surveillance and its regulation for more than a century. Later on, with the enactment of The Information Technology Act, 2000 on 9th June 2000; the surveillance laws in India are monitored under both of these laws. Hence, these two statutory regulations are the only ones that protect our newly recognized Fundamental Right of Privacy.

The Judicial Development of the Fundamental Right to Privacy has been complex, with broadly broad views.

The first case to discuss Privacy as a Fundamental Right was M.P. Sharma vs. Satish Chandra[1] in 1954, A bench of 8 Judges held that "There is no concept of Right to Privacy in our Constitution. This Right is available in the United States under the 4th Amendment of their Constitution." The second major case in 1963 was of Kharak Singh vs. State of Uttar Pradesh,[2] where a bench of 6 Judges clearly stated that the Right to Privacy is not a guarantee under our Constitution.

However, on the other side, Supreme Court Judgments with minor benches held the Right to Privacy as a Fundamental Right. The Gobind vs. Union of India[3] in 1975, a 3-judge bench held that – "India and the freedom of speech create an independent Right of Privacy as an emanation from them which one can characterize as a Fundamental Right, we do not think that the Right is absolute." In another case of R. Rajagopal vs. State of Tamil Nadu[4] and Peoples Union of Civil Liberties (PUCL) vs. Union of India[5] , a 2 Judge bench held that the Right to Privacy is enshrined in Art 21 of The Constitution of India, 1950.

Finally, due to recent conflicting judgments of the Supreme Court against its landmark judgments made the status of the Right to Privacy ambiguous in the Indian Court. Therefore, to have a clear and explicit position on this, the Supreme Court formed an 11 Judge Bench in the landmark case of Justice K.S. Puttaswamy vs. Union of India[6]. In this the bench unanimously held that the Right to Privacy is a Fundamental Right enshrined in our Constitution and can be traced to Article 14, Article 19 and Article 21 of The Constitution of India. The Court also stressed the need to enact a law on Data Privacy due to globalization and Technology. Therefore, this Judgement cleared the Court's position concerning Privacy. Hence, this Research Paper will also be viewed with the backdrop of the Right to Privacy and Surveillance Laws in India.

DATA PRIVACY BILL:

In July 2017, a committee was formed in response to the demand of a data protection law. This committee was held under the chairmanship of Justice B.N. Srikrishnan and hence came into being the legal framework draft of Personal Data Protection Bill, 2018. In furtherance of observation laid down in the case of Justice K.S. Puttasawmy vs. Union of India, the Personal Data Protection Bill was drafted based on the report of Justice B.N. Srikrishnan Committee, and introduced in 2019 by the Ministry of Electronics and Information Technology[7]. According to National Crime Record Bureau, there has been an increase of 11.8% in CyberCrime in 2020. Therefore, this Bill is a need of an hour as The Information technology Act, 2000 is the only legislated Law dealing with cyberspace data privacy and offences. The Preamble of this Bill explicitly mentions that the Right to Privacy is a Fundamental Right and that it is necessary to protect this data. Therefore, this Bill strives to protect people from illegal breach of Privacy through means of surveillance, whether done by the State or by any Corporate organization. Some of the Important aspects of this Bill are – 1. Types of Data – The Bill distinguishes data into two types - Personal Data and Sensitive Personal Data. The Bill provides more stringent laws for Sensitive Data than Personal Data as it deals with intimate details of a person that would cause significant harm to him if leaked.

ISSN **0975-6795 (Print)**
2321-5828 (Online)
DOI: 10.52711/2321-5828.2022.00046

Vol. 13 |Issue-04 |
October – December | 2022

Available online at
www.anvpublication.org

Research Journal of Humanities and Social Sciences
Home page *www.rjhssonline.com*

REVIEW ARTICLE

Death Penalty: Relevancy and Necessity

Dr. Priya Rao
Assistant Professor, S.O.S. In Law, Pt. Ravishankar Shukla University, Raipur CG.
*Corresponding Author Email: **profpriyarao79@gmail.com**

ABSTRACT:
The most debatable topic nowadays is capital punishment. Where most European countries are abolishing it to align with humanistic approach but some countries still retain this punishment. In our country although there is a shift from sentence of death to lesser sentence but there is also a clear intention of maintaining capital sentence to meet the ends of justice in appropriate cases.

KEYWORDS: Death Penalty, Relevancy, Necessity.

INTRODUCTION:
Since long time our society has been inflicting punishment upon wrongdoer, so that the society could be protected as well as other persons must be refrain from committing the same thing in the society.

The Death Penalty is a form of punishment whereby a state punishes a person who has been convicted of crime to death by execution. The Death Penalty has been widely abolished in most of the countries but also it has not been abolished or reinstated in some countries. In this article I want to discuss the necessity and relevancy of Death Penalty in India and whether or not it is still a relevant punishment in modern society.

Meaning of Capital Punishment:
The term 'Death Penalty' or 'Capital Punishment' stands for highest level of punishment, which is given in severe, grievous or heinous types of crime. May be the definition and extent varies from different scholars, countries, age group, but generally in jurisprudence, criminology, penology and common usage and sense capital punishment means sentence of death.

Received on 24.09.2022 Modified on 26.10.2022
Accepted on 05.12.2022
Res. J. Humanities and Social Sciences. 2022; 13(4):283-286.
DOI: 10.52711/2321-5828.2022.00046

HISTORICAL BACKGROUND:
There is no country where Capital Punishment has never existed. It is an ancient form of sanction. The first glimpse of Capital Punishment we find in Hammurabi Code of Law 18th century BC in which there were 25 offences punishable with capital punishment. After that Hitti Penal Code (10th century BC) and Derconian Penal Code of Athens (7th century BC) in which all offences were punishable with death penalty. Capital punishment for murder, treason, arson and rape was widely employed in ancient Greece under the law of Draco (7th century BCE) though Plato agreed that it should be used only for the incorrigible.

The Roman also used it for a wide range of offence, though citizens were exempted for a short period of time during the republic.[1]

Also it supported by Sir Henry Maine who stated that "Roman republic did not abolish death sentence though its non-use was primarily directed by punishment or exile and the procedure of questions.[2]

JURIST APPROACH AND THEORIS OF PUNISHMENT:
The Criminal Justice system is based on various theories of punishment. Sir Walter Moberly praises the definition given by Grotious that when a wrongdoer does a

SHODH SAMAGAM

ISSN : 2581-6918 (Online), 2582-1792 (PRINT)

Right to Life in Indian Constitution With Special Focus on Right to Food

Priya Rao, (Ph.D.), School of Studies in Law
Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, INDIA

ORIGINAL ARTICLE

Corresponding Author

Priya Rao, (Ph.D.), School of Studies in Law
Pt. Ravishankar Shukla University,
Raipur, Chhattisgarh, INDIA

shodhsamagam1@gmail.com

Received on : 20/03/2023
Revised on : -----
Accepted on : 27/03/2023
Plagiarism : 05% on 20/03/2023

ABSTRACT

This article focuses on the various aspects of Indian constitution related to the right to food. Special focus has been laid down on the Food Safety and Security Act, 2006. The paper addresses the important judgments laid down in the field of right to food. India is signatory to many international treaties involving right to food. Indian Constitution also indirectly refers to right to food. Therefore, there is an obligation for the Indian Government (Centre and states) to fulfill the right to food of the people.

KEY WORDS

Right to Life, Right to Food, Constitution, Hunger, Food Safety, Initiatives.

INTRODUCTION

The right to life and individual liberty are the primary early privileges for the development of human character. It is an ethical right that every person wherever should consistently possess. Right to life and individual liberty is the modern term for what has traditionally been regarded as "natural right." It is also regarded as one of the most important inherent and inalienable fundamental rights, which enables a person to live his life as he pleases. Article 3 of the Universal Declaration of Human Rights recognizes the right to life and individual liberty, stating, "Everyone has the right to life, freedom, and individual security." Article 9 of a comparable document states, "No one will be subject to inconsistent capture, detention, or deportation." It proves that the international community is comparable to the protection of human life and liberty. In Part III of the Constitution, under the heading Fundamental Right, the framers of our Constitution incorporated Article 21 which states, "No person shall

Vol. 9, No. 1, January - June, 2022
Print ISSN : 2348-1765
Online ISSN : 2348-1773

Journal of Information Management

IndianJournals.com
A product of Diva Enterprises Pvt. Ltd.

JIM - Journal of Information Management
Vol. 9, No. 1, January - June 2022, pp 31-36
DOI : 10.5958/2348-1773.2022.00003.0

Importance of Webinars in the Skill Development of LIS Professionals of India: A Study

Suryakant Dewangan[1]* and Maya Verma[2]**

[1]Research Scholar, [2]Professor, School of Studies in Library and Information Science, Pandit Ravishankar Shukla University, Raipur, Chhattisgarh, India
(*Corresponding author) email id: *suryadev235@gmail.com, **verma_maya64@rediffmail.com

Received: 19-01-2022; Accepted: 23-05-2022

ABSTRACT

Currently, information technology is being used extensively all over the country, which has led to a significant change in the way people learn and teach. Webinars are also a part of this transformation of IT and their popularity is increasing day by day. Webinars provide new opportunities for people to build their skills. The whole study is based on library science professionals from all over India. The data have been collected by the survey method using Google Forms in the online medium and sent to 500 LIS professionals through E-mail. Out of which, we have received responses from 389 (77.8%). The data were analysed in Excel using simple percentages. The findings revealed that Library Professionals have high-level awareness of Webinars and they are using open source tools such as Google Meet, YouTube, WebEx and Zoom ext. There is some different perception of library professionals for attending webinars, in which many participants get e-certificates and get some fresh ideas and knowledge. Webinars have many technical issues, with Internet connectivity being the most common. The overall importance of the webinar respondents rated it as very useful. This study is significant because, during the Corona crisis, webinar events are increasing continuously and our dependence on them is increasing.

Keywords: Webinar, Library professionals, Information technology, Skill development, Web applications, Internet

INTRODUCTION

The continuous development in information technology has taken the form of the information revolution. The inclusion of the information revolution in our daily life has started yielding maximum results in minimum time. Whether it is education or industry, agriculture or health, the importance of information technology has increased rapidly. Easy access to mobile phones and the Internet has played an essential role. This revolutionary influence of information technology has also influenced our life culture. A class affected by the information revolution is becoming technically rich; on the other hand, the untouchable class is slowly developing based on traditional knowledge due to all kinds of work conducted through the Internet. Our society has adopted this technology with chaos and the Internet has become an essential part of our lives.

The education sector is benefiting the most from the use of the Internet. Nowadays, the Internet has made the content and curriculum for learners worldwide relatively easy and convenient. Through a computer and Internet connection, we can attend classes anywhere or participate in discussions, seminars and webinars. The webinar is an online presentation that conducts

AN ASSESSMENT OF WEB INFORMATION SEEKING BEHAVIOR AND DIGITAL LITERACY SKILLS AMONG PRINT AND ELECTRONIC MEDIA JOURNALIST OF RAIPUR, CHHATTISGARH

Suryakant Dewangan[1]* Dr. Maya Verma[2]

1. Research Scholar, School of Studies in Library and Information Science, Pandit Ravishankar Shukla University, Raipur, Chhattisgarh
2. Professor, School of Studies in Library and Information Science, Pandit Ravishankar Shukla University, Raipur, Chhattisgarh
*Corresponding Author

Abstract:
Digital information has become one of the most important resources for social development in the present era, benefiting all sections of society, especially students, researchers, teachers as well as journalists in their field of work. New journalists rely heavily on the Internet for their professional and personal activities. However, there is a lot of information on the Internet that is not suitable for learning use. The ability to efficiently search and retrieve information online is therefore crucial for journalists. This study aims to assess the web information search behavior and digital information literacy skills of Raipur city journalists. In this study, a structured 200 questionnaires were randomly distributed to journalists, and 153 (76.5%) questionnaires were submitted. The questionnaire analysis revealed that 41.18% of journalists needed web information for news writing. 36.60% of journalists have difficulty accessing the Internet. Most respondents were familiar with computer knowledge and its functioning. Some respondents have good Internet literacy skills, while others have average or low Internet literacy skills.
Keywords: Web, Information Seeking, Information Behavior, Journalists, Digital Literacy, Information Literacy

Introduction:

In the 21st century, due to the continuous changes in the field of information-receiving, media institutions have wholly changed their journalism work by adopting web-internet-related technologies. The new generation of journalists has become heavily dependent on the Internet for their professional, academic, and personal activities. Journalists quickly access various types of information through the Internet, some of which are suitable for them, some of which are not. Journalists also need competencies related to digital literacy to access information through the web that helps them efficiently search and retrieve information online.

According to the American Library Association's (ALA) Presidential Committee on Information Literacy, Final Report, "To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use the needed information effectively."

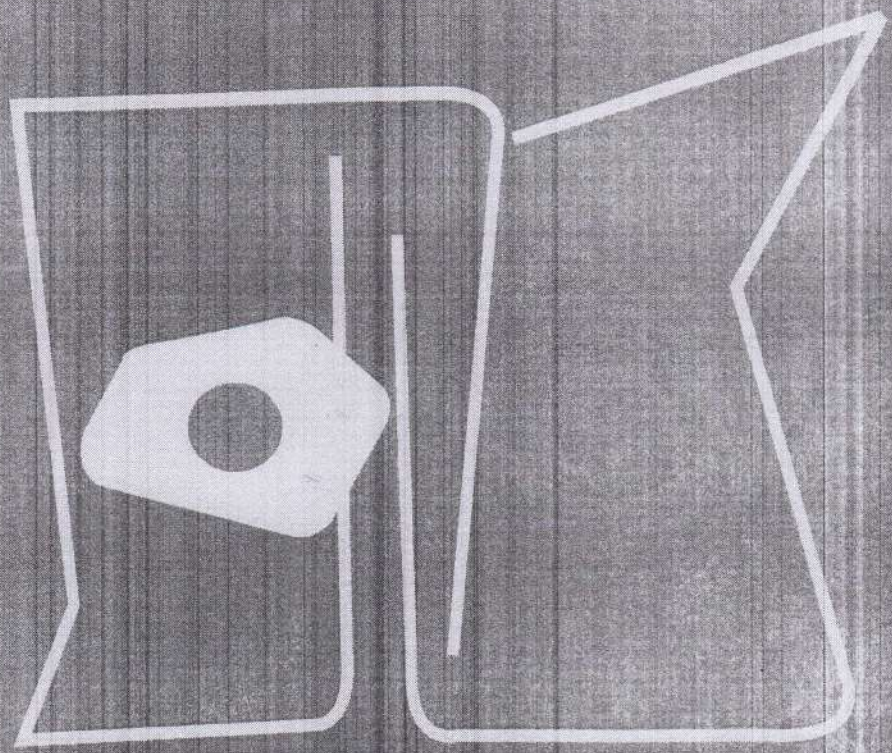
Media professionals are defined as specialized candidates or information seekers. They are information consumers and communicators who use their energy to provide information to the public. This study aims to determine how much digital literacy journalists have and how much access they have to web-based information for their work.

Raipur's Journalism: An Overview

Chhattisgarh's Raipur city has a long history of journalism, where many newspapers and magazines were published before independence. Currently, more than 20 electronic news channels and 100 Newspapers are broadcast and published here. Among them are the Dainik Bhaskar, NaiDuniya, Patrika, Navbharat, Haribhoomi, Chhattisgarh, Navpradesh, Mahakaushal, and Hitwada, Chronicle, and other electronic media, such as IBC 24, INH News, Doordarshan Raipur, Media 24, News-18,

ग्रन्थालय विज्ञान

खण्ड 53 अंक-2 ISSN 0973-564 X जुलाई-दिसम्बर 2022



प्रोफेसर कौला ग्रन्थालय तथा सूचना विज्ञान सन्दान

(विश्वविद्यालय अनुदान आयोग द्वारा वर्ष 2017–2018 एवं 2018–2019 हेतु अनुमोदित
ग्रन्थालय एवं सूचना विज्ञान विषय की हिन्दी की एकमात्र पत्रिका)

ISSN 0973-564x

ग्रन्थालय विज्ञान

पूर्व समीक्षित शोध पत्रिका

खण्ड 53 अंक 2
जुलाई–दिसम्बर, 2022

प्रोफसर कौला ग्रन्थालय तथा
सूचना विज्ञान संदान

विषय सूची

2
मेण्डले : संदर्भ प्रबंधन का प्रमुख साधन

(Mendeley : An Important Tool for Reference Management)

मोनिका त्रिपाठी शर्मा*
डॉ. संतू राम कश्यप**

[मेण्डले संदर्भ प्रबंधन सॉफ्टवेयर की चर्चा करता है। मेण्डले शोधपत्र या शोधप्रबंध लेखन के समय संदर्भों के प्रबंधन का प्रमुख साधन है।]

1. परिचय (Introduction)

आज के तकनीकी युग में वेब 2.0 का उद्‌भव सूचना एवं संचार के क्षेत्र में एक नई क्रांति लाने वाला साबित हुआ है। विभिन्न क्षेत्रों में वेब 2.0 के उद्‌भव से नई तकनीकें विकसित हुई हैं। वेब 2.0 शैक्षणिक शोधार्थियों को उनके शोध में सहयोग करने, वांछित शोध सामग्री खोजने, समान विषय पर कार्यरत अन्य शोधार्थियों से सहयोग प्राप्त करने, अपने शोध को प्रसारित करने और यह जानने के लिए कि किसी विशिष्ट विषय क्षेत्र पर किस शोध का व्यापक प्रभाव पड़ा है, समझने में सहायक सिद्ध हुआ है।

विश्वविद्यालय एवं महाविद्यालय उच्चस्तरीय शैक्षणिक संस्थान होते हैं, जहाँ पर अध्ययन–अध्यापन के अतिरिक्त शोध कार्य भी सम्पन्न किए जाते हैं। शोध कार्य के अंतर्गत एक शोधकर्ता द्वारा किसी विशिष्ट विषय शीर्षक पर शोध कार्य किया जाता है। जिसे शोध प्रबंध (Thesis) अथवा शोध पत्र के रूप में प्रस्तुत किया जाता है। शोध प्रबंध अनेक अध्यायों में विभक्त रहता है, जिनमें से कुछ भाग उद्धरण (Cite), संदर्भसूची (Reference) एवं ग्रंथसूची (Bibliography) के होते हैं।

किसी भी शोधार्थी को अपने शोधपत्र या शोधप्रबंध लेखन के समय मुख्य समस्या उद्धरणों (Citations) एवं संदर्भों (References) के व्यवस्थित प्रबंधन सम्बंधी होती है। शोधार्थी को शोध लेखन के समय उद्धरण (Citation) देना और ग्रंथसूची (Bibliography) बनाना एक श्रमसाध्य कार्य

* शोधार्थी, ग्रंथालय एवं सूचना विज्ञान अध्ययनशाला, पंडित रविशंकर शुक्ल विश्वविद्यालय रायपुर, (छ.ग.)
monikatsharma@gmail.com, mobile – 87705-31796

** सह – प्राध्यापक, ग्रंथालय एवं सूचना विज्ञान अध्ययनशाला, पंडित रविशंकर शुक्ल विश्वविद्यालय रायपुर, (छ.ग.)
santuramkashyap90@gmail.com, mobile – 98265-60119

RNI REGN. No. : UPENG/2010/37607 ISSN : 0976-7274

Professional Journal of Library and Information Technology

The Bi-Annual Peer Reviewed and Refereed Journal of Multi Dimensional Research

Vol. 12 **No. 2** **July-December- 2022**

For Information Contact at:

E-mail
Managing Editor (Hon.)
sanjaysharma.journal@gmail.com /
sanjaysharmalib@rediffmail.com website: www.pjolait.com
Mobile: 9953218447, 9412549337, 9818941493

Web Site: www.pjolait.com
Journal - 2022

SKP

Shree Kala Prakashan, Delhi-7

RNI REGN. No. : UPENG/2010/37607 ISSN : 0976-7274

Professional Journal of
Library and Information Technology

Vol. 12 No. 2 July-December 2022

A Bibliometric Study on Professional Journal of Library and Information Technology During 2016 - 2020

Dr. Santu Ram Kashyap
Sr. Assistant Professor
SOS in Library & Information Science
PT. Ravishankar Shukla University, Raipur (C.G.) – 492010, India
E- mail: sr_kashyap1976@rediffmail.com

Received on 02.02 .2022, Received on 28.02.2022

ABSTRACT

The study aimed to determine article distribution by year, author productivity, author collaboration level, page length, and cited / referred documents. Study results show that out of 150 articles, 38 (25.34%) were published in 2016 while 17 (11.33%) were published in 2020. From 255 contributors, 60 (23.52%) articles were written by a single author, 152 (59.60%) articles by two authors, 39 (15.29%) by three authors, and only 04 (1.56%) by four authors. Out of 150 articles, 10 articles (6.66%) were contributed by Sanjay Kumar Sharma. During the study period 2016 - 2020, there was 0.764 degree of author collaboration.

Keywords: Bibliometric Study, Authorship Pattern, Citation, Degree of Collaboration, Productive Authors and Productive Institutions.

Introduction

The Professional Journal of Library and Information Technology is a well known and **reputed UGC – Approved journal No. 47973 (Old list)** in the field of library and information science. It is a Bi-Annual Peer Reviewed and Referred journal. It published from Shree Kala Prakashan Delhi, email: shreekalaprakashan@gmail.com with twice a year in the month of January and July. The editor in chief and managing editor of this journals are Dr. Anil Kumar Dhiman and Dr. Sanjay Kumar Sharma. The aim of this journal is to encourage research work in the field of management, library science and Information technology. Alan Pritchard, a British librarian, coined the term Bibliometrics in 1996. It is among the most popular studies in the field of library & information science. An analysis of bibliometrics is the statistical analysis of publications in a specific journal

RNI REGN. No. : UPENG/2010/37607 ISSN : 0976-7274

Professional Journal of
Library and Information Technology

Vol. 12 No. 2 July-December 2022

Information Needs and seeking behaviour among the Social science faculty of Pt. Ravishankar Shukla University, Raipur and Atal Bihari Bajpai University Bilaspur: A Comparative Study

Dr. Kirti Jachak
Library Assistant-II
Pt Ravishankar Shukla Univeristy,
Raipur (C.G.)
E-mail: kirtijachak@gmail.com

Dr. Santu Ram Kashyap
Associate Professor
Pt Ravishankar Shukla Univeristy,
Raipur (C.G.)
E-mail: sr_kashyap1976@rediffmail.com

Received on 28.04.2022, Accepted on 25.05.2022

ABSTRACTS

This paper highlights the comparison of information needs and seeking behavior among the faculty of social science of Pt. Ravishankar Shukla University, Raipur and Atal Bihari Bajpai University Bilaspur. The study was based on the survey method and for the collection of related data, well structured questionnaire was used as a tool. There were 410 questionnaires distributed among the respondents of which 308 (75.12%) questionnaires were received back. The study revealed that 87.5% of the faculty of Pt. Ravishankar Shukla University, Raipur and 88.83% of Atal Bihari Vajpayee University, Bilaspur find information for teaching. It is clear that the printed and electronic information sources consulted by Pt.Ravishankar Shukla University, Raipur and Atal Bihari Vajpayee University, Bilaspur are quite different concerning all the resources. There are 90% of the faculties of Pt. Ravishankar Shukla University, Raipur uses reference books and 84.57% faculty of Atal Bihari Vajpayee Univeristy, Bilaspur use textbooks to seek information. The faculty of both universities gave 1st rank to the internet as an information source. It was also found that faculty preferred keyword search techniques to find web-based information. In the context of the problems encountered in seeking information, it was found that the faculties of Pt. Ravishankar Shukla University (61.33) and Atal Bihari Vajpayee University (62.02) have to face the main problem of inadequacy of library resources while searching for the necessary information.

Keywords: Information Needs, Seeking Behavior, Social Science, Faculty Member, Pt. Ravishankar Shukla University, Atal Bihari Vajpayee University, Social Sciences.

E-resources: To the Perspective of Library

Neelam Markande[1], Santu Ram Kashyap[2]

[1]MLIS, UGC – NET (NFSC)

[2]SoS in Library & Information Science, PT. Ravishankar Shukla University,Raipur (C.G.), India

*Corresponding Author: neelammarkande08@gmail.com

Abstract: This paper aim to determine the needs, types, advantages, disadvantages and effect of e-resources to the libraries'-resources has led to tremendous change in the way libraries function and offer services to their users. This paper will provide the information about how e-resources promote the use of library and solve many problems faced by researcher and other library users. The basic objective of this paper is to inform all aspects of E-resources.

Keywords: e- resources, Print resources, Types & Characteristics of e- resources, Need of e-resources. Advantages and Disadvantages of e – resources. Publishers and websites. e – Resources and library.

Introduction

The advent of technology has led to prodigious use of e-resources. Which has rapidly change the pattern of library housekeeping operations and also changed the way of information dissemination. Increasing technology has almost ended the trend of print resources and started the trend of digital resources / e-resources.

E-resources not only help in overcompensate the geographical limitation but also eliminates the time boundation which has a profound effect on academic life. E-resources consist of databases, articles, thesis, dissertation, e-books, e-journals, e-newspaper, CD-ROMs which is best alternative of print media.

The main aim of using electronic resources is to promote the library use and solve the problems faced by library user such as Students, teachers and research scholars.

What is E- Resources?

An e-resource is information resource that requires electronic media to access its content. e - resources refer to all the products that a library provides through a network whether it is provided online or offline. Example CD ROM, e-books, e-newspaper, bibliographic data-bases and digital collection of data etc.

Objectives

The objectives of this study are as follows.

1. To know the needs of E- Resources.
2. To study Types and Characteristics of E- Resources.
3. To know advantages and disadvantages of E- Resources.
4. To know the publishers and its website of E- Resources.
5. To know the similarities and difference between Print and E- Resources.
6. To study about E- Resource and library.

DOI: 10.52228/JRUA.2023-29-1-6

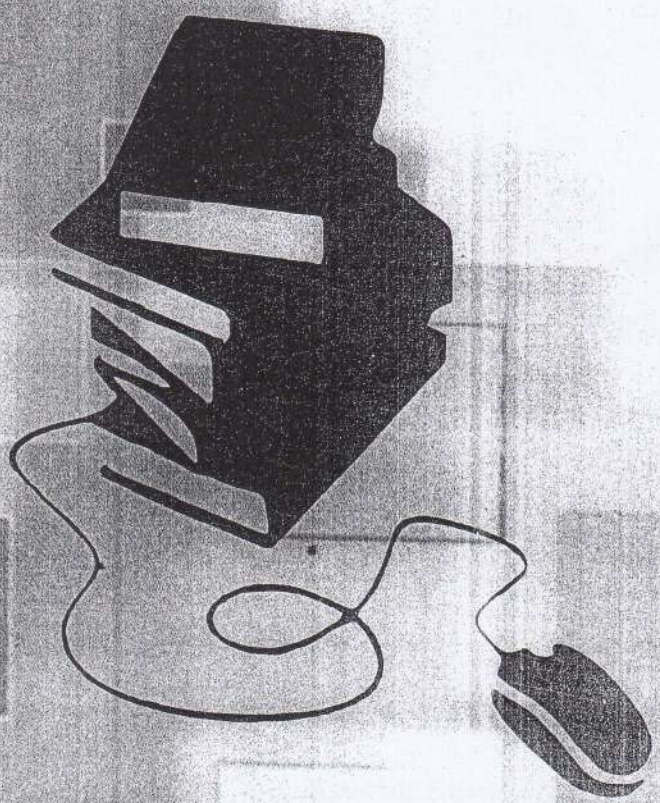
Peer Reviewed

Volume 10, No. 1
January - June 2023

Print ISSN : 2348-0458
Online ISSN : 2455-8060

Kalinga Institute of Industrial Technology (KIIT)
Deemed to be University
(Established U/S 3 of UGC Act, 1956)
Bhubaneswar, Odisha, India

KIIT Journal of Library and Information Management



IndianJournals.com
A product of Diva Enterprises Pvt. Ltd.

Print ISSN: 2348-0858
Online ISSN: 2455-8060

KIIT - Journal of Library and Information Management

Contents

Volume 10, No. 1, January-June 2023

Printed & Published by: Diva Enterprises Pvt. Ltd. on behalf of KIIT Deemed to be University, Bhubaneswar, Odisha, **Printed at:** Spectrum, 208 A/14A, Savitri Nagar, New Delhi-110017, **Published at:** Diva Enterprises Pvt. Ltd., B-9, A-Block, L.S.C., Naraina Vihar, New Delhi 110028, India, **Editor-in-Chief:** Dr. Bijaylaxmi Rautaray

KIIT - Journal of Library and Information Management
Vol. 10, No. 1, January-June 2023: 53-57
DOI : 10.5958/2455-8060.2023.00006.X

Research Trend in Library and Information Science from 1991- 2020: A Case Study of Chhattisgarh State

Santu Ram Kashyap[1]**
Sunil Kumar Satpathy[2]*

Submitted: 10-12-2022; Revised: 23-02-2023; Accepted: 02-03-2023

ABSTRACT

The paper attempts to make an extensive study of research trends in prominent universities of Chhattisgarh during the last three decades with an intense focus on doctoral researches, PhD supervisors, topic wise distribution of theses submitted to universities of Chhattisgarh. The study reveals that research on recent trends of modern libraries, use of various ICT tools and techniques in libraries, e-resources, digital library among other have not so far been focus areas of research. The reasons may be the course curriculum of these universities which are primarily based on traditional courses on Library and Information science rather than recent trends, poor faculty strength, and poor ICT infrastructure. It also indicates towards poor library system and services of the state during the period that needs to be taken care of. Moreover, the study reveals that the research work of G.G. University, Bilaspur is little more than Pt. R.S. University, Raipur and numbers of supervisors are almost same in both universities.

Key words: Library and information science, Research trends, Pt. Ravishankar Shukla University, Guru Ghasidas University

INTRODUCTION

Research is a process to invent new knowledge, means a process which leads toward unknown from known. Research is a continuous process which is result of human curiosity. Human knowledge is ever increasing and there is constant growth of advancements and human knowledge in every field of knowledge and Library and Information Science field is not an exception a new discovery, research again starts to discover new knowledge. Library and information centers have undergone many changes over the years in terms of collections and organization of library resources, introduction of new Information Communication Technology, software, services etc. to provide satisfactory services to library users. Libraries and Information centers have transformed from traditional libraries to modem/ digital libraries. Accordingly, the Library and Information Science subject has also changed drastically in terms of study and research. To cope up with the changing demands of users, technology and social changes, researcher of LIS have carried out researches in various aspects of LIS and the research outputs are reflected in the

[1]Associate Professor, SOS in Library & Information science, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, India
[2]Deputy Librarian, Central Library, NIT, Raipur, Chhattisgarh, India
(*Corresponding author) email id: *sksatpathy.lib@nitrr.ac.in, **srkashyap1976@rediffmail.com

Research Productivity in Ph. D. Thesis in Agronomy of Indira Gandhi Krishi Vishwavidyalaya, Raipur During 2001-2021: A Study

Harish Kumar Sahu[1], Shrawan Yadav[2]

[1,2] School of Studies Library & Information Science, Pt. Ravishankar Shukla University, Raipur (C.G.) India.

*Corresponding Author: hari197479@yahoo.in

ABSTRACT: In the present research paper, the research productivity of the subject of Agronomy at Indira Gandhi Agricultural University, Raipur has been studied from 2001-2021. For the study, the data on the subject of Agronomy at Indira Gandhi Agricultural University, Raipur has been collected from Krishikosh of Indian Council of Agricultural Research. Research productivity, authorship productivity, crop distribution, etc. have been described in the study. A total of 54 research works were completed in the subject of Agronomy from 2001-2021, out of which 45 male researchers and 09 female researchers were involved. Highest number of research work was done in year 2016 09, second place in 2017 and 2019, Dr. Narendra Pandey, Dr. G.K. Shrivastava , Dr. M.C. Bhrambri has the maximum number of 06 research scholars and Dr. Rajendra Singh Lakpale, Dr. B.L. Chandrakar , 04 researchers has been directed by Dr. G.S. Tomar and Dr. S.S. Kolhe. Research has been done on the maximum crop paddy and the second number, research has been done on maize.

Keywords - Agriculture, Rice, Agronomy, Research Productivity, Research Output.

Introduction:

The Indira Gandhi Agricultural University, the only agricultural university of Chhattisgarh in central India, is located in Raipur. Before 1987, this university was under the Jawaharlal Nehru Agricultural University, Jabalpur, Madhya Pradesh. Indira Gandhi Agricultural University, Raipur was established in the year 1987, and the Department of Agronomy was established in the year 1994. Since then date, research is being done on this subject.(*Indira Gandhi Krishi Vishwavidyalaya, Raipur*)

Agronomists generally work with crops that are grown on a large scale (e.g., small grains) and that require relatively little management. Agronomic experiments focus on a variety of factors relating to crop plants, including yield, diseases, cultivation, pest and weed management, and sensitivity to factors such as climate and soil. Agronomists may specialize in plant breeding and biotechnology to improve crops. Many agronomists also utilize ecological principles to conserve and protect the environment from the negative effects of agriculture, a field known as agroecology.(Encyclopedia)

Agriculture provides us food, feed, fiber, fuel, furniture, raw materials, feedback materials for and from factories, funds, flood control, a free, fair, and new environment, abundant food driving out famine friendship eliminating fights. In the present study, the research productivity of the subject of agronomy at Indira Gandhi Agricultural University, Raipur is to be studied. The study aims to find out the trends of research in comparison to other subjects of the university. The author aims to study the research areas taking place in production agronomy.

Review of Literature

Nimat, Ravindra B. (2015) the study is to analyze the authorship pattern of Citations in Agronomy Ph.D Thesis at Agricultural University of Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. To accomplish the present study was conducted on 85 samples from Dr. Panjabrao Deshmukh Krishi

DOI: 10.52228/JRUA.2023-29-1-5

Use of Social Networking Sites among Students of Library and Information Science, Pt. Ravishankar Shukla University, Raipur

Harish Kumar Sahu*

School of Studies in Library & Information Science, Pt. RavishankarShukla University, Raipur (Chhattisgarh) India.

hari197479@yahoo.in

*Corresponding Author: hari197479@yahoo.in

Abstract: This study examines the social networking sites among college students in India have significantly increased. The purpose of the study is to investigate the use of social networking sites among students of Library and Information Science, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh. Structured questionnaires were used to collect the data from a representative sample of **61** (B. Lib. & I. Sc. **33**, M. Lib. & I. Sc. **18** and **10** research scholars) students who were selected. The collected data were analyzed using different statistical methods. The result indicates that all Library and Information Science students are aware of social networking sites. They are using at least one form of social networking website to interact with family members and friends and also connect to their classmates for online study. Facebook and Whatsapp are the commonly used social networking sites among the Library and Information Science students and they use them for friendly communication. There are benefits of using social networking sites as well as dangers associated with social networking sites which are discussed in this paper.

Keywords– Socialnetworking sites, Social media, Social networking,University,Library and Information Science.

Introduction

In this present era, Social Media enables users to generate interpersonal connections based on common grounds. Social networking sites (SNS), such as Facebook, YouTube, Whats-app, Friendster, LinkedIn, MySpace Orkut, Flixter, Twitter, My Life, and Wikipedia set up personal communities, allow users to make comments on the profiles of their friends and send private messages. So SNS are being currently used regularly by millions of people. Because of this, the impact of SNS has increased. It is a modern communication channel through which people connect to share with one another their experiences, ideas, messages, pictures, and information of interest. In the modern age, social networking sites are boon for internet users.

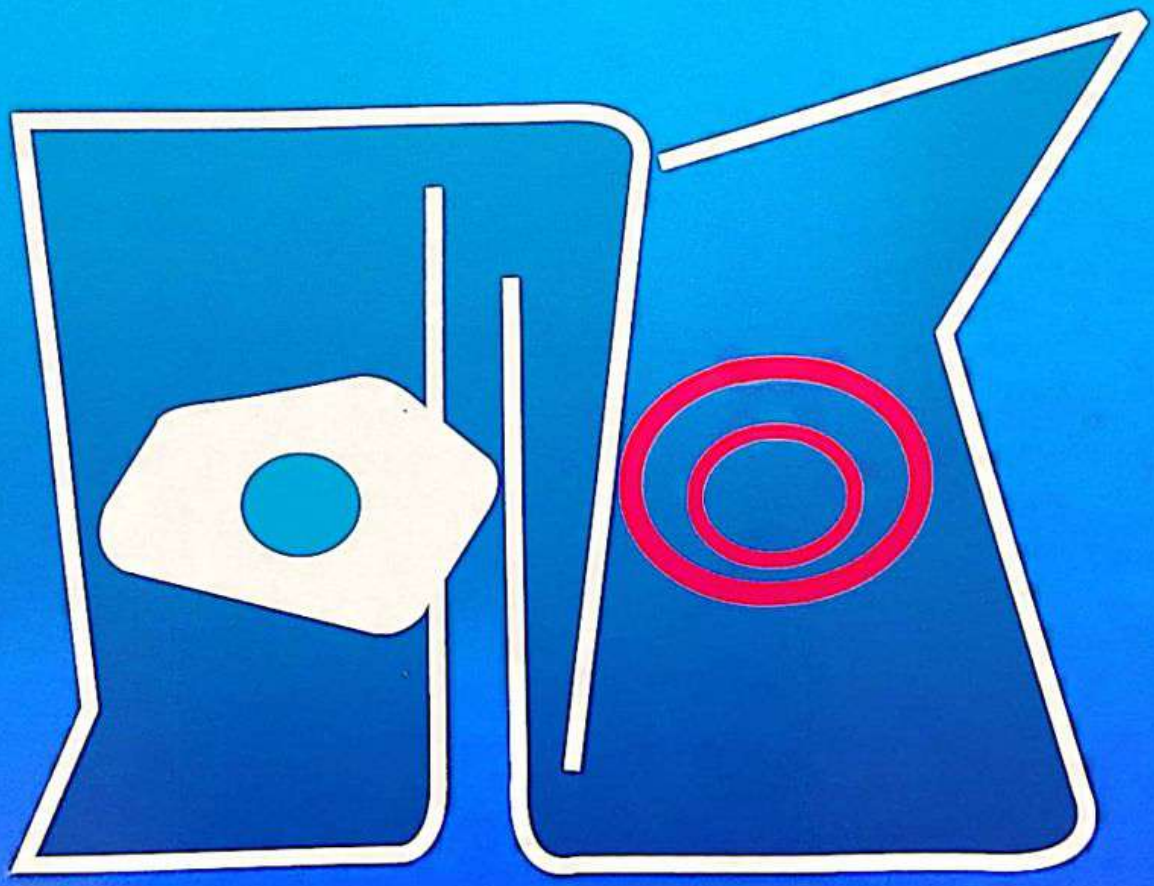
Objectives of the Study

- To identify the benefits and purpose of using social media in students of Library and Information Science, Pt. Ravishankar Shukla University.
- To know the various categories of social networking sites using social media.

DOI: 10.52228/JRUA.2022-28-2-2

ग्रन्थालय विज्ञान

खण्ड 53 अंक–2 ISSN 0973-564 X जुलाई–दिसम्बर 2022



प्रोफेसर कौला ग्रन्थालय तथा सूचना विज्ञान सन्दान

6

पादप प्रजनन एवं आनुवंशिकी विषय के सन् 1999 से 2021 तक कृषि वैज्ञानिकों की शोध उत्पादकता का अध्ययन : इंदिरा गॉधी कृषि विश्वविद्यालय, रायपुर के विशेष संदर्भ में

(Study of Research Productivity of Agricultural Scientists from the year 1999 to 2021 on the subject of Plant Breeding and Genetics : With special reference to Indira Gandhi Krishi Vishwavidyalaya, Raipur)

श्रवण यादव*
डॉ. हरीश कुमार साहू**

[कृषि शिक्षा के क्षेत्र में कृषि संकाय के विशय पादप प्रजनन एवं आनुवंशिकी (Plant Breeding & Genetics) का महत्वपूर्ण स्थान है। इंदिरा गॉधी कृषि विश्वविद्यालय, रायपुर (छ.ग.) में पादप प्रजनन एवं आनुवंशिकी (Plant Breeding & Genetics) विशय में 1999 से 2021 तक कुल 49 शोध कार्य हुए हैं। पादप प्रजनन एवं आनुवंशिकी विभाग के शोध उत्पादकता, शोध प्रवृत्ति तथा शोध के विषय क्षेत्र का अध्ययन कर निष्कर्ष प्रस्तुत करता है।]

1. परिचय (Introduction)

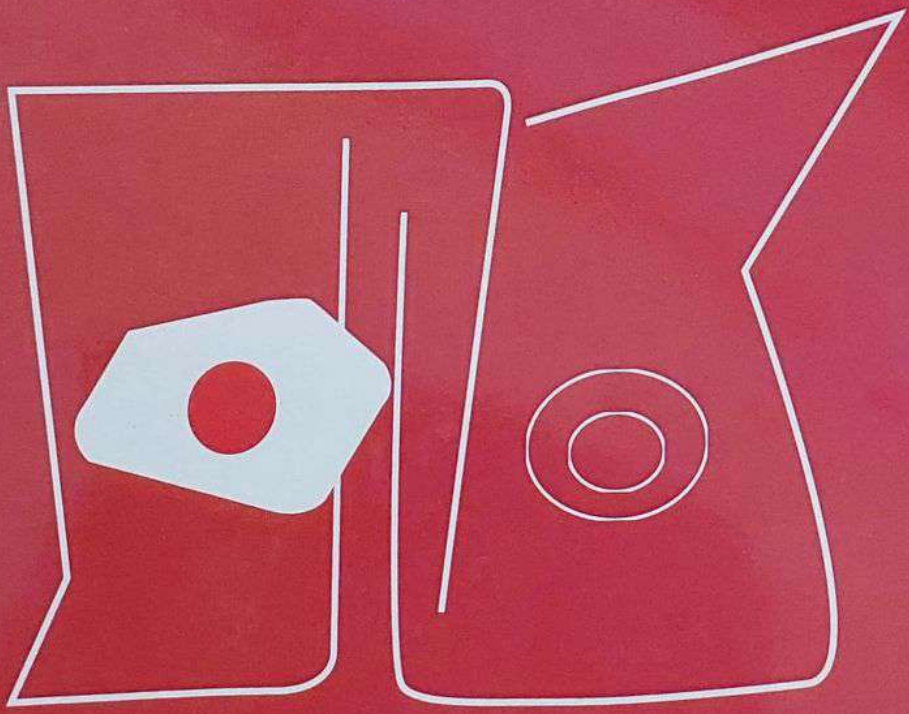
पादप प्रजनन में फसलों की ऐसी नई तथा उन्नत गुणवत्ता वाली किस्मों को विकसित किया जाता है, जिनमें वर्तमान तथा प्राचीन किस्मों से अच्छे गुण विद्यमान हो। यह तभी संभव है जब वर्तमान किस्मों में आनुवंशिक बदलाव (Hereditary change) लाया जाए। यह बदलाव पादप प्रजनन की विधियों के प्रयोग द्वारा लाया जा सकता है। पादप प्रजनन में शुद्ध वंशक्रम (Pure lines) का संकरण (Crossing) सम्मिलित है। इस संकरण के बाद कृत्रिमचयन कर अधिक उत्पादन देने वाली रोग प्रतिरोधी, पोषण किस्मों को अलग कर लिया जाता है। संकरण द्वारा दो जनेटिकली अलग जनकों के बीच क्रॉस कराकर नई किस्में विकसित की जाती है। पादप प्रजनन में आनुवंशिकी (Genetics), आण्विक विज्ञान (Molecular biology) तथा उत्तक संवर्धन (Tissue culture) विधियों का निममित प्रयोग करके साथ–साथ आनुवंशिकी अभियांत्रिकी (Genetic Engineering) का प्रयोग भी वर्तमान समय में किया जा रहा है।

* शोधार्थी, ग्रंथालय एवं सूचना विज्ञान अध्ययन शाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)
ई–मेल : shrawanyadav12@gmail.com

** वरिष्ठ सहायक प्राध्यापक, ग्रंथालय एवं सूचना विज्ञान अध्ययन शाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.) ई–मेल : hari197479@yahoo.in

ग्रंथालय विज्ञान

खण्ड 53 अंक 1 ISSN 0973-564X जनवरी - जून 2022



प्रोफेसर कौला ग्रंथालय
तथा
सूचना विज्ञान सन्दान

13

वर्ल्ड डिजिटल लाइब्रेरीज : एन इन्टरनेशनल जर्नल पत्रिका, 2008 – 2019 का ग्रंथमिति अध्ययन

(Bibliometric Study of World Digital Libraries: An International Journal from 2008- 2019)

डॉ. हरीश कुमार साहू*

[वर्ल्ड डिजिटल लाइब्रेरीज : एन इन्टरनेशनल जर्नल पत्रिका के खण्ड संख्या 1 (2008) से लेकर 12 (2019) तक में प्रकाशित लेखों का ग्रंथमिति अध्ययन प्रस्तुत करता है।]

1. परिचय (Introduction)

ग्रंथालय एवं सूचना विज्ञान के क्षेत्र में "वर्ल्ड डिजिटल लाइब्रेरीज : एन इन्टरनेशनल जर्नल" एक बहुत ही महत्वपूर्ण पत्रिका है। इस पत्रिका का प्रकाशन टेरी (द एनर्जी एण्ड रिर्सोसेस इंस्टीट्यूट) द्वारा अर्ध –वार्षिक रूप से किया जा रहा है । इस आलेख में "वर्ल्ड डिजिटल लाइब्रेरीज : एन इन्टरनेशनल जर्नल" पत्रिका के लेखों का ग्रंथमिति अध्ययन किया गया है। ग्रंथमिति अध्ययन में आकडों को उद्धरण विश्लेषण द्वारा विश्लेषित किया जाता है। गंथमिति अध्ययन के अंतर्गत किसी भी विषय या साहित्य के विभिन्न पक्षों का संख्यात्मक एवं गणनात्मक अध्ययन किया जाता है। उद्धरण विश्लेषण को किसी भी विषय के लिए ग्रंथमिति अध्ययन हेतु एक महत्वपूर्ण तकनीक माना जाता है।

प्रस्तुत अध्ययन में पत्रिका के लेखों का प्रकाशन का वर्षानुसार विवरण, वर्षानुसार उद्धरण का विवरण, उद्धरित प्रलेखों के प्रकार, वर्षानुसार ग्रथों में लेखकत्व प्रभाव, एकल लेखक एवं सह लेखकों के योगदानों की दशा स्थिति के मान को गणितीय सांख्यिकीय अध्ययन की सहायता से दर्शाया गया है।

2. उद्देश्य (Objectives)

इस अध्ययन का मुख्य उद्देश्य "वर्ल्ड डिजिटल लाइब्रेरीज : एन इन्टरनेशनल जर्नल" पत्रिका में प्रकाशित लेखों का ग्रंथमिति अध्ययन प्रस्तुत करना है। इसके अंतर्गत हैं:

1, "वर्ल्ड डिजिटल लाइब्रेरीज : एन इन्टरनेशनल जर्नल" पत्रिका में प्रकाशित 24 खण्ड तक लेखों एवं लेखकों की संख्या बताना ।

* वरिष्ठ सहायक प्राध्यापक, ग्रंथालय एवं सूचना विज्ञान अध्ययनशाला, पं. रविशंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.) ई–मेल : hari197479@yahoo.in

14

भारत के चयनित संस्थाओं में कृषि विज्ञान का 2017 से 2021 तक प्रकाशन उत्पादकता : एक अध्ययन
(Publication Productivity of Agricultural Science in Selected Institutions of India from 2017 to 2021: A Study)

श्रवण यादव*
डॉ. हरिश कुमार साहू**

[कृषि आधारित प्रकाशन उत्पादकता की प्रमुख पाँच कृषि संस्थाओं का तुलनात्मक अध्ययन करता है। अध्ययन के लिए वर्षानुसार वितरण, प्रमुख लेखक अनुसार उत्पादकता एवं प्रलेख अनुसार उत्पादकता का उपयोग करते हुए आंकड़ों का विश्लेषण का निष्कर्ष प्रस्तुत करता है।]

1. परिचय (Introduction)

भारत कृषि प्रधान देश है, ग्रामीण भारत के लगभग 80 प्रतिशत व्यक्ति कृषि उत्पाद या कृषि से संबंधित गतिविधियों पर कार्य कर रहे हैं, उसी परिपेक्ष्य में कृषि शिक्षा भी एक है। कृषि उत्पादों, कृषि तकनीकों, कृषि विकास में बढ़ोत्तरी के लिए कृषि शिक्षा की आवश्यकता महत्वपूर्ण होती है।

भारत में कृषि शिक्षा का इतिहास मध्यकाल से जाना जाता है, जब नालंदा एवं तक्षशिला में कृषि को पाठ्यक्रम में सम्मिलित किया गया था। 20वीं भाताब्दी के प्रारंभ शुरुआत में ही कृषि शिक्षा औपचारिक पाठ्यक्रम में प्रारंभ हुई जब छः कृषि महाविद्यालय थे : कानुपर, लायलपुर, कोयंबटूर, नागपुर, पुणे और सबौर। आजादी के स्वतंत्रता के पश्चात बाद कृषि शिक्षा के विकास के लिए भारत सरकार द्वारा भारतीय कृषि अनुसंधान परिषद की स्थापना की गई, जिसका कार्य कृषि शिक्षा का विकास, नियम और प्रारूप तैयार करना था। सन् 1960 में भारत का पहला कृषि विश्वविद्यालय की पंतनगर (उत्तराखंड) में स्थापना हुई थी। प्रकाशन उत्पादकता किसी भी लेख के इनपुट और आउटपुट का अनुपात है। प्रकाशन उत्पादकता एक निश्चित समय में एक चयनित इकाई द्वारा प्रकाशित लेखों की संख्या से व्यक्त की जाती है। प्रकाशन गतिविधि के तीन स्तर हो सकते हैं 1. व्यक्तिगत एवं अनुसंधान समूहों का प्रकाशन आउटपुट 2. वैज्ञानिक पत्रिकाओं का

* शोधार्थी, ग्रंथालय एवं सूचना विज्ञान अध्ययन शाला, पं. रवि शंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)
ई-मेल : shrawanyadav12@gmail.com
** वरिष्ठ सहायक प्राध्यापक, ग्रंथालय एवं सूचना विज्ञान अध्ययन शाला, पं. रवि शंकर शुक्ल विश्वविद्यालय, रायपुर (छ.ग.)
ई-मेल : hari197479@yahoo.in

Biological Rhythm Research

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/nbrr20

Consequences and factors associated with OSA: a brief review

Noorshama Parveen & Arti Parganiha

To cite this article: Noorshama Parveen & Arti Parganiha (2023) Consequences and factors associated with OSA: a brief review, Biological Rhythm Research, 54:1, 1-40, DOI: 10.1080/09291016.2022.2054558

To link to this article: https://doi.org/10.1080/09291016.2022.2054558

Published online: 28 Mar 2022.

ISSN: 2309-5288 (Print)
ISSN: 2309-6152 (Online)
CODEN: JCLMC4

Journal of Coastal Life Medicine

A Review on Hydroponics: A Sustainable Approach for Plant Cultivation

Received: 22 August 2022, **Revised:** 28 September 2022, **Accepted:** 24 October 2022

Mr. Labya Prabhas and Prof. Amia Ekka

School of Studies in Life Science, Pt. Ravishankar Shukla University, Raipur (Chhattisgarh – India)

*labya_127@yahoo.co.in

Keywords

Sustainable development, threshold limit, resources, challenge, plant cultivation, land area, water consumption, compatible, morphology.

Abstract

Sustainable development is really a matter of concern now days. Many natural events prove that Earth is reaching nearby its threshold limit in terms of natural resources. Saving is natural resources with maintaining rate of development for any country is a major challenge. Especially in case of agriculture, rate of utilization of land area and water consumption is really high. Some effort towards modification in traditional methods of plant cultivation is essential but with rise in total plant productivity or without affecting previous rate of productivity is required. Hydroponics, a novel or non popular plant cultivation technique is showing some assurance towards sustainable development. Hydroponics is a method of plant cultivation without soil. Amount of water requirement is really very less as compared to soil based technique. Some of the plant species is very much compatible for hydroponic cultivation. They include mostly herbaceous or plants with small morphology. An earlier report proves that the existence of hydroponic for plant cultivation in all the seven continents of the world map. Which indicates that world is ready to adopt modification and novel approaches over traditional method of plant cultivation.

1. Introduction

Water is souvenir from the nature to us. Existence of all life kind depends upon water prosperity of the Earth. Consumption level may vary from species to species among all living organism but this cannot elucidate importance water in their life. All life forms including unicellular to multicellular organisms is composed of water as a major part in their total cadaver. Life cycle of higher organism like humans and plants are extensively affected by availability of water type for their use. A well known fact that everyday rise in human population is directly compelling us to thing about food scarcity and food security. We are well aware that food resources are the major concern for the existence of mass population. Existence of human population also affects almost all other living species directly and indirectly in food web, but without continuous supply of useable water resources and food, there is a threat of mass destruction. Now, there is a need to find out some new ideas and creative work out that can help to ensure existence of living beings for longer time with available and limited resources, specially water and food.

Agriculture provides us a major part of food and energy resources. This is followed by dairy and animal farming in well support. But question is **"what are the basic needs in agriculture?"** Yes, the answer is Sunlight, Water and Nutrition. Apart from sunlight, water also helps in transportation of various mineral and ions from soil to plant body. It means supply of nutrition also depends upon water flow from outside plant cell to inside. If, importance of water is significant and only limited resources are available with us then it's certainly a matter of discussion. Because limited water resources and rate of consumption and pollution in water body is hospitable for upcoming troubles.

Biochem. Cell. Arch. Vol. 22, No. 2, pp. 3969-3974, 2022
DocID: https://connectjournals.com/03896.2022.22.3969
DOI: https://doi.org/10.51470/bca.2022.22.2.3969
ISSN 0972-5075
eISSN 0976-1772

RECEIVER OPERATING CURVE (ROC) ANALYSIS FOR FLUOROSIS USING SIMPLE BLOOD PARAMETER NEUTROPHIL LYMPHOCYTE RATIO

S. Gupta[1], A. N. Poddar[2*], C. Kumar[3] and S. Pervez[4]

[1,2]School of Studies in Life Sciences, [4]School of Studies in Chemistry, Pt. Ravishankar Shukla University, Raipur- 492010, India.
[3]Govt. RRM PG College, Surajpur-497229, Chhattisgarh, India.
*e-mail:adinpod@gmail.com

(Received 9 July 2022, Revised 13 September 2022, Accepted 21 September 2022)

ABSTRACT : The study aims to assess the preclinical stage of fluorosis i.e. Non skeletal fluorosis in human populations using a simple blood parameter, Neutrophil Lymphocyte Ratio as a predictive tool and includes different fluorosis categories (Dental, Skeletal & Non skeletal) surveyed out in the endemic villages and compared with the control population of non endemic area. Study Populations belonging to endemic villages Kowataal, Fulsar, Mahuapaani, Korbi and Amatikra within the block Podi uproda, distt. Korba situated in Chhattisgarh state of central India were cross sectionally studied. Segregation was done on the basis of Suspect (non-symptomatic) and Confirmed (Dental and Skeletal) cases of fluorosis and neutrophil to lymphocyte ratio calculated. A total 180 individuals were included in the study, out of which 67.33 % were confirmed cases of fluorosis. A significant decline in neutrophil to lymphocyte ratio was observed upon chronic fluoride ingestion. In the Receiver Operating Characteristic curve analysis of obtained NL ratios, the overall cut off value for fluorosis was obtained as ≤ 2.379 in the selected endemic region irrespective of symptoms of fluorosis *i.e.* dental or skeletal. The results concluding that The NL ratio can be used as a simple parameter for preclinical identification of fluorosis in fluoride exposed populations. However, urine and blood fluoride analyses of the subjects are also needed for further confirmation.

Key words : Neutrophil lymphocyte ratio, non skeletal fluorosis, ROC, skeletal fluorosis.

How to cite : S. Gupta, A. N. Poddar, C. Kumar and S. Pervez (2022) Receiver Operating Curve (ROC) analysis for fluorosis using simple blood parameter neutrophil lymphocyte ratio. *Biochem. Cell. Arch.* **22**, 3969-3974. DOI: https://doi.org/10.51470/bca.2022.22.2.3969, DocID: https://connectjournals.com/03896.2022.22.3969

INTRODUCTION

Preceding dental and skeletal fluorosis, some preclinical changes take place in the blood and body due to acute or chronic ingestion of fluoridated drinking water and have been considered under non-skeletal manifestations. Such manifestations are often overlooked due to the misconception that fluoride affects only bones and teeth (Raghuvansi *et al*, 2010). Fluoride has multiple effects on human health. A few are characterized by mineralization changes in the calcified tissues resulting in dental fluorosis and skeletal deformities. Besides other metabolic effects, visceral organs like liver and kidneys are also susceptible to toxic effects of fluoride and pathological changes in these vital organs can occur even before overt clinical signs of F intoxication (Shashi, 2002). Fluoride exposure is also associated with oxidative damage to RBCs, liver and kidney tissues. Consequent to oral exposure, fluoride is rapidly absorbed to reach systemic circulation. In blood, about 75% of it remains free in plasma and about 5% remains bound to plasma proteins. The rest of the blood F is found mainly inside RBCs or with their membrane (Swarup and Dwivedi, 2002). Neurological manifestations, like headache, insomnia (lack of sleep), lethargy (fatigue), depression, polyuria and polydipsia have been reported in populations with endemic fluoride (Sharma *et al*, 2009). Besides, skeletal and dental fluorosis, excessive consumption of fluoride may lead to muscle fiber degeneration, low hemoglobin levels, excessive thirst, headache, skin rashes, nervousness, depression, etc (Meenakshi, 2006). Pre skeletal stage of fluorosis is associated with occasional complains of pains in small points of limits and back, which simulate rheumatoid arthritis and ankylosing spondylosis (Krishna and Kiran, 2013).

In earlier studies (Zahorec *et al*, 2008; Zazula *et al*, 2008; Papa *et al*, 2008; Halazun *et al*, 2008; De Jager *et al*, 2010; Kaol *et al*, 2010; Indavarapu and Akinapelli, 2011; Tomita *et al*, 2011; Proctor *et al*, 2012; Kim and

International Journal of All Research Education and Scientific Methods (IJARESM),
ISSN: 2455-6211, Volume 11, Issue 5, May-2023, Available online at: www.ijaresm.com

Biochemical Alteration Due To Accumulation of Fluoride in Cat Fish, Claries Batrachus

Shivani Gupta[1], Aditi (Niyogi) Poddar[2], Purva Mishra[3], Chandan Kumar[4]

[1,2]School of studies in Life Science, PRSU, Raipur, India
[3]School of Life & Allied Sciences, ITM University, Raipur, India
[4]Department of Zoology, Govt. RRM PG college, Surajpur, India

---

ABSTRACT

Fluoride is a natural component of the earth's crust and soil. Small amounts of fluorides are present in water, air, plants, and animals, which when enters the food chain causes toxic effects to the ecosystem due to its bioaccumulation. The fluoride ions act as enzymatic poisons, inhibiting enzyme activity and ultimately interrupting metabolic process such as glycolysis and synthesis of proteins. After oral uptake, water-soluble fluorides are rapidly and almost completely absorbed in the gastrointestinal tract. As soon as fluoride is absorbed, blood fluoride levels increase. The study deals with the acute exposure of sodium fluoride to *Clarias batrachus* under laboratory condition. Biological samples were collected after every 24 hours for estimation of biochemical parameters (Total protein, ACP, ALP, GOT, GPT). The percent fluoride accumulation and the bio-concentration factor were studied after 96 hr of exposure. The result indicates significant changes in the biochemical parameters. The statistical analysis was done using five-way ANOVA.

Keywords: Bioaccumulation, Biochemical alteration, Bio concentration factor

INTRODUCTION

Fluoride is a natural component of the earth's crust and soil. Small amount of fluoride is present in water, air, plants, and animals, which when enters the food chain causes toxic effects to the ecosystem (1). Aquatic life is continuously exposed to fluoride which tends to accumulate in the exoskeleton, bones and tissues of the fishes (2). The fluoride ions act as an enzymatic poison, inhibiting enzyme activity (3) and ultimately interrupting metabolic process such as glycolysis and synthesis of proteins (4). High concentration of fluoride causes fluorosis. After oral uptake, water-soluble fluorides are rapidly and almost completely absorbed in the gastro-intestinal tract. As soon as fluoride is absorbed, blood fluoride levels increase (at 10 minutes), reaching peak levels at 60 minutes. The rate of fluoride absorption from the stomach is directly related to the acidity (pH <3.5) of its contents. Absorbed fluoride is transported via the blood; with prolonged intake of fluoride from drinking-water, concentrations in the blood are the same as those in drinking-water, a relationship that remains valid up to a concentration in drinking-water of $10mgL^{-1}$. Distribution of fluoride is a rapid process. It is incorporated into exoskeleton and bones; there is virtually no storage in soft tissues. Incorporation into exoskeleton and skeletal tissues is reversible: after cessation of exposure, mobilization from these tissues takes place. Fluoride is excreted via kidneys (5, 6, 7, 8).

MATERIALS AND METHODS

1. Exposure of Toxicants

Healthy cat fishes *C. batrachas* were procured live from the local fish market and acclimatized for seven days in glass aquaria under laboratory conditions with continuous oxygen supply and fed daily (twice a day). After acclimatization fishes were subsequently divided into two groups i.e., control and experimental. Fishes of control group were exposed to normal tap water, whereas experimental group were exposed to sodium fluoride in water for short term duration of 96hrs with sub lethal concentration 300 ppm of NaF.

2. Sample Collection

(A) Water- Water is collected from the aquaria in plastic bottle for residual fluoride analysis after 96 hrs of treatment.

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022

Total Chlorophyll Determination in Leafy Vegetables Cultivated in Hydroponics and Soil

Labya Prabhas[1], Dr. Amia Ekka[2]

[1]Assistant Professor, School of Studies in Life Science,
Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, India.

[2]Professor, School of Studies in Life Science, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, India.

ABSTRACT:

There are many factors that can be used to describe the growth outline of the plant. Qualitative and quantitative estimation of phyto-chemical composition of the plant's can directly reflects the growth pattern. These may also reflects the nutraceutical values of the plant for human consumption. Selected plant species are leafy vegetables and popular among the people of central India. Cultivation of selected plant's species is carried out in two different ways. Traditional method of plant cultivation includes soil based cultivation and other is hydroponic technique. In hydroponics, there is no need of soil, liquid media remains in direct contact with the seed and root of the plant. Hydroponically grown *S. oleracea* L (1.447 mg/g) was recorded with highest amount of chlorophyll, followed by *M. arvensis* (1.338 mg/g), *C. sativum* (1.162 mg/g), *T. F. graceum* L. (1.097 mg/g), *C. olitorius* L. (1.060 mg/g), *A. viridis* (0.917 mg/g) and *C. arietinum* (0.643 mg/g). On the other hand total chlorophyll content in soil cultivated plants was found highest in *M. arvensis* (1.206) followed by *S. oleracea* L. (1.085), *C. sativum* (1.046 mg/g), *T. F. graceum* L. (0.906) ,*C olitorius* L. (0.859 mg/g), *C. arietinum (*836 mg/g) and *A.viridis* (0.794). This study may reveal the compatibility and acceptance of hydroponics for plant cultivation. Chlorophyll content was consistently high in most of the experimental plants cultivated in hydroponic system as compared to soil cultivated plants.

Keyword: Phyto-chemical, neutraceutical, hydroponics, total chrolophyll, protein content, carbohydrate, recognize, suitable.

INTRODUCTION:

Plant is composed of various type of light capturing pigment like chrolophyll, carotenoid and much other type of pigments. Chlorophyll is an important fraction of photosynthetic machinery. Amount of chlorophyll directly represent the number of chloroplast in plant cell. Richness in chlorophyll molecules is responsible for capturing sunlight and conversion into sugar compound. Hence, optimum rate of production of sugar inside plant cell mainly depends upon amount chlorophyll molecule. If optimum sugar is produced and stored by plant then this will result imitate optimum growth of plant too. It means chlorophyll is an important tool which is directly associated with growth of the plant. Chlorophyll is found in

International Journal of Advance Research in Science and Engineering
Volume No. 12, Issue No. 05, May 2023
www.ijarse.com
IJARSE
ISSN 2319 - 8354

Review on Phosphate solubilizing micro-organisms

Dr. Pervez Ahmed Khan [1], Dr. Amia Ekka[2] and Dr. Mehar Afroz Qureshi [3]

[1,2] School of Studies in Life sciences,
Pt. Ravishankar Shukla University, Raipur – 492010, Chhattisgarh, (India)
[3]College of DT and Food Sc., Chhattisgarh Kamdhenu University, Raipur-4920010, Chhattisgarh, (India)

Abstract

Biofertilizer can provide an economically viable support to small and marginal farmers for realizing the ultimate goal of increasing productivity. Biofertilizer are low cost, effective and renewable source of plant nutrients to supplement chemical fertilizers. Microorganisms, which can be used as biofertilizer, include bacteria, fungi and blue green algae. These organisms are added to the rhizosphere of the plant to enhance their activity in the soil. Sustainable crop production depends much on good soil health.

Introduction

Phosphate solubilizing micro-organisms (PSM) solubilize insoluble forms of inorganic phosphorus and also mineralize organic forms of it and progress the availability of phosphorus to the plants. It is reported that phosphate solubilizing microorganisms of plant rhizosphere are more effective than others from the same soil. High quantity of phosphate solubilizing microorganism is concentrated in rhizosphere and they are metabolically more active than microorganisms from other sources [1]. Phosphate solubilizing organisms dissolve the fixed mineral phosphate and make it available to plants [2,3].

Isolation and Screening

It should be noted that filamentous fungi are among the most active and studied solubilization agents and a typical process for RP solubilization in submergd (single batch, shake-flask) fermentation conditions involves glucose based media and is performed for 7-20 days [4, 5, 6,7, 8].

Filamentous fungi are broadly used as producers of organic acids [9] and in particular *Aspergillus niger* and some *Penicillium* species have been tested in fermentation system or inoculated directly into soil in organize to solubilize 13 rock phosphate [10, 11]. [12] found that all the isolates of *Aspergillus tubingensis* and *A. niger* isolated

International Conference on Modern Engineering, Science & Management
Parvatibai Genba Moze College of Engineering,Wagholi, Pune
Date: 10th-11th June 2023
ISBN : 978-93-91535-51-3

Paper Titles- Review on Optimization of the process for phosphate solubilization

Dr. Pervez Ahmed Khan [1], Dr. Amia Ekka[2], Dr. Mehar Afroz Qureshi[3]

[1](School of Studies in Life sciences, Pt. Ravishankar Shukla University, Raipur Chhattisgarh, India)
[2](School of Studies in Life sciences, Pt. Ravishankar Shukla University, Raipur Chhattisgarh, India)
[3](College Of DT and Food Sc., Chhattisgarh Kamdhenu University, RaipurChhattisgarh, India)

ABSTRACT

Improving soil fertility is one of the most common practices in agricultural production. Phosphorus (P) is one of the most essential plant nutrients for maximizing crop productivity. This nutrient is limited in soils, which remain as a major challenge to agriculturists and land managers. Phosphorus is one of the major nutrients, second only to nitrogen in requirement for plants. A greater part of soil phosphorus, approximately 95–99% is present in the form of insoluble phosphates and cannot be utilized by the plants. Compared with the other major nutrients, phosphorus is by far the least mobile and available to plants in most soil conditions. Although phosphorus is abundant in soils in both organic and inorganic forms, it is frequently a major or even the prime limiting factor for plant growth.

Keywords: Aspergillus, Penicillium, Phosphate solubilizing fungi & Solubilization

A large number of micro-organism including bacteria, fungi, actinomycetes and algae shows Phosphate solubilization and mineralization capacity. Soil microorganisms improve plant nutrient acquisition. They are involved in a wide range of biological processes including the transformation of insoluble soil nutrients [1]. Among them some are capable of solubilizing and mineralizing insoluble soil phosphorus for the growth of plants. Phosphorous is a major growth limiting nutrient. As like nitrogen, there is no large atmospheric source that can be made biologically available. Phosphorous plays a major role in plant growth and is the key plant growth limiting nutrient despite its abundance in soils in both inorganic and organic forms [2]. [3] explained the effect of incubation periods on phosphate solubilization from phosphate rock. The inoculation of the growth media with the Aspergillus niger resulted in the highest phosphate solubility of the rock phosphate after 9 day of culturing. The effects of different pH and temperatures on the growth of Rhizoctonia solani and solubilization of insoluble calcium phosphate, strontium hydrogen phosphate, zinc phosphate, cobalt phosphate and manganese phosphate by Rhizoctonia solani on solidified media was investigated by Jacobs et al., 2002.

2nd International Conference on Management,
Engineering, Science and Humanities
Builders Engineering College,Kangeyam Institute of Commerce,
Date: 3rd June 2023, ISBN : 978-93-91535-52-0

Review on Use of Phosphate solubilizing fungi as biofertilizer for Chikpea production

Dr. Pervez Ahmed Khan [1], Dr. Amia Ekka[2] and Dr. Mehar Afroz Qureshi[3]

1(School of Studies in Life sciences, Pt. Ravishankar Shukla University, Raipur – 492010, Chhattisgarh, India)

2(School of Studies in Life sciences, Pt. Ravishankar Shukla University, Raipur – 492010, Chhattisgarh, India)

3(College Of DT and Food Sc., Chhattisgarh Kamdhenu University, Raipur-4920010, Chhattisgarh, India)

ABSTRACT

Phosphate solubilizing microorganism plays an important role in the plant nutrition through increase in P uptake by the plants and their use as plant growth supporter, is an important contribution to biofertilization of agricultural crops. The use of efficient PSM (phosphate-solubilizing microorganisms), opens up a new option for better crop productivity and for better yield performance without affecting the soil health. Phosphorous is one of the most abundant metallic element found in the earth's crust and present in soils in both organic and inorganic forms. Though it is present in high concentration, only 0.1% of the total P is available to plant because of poor solubility and its fixation in soil with other metallic elements in the soil such as Ca, Al, Fe to form calcium phosphate, aluminum phosphate and ferrous phosphate and thus becomes unavailable to plants. Execusaive use of chemical based P fertilizers has long term impact on the environment in terms of eutrophication, soil and fertility reduction.

Keywords: *Aspergillus, Penicillium , Phosphate solubilizing fungi & Solubilization*

Many researchers reported the positive effects of phosphate solubilizing fungi on the growth of various plants. [1] was expalin the growth of maize (*Zea mays*) plant were significantly enhanced by *Aspergillus tubingensis* and *A. niger* in nursery condition. [2] was arrangement of pot experiment of soyabean plant. *A.niger* and *P. italicium* significantly improved dry matter, yield of plant, percentage of protein and oil. [3] reported that the dual inoculation of *Aspergillus niger* and *P. notatum* was significantly improved dry matter, yield of groundnut plant, percentage of protein, nitrogen, phosphors and oil content in pot experiment. [4] investigated the enhancement of the growth and mineral nutrition of lettuce plants by *Penicillium albidium*. [5] reported the effect of phosphate solubilizing fungi (*Penicillium bilaji and Penicillium* sp.) and phosphorus levels on growth, yield and nutrient content in maize. They explained significantly influenced plant height, number of leaves per plant, dry matter production, cob length, grain weight per cob, grain yield and tissue nutrient content. Effect of phosphate solubilizing fungi on the soil nutrient status and yield of mungbean (*Vigna radiate* L) crop was reported by [6].

Characterization of a novel keratinase from *Chrysosporium tropicum*

Sarkar Ashis Kumar[1]* and Gupta Ashwini Kumar[2]
1. Faculty of Science, Shri Rawatpura Sarkar University, Raipur 492016, Chhattisgarh, INDIA
2. School of Life Sciences, Pandit Ravishankar Shukla University, Raipur 492010, Chhattisgarh, INDIA
*toashis@gmail.com

Abstract

A keratinophilic fungus Chrysosporium tropicum was isolated from poultry farm soil and screened for extracellular keratinase activity. The fungus was cultured in basal salts medium and keratinase production was assessed. The novel keratinase was purified by Sephadex G-100 column chromatography and characterized. The molecular weight of the enzyme was estimated to be 14.5 KDa by sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE). The optimum pH and temperature of the keratinase were found to be 7.5 and 40°C respectively.

The Km for keratin powder from human hair was 6.67 mg and the Vmax of novel keratinase was determined to be 0.33 mg ml^{-1} by the Lineweaver-Burk plot. The enzyme activity was almost completely inhibited by phenylmethylsulphonyl fluoride (PMSF) suggesting that the keratinase belongs to the serine protease family.

Keywords: Keratinophilic fungi, *Chrysosporium tropicum*, extracellular keratinase, purification.

Introduction

Keratin, an insoluble fibrous protein, is non-degradable by common proteases such as pepsin, trypsin, papain etc. because of the presence of high degree disulfide cross-linking. The keratinous wastes generally are feathers, hair, nails, horn, hoofs, skin, scales and wool. Globally the most abundant keratinous materials are poultry feathers which are increasing annually with rising global production and consumption[18]. Feathers contain around 90% keratin protein and the traditional methodology to degrade those leads to the destruction of valuable amino acids needed to prepare protein-rich feather meal.

Traditionally feathers are degraded by alkali hydrolysis and steam pressure cooking, consuming a huge amount of energy and producing waste which leads to environmental hazards[8,11]. Numerous microorganisms, actinomycetes, bacteria and fungi, are responsible for keratin utilization in nature and thrive on it. These organisms produce proteolytic enzymes keratinase having keratinolytic ability which naturally degrades keratin wastes[3,20].

Keratinophilic or keratinolytic fungi are closely related to dermatophytes and have the capability of tissue invasion[21]. Enzyme keratinase has been purified and characterized, produced by various microorganisms such as fungi[1,9,13,16,17], bacteria[2,11] and a few Streptomyces species[6]. The keratinase produced by these organisms showed specific activity on insoluble keratin. The production of extracellular keratinase was governed by several factors like temperature, pH, carbon and nitrogen sources and types of keratin substrates.

The characterization of keratinase is warranted for important biotechnological applications in industrial processes[1]. The industrial application of keratinase varies hugely as it has been used for dehairing of skin and hides, preparation of feather meal and nitrogen fertilizers from poultry feathers. The present study deals with the production, purification and characterization of extracellular keratinase from *Chrysosporium tropicum* (NFCCI-3317) isolated from a poultry farm soil.

Material and Methods

Isolation and maintenance of culture: *C. tropicum* (NFCCI-3317) was isolated from the poultry farm soil of Raipur, India. The fungus was maintained in Sabouraud's dextrose agar (pH 5.60) at 26±2°C.

Production of keratinase enzyme: For production of extracellular keratinase enzyme, basal salts medium [KH_2PO_4 - 1.5g; $MgSO_4.7H_2O$ - 0.025g; $FeSO_4.7H_2O$ - 0.015g; $ZnSO_4.7H_2O$ - 0.005g and $CaCl_2$ - 0.025g in 1 litre, deionized distilled water, pH – 7.0] was used for the fungus. Erlenmeyer flasks (150 ml) containing 50 ml of this medium supplemented with 500 mg of defatted and pre-sterilized human hairs (1 cm length) as a substrate were inoculated and incubated at 27°C for 6 weeks in static condition. Six test flasks and one control set were maintained for observations. Each test flask was inoculated with a 6 mm disc from 7-day old fungal culture. Flasks containing the medium with a disc of agar without the fungus served as control. After the incubation period, culture filtrates from each flask were filtered through Whatmann filter paper no. 42 and centrifuged at 5000 rpm for 5 min. The supernatant was used for the estimation of extracellular keratinase enzyme and protein.

Assay of keratinase activity: To assess the keratinase activity, the method of Yu et al[23] was followed with some modifications. 50 mg of human hairs (4-5 mm in length) were suspended in 4.5 ml of 0.028M phosphate buffer to which 0.5 ml of culture filtrate was added as an enzyme source. The reaction mixture was incubated at 37°C for 1 h and then immersed in ice water for 10 min to stop the

SAMRIDDHI
A Journal of Physical Sciences, Engineering and Technology

THE SOCIAL-ECONOMIC IMPACT OF TUBERCULOSIS: A REVIEW

Shivendra Singh Dewhare[1]* and **Shailendra Kumar[2]**

[1]*Assistant Professor, School of Studies in Life Science, Pt. Ravishankar Shukla University, Raipur, 492010, Chhattisgarh, India E.mail ID: shivendraprsu@gmail.com

[2]Assistant Professor, School of Studies in Anthropology, Pt. Ravishankar Shukla University, Raipur, 492010, Chhattisgarh, India E.mail ID: shailverma48@gmail.com

Corresponding author

Shivendra Singh Dewhare

Assistant Professor, School of Studies in Life Science,

Pt. Ravishankar Shukla University, Raipur, 492010, Chhattisgarh, India

E.mail ID: shivendraprsu@gmail.com

Abstract:

Globally, Tuberculosis has visibly impacted the daily lives of ordinary peoples in almost every country. However, the impact is pre dominant in developing countries, where poverty, social discrimination is rampant. Tuberculosis patients often face difficulty in social as well as personal aspect of life. Worldwide there is an understanding that controlling tuberculosis requires a careful amalgamation of various control programs, treatment regime and different aspects of social determinants. There is a lack of substantial literature addressing the social and economic assessment of tuberculosis patients. In this review we have reviewed the various initiatives taken by World Health Organization and supplemented the information with the steps taken by Indian government towards End TB strategy with special emphasis on social economic aspect of tuberculosis. In present paper tried to understand social- economical impact of tuberculosis in their patients and also sure relationship of culture and society with health.

Keyword: Tuberculosis, economic, social determinants, cost, Drug resistant TB, Management

1. Introduction:

Humans live in two worlds in the world: as members of the animal kingdom, they live in the animal kingdom, and as social members, they live in the social kingdom. There are lots of dimensions that have major or direct relationships between the social and animal kingdoms, and health is one of them, especially health. Reproductive health, epidemiology, etc. are strangely related to the social and environmental kingdoms. Causes, treatment, prevention, and promotion are the four major dimensions of health .And all four dimensions are directly related to the economic dimension, like If a family has a good economic situation, they are more likely to make good food choices. If they have access to a variety of nutrients, their nutritional levels are higher than in other families. AIDS, tuberculosis, Typhoid, and other diseases have had a direct and long-term impact on human society throughout

3.4.5 (Research Paper Publication)
2022-23
No. of Publication - 03

RNI : CHHBIL/2018/77892
ISSN : 2582-1792 (P)
2581-6918 (E)

IMPACT 2022 6.679 SJIF FACTOR

शोध समागम®

SHODH SAMAGAM

October to December 2022
Year - 04, Volume - 04, Issue - 02

A Double-blind, Peer-reviewed & Referred,
Quarterly, Multidisciplinary
and Bilingual Research Journal

Articles uploaded in Google Scholar

Aditi Publication

RNI : CHHBIL/2018/77892
ISSN : 2582-1792 (P)
2581-6918 (E)

CONTENTS

Amoghvarta

RNI : CHHBIL/2021/[illegible]
ISSN : 2583-0775 (P)
2583-31[illegible] (E)

IMPACT 2022 4.824 SJIF FACTOR

AMOGHVARTA

A Double-blind, Peer-reviewed, Quarterly, Multidisciplinary and Bilingual Research Journal

September to November 2022
Year - 02, Volume - 02, Issue - 02

Aditi Publication
Raipur, Chhattisgarh

AMOGHVARTA

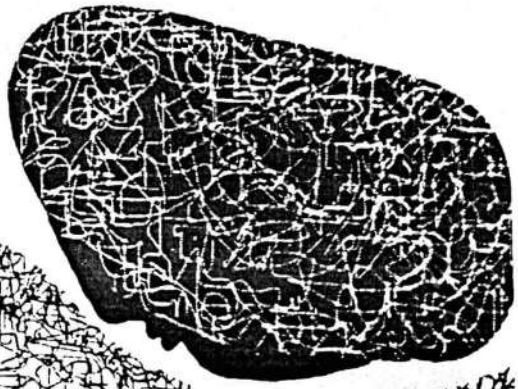
RNI : CHHBIL/2021/80395
ISSN : 2583-0775 (P)
2583-3189 (E)

CONTENTS

संपादक
डॉ. गिरिराजशरण अग्रवाल
डॉ. मीना अग्रवाल

ISSN 0975-735X

UGC APPROVED CARE LISTED JOURNAL



शोध दिशा

59

शोध दिशा

ISSN 0975-735X

विश्वस्तरीय शोध-पत्रिका
केंद्रीय हिंदी संस्थान, आगरा से अनुदान प्राप्त
UGC APPROVED CARE LISTED JOURNAL
विश्वविद्यालय अनुदान आयोग द्वारा मान्यता प्राप्त शोध पत्रिका

शोध अंक 59 जुलाई-सितंबर 2022 400.00 रुपए

संपादकीय कार्यालय
हिंदी साहित्य निकेतन, 16 साहित्य विहार,
बिजनौर 246701 (उ०प्र०)
फोन : 0124-4076565, 09557746346
ई-मेल : shodhdisha@gmail.com
वैब साइट : www.hindisahityaniketan.com

क्षेत्रीय कार्यालय

हरियाणा
डॉ० मीना अग्रवाल
ए-402, पार्क व्यू सिटी-2 सोहना रोड,
गुड़गाँव (हरियाणा)

दिल्ली एन०सी०आर०
डॉ० अनुभूति
सी-106, शिवकला अपार्टमेंट्स
बी 9/11, सेक्टर 62, नोएडा
फोन : 09958070700

(सभी पद मानद एवं अवैतनिक हैं।)

संपादक
डॉ० गिरिराजशरण अग्रवाल
07838090732

प्रबंध संपादक
डॉ० मीना अग्रवाल

संयुक्त संपादक
डॉ० शंकर क्षेम
प्रमोद सागर

उपसंपादक
डॉ० अशोककुमार
09557746346
डॉ० कनुप्रिया प्रचण्डिया

कला संपादक
गीतिका गोयल/ डॉ० अनुभूति

विधि परामर्शदाता
अनिलकुमार जैन, एडवोकेट

आर्थिक परामर्शदाता
ज्योतिकुमार अग्रवाल, सी०ए०

शुल्क
आजीवन (दस वर्ष): छह हजार रुपए
वार्षिक शुल्क : एक हजार रुपए
यह प्रति : चार सौ रुपए

स्वत्वाधिकारी, मुद्रक, प्रकाशक डॉ० गिरिराजशरण अग्रवाल द्वारा श्री लक्ष्मी ऑफसैट प्रिंटर्स, बिजनौर 246701 से मुद्रित एवं 16 साहित्य विहार, बिजनौर (उ०प्र०) से प्रकाशित। पंजीयन संख्या : UP HIN 2008/25034

संपादक : डॉ० गिरिराजशरण अग्रवाल

IOSR-JBM

IOSR Journals
International Organization of Scientific Research

IOSR Journal of Business and Management

e-ISSN : 2278-487X Volume : 24 Issue : 7 Series-4 p-ISSN : 2319-7668

Contents:

Peer Reviewed Refereed Journal

3.4.5

IOSR Journal of Business and Management (IOSR-JBM)
e-ISSN: 2278-487X, p-ISSN: 2319-7668, Volume 24, Issue 7, Ser. IV (July. 2022), PP 07-10
www.iosrjournals.org

Are MSME Employer of Choice? - An Empirical Enquiry

Sanskrity Joseph and S. K. Indurkar
Institute of Management, Pt. Ravishankar Shukla University, Raipur (CG), 492010

Abstract:
The start-up boons and entrepreneurial insights of young entrepreneurs have brought a renaissance in the Indian MSME sector in India. Small and medium sector industries in India are offering a host of employment opportunities to skilled and unskilled labour along with a vast array of innovative products and service offerings. Ahmed and Sana (2016) indicated that MSME sector is approximately going to employ 80.52 million people in near future. The advent of a pandemic like covid has shrunk the job markets and job markets have witnessed a steep decline in their job offerings. Tripathi (2020) highlighted that pandemic in India has contracted the earnings of MSME by 20% thus causing huge impacts on employability and generation of employment in this sector. Further lack of manpower planning coupled with a low orientation towards training has increased the problems related to attraction and retention of manpower in MSMEs in India. Ambler and Barrow (1996) have indicated that employer branding is key to retention and acquisition of employees in competitive labour markets. The covid situation in India has necessitated the understanding of employing the right man for the right job to make optimum utilization of scarce resources. Further a huge distress amongst job aspirants as they are unable to connect with their future employers due to strict covid protocols. Social media in various cases has come to the rescue where recruitment advertisements are published by companies through various social media platforms to reach the right talent base. In the current scenario where the job market is shrinking and employability is decreasing the present paper is an attempt to understand whether MSMEs can become an employer of choice."

Key Words: *MSME, employer branding, manpower planning, social media*

Date of Submission: 02-07-2022 Date of Acceptance: 14-07-2022

I. Introduction:

The approach is always guided by the need of Indian Markets. Employer branding practices in the MSME sector are also a leading example of this standard. Purushottam et al (2019) indicated that financial constraints and lack of loyal employees are still the basic problems of MSMEs. He further opined that employees in the MSME sector feel that the practice of employer branding is still in its novice stage in the MSME sector. MSME sector in India faced an unprecedented situation with the advent of the Pandemic. The bottlenecks in meeting the dwindling demand side of its products and services led to an extreme disparity in the sector. The Government of India with its handy financial packages has made a gigantic effort to revive its MSMEs sector. This has forced the MSMEs to come up with a strategic plan to work for their survival. Gudi et. al (2021) underlined the problem of the MSME sector in India by highlighting that the downfall in economic activities reduced productivity leading to a loss in employment opportunities which in turn brought uncertainty with respect to income generation and survival. Further, the process of branding is almost absent in the MSME sector in India as well as abroad. The management of MSME perceives branding as a futile exercise as they feel that trading can be done without branding. Setiawati (2019) highlighted that lack of use of communication channels to promote themselves as a brand has led to the loss of market for MSME. Srinivasan and Kunjangad (2019) further highlighted that the MSME sector is working with various dilemmas. They focus on short-term strategies and ignore efficient demand management practices which can be better handled by innovation and equipped manpower.

The feeling of uncertainty related to job markets is causing huge pressure on individuals who are now termed as Covid batch and are facing problems with their career progressions. The effect of the pandemic had a direct effect on their examination and results which were caused by delays in sessions due to country-wide lockdowns. They are eagerly looking for a career opening in the MSME sector. They are the internet generation and they usually use Social media to enquire about jobs in their relevant fields. Social recruitment is becoming a recommended source for tracing potential employees. Hamdan et. al (2019) used the promotion optimisation model to understand the impact of the promotion mix on prospective clients. Their study concluded that the perception of the receiver of a message with respect to mutual trust and responsibility related to a media determines its success. Grzesiuk and Wawer (2018) conducted a survey of 100 Polish companies to understaad

VSRD-TNTR

VSRD INTERNATIONAL JOURNAL OF TECHNICAL & NON-TECHNICAL RESEARCH

e-ISSN: 0976-7967, p-ISSN: 2319-2216

Special Issue

VOLUME XIII DECEMBER 2022

Editors: Prof. (Dr.) Divya Chowdhry, Prof. (Dr.) Anil Kumar Singh & Mr. Anand Kumar Dixit

5th International Conference on

"Paradigm Shift in Management Strategies and Technological Innovation"

IC-PSMSTI 2022

Organised & Hosted By

JAGRAN INSTITUTE OF MANAGEMENT

620, W-Block Juhi, Saket Nagar, Kanpur, Uttar Pradesh, INDIA
Web: www.jimkanpur.ac.in, Email: admin@jimkanpur.ac.in, Ph. 0512-2601126, 9935444524

NATIONAL PENSION SYSTEM VIS-À-VIS CONTRIBUTORY PROVIDENT FUND: A STATISTICAL STUDY ON TWO SOCIAL SECURITIES IN INDIAN SCENARIO

Dinesh Kumar Lalwani
Research Scholar, Institute of Management
Pt. Ravishankar Shukla University, Raipur, Chhattisgarh
Email: lalwanidineshkumar@gmail.com

Dr. Susheel Kumar Indurkar
Assistant Professor, Institute of Management
Pt. Ravishankar Shukla University, Raipur, Chhattisgarh
Email: ski2406@gmail.com

Dr. Sanskrity Joseph
Assistant Professor, Institute of Management
Pt. Ravishankar Shukla University, Raipur, Chhattisgarh
Email: sanskrityjoseph@gmail.com

ABSTRACT

Social Security provides a basis of income on which employees can make a plan for their life after retirement or being disabled before retirement or for various needs of the family during service and financial support to the family in case of death of the employee while in service. There are various social security avenues like healthcare, disability, childcare, provident fund, gratuity, pension, insurance, etc. For organized sector employees the important contributory social security schemes are National Pension System (NPS) and Contributory Provident Fund (CPF). NPS is a defined contribution pension system administered and regulated by the Pension Fund Regulatory and Development Authority (PFRDA) while CPF is administered by the Employees Provident Fund Organization (EPFO). An employee can avail of only one institutional contributory scheme as per the rules laid down by the government. The current study through a literature review tries to highlight various aspects of the NPS and CPF. Further, the research brings forward the differences between NPS and CPF statistically. For this literature review research papers, various thesis/dissertations, websites, etc. have been referred. The findings bring in to light the merits and demerits of both schemes.

Keywords: Social Securities, National Pension System, Contributory Provident Fund.

1. INTRODUCTION

As per the Social Security Bulletin, Volume 55, No.1, Spring 1992, pp.63-64, the credit for introducing the term "Social Security"[1] goes to Abraham Epstein, a national leader in the social welfare movement in the first half of the century of the United States of America.

1.1 SOCIAL SECURITIES

As per the bulletin, Epstein worked as Research Director at the Pennsylvania Commission on Old Age Pensions from 1918 to 1927. It was due to his efforts that the State adopted the old-age assistance law in the year 1923 and in 1927 he founded the American Association for Old Age Security. In 1933 he changed the name of his organization from the "American Association for Old Age Security" to "American Association for Social Security" which later on became the basis of the Social Security Act of 1935 establishing the Federal Old-Age Benefits Program, the Unemployment Compensation program and the Federal Assistance Program (among other similar social welfare programs).

Webster's Third New International Dictionary defines the term social security as "1. The principle of public provision for the economic security and social welfare of the individual and his family (as through social insurance or assistance)" 2a. A U.S. government program established in 1935, gradually extended since, and including provisions for old age and survivors' insurance, and old age assistance; 2b. a deduction or payment made under the U.S. social security program (deducted three dollars from his check for social security) (hasn't received his social security for this month). According to Emil Frankel, Epstein's friend and colleague security is the term incorporated in various social legislations which became a household word in the United States and spelled assurance to millions of citizens in meeting life's untoward economic problems. Apart from individually purchased family health insurance policies, and the availability of government and charitable hospitals, there are various social security avenues for an employee working in the organized sector such as Employee State Insurance Coverage, organizational level tie-up with various private hospitals, institutional/organizational medical and health care facilities, etc. Social security for employees of the organized sector also includes Provident Fund, Gratuity, Pension, Earned Leave Encashment, etc.

Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/16248
DOI URL: http://dx.doi.org/10.21474/IJAR01/16248

RESEARCH ARTICLE

EXPLORING DYNAMIC EFFECT OF SALES PROMOTION ON CONSUMERS: A REVIEW

Dr. Neha Soni and Dr. G.K. Deshmukh

Manuscript Info

Manuscript History
Received: 10 December 2022
Final Accepted: 14 January 2022
Published: February 2023

Key words:-
Consumer, Digital, Purchase, Retailer and Sales Promotion

Abstract

The recent trend in marketing is customers focused which is intended to fulfill diversified needs, wants and satisfying them. The consumer during purchase evaluates various marketing factors which add value to product either by saving money or providing added benefits. Retailers in this digital era adopt promotional strategies (sales promotion) on routine bases, to persuade and stimulate consumers to buy. Since decades large number of studies has been performed by various authors describing significance of sales promotion. This study elaborates the research conducted in recent years in context with sales promotion techniques and its effectiveness among consumers by reviewing 22 research papers.Sales promotion techniques includes coupons, rebates, price packs, premiums, frequency programs, prizes (contests, sweepstakes, games), patronage awards, free trials, product warranties, point-of-purchase (P-O-P) displays and demonstrations etc, which produce quick results as it boosts sales quickly and make customer loyal in long run. It was evident from past researches review that sales promotion had positive and significant influence on consumers towards purchasing similar or differential products of varying quantities from diversified segments of market. Thus, marketer by selecting combination of sales promotion techniques can exaggerating sales and generate profit.

Introduction:-

A wide number of studies on sales promotion have been reviewed since past decades discussing its significance in the present business scenario. Sales promotion is always fascinating and dynamic field of study both for marketers and retailers understood well through its models and theories. Brassington and Pettitt (2000) explained that sales promotion includes a range of marketing techniques designed within a strategic marketing framework to add extra value to a product or service over and above the 'normal' offering in order to achieve specific sales and marketing objectives, this extra value may be a short-term tactical nature or it may be part of a longer-term franchise-building program. Further, Kotler and Keller (2012) stated sales promotion, as a key ingredient in marketing campaigns, consists of a collection of incentive tools, mostly short term, designed to stimulate quicker or greater purchase of particular products or services by consumers or the trade.

The sales promotion techniques are widely considered by almost all the retailers to promote products to the customers in the market. The customers get stimulated and make decision to purchase based on available sales promotion schemes with products. According to Hawkins et al. (2001) consumer behavior is the study of individuals, groups or organizations and the processes they use to select, secure, use and dispose of products,

Corresponding Author:- Dr. Neha Soni

service,experiences or ideas to satisfy needs and the impacts that these processes have on the consumer and society. The buying decision of consumers is influenced by sales promotion as they gain additional advantages either in price form or non-price of promotion. Kotler and Keller (2012) have categorized sales promotion techniques on the bases of consumer, business and trade in order to understand better implications in each segment.

The paper is a review study where descriptive research was conducted with 20 research papers and articles belonging to time period 2009-2022 which were thoroughly studied on the bases of key factors, statistical tool applied, key findings and publishing journal.

Research Objectives:-

1. To understand the sales promotion and its techniques.
2. To find significant sales promotion techniques and its impact on consumer purchase decision through review of literature.

Review Of Literature:-

The paper has undergone review ofprevious research papers and articles of theoretical and empirical perspective in the field of sales promotion, its techniques and significant effect among consumers.Sales promotion an effective promotional technique as it satisfies specific demand of consumers providing opportunity to get more than expected, thus considered as integral part of consumer decision making. The managers have spurred the applicability of sales promotion in their business in order to gain satisfaction of consumers.

Large number of researches has been performed describing sales promotion and its effectiveness, among them the significant from past 10 years have been considered for review in the study. It was evident from the findings of previous researchers that sales promotion techniques are essential factor of marketing as its significance is found in all stages of consumer buying decision. Review of previous studies has been summarized in the Table 1(Refer Table 1).

1. According to Palazon and Delgado-Ballester (2009) effectiveness of promotional strategy were examined taking into consideration price discount and premium promotion. Price discount was commonly employed in comparison to others as had perception of reduced price. Experimental research was conducted to analyze interaction effect of effectiveness on promotional benefit level (low, moderate and high) and promotionaltype which provided differential results in each level.Thus, the study assists managers in designing significant strategy for their products.
2. Nochai and Nochai (2011) in their study analyzed sales promotion factors effect on purchasing portable PC's or Notebook of selective companies. Among the various sales promotion factors offer member card for discount, extended warranty period, bundled with scanner, billboard, leaflet and installment were considered in the research. The statistical test results revealed that sales promotion has significant impact, as customers purchase depends on the benefits gained from considered factors. On regular bases if sales promotion factors are considered market share of product will increase and customer needs may be satisfied.
3. Ullah and Islam (2011) had undergone extensive study on understanding effect of warranty on electronic purchase. Warranty was examined taking into consideration its key variables which includeService Provider's Accountability, Reliability of Product, Long Term Warranty, Short Term Warranty, Branded Product, Non-branded Product, Country of Origin and Risk Reliever. As warranty plays significant role in buying thus most of the variables were found significant and considered by consumer while purchase. Marketers while designing strategies should consider above variables to stimulate products sales.
4. Jones and Smith (2011) accessed effect of point of sale (point of purchase) on purchase (alcohol) among young people. Three different locations Consumers (metropolitan, regional and rural) were considered in the study. It was evident in the research that point of sale has influence on purchase when free gift offers and price discount offers were provided to customers and also intended them to buy more. It was also observed that consumer's recalls previous promotion offers when the new purchases were made. The consumption of alcohol may vary due to demographic change in age, gender and geographical location as needs vary. The study assist helps dealers and distributors in framing policies and strategies to stimulate sales.
5. Ettl-Huber and Steurer (2012) analyzed effect of sweepstake and contest on radio audience. Sweepstake and contest techniques of sales promotion are widely considered in various product segments but are rarely noticed in radio marketing. As the listeners served well with advertising, media, brand recognition and prizes that attract them most. The research analysis interpreted that both sweepstake and contest have positive influence towards

THE EDUCATIONAL CHALLENGES FOR ADOLESCENT FEMALES' IN LOWER SETTLEMENT OF CHHATTISGARH: A QUALITATIVE STUDY

PratibhaBarik, Assistant Professor, Shri Shankaracharya Professional University, Bhilai,
pratibha.barik@gmail.com
MinalUprety, Associate Professor, Kirloskar Institute of Management, Pune
minaluprety2022@gmail.com,
G. K. Deshmukh, Associate Professor, Pt. Ravishankar Shukla University, Raipur,
gkd16@yahoo.co.in

Abstract
The qualitative study examined the challenges and supporters to adolescents' girls ability to enrol in and complete secondary education in lower settlements of Raipur and Bilaspur district of Chhattisgarh State. In-depth interviews were conducted with 21 adolescent girls aged 12-19 years with their respective parents/ guardians and 10 female school teachers working in government schools' nearby slums areas. The study revealed various challenges that functioned at individual, family, society and educational levels which were found to prevent disadvantaged caste adolescent girls from enrolling in and continuing their education in this environment. Further, the supporters of education were also identified. The study emphasizes the significance of trying to alter ideas and expectations around gender norms as well as raising the standard of education in this context in order to remove barriers to girls' education.
Key words: Adolescent girl, Education, Gender, Challenges, Supporters, lower settlement.

Introduction
It is commonly agreed that increasing females' school attendance benefits both individual and society and is a matter of social equality and development. Girls' education has ramifications beyond the girl herself, since it benefits the whole community and nation. Educating girl's helps in economic development by increasing productivity and reducing the income gap in families (Abu-Ghaida&Klassan, 2004; Birdsall et al., 1993). However, in certain countries, (India) females are still disadvantaged in terms of school access and experiences, and are more likely to school drop-out than boys. The prevalence of child or adolescent marriage and neonatal and maternal mortality increases as the school dropout rate rises (Hill & King, 1995; Jensen, 2012). To begin addressing the problem of education participation, a deeper knowledge of the factors that encourage females from attending and remaining in secondary school is required to achieve a success in gender disparity in India.
"Adolescence" is Latin originated word "Adulescere" means, "to grow, to mature", "to emerge" or "achieve identity". It is a significant phase of transition from childhood to adulthood bringing a change in mental, emotional and psychological development. As per WHO, age of adolescence lies between 10-19 years, but in Indian culture girls are considered to be grown up after the occurrence of menarche, they are no more treated a child (Abraham, Leena, 2001).
Globally, gender parity in OOS (out of school) rates is declining, but regional and national differences continue. Out the 77.7 percent Indian literacy rate in 2022, male literacy rate stands at 84.7 percent and female literacy rate stands at 70.3 percent as compared to global average female literacy rate of 79 percent (as per UNESCO[1]). The net attendance ratio (NAR) declines in secondary school remain illusive for females: according to National Family Health Survey, 2019-21, NAR of female age 6-13 years is 93.9 percent, 11-13 years is 92.6 percent, 14-15 years is 81.6 percent and 16-17 years is 62.6 percent showing a down fall.
Even in 20th century, adolescent girls outlook are often being ignored there are very limited evidence available who talks about these girls (Sylvia, Martina and Jordana,2017). In India, gender norms subordinate women to males in public and private activities in terms of power and wealth. This problem offers a severe barrier to achieving SDG-4 (Sustainable Development Goals) to "provide

[1] https://www.unesco.org/en/articles/why-educating-women-more-important-we-realize#:~:text=Some%20Important%20Statistics&text=Of%20the%2077.7%25%20Indian%20literacy,%25%20(as%20per%20UNESCO).

inclusive and equitable quality education and promote lifetime opportunities for all" and SDG-5 to "achieve gender equality and empower all women and girls" by 2030. After Covid-19 the situation has become more worse, nearly 24 million learners out of which 11 million are projected to be girls and young women might never return to formal education, due to the pandemic (as per UNICEF[2]). A survey conducted in India on International Women's Day 2022 by U-Report poll of the United Nations Children's Fund (UNICEF) revealed that around 38% of the respondents knew at least one female student who had dropped out of school and the report was an alarming for India. In a report by Unified District Information System for Education Plus (UDISE+) 2020-21 revealed that the annual dropout rate of secondary school students was 14.6%. The Children from lower settlement faced the most difficulty in accessing the remote learning. Yasumasa Kimura, UNICEF India Representative, fears that there is a risk of a "lost generation of children" who will never return to school and that the impact on female students is disproportionately worse[3]. In addition, beyond the question of access, there is considerable evidence that gendered social and schooling experiences are a major factor in discouraging female participation and learning, from social attitudes to the educated female, to schools as sites of gendered discrimination and violence (Stromquist and Fischmann, 2009).

This qualitative paper summarizes the educational obstacles and inequalities confronted by adolescent girls in low-income communities and relevant literatures were being reviewed. Further the factors facilitate the girls not to drop out or enrol in schools were explored and the findings of the research will help to reframe the education policies for these vulnerable girl's residing in lower settlements and its successful implication in the near future. The research highlights the importance of female education for the society and supporters to keep them educated has also been revealed.

Literature Review

Education is a fundamental capability in and of itself since it allows people to expand their freedom and goals. Female education has been strongly correlated with human and social development (Bandyopadhyay and Subrahmanian, 2008). Educated girls participates in politics and benefits society as well as country (Bertini&Ceretti, 2020). Educated girls takes the decision to postpones her marriage and have a lower lifetime fertility (Brown, 2012; Temin and Levine, 2009), reduce the risk of HIV/AIDS, increases family income and increases women power in the household and lower rates of domestic violence (Fancy, 2012; Brown, 2012). Educated women's are concern and aware about their health, sexual knowledge, STIs, HIV, childbirth and pregnancy (UNICEF, 2011). But the decline in schooling is associated with lower earning potential, lower access to financial resources, less knowledge of family planning, higher fertility and lower intervention and decision making power in the house (Svanemyr J, Amin A, Robles OJ, Greene ME, 2015; Grown C, Gupta GR, Pande R, 2005; Boyle MH, Racine Y, Georgiades K, Snelling D, Hong S, Omariba W, et al., 2006).

In today's scenario the Adolescents and their male counterpart have found centre space in Sustainable Development Goals (SDGs), 2015 and it addresses the needs of women and adolescents. The Central as well as State governments have also recognized the significance and problems of educating adolescents and have implemented supportive schemes like the Rajiv Gandhi Scheme for the Empowerment of Adolescent Girls (SABLA), the Integrated Child Protection Scheme (ICPS), the SarvaShikshaAbhiyaan (SSA), the National Education for Girls at Elementary Level (NPEGEL), the Kasturba Gandhi BalikaVidyalaya (KGBV). In 2021 UNICEF India supported the government and partnering bodies in 17 states by providing technology to 1.55 crore children to continue their learning from home and among them 50.5% were female. Further UNICEF is supporting the Indian Government in back-to-school campaigns, awareness and outreach initiatives and learning recovery programmes at schools and in the communities. But still 258 million children and adolescents are out of school globally for the 2018 school year, or one-sixth of the school-age population by, UNESCO Institute for Statistics, 2019.

---

[2] https://www.orfonline.org/expert-speak/nep-2020-achieving-universal-literacy-in-india-by-2047/

[3] https://www.telegraphindia.com/edugraph/news/unicef-india-report-highlights-alarming-rise-in-dropout-rates-of-female-school-students/cid/1858585

Effect of Age on Psychological Burnout in National Male Hockey Players

Dr.Vivek Mishra
Principal, Netaji Subhas College, Abhanpur, Raipur (C.G.)
&
Prof. C.D. Agashe
School of Studies in Physical Education,
Pt. Ravishankar Shukla University, Raipur C.G.

ABSTRACT

The present study aimed to assess the impact of age on psychological burnout in national male hockey players. To conduct the study 60 national / interuniversity male hockey players were selected. This sample comprises 30 male hockey players between 18-24 years of age group and 30 male hockey players between 25-28 years of age group. The magnitude of psychological burnout was evaluated with the Athlete Burnout Questionnaire. This questionnaire is a valid measure to assess psychological burnout and the authors of this questionnaire are Raedeke and Smith (2001). The questionnaire consists of 15 items based on three sub-scales i.e. emotional exhaustion, devaluation and a reduced sense of accomplishment respectively. Results revealed a significant effect of age on psychological burnout in national male hockey players and the symptoms of psychological burnout were significantly higher in younger age group as compared to older age group hockey players. It was concluded that age certainly has a significant predictor value in describing symptoms of psychological burnout in national male hockey players.

Keywords: **Psychological burnout, hockey, national male players**

INTRODUCTION

An endless devotion is needed to attain success in any field and this is true in the field of sports also. Sportspersons always strive to improve their skills and game-related attributes but sometimes the pressure to acquire the perfect skill set training load becomes unbearable. In sports win and loss is part of the game so when an athlete does not taste success despite the best of his efforts he feels let down. Markati (2018) feels that sports competition is a pressure cooker and apart from physical stressors there are psychological stressors also and can cause psychological burnout.

When a person is experiencing stress for a long time and the magnitude of stress is beyond tolerable limits, he may suffer from burnout. So burnout is caused by physical or

mental fatigue or exhaustion. When we are overstressed due to some unmet and challenging goals it leads to emotional and physical exhaustion. When burnout sets in a person become disinterested in pursuing goals and is unwillingly put effort to complete that task.

Maslach was credited with the term burnout in the year 1976 and believed that burnout is specific to an individual. When an athlete feels the heat of the training and feels that physical drills that are easy a few days ago need herculean effort to complete it shows that burnout is setting in. It is developed gradually and sets in over a while.

The emotional signs of burnout include lack of motivation and confidence, pessimistic attitude, helplessness and feeling defeated in all areas of life.

The psychological signs are social isolation, eating disorder, low frustration tolerance, procrastination and lack of punctuality. The theory of burnout gained momentum after 1997. In this year Raedeke's (1997) conceptualised psychological burnout as the total of emotional exhaustion, devaluation and reduced sense of accomplishment.

The model suggested that extreme mental and physical fatigue is the first part of the framework offered by Raedeke's. Devaluation is the second important element or factor used by Raedeke to describe burnout. Devaluation means a lack of motivation and this includes no interest to take part in a favourite sport or no will to work hard to attain success. The third factor reduced sense of accomplishment completes this framework and this factor defines the self-doubts and lack of confidence in the athlete due to severe stress.

The other major contributor towards burnout in sports is the work of Gustafsson et al. (2016). He described the three factors of Raedek's (1997) in the light of sports performance. While defining emotional exhaustion, Gustafsson emphasized intrinsic demands faced by sportsperson which eventually culminates into stress and emotional exhaustion. This model also states that when a sportsperson feels that this performance is below par with his abilities devaluation sets in.

Although facts about the prevalence of burnout in athletes are scientifically limited Gould and Dieffenbach (2002) found severe psychological burnout in 1-7% of athletes while 15% had moderate symptoms of psychological burnout. Francisco et al (2014) found that 12.7% of sportspersons have severe burnout symptoms but the majority are less likely to suffer from burnout. The issue of burnout in sportspersons is mostly unreported. Still few studies have documented its prevalence in players from different sports and hockey is one of them. Due to pro leagues and commerical aspect coming in hockey, the players feel the pressure to perform at the their best all the time. They also feel the pressure of rigorous training schedule to maintain and enhance their skills. The hockey players in this context may

feel signs of psychological burnout. Hence the present study was planned to assess the influence of age on psychological burnout in national male hockey players.

REVIEW OF LITERATURE

Bhagirathi (2008) in their study on hockey players concluded that emotional states play a part in decreased concentration and thereby leading to poor goalkeeping performance.

Khan (2014) in their found that the national level hockey players possesses significantly higher sports self confidence as compared to intercollegiate level hockey players.

Night (2015) reported that emotional intelligence among male field hockey players can be predicted by their playing position.

Suhail and Francis (2016) reported that national male field hockey players possesses greater magnitude of mental toughness as compared to state level male field hockey players.

Santos et al. (2020) reported that burnout in athletes can be determined by nature of sport but not with advancing age or gender.

OBJECTIVES

a. The objective of the present study was to compare psychological burnout among national male hockey players based on different age groups.

b. The objective of the present study was to compare emotional exhaustion, devaluation and reduced sense of accomplishment among national male hockey players based on different age groups.

HYPOTHESIS

1. It was hypothesized that the symptoms related to psychological burnout in national male hockey players will be significantly different based on their age.

2. It was hypothesized that the symptoms related to sub-factors of psychological burnout namely emotional exhaustion, devaluation and a reduced sense of accomplishment in national male hockey players will be significantly different based on their age.

METHODOLOGY

The following methodological steps were taken to conduct the present study.

Sample:-

To conduct the study 60 national / interuniversity male hockey players were selected. This sample comprises 30 male hockey players between 18-24 years of age group and 30 male hockey players between 25-28 years of age group. Purposive sampling was used to select subjects from different states of India.

Tools:

Athlete Burnout Questionnaire:

The Athlete Burnout Questionnaire standardized by Raedeke and Smith (2001) with three sub-factors namely emotional/physical exhaustion, devaluation and a reduced sense of accomplishment was adopted. The questionnaire is based on five points Likert scale and there are 15 items with 5 each for assessing three sub-factors. Summing the scores on three sub-factors gives an overall psychological burnout score. This questionnaire is highly reliable and valid.

Procedure:

- 60 national male hockey players were selected keeping in mind the age group of 18-24 years and 25-28 years.
- ABQ standardized by Raedeke and Smith (2001) was administered to each subject according to their convenience.
- Scoring was done exactly as instructed by the authors for three sub-factors and then totalled for overall psychological burnout.
- The comparative statistics were calculated by the independent sample 't' test.
- Results are given in Tables 1 and 2 respectively.

RESULT AND DISCUSSION:

Table No. 1

Comparison of psychological burnout in national male hockey players based on Two Different Age Groups

Variable	Age Group (National Male Hockey Players)						t
	18-24 years			25-28 years			
	N	Mean	S.D.	N	Mean	S.D.	
Psychological Burnout	30	27.66	7.15	30	23.10	4.80	2.90

t(df=58) = 2.01 at p<.05 and 2.66 at p<.01;

A perusal of statistical values shown in table 1 indicates that the mean score on psychological burnout in national male hockey players from the 18-24 years age group was 27.66 while the standard deviation was 7.15. The mean score on psychological burnout in national male hockey players from the 25-28 years age group was 23.10 while the standard deviation was 4.80. The mean difference between groups was 4.56. The t=2.90 indicate that symptoms of psychological burnout were significantly higher in subjects belonging to the 18-

24 years age category as compared to subjects belonging to the 25-28 years age category thereby denoting the effect of age on psychological burnout among national male hockey players.

Table No. 2

Comparison of Dimensions of Psychological Burnout in National Male Hockey Players Based on Two Different Age Groups

Sub-factors of Psychological Burnout	Age Group (National Male Hockey Players)						t
	18-24 years			25-28 years			
	N	Mean	S.D.	N	Mean	S.D.	
Emotional/ Physical Exhaustion	30	8.23	2.94	30	6.43	1.59	2.94
Devaluation	30	9.73	3.01	30	9.63	2.96	0.12
Reduced Sense of Accomplishment	30	9.70	3.06	30	7.03	1.80	4.10

$t(df=58) = 2.01$ at $p<.05$ and 2.66, $p<.01$

The first sub-factor of psychological burnout is emotional/physical exhaustion. The mean for national male hockey players from 18-24 years of age category on emotional/physical exhaustion was 8.23 and the standard deviation was 2.94. The mean for national male hockey players from 25-28 years of age category on emotional/physical exhaustion was 6.43 and the standard deviation was 1.59. The mean difference between groups was 1.80 and the t=2.94 denoting that symptom of emotional/physical exhaustion was significantly higher in national male hockey players belonging to 18-24 years of age as compared to national male hockey players belonging to the 25-28 years age group at .01 level of statistical significance.

No statistical evidence was found in the devaluation subfactor of psychological burnout when compared between national male hockey players belonging to two age groups namely 18-24 years and 25-28 years. ($t=0.12$, $p>.05$)

The third sub-factor of psychological burnout is a reduced sense of accomplishment. The mean for national male hockey players from 18-24 years of age category on a reduced sense of accomplishment was 9.70 and the standard deviation was 3.06. The mean for national male hockey players from 25-28 years of age category on a reduced sense of accomplishment was 7.03 and the standard deviation was 1.80. The mean difference between groups was 2.66 and the t=4.10 denoting those symptoms of reduced sense of accomplishment was

https://doi.org/10.37896/sr9.5/032 ISSN: 0039-2049

significantly higher in national male hockey players belonging to 18-24 years of age as compared to national male hockey players belonging to the 25-28 years age group at .01 level of statistical significance.

DISCUSSION:

The results of this study indicate a significant effect of age on psychological burnout in national male hockey players. Raedeke and Smith (2001) reported that young athletes are at greater risk for psychological burnout while De Francisco et al. (2014) found no significant effect of age on burnout in athletes. The results can be understood through coping and athlete burnout hypotheses proposed by Raedeke and Smith (2001) in which they suggested that with advancing age an athlete learn to cope with stressful situations better so it is highly that male hockey players within the age range of 18-24 may experience more burnout symptoms.

CONCLUSION

Based on the results, it can be concluded that age significantly influences symptoms of psychological burnout in national male hockey players. It may also be concluded that younger and less experienced national male hockey players need to be assessed regularly for signs of burnout and if required proper psychological counselling be arranged for them.

REFERENCES

Bhagirathi, S. E. (2008). Relationship of Anxiety and Acheivement Motivation to Goal Keeping among Secondary School Level Girl Hockey Players. Journal of Exercise Science and Physiotherapy, Vol. 4, No. 2: 115-118.

De Francisco, C., Garcés de los Fayos, E. J. and Arce, C. (2014). Burnout en deportistas: prevalencia del síndrome a través de dos medidas. [Burn-out in athletes: Prevalence of the syndrome through two measures]. Cuadernos de Psicología del Deporte, 14(1), 29-38.

Francisco, C., Fayos, E.J.G., and Arce, C. (2014). Burnout endeportistas: prevalenciadel síndrome a través de dos medidas. CuadPsico Deporte; 14(1):29-38.

Gould, D. and Dieffenbach, K. (2002). Overtraining, underrecovery, and burnout in sport. In: M Kellman, editor. Enhancing recovery: Preventing underperformance in athletes. Champaign, IL: Human Kinetics;, p. 25-35.

Gustafsson, H., Lundkvist, E., Podlog, L., and Lundqvist, C. (2016). Conceptual confusion and potential advances in athlete burnout research. Perception and Motor Skills, 123(3), 784–791.

Kamimura, A., Kawata, Y., Raedeke, T.D. and Hirosawa, M. (2020). Association of Athlete Burnout with Depression Among Japanese University Athletes. The Juntendo Medical Society, 66, 3, 221-232.

Khan, M.K. (2014). A comparative study of self-confidence among different levels hockey players. Review of Research Journal 2014 Vol. 3, No. 4, 60-61.

Madigan, D. J., Stoeber, J., and Passfield, L. (2015). Perfectionism and burnout in junior athletes: a three-month longitudinal study. J. Sport Exerc. Psychol. 37, 305–315.

Markati, A., Psychountaki, M., Kingston, K., Karteroliotis, K. and Apostolidis, N. (2019). Psychological and situational determinants of burnout in adolescent athletes. International Journal of Sport and Exercise Psychology, 17:5, 521-536.

Maslach, C., Schaufeli, W. B. and Leiter, M. P. (2001). Job burnout. Annual Review of Psychology, 52(1), 397-422.

Night, J.R.S. (2015). Analysis of Emotional Intelligence among Hockey Players in Relation to their Positional Play. Research Journal of Physical Education Sciences, Vol. 3(7), 8-11.

Raedeke, T. D. (1997). Is athlete burnout more than just stress? A sport commitment perspective. Journal of Sport and Exercise Psychology, 19(4), 396-417.

Raedeke, T. D. and Smith, A. L. (2001). Development and preliminary validation of an athlete burnout measure. Journal of Sport & Exercise Psychology, 23(4), 281-306.

Santos, A.C.A., Pires, D.A., Vorkapic, C.M.F. and Bastos, A. de A. (2020). Differences in perception of burnout syndrome among young athletes from individual and team sports. Motricidade, vol. 16, n. 1, pp. 39-46.

Suhail, K.M. and Francis, V.P. (2016). Mental toughness among the hockey player of state and national level. International Journal of Research in Social Sciences, Vol. 6, Issue 10, pp. 560-569.

Comparison of Body Image in Disabled Athletes and Non-athletes Based on Gender

Dr.Vivek Mishra
Principal, Netaji Subhash College, Abhanpur, Raipur (C.G.)
&
Prof. C.D. Agashe
School of Studies in Physical Education,
Pt. Ravishankar Shukla University, Raipur C.G

ABSTRACT

The general attitude of society toward physical disability is that they are unable to contribute to society in the same way as a disabled person. The physical disability sometimes causes negative thoughts to creep into the psyche and that also includes negative body image. The present study aims to investigate the effect of sports participation on the body image of physically disabled individuals of both sexes. To conduct the study 60 physically challenged athletes with an average age of 26.50 years were selected from various competitions at the national level organized for physically disabled people. The sample comprises 30 physically challenged males and 30 physically challenged female athletes. To serve the purpose of the study, 30 physically challenged male non-sportspersons and 30 physically challenged female non-sportsperson were also selected and their average age was 25.30 years. The body image of selected physically disabled adults was evaluated by Body Image Questionnaire standardized by Agashe and Karkare (2008). The nature of this research requires a 2x2 research design. It was found that participation in sports has a significant effect on body image with physically challenged athletes showing significantly better body image than the physically challenged non-athletes. The main effect of gender exhibiting that physically disabled males have significantly better body image as compared to physically disabled females. The interaction between two independent variables was unable to influence body image. It was concluded that participation in sports and gender are two independent factors that have a marked effect on the body image of physically disabled subjects.

Keywords: physical disability, body image, sports participation

Introduction

Feeling of aesthetics regarding body is termed body image and this term is first used by Shilder (1935) in his well known and appreciated work on the appearance and image of the human body. In almost, every society beauty and appearance is always admired and for ages, some norms are considered essential for beauty and appearance but not every individual needs to have the same kind of body type that is culturally defined as an ideal body. Schilder (1935) propagated that it is the picture or mental image of the body that is formed by our imagination about looks. Cash and Pruzinsky (2004) considered body image as a multifarious aspect that is related to the thinking process about physical appearance. Body image is a mental image of physical appearance that a person creates and it also includes emotional aspects. Bainfield and McCabe (2002) consider body image as the physical self and feeling of an individual regarding the appearance of the body. Through body image, individuals create a psycho-physical identity. Percept and concept form body image and Kolb (1959) believes that cultural beliefs have a tremendous influence on them. The importance of studying body image lies in its ill effects. Several researchers namely Neumark et al. 2006, Paxton et al. 2006; van den Berg et al. (2010), Wasylkiw et al. (2012); Izydorczyk, B. (2013); Kakkar (2020) have documented that body image causes several psychological, physical and physiological problems such as depression, cognitive anxiety, social isolation, eating disorder etc. That is why body image has been given so much weight in recent years. When body image concerns are rising alarmingly even in the non-disabled population, naturally, it is also present in the physically challenged population because disability often hinders relations in our society. Bahram and Shafizadeh (2002) reported that body image is certainly a part of personality and due to disability a person is short of confidence and feels that he/she is dependent on others. A disabled person feels that physical impairment is the primary reason for this and attributes it to physical appearance. This is not surprising because disability means a physical or mental state which hinders a person's motor movement or doing certain activities just like normal individuals. It is a perceptual challenge because disabled people are considered inferior to non-disabled in many aspects and these negative perceptions persist in our society because of masculinity and feminity concepts prevailing in our society. Hence it may be possible that a person with physical impairment may be low in body image, confidence and self-concept. Attempts have been made to improve the psycho-social and physical well-being of physically challenged people through various modes and sports participation has also been used in this regard. In the 18th and 19th centuries sports as a

medium emerged as a rehabilitation tool for physically disabled people but Guttman started using competitive sport as a tool for rehab. of people with disability. Nowadays the majority of sports that are played by able-bodied sportspersons are also there for the physically disabled with few modifications. Later on, research work is carried out regarding the role of sports participation in the rehabilitation of persons with disability. Researchers like Zarandi (2011) and Goran et al. (2012) reported that sports participation as an integrated therapy is useful in enhancing the psycho-social well-being of physically challenged people.

OBJECTIVE :

The following objectives were framed by the researcher to conduct this study :

1. To assess the main effect of participation in competitive sports on the body image of selected physically challenged adults.
2. To assess the main effect of gender on the body image of selected physically challenged adults.
3. To assess the interaction effect of participation in competitive sports and gender on the body image of physically challenged adults.

HYPOTHESIS :

It was hypothesized that participation in competitive sports (athletes - nonathletes) and gender (male-female) will significantly influence the body image of physically disabled adults.

METHODOLOGY

Sample

To conduct the study 60 physically challenged athletes with an average age of 26.50 years were selected from various competitions at the national level organized for physically disabled people. The sample comprises 30 physically challenged males and 30 physically challenged female athletes. To serve the purpose of the study, 30 physically challenged male non-sportspersons and 30 physically challenged female non-sportsperson were also selected and their average age was 25.30 years.

Tools

The body image of selected physically disabled adults was evaluated by Body Image Questionnaire standardized by Agashe and Karkare (2008). This questionnaire has 25 statements with multiple response options. Both textual and picture-based

statements are included in this questionnaire. This questionnaire is highly reliable (test-retest coefficient 0.82) and valid (LawShe coefficient 0.92). The scoring pattern indicates that the higher the score, the poorer the body image of the respondent.

Procedure

30 physically challenged males, 30 physically challenged female athletes, 30 physically challenged male non-sportspersons and 30 physically challenged female non-sportsperson were asked to give their response on 25 statements given in BIQ. The responses were numerically tabulated. For 2x2 ANOVA design the responses were arranged accordingly in four cells. Results are given in table 1 and 2 respectively.

RESULTS :

Table 1

Effect of Sports Participation (A) x Gender (B) on Body Image of Physically Disabled Adults

		Gender (B)		Marginal Mean
		Male (b_1)	Female (b_2)	
Sports Participation (A)	Athletes (a_1)	N=30 M=14.43 S.D. = 6.78	N=30 M=20.26 S.D.=7.35	17.35
	Non-athletes (a_2)	N=30 M=19.70 S.D.=7.14	N=30 M=21.76 S.D.=7.18	20.73
Marginal Mean		17.06	21.01	

ANOVA Summary

Source of Variation	SS	df	MS	F
A	343.408	1	343.408	6.77**
B	468.075	1	468.075	9.23**
AB	106.408	1	106.408	2.09 (NS)
Within treatment (Error)	5880.900	116	50.697	

** Significant at .01 level; NS Not Significant

Table 1 reveals the following facts–

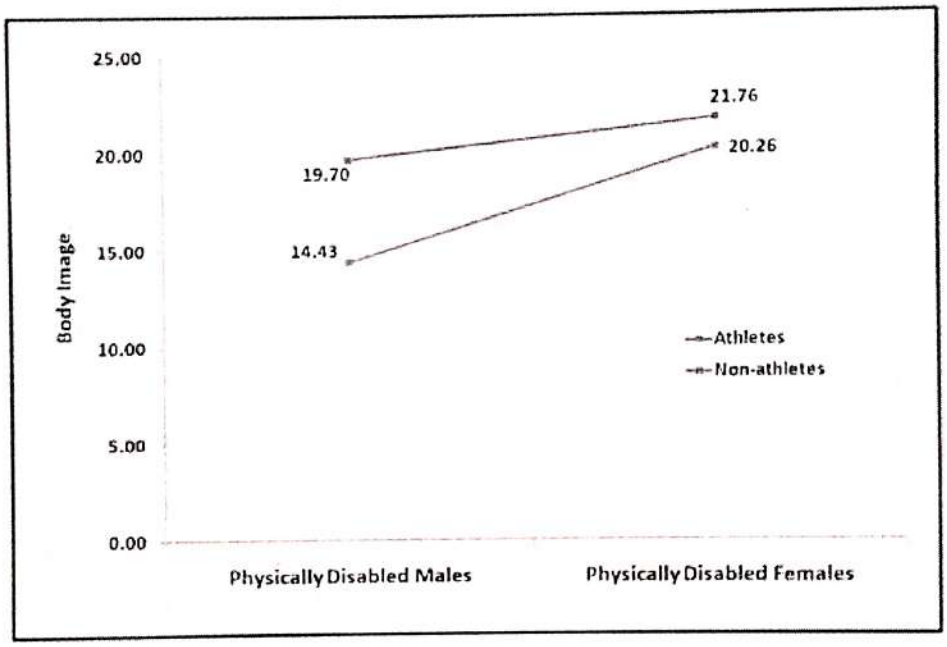
- The main effect of sports participation on the body image of physically disabled adults was statistically significant. The F ratio of 6.77 shows that

physically disabled athletes have much superior body image (M=17.35) as compared to physically disabled non-athletes (M=20.73) with p<.01.

- The main effect of gender on the body image of physically disabled adults was statistically significant. The F ratio of 9.23 shows that physically disabled males possess significantly superior body image (M=17.06) as compared to physically disabled females.
- The two-factor interaction of participation in competitive sports and gender was not observed in the body image of physically disabled adults (F=2.09, p>.05)

Figure 1

Factor A (Sports Participation) and Factor B (Gender) on Body Image of Physically Disabled Adults.



DISCUSSION:

In the present study, physically disabled athletes showed superior body image as compared to physically disabled non-athletes. Javadi and Kadivar (1995) under personality psychology reported that competitive sports mediate self-esteem. Since a majority of sports participation requires physical activity thereby physically disabled adults gain more fitness and belief about their abilities which in turn enhance their body image.

Similarly, Agashe and Tiwari (2016) in their study reported that participation in sports improves social adjustment in a group of physically disabled adults.

It was also found that body image in physically disabled females was more distorted than the physically disabled males because females with disability have to face more social stigma than males. The results are also supported in a normal population by Shaheen et al. (2016).

The joint effect of two independent variables namely sports participation and gender was not observed on the body image of physically disabled adults which is natural because both the variables have created a significant main effect.

Also, the two lines given in figure 1 are not cutting each other thereby proving the result statistically.

CONCLUSION:

1. Participation in competitive sports boost the body image of physically disabled adults.
2. Gender influences body image in physically disabled adults.

REFERENCES:

Agashe, C.D. and Tiwari, P.K. (2016). Self Concept of Secondary Student Athletes and Non Athletes with Physical Disability: A Comparative Study. Indian Streams Research Journal, Vol. VI, Issue V.

Bahram, A. and Shafizadeh, M. (2002). The comparison of active and nonactive adults body image and its relation with somathotype and body composition. Tarbiat Moallem University,Tehran.

Bainfield, S.S. and McCabe, M.P. (2002). An evaluation of the construct of body image. Adolescence ; 37(146):373-93.

Cash, T.F., and Pruzinsky, T. (2002). Future challenges for body image theory, research, and clinical, practice. In T.F. Cash & T. Pruzinsky (Eds.), Body Images: A Handbook of Theory, Research, and Clinical Practice (pp. 509-516). New York: Guilford Press.

Goran, K.; Lazarevic, L.; Sasa, J. and Bacana, L. Eminovic (2012). Personality characteristics of serbian male wheelchair and professional basketball players. Acta Univ. Palacki. Olomuc., Gymn. Vol. 42, No. 2, 41-47.

Izydorczyk, B. (2013). Selected psychological traits and body image characteristics in females suffering from binge eating disorder. Archives of Psychiatry and Psychotherapy, 1 : 19–33.

Javadi, M. and Kadivar, P. (1995). Personality psychology. 4th edition. Rasa publication.

Kakkar, S.P. (2020). To assess the relationship of body image concern with self-esteem, loneliness, disordered eating, and depression among young adults. The International Journal of Indian Psychology, Vol. 8, Issue 4.

Kolb, L. C. (1959). Disturbances in body image. In: Arieti S, ed. American handbook of psychiatry. New York: Basic Books; 1:749-69.

Schilder, P. (1935). "The Image and Appearance of the Human Body. Studies in Constructive Energies of the Psyche". Kegan Paul, London.

Shaheen, A., Kumar, H., Dev, W., et al. (2016). Gender difference regarding body image: a comparative study. Adv Obes Weight Manag Control.; 4(4):76-79.

van den Berg, P.A., Mond, J., Eisenberg, M., Ackard, D. and Neumark-Sztainer, D. (2010). The link between body dissatisfaction and self-esteem in adolescents: similarities across gender, age, weight status, race/ethnicity, and socioeconomic status. J Adolesc Health.; 47(3):290-6.

Wasylkiw, L., MacKinnon, A.L. and MacLellan, A.M. (2012). Exploring the link between self-compassion and body image in university women. Body Image 9, 236– 245.

Zarandi, H.P.; Rahmaninia, F.; Dejahang, M. and Mohaddes, F. (2011). Comparing the Mental Health of the Athletic and Non- athletic Physically- disabled People. Iranian Journal of Health and Physical activity. Vol. 2, No. 1, 2011.

Prophesy of Spiker Performance on the basis of selected Anthropometric Characteristics

Mithilesh Kumar Singh[1], Arti Dhankhar[2,*], Rakesh Kumar Patel[3], Rajeev Choudhary[4]

[1] Research Scholar, School of Studies in Physical Education, Pt. Ravishankar Shukla University, Raipur (C.G.)
[2]Associate Professor, Ramjas College, University of Delhi
[3]Lecturer, DIET, Shahjahanpur (U.P.)
[4]Professor in Physical Education, Pt. Ravishankar Shukla University, Raipur (C.G.)

*Corresponding author: artidhankhar@ramjas.du.ac.in

Abstract

Objective: The study was conducted with an objective to prophesy the spiker's performance on the basis of anthropometric characteristics.
Variables: In the study, Spiker's Performance was selected as dependent variable (DV) and selected anthropometric characteristics i.e. SH (Spiker's Height), SW (Spiker's Weight), SAL (Spiker's Arm Length), SFAL (Spiker's Fore Arm Length, SUAL (Spiker's Upper Arm Length), SUAC (Spiker's Upper Arm Circumference), SWC (Spiker's waist Circumference), SHC (Spiker's Hip Circumference), SLL (Spiker's Leg Length), SLLL (Spiker's Lower Leg Length), STC (Spiker's Thigh Circumference) and SCC (Spiker's Calf Circumference) were observed independent variables (IV).
Subjects: For the purpose of the present study, 75 spikers were selected as subjects from interuniversity level volleyball tournament organized in India.
Statistical Analysis: To find out relationship between Dependent Variable (Spiker's Performance) and Independent Variables (selected Anthropometric Characteristics), product moment correlation and multiple correlations were applied. For the prophecy of Dependent Variable (Spiker's Performance) on the basis of Independent Variables (selected Anthropometric Characteristics), multiple regression equation was applied.
Conclusions: For the prophecy of Dependent Variable (Spiker's Performance) on the basis of Independent Variables (selected Anthropometric Characteristics) two regression models are established. Established regression models are: (1) Spiker's Performance = -35.586 +.667 X Spiker's Arm Length and (2) Spiker's Performance = -23.512 +.458 X Spiker's Arm Length + .210 X Spiker's Upper Arm Circumference.

Keywords - Spiker's Performance and Anthropometric Characteristic

Introduction

Volleyball is a team game in which two teams of six players are separated by a net. Each team tries to score points by grounding a ball on the other team's court under organized rules. It has been a part of the official program of the summer Olympic games since 1964. In India it was in the year 1952 that the first national championship was held at Chennai (Uppal, A. K., & Satyanarayana, V.). Anthropometric has been used for identification and understanding human physical difference as an early tool of physical anthropology. Anthropometry is derived from a Greek word anthropos which means "human" and metron which means "measure". Anthropometry involves the systematic

DOI: 10.52228/JRUA.2022-28-2-6

measurement of physical properties of human body. A French mathematician was the first known person to use the term "anthropometric or anthropometry," the measurement of man dates back to ancient civilizations and is the oldest form of measurement. It was of great interest in ancient India and later in Egypt where study was undertaken to find one part or component of the body that would predict or become common measurement of all body parts. In Egypt, for example the length of the middle finger was considered a common measure of all body proportions. For instance, 5 finger length to knee, 10 to the pubic arch and 8 to the length of the arm reach. The Greeks were experts in body proportions. Not only in the game of volleyball, but in all the games, there is significant contribution of anthropometry. In different games, players play at different playing positions with different specialty, as a results different anthropometric measurements are required at different positions, due to differential nature of requirement.

Objective of the study

The objective of the study was to prophesy spiker's performance on the basis of anthropometric characteristics.

Variables of the study

For the purpose of the study, Spiker's Performance was selected as dependent variable (DV) and selected anthropometric characteristics i.e. SH (Spiker's Height), SW (Spiker's Weight), SAL (Spiker's Arm Length), SFAL (Spiker's Fore Arm Length, SUAL (Spiker's Upper Arm Length), SUAC (Spiker's Upper Arm Circumference), SWC (Spiker's waist Circumference), SHC (Spiker's Hip Circumference), SLL (Spiker's Leg Length), SLLL (Spiker's Lower Leg Length), STC (Spiker's Thigh Circumference) and SCC (Spiker's Calf Circumference) were observed independent variables (IV).

1. Subjects of the study

The study included the subjects who participated in Inter-university level Volleyball Tournament organized under the banner of Association of Indian Universities in India. A total of 75 male spikers were purposively selected for the study. The age of the subjects ranged from 18 - 28 Years.

2. Statistical Analysis:

To find out relationship between Dependent Variable (Spiker's Performance) and Independent Variables (selected Anthropometric Characteristics), product moment correlation and multiple correlations were applied. For the prophesy of Dependent Variable (Spiker's Performance) on the basis of Independent Variables (selected Anthropometric Characteristics), multiple regression equation was applied.

Results and Findings:

Table – 1: Table showing Pearson Correlation Coefficient and Significance (1-tailed) showing the relationship between Spiker's Performance and selected Anthropometric Characteristics

DOI: 10.52228/JRUA.2022-28-2-6

		SP	SH	SW	SAL	SFAL	SUAL	SUAC	SWC	SHC	SLL	SLLL	STC	SCC
Pearson Correlation Coefficient	SP	1.000	.659	.567	.666	.553	.646	.622	.595	.548	.582	.617	.552	.614
	SH	.659	1.000	.906	.889	.817	.769	.903	.912	.834	.918	.943	.865	.858
	SW	.567	.906	1.000	.800	.740	.687	.908	.826	.757	.854	.839	.809	.789
	SAL	.666	.889	.800	1.00	.912	.875	.756	.881	.798	.835	.824	.874	.884
	SFAL	.553	.817	.740	.912	1.000	.598	.704	.779	.717	.847	.743	.842	.860
	SUAL	.646	.769	.687	.875	.598	1.000	.644	.799	.709	.628	.731	.711	.710
	SUAC	.622	.903	.908	.756	.704	.644	1.000	.789	.735	.804	.851	.731	.732
	SWC	.595	.912	.826	.881	.779	.799	.789	1.00	.899	.844	.882	.867	.840
	SHC	.548	.834	.757	.798	.717	.709	.735	.899	1.000	.793	.822	.789	.809
	SLL	.582	.918	.854	.835	.847	.628	.804	.844	.793	1.00	.838	.847	.881
	SLLL	.617	.943	.839	.824	.743	.731	.851	.882	.822	.838	1.000	.813	.793
	STC	.552	.865	.809	.874	.842	.711	.731	.867	.789	.847	.813	1.000	.887
	SCC	.614	.858	.789	.884	.860	.710	.732	.840	.809	.881	.793	.887	1.000
Significance (1-tailed)	SP	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	SH	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	SW	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	SAL	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000	.000
	SFAL	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000	.000
	SUAL	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000	.000
	SUAC	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000	.000
	SWC	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000	.000
	SHC	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000	.000
	SLL	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000	.000
	SLLL	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000	.000
	STC	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.	.000
	SCC	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.

Table- 1 shows Pearson Correlation Coefficient and Significance (1- tailed) in relation to Spiker's Performance and selected Anthropometric Characteristics. Significant relationship was found between SP and SH (r = .659); SP and SW (r = .567); SP and SAL (r = .666); SP and SFAL (r = .553); SP and SUAL (r = .646); SP and SUAC (r = .622); SP and SWC (r = .595); SP and SHC (r = .548); SP and SLL (r = .582); SP and SLLL (r = .617); SP and STC (r = .552); SP and SCC (r = .614); SH and SW (r = .906); SH and SAL (r = .889); SH and SFAL (r = .817); SH and SUAL (r = .769); SH and SUAC (r = .903); SH and SWC (r = .912); SH and SHC (r = .834); SH and SLL (r = .918); SH and SLLL (r = .943); SH and STC (r = .552); SH and SCC (r = .858); SW and SAL (r = .800); SW and SFAL (r = .740); SW and SUAL (r = .687); SW and SUAC (r = .908); SW and SWC (r = .826); SW and SHC (r = .757); SW and SLL (r = .854); SW and SLLL (r = .839); SW and STC (r = .809); SW and SCC (r = .789); SAL and SFAL (r = .912); SAL and SUAL (r = .875); SAL and SUAC (r = .756); SAL and SWC (r = .881); SAL and SHC (r = .798); SAL and SLL (r = .835); SAL and SLLL (r = .824); SAL and STC (r = .874); SAL and SCC (r = .884); SFAL and SUAL (r = .598); SFAL and SUAC (r = .704); SFAL and SWC (r = .779); SFAL and SHC (r = .717); SFAL and SLL (r = .847); SFAL and SLLL (r = .743); SFAL and STC (r = .842); SFAL and SCC (r = .860); SUAL and SUAC (r = .644); SUAL and SWC (r = .799); SUAL and SHC (r = .709); SUAL and SLL (r = .628); SUAL and SLLL (r = .731); SUAL and STC (r = .711); SUAL and SCC (r = .710); SUAC and SWC (r = .789); SUAC and

DOI: 10.52228/JRUA.2022-28-2-6

SHC (r = .735); SUAC and SLL (r = .804); SUAC and SLLL (r = .851); SUAC and STC (r = 731); SUAC and SCC (r = .732); SWC and SHC (r = .899); SWC and SLL (r = .844); SWC and SLLL (r = .882); SWC and STC (r = .867); SWC and SCC (r = .840); SHC and SLL (r = .793); SHC and SLLL (r = .822); SHC and STC (r = .789); SHC and SCC (r = .809); SLL and SLLL (r = .838); SLL and STC (r = .847); SLL and SCC (r = .881); SLLL and STC (r = .813); SLLL and SCC (r = .793) and STC and SCC (r = .887) prospectively.

Table- 2: Table showing residual statistics in relation to the establishment of Models for the prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics

	Minimum	Maximum	Mean	Standard Deviation
Predicted Value	16.8593	24.4574	20.5067	2.06141
Residual	-5.73647	5.63883	.00000	2.16324
Standardized Predicted Value	-1.769	1.917	.000	1.000
Standardized Residual	-2.616	2.571	.000	.986
a. Dependent Variable: SP				

Table- 2 shows residual statistics in relation to the establishment of Models for the prognostication of Spiker's Performance on the basis of selected Anthropometric Characteristics. In this table value of standardized residual shows the outliers of the residual. In assumption of application of multiple regression, there should not be any outliers of the residuals and the minimum value of standardized residuals should not be less -3 and the maximum value should not be above +3. In this table, the minimum value of standardized residual is -2.616 and the maximum value of standardized residual is 2.571. This proved that the standardized residuals lie in the expected range from -3 to +3. It is concluded that there is no outliers in the residuals.

Figure- 1: Figure showing Mean, Standard Deviation and normal curve of residuals in relation to the establishment of Models for the prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics

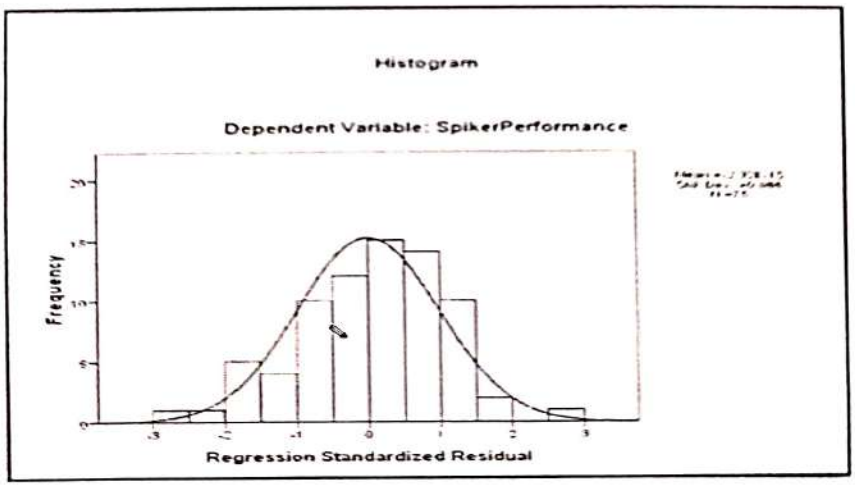


Figure- 1 shows Mean, Standard Deviation and normal curve of residuals in relation to the establishment of Models for the prognostication of Spiker's Performance on the basis of selected Anthropometric Characteristics. As per another assumption of application of multiple regression, the residuals should be normally distributed with mean 0 and Standard Deviation 1. The figure shows the

DOI: 10.52228/JRUA.2022-28-2-6

normality of residuals, mean is almost 0 and Standard Deviation is 0.986 (near to one), so the assumption, that residuals should be normally distributed with mean 0 and Standard Deviation 1 is also fulfilled.

Figure- 2: Figure showing Normal P-P Plot in relation to the establishment of Models for the prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics

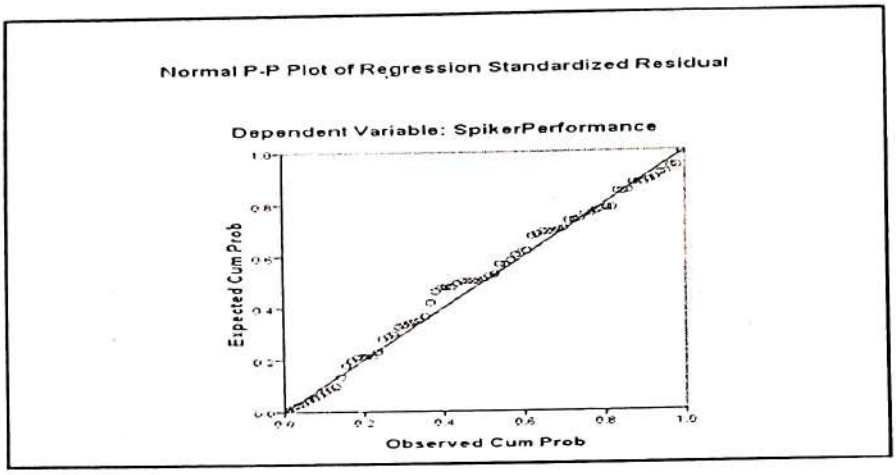


Figure 2 shows the Normal P-P Plot in relation to the establishment of Models for the prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics. In this figure, a standard line is generated. In case of the normality of residuals, all the scores should be scattered near to this line. In this figure all the scores are scattered near to this line, this proved that residuals are normally distributed.

Figure- 3: Figure showing Constant Variance of residuals in relation to the establishment of Models for the prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics

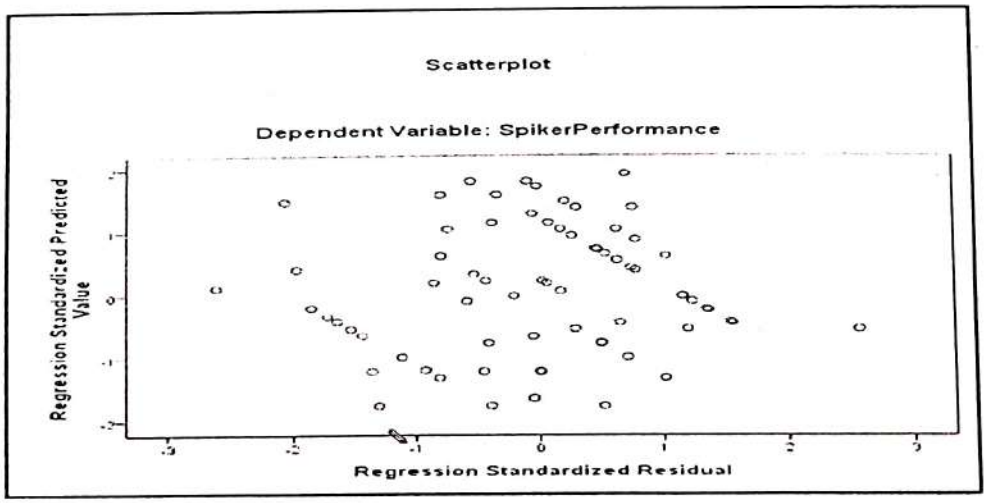


Figure shows Constant Variance of residuals in relation to the establishment of Models for the prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics. The figure shows no clear-cut pattern, this shows that there is constant variance of residuals. This proves this assumption also fulfilled.

Table- 3: Table showing Model Summary in relation to the establishment of Models for the

DOI: 10.52228/JRUA.2022-28-2-6

prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics

Established Models	R- Value	R Square-Value	Adjusted R Square Value	Standard Error of the Estimate Value	Durbin - Watson Value
1	.666[a]	.443	.436	2.24462	1.556
2	.690[b]	.476	.461	2.19308	
a. Predictors: (Constant), SAL					
b. Predictors: (Constant), SAL, SUAC					
c. Dependent Variable: SP					

Table- 3 shows the Model Summary in relation to the establishment of Models for the prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics. For the purpose, two models are established. First model is established on the basis of Spiker's Arm Length and second model is established by Indian Spiker's Arm Length and Spiker's Upper Arm Circumference. This table also shows Durbin - Watson Value. This value is shows that there is no strong positive and no strong negative relationship. This value away from 0 and 4 and the expected value is near to 2. So this assumption also is fulfilled.

Findings related to model- 1: In case of model 1, the R- value of .666 shows the coefficient of correlation between Spiker's Performance and Spiker's Arm Length. The value of R Square .443 shows that 44% Spiker's Performance is explained by Spiker's Arm Length.

Findings related to model- 2: In case of model 2, the R- value of .690 shows the coefficient of correlation between Spiker's Performance and Spiker's Arm Length & Spiker's Upper Arm Circumference. The value of Adjusted R Square .461 shows that 46% Spiker's Performance is explained by Spiker's Arm Length & Spiker's Upper Arm Circumference.

Table 4: Table showing results of Analysis of Variance in relation to the establishment of Models for the prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics

	Models	Sum of Squares value	Degree of freedom	Mean Square value	F- Value	Significance
1	Regression	292.948	1	292.948	58.144	.000[a]
	Residual	367.798	73	5.038		
	Total	660.747	74			
2	Regression	314.455	2	157.228	32.690	.000[b]
	Residual	346.291	72	4.810		
	Total	660.747	74			
a. Predictors: (Constant), SAL						
b. Predictors: (Constant), SAL, SUAC						
c. Dependent Variable: SP						

Table- 4 shows results of Analysis of Variance in relation to the establishment of Models for the prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics. The result of analysis of variance talks about the utility of established regression models. If the value of established model is significant in that case, the established model has a utility. In both models, the F value of 58.144 and 32.690 are found significant. This proved that the established models are useful

DOI: 10.52228/JRUA.2022-28-2-6

and the result may be generalized.

Table- 5: Table showing results of related to establishment of Models for the prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics

Coefficients[a]														
Models		Unstandardized Coefficients		Standardized Coefficients	T-Value	Significance	95% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Standard Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	Constant	-35.586	7.361		-4.835	.000	-50.256	-20.916					
	SAI	.667	.088	.666	7.625	.000	.493	.842	.666	.666	.666	1.000	1.000
2	Constant	-23.512	9.183		-2.560	.013	-41.818	-5.206					
	SAI	.458	.131	.457	3.509	.001	.198	.719	.666	.382	.299	.428	2.335
	SUAC	.210	.099	.276	2.115	.038	.012	.407	.622	.242	.180	.428	2.335
a. Dependent Variable: SP													

Table- 5 shows results of related to establishment of Models for the prophesy of Spiker's Performance on the basis of selected Anthropometric Characteristics.

Findings related to model- 1:

In case of model one, the value of constant is found -35.586 and B- value of Spiker's Arm Length is found .667.

Spiker's Performance = -35.586 +.667 X Spiker's Arm Length

Findings related to model- 2:

In case of model two, the value of constant is found -23.512 and B- value of Spiker's Arm Length is found .458 & the value of Spiker's Upper Arm Circumference is found .210.

Spiker's Performance = -23.512 +.458 X Spiker's Arm Length + .210 X Spiker's Upper Arm Circumference

Table- 6: Table showing details of excluded variables in relation to the establishment of Models for the prognostication of Spiker's Performance on the basis of selected Anthropometric Characteristics

DOI: 10.52228/JRUA.2022-28-2-6

Models		Beta In	T- Value	Significance	Partial Correlation	Collinearity Statistics		
						Tolerance	VIF	Minimum Tolerance
1	SH	.321[a]	1.708	.092	.197	.210	4.757	.210
	SW	.095[a]	.648	.519	.076	.361	2.773	.361
	SFAL	-.322[a]	-1.528	.131	-.177	.169	5.911	.169
	SUAL	.273[a]	1.528	.131	.177	.235	4.252	.235
	SUAC	.276[a]	2.115	.038	.242	.428	2.335	.428
	SWC	.036[a]	.195	.846	.023	.224	4.469	.224
	SHC	.047[a]	.322	.748	.038	.364	2.750	.364
	SLL	.086[a]	.541	.590	.064	.303	3.298	.303
	SLLL	.214[a]	1.395	.167	.162	.320	3.122	.320
	STC	-.128[a]	-.707	.482	-.083	.236	4.237	.236
	SCC	.114[a]	.606	.547	.071	.218	4.583	.218
2	SH	.044[b]	.150	.882	.018	.085	11.715	.085
	SW	-.342[b]	-1.542	.128	-.180	.145	6.895	.145
	AFAL	-.346[b]	-1.689	.096	-.197	.169	5.929	.143
	SUALK	.294[b]	1.689	.096	.197	.234	4.265	.172
	SWC	-.137[b]	-.694	.490	-.082	.188	5.308	.188
	SHC	-.059[b]	-.394	.695	-.047	.323	3.095	.301
	SLL	-.093[b]	-.522	.603	-.062	.233	4.289	.233
	SLLL	.029[b]	.151	.880	.018	.200	5.010	.200
	STC	-.220[b]	-1.228	.224	-.144	.225	4.454	.207
	SCC	.035[b]	.189	.851	.022	.209	4.787	.193

a. Predictors in the Model: (Constant), SAL

b. Predictors in the Model: (Constant), SAL, SUAC

c. Dependent Variable: SP

Table- 6 shows details of excluded variables in relation to the establishment of Models for the prognostication of Spiker's Performance on the basis of selected Anthropometric Characteristics. In model one, the excluded variables are SH, SW, SFAL, SUAL, SUAC, SWC, SHC, SLL, SLLL, STC, SCC and in second model the excluded variables are SH, SW, SFAL, SUAL, SWC, SHC, SLL, SLLL, STC and SCC.

3. Discussion:

Similar type of study was conducted to prognosticate setter's performance on the basis of anthropometric characteristics and two models have been established by the authors (Singh, M. K and Choudhary, R.). Another study was conducted to predict Libros performance on the basis of anthropometric characteristics and three models have been established by the authors (Singh, M. K, Patel, R. K. and Choudhary, R.). Both the positions i. e. Setter and Libro belongs to the same game (Volleyball). Studies shows that different type of body dimensions are required to excel at a specific playing position. This proves that, specific regression model should be used to estimate player's performance at specific position.

DOI: 10.52228/JRUA.2022-28-2-6

References

1. Best, J.W. (1963). *Research in education*. U.S.A.: Prentice Hall.
2. Chan, Y. H. (2003). *Biostatistics 101: Data presentation*. Singapore medicine journal, 44 (6), 280-285.
3. Chan, Y. H. (2003). *Biostatistics 104: correlational Analysis*. Singapore medicine journal, 44 (12): 614-619.
4. Choudhary, R., Patel, R. K., Chaudhary, S. D., & Singh, M. K. (2018). Differential Impact of Participation in Handball & Kabaddi on Selected. *International Journal of Physical Education and Sports, 3*(3), 41-44.
5. Clark, H. H., & Clark, D. H. (1975). *Research process in physical education*. Englewood cliffs, New Jersey: Prentice Hall, Inc.
6. Field, A. (2009). *Discovering statistics using SPSS*. London: SAGE Publications Ltd.
7. Gay, L.R. (2000). *Educational research*. U.S.A: Prentice Hall.
8. Gupta, S. L. & Gupta, H. (2011). *SPSS for researchers*. New Delhi: international Book House Pvt. Ltd.
9. Landau, S. & Everitt, B. S. (2004). *A handbook of statistical analysis using SPSS*. New York: Chapman & Hall/CRC Press LLC.
10. Patel, R. K., & Choudhary, R. (2015). Comparison of reaction ability among different playing positions of handball players. *National journal of Physical Education and Sports Science, 2*(1), 80-82.
11. Patel, R. K., & Choudhary, R. (2016). Balance ability possessed by handball players pertaining to different playing positions. *International journal of Applied Research, 2*(4), 481-483.
12. Patel, R. K., & Choudhary, R. (2016). Estimation of Right Shooter performance in Handball on the basis of Coordinative abilities. *Physical Education Yogic & Allied Sciences*, 428-434.
13. Patel, R. K., & Choudhary, R. (2016). Prediction of Right Winger Performance in Handball on the Basis of Selected Co-ordinative Abilities. *International Journal of Physical Education and Applied Exercise Sciences, 2*(1), 106-112.
14. Patel, R. K., & Choudhary, R. (2017). Prediction of Goal Keeper Performance on the Basis of Coordinative Abilities. *International Journal of Physical Education and Applied Exercise Sciences, 2*(2), 16-22.
15. Patel, R. K., Choudhary, R., Singh, M. K., & Dalal, P. (2017). Estimation of Left Shooter's Performance in Handball on the Basis of Coordinative Abilities. *National Journal of Physical Education and Sports Sciences, 3*(2), 34-37.
16. Singh, M. K, and Choudhary, R. (2021). Prognostication of Setter Performance on the basis of Selected Anthropometric Characteristics. *International Research Journal of Sports Glimpses.* V (II), 143-147

DOI: 10.52228/JRUA.2022-28-2-6

17. Singh, M. K, Patel, R. K. and Choudhary, R. (2021). Prediction of Libero's Performance on the basis of Selected Anthropometric Characteristics. *Journal of Ravishankar University.* 27 (1), 89-98

18. Uppal, A. K., & Satyanarayana, V. (2020). *Physical education UGC-NET, KVS, NVS, DSSSB, TGT, PTI, PGT, SCERT- TET.* Delhi: Sports Publication, *page*- 845.

19. Verma, J. P. (2000). *A text book on sports statistics.* Gwalior: Venus Publications.

DOI: 10.52228/JRUA.2022-28-2-6

Materials Science and Engineering: B
Volume 294, August 2023, 116511

Structural, photoluminescence, and thermoluminescence behaviors of Samarium doped $CaWO_4$ phosphor

R. Paikaray [a], T. Badapanda [a], H. Mohapatra [a], T. Richhariya [b], Nameeta Brahme [c], Satya N. Tripathy [d]

https://doi.org/10.1016/j.mseb.2023.116511
Rights and content

Abstract

This manuscript reports the crystal structure, photoluminescence and thermoluminescence behavior of Samarium doped $CaWO_4$ i.e., $Ca_{1-x}Sm_{2x/3}WO_4$ (x: 0.01, 0.02, 0.03, 0.04, 0.05) synthesized by conventional solid state reaction method. The X-ray diffraction data are analyzed using Rietveld refinement method and showed that samples exhibit cento-symmetric tetragonal crystal structure with $I4_1/a$ (No. 88) space group. The unit cell volumes are increased with rising Sm composition. The energy bandgaps of the phosphors are observed by the UV–Visible absorbance spectroscopy and found to be directly proportional to the cell volume. Photoluminescence properties are considered from the excitation as well as emission spectra. These spectra resulted that the critical quenching concentration occurred at x=0.02 due to the dipole–dipole interactions with critical energy transfer distance of 20Å. The color purity and correlated color temperature values of the sample can be measured from the CIE Chromaticity. It is also described the orange-red emission color of the phosphors. Lower UV dosimetry with second order kinetics is obtained from the thermoluminescence spectra of x=0.02 with 30min UV radiation.

Introduction

Now-a-days phosphors are used as luminescent materials in light emitting diodes due to their significant features like excellent luminescence behavior with various emission colors, less power consumption, good efficiency, extensive operation lifetimes, negligible pollution, and broad applicability in lighting as well as displays than the conventional lighting devices. Hence many researchers are paying attention to prepare these types of phosphors with great luminescence behaviors [1]. In last few years, several investigations are going on to find out the most appropriate phosphors with various emission

Materials Science in Semiconductor Processing 159 (2023) 107396

Contents lists available at ScienceDirect

Materials Science in Semiconductor Processing

journal homepage: www.elsevier.com/locate/mssp

Investigation of photoluminescence, thermoluminescence, and energy transfer mechanism in Ce/Dy co-doped $Sr_2Al_2SiO_7$

Tripti Richhariya [a,*], Nameeta Brahme [b], D.P. Bisen [b], T. Badapanda [c], Kanchan Tiwari [d], Asmita Jain [e]

[a] Department of Physics, Kalinga University, Raipur, C.G., 492101, India
[b] SoS in Physics and Astrophysics, Pt. Ravishankar Shukla University, Raipur, C.G., 492010, India
[c] Department of Physics, C.V. Raman Global University, Bhubaneswar, Odisha, 752054, India
[d] Department of Physics, Govt. Nagarjuna P. G. College of Science, Raipur, C.G., 492010, India
[e] Centre for Basic Science, Pt. Ravishankar Shukla University, Raipur, C.G., 492010, India

ARTICLE INFO

Keywords:
Photoluminescence
Thermoluminescence
Energy transfer
Dosimetry

ABSTRACT

In the present manuscript, we report the luminescence properties and energy transfer mechanism of Ce/Dy co-doped $Sr_2Al_2SiO_7$ (SASO) phosphors prepared through the solid-state reaction method. Phase identification was done through a powder X-Ray diffraction tool and the obtained diffractogram confirms the formation of the desired phase. The Photoluminescence excitation and emission spectra of the prepared samples were investigated. Photoluminescence studies revealed that the luminescence intensity rises with increasing Dy concentration and optimized intensity was observed at 1 mol%. The energy transfer in the host has been attained successfully to produce color tunability. The Commission International de l'Eclairage (CIE) chromaticity coordinates and correlated color temperature (CCT) has been calculated. The energy transfer mechanism is further investigated via Thermoluminescence (TL) spectra. Further, the TL properties of synthesized phosphors were analyzed via the glow curve method along with varying UV doses. As compared to the single-doped phosphors, the TL glow curve indicates that very high intensity is observed at very low UV doses and the major TL peak is located in a higher temperature region. The calculated kinetic parameter indicates that Ce/Dy co-doped SASO has both shallow and deeper traps. All these findings suggest the potential applicability of synthesized phosphors as a low UV dosimeter.

1. Introduction

White light-emitting diodes (WLEDs) are the most striking topic of research in the field of solid-state lighting and display technologies. Several attempts had already been made, and many others have been continued by many researchers, to develop an efficient, single-phase white light-emitting phosphor [ ]. Until now, three well-known methods are considered the most convenient methods to achieve WLEDs. One of these methods is combining a blue-emitting LED chip with Ce^{3+}-activated $Y_3Al_5O_{12}$. Nevertheless, this method is accompanied by several drawbacks, such as poor thermal stability and chemical durability, a low color rendering index (CRI), and a low correlated color temperature (CCT) [ ]. To overcome these drawbacks, another method is employed in substitution of this method by integrating tri-color (Red, Green, and Blue) and UV LED chip. Still, the major issue with this method is the reabsorption of blue light, which takes place through red and green light. This has a significant impact on luminous efficiency. Another approach is to use blue LED to stimulate single-phase yellow phosphor or mixed-phase red and green phosphor [,]. Thus, the task of achieving an efficient single-phase white light-emitting phosphor remains same. Nowadays, phosphor-converted (PC) LEDs get much attention in display technology due to their various advantages over traditional technology. For the development of a single-phase white light emitting diode, currently, the most widely used method is the introduction of a sensitizer and an activator into a single host. The phosphor prepared by this method may be efficiently able to generate white light via energy transfer between the sensitizer and activator [ ].

For the choice of dopants, among the 14 rare earth ions, the trivalent cerium ion drew considerable attention. Trivalent cerium shows intense broadband spectra in the visible region due to its parity allowed $5d \rightarrow 4f$

* Corresponding author.
E-mail address: [redacted] (T. Richhariya).

Received 27 October 2022; Received in revised form 12 January 2023; Accepted 12 February 2023
Available online 17 February 2023

Journal of Molecular Structure 1290 (2023) 135902

Contents lists available at ScienceDirect

Journal of Molecular Structure

journal homepage: www.elsevier.com/locate/molstruc

Exploration of crystal structure, and luminescence behaviors of Terbium-activated $CaWO_4$ phosphor

R. Paikaray [a], T. Badapanda [b,*], H. Mohapatra [c], T. Richhariya [b], K. Tiwari [a], Nameeta Brahme [d], Satya N. Tripathy [a]

[a] Department of Physics, C.V. Raman Global University, Bhubaneswar, Odisha 752054, India
[b] Department of Physics, Kalinga University, Raipur, Chhattisgarh 492101, India
[c] SoS in Physics and Astrophysics, Pt. Ravishankar Shukla University, Raipur C.G. 492010, India
[d] Department of Physics, Government Autonomous College, Angul, Odisha 759143, India

ARTICLE INFO

Keywords:
Rietveld refinement method
UV Visible absorbance spectra
Photoluminescence behavior
CIE Chromaticity coordinates
Thermoluminescence spectroscopy

ABSTRACT

This manuscript includes structural, optical, photoluminescence, and thermoluminescence behaviors of Terbium incorporated $CaWO_4$ samples with nominal compositions of $Ca_{1-x}Tb_{2x/3}WO_4$ (x = 0.01, 0.02, 0.03, 0.04, 0.05) prepared by the traditional solid-state reaction route. Results found from the Rietveld refinements of X-ray diffraction patterns confirmed that all the samples have tetragonal crystal structures with $I4_1/a$ space group. The variation of unit cell volume with the compositions shows an anomaly at x = 0.03. Band gap energy values of these synthesized samples are found from the UV–Visible absorbance spectra with increasing order. Photoluminescence behaviors, as well as the FWHM values, are analyzed from the excitation along with the emission spectra. Critical quenching concentration at x = 0.03 with a critical energy transfer distance of ~ 20 Å caused by the dipole-dipole interactions is found in these spectra. CIE Chromaticity coordinates are indicated the green emission color of all the prepared samples with high color purity, correlated color temperature, color rendering index, and luminous efficiency of radiation values. Quantum efficiency of the material with x = 0.03 Tb concentration is observed under 255 nm excitation wavelength. PL decay analyses of the phosphors are carried out and the average lifetime values are calculated. Thermoluminescence spectroscopy of x = 0.03 irradiating by 15 min of UV dose is described as the lower UV dosimetry and second-order kinetics of the material.

1. Introduction

Over the last few decades, phosphors having luminescent nature are used in the light emitting diodes rather than the conventional lighting devices [1]. They have good luminescence properties, different types of colors of emission, considerable efficiencies, excellent operating conditions, fewer pollutions, low power utilization, wide uses in lighting applications, and many more important features [2–4]. Therefore, several pieces of research are going on by scientists to synthesize phosphors with improved luminescence properties. Material scientists are involved to explore these types of phosphors like nitrates, molybdates, silicates, aluminates, oxides, and tungstates with enhanced photoluminescence behaviors [5–8]. It has been studied that metal tungstates with scheelite structures have wide emission ranges, good efficiencies, and self-activating behaviors and can be utilized in the lighting devices such as LEDs, FEDs, and display screens [5,6]. Among all the metal tungstates, Calcium tungstates have prominent properties in photoluminescence and thermoluminescence spectroscopy, blue emission color with extensive emission range in UV–Visible region, a great value in color purity & quantum efficiency, less optical loss, appropriately correlated color temperature value [9–11]. Hence Calcium tungstate acts as a suitable host material for the light emitting diodes [12]. Moreover, past investigations are revealed that doping of different rare earth materials with $CaWO_4$ can be improved luminescence properties by producing various paths for energy transfer and reducing the critical quenching concentration of the material [13–15].

Photoluminescence behaviors with orange-red emission color of Sm-doped $CaWO_4$ are discussed extensively by Kaur et al. [16]. Du et al. explained the yellow emission color of Dy-doped $CaWO_4$ and also their optical behaviors [17]. Zhang et al. prepared Eu and Tb-doped $CaWO_4$ phosphors and investigated that they have red as well as green emission colors respectively [18]. However, the reason the behind energy transfer

* Corresponding author.
E-mail address: [redacted] (T. Badapanda).

Received 31 December 2022; Received in revised form 28 May 2023; Accepted 30 May 2023
Available online 30 May 2023

J Mater Sci: Mater Electron (2023) 34:1151

Luminescence studies of Sm^{3+} doped CdB_4O_7 phosphors

Kamlesh Thakkar[1], Ravi Sharma[2,*], Nameeta Brahme[1], D. P. Bisen[1], Anita Verma[1], and Tripti Richhariya[3]

[1] School of Studies in Physics and Astrophysics, Pt. Ravi Shankar Shukla University, Raipur, C.G., India
[2] Govt. Arts and Commerce Girls College Devendra Nagar, Raipur, C.G., India
[3] Department of Physics, Kalinga University, Naya Raipur, C.G. 492101, India

Received: 29 September 2022
Accepted: 21 April 2023
Published online:
16 May 2023

ABSTRACT

Rare earth Sm^{3+}-doped cadmium tetra borate (Cd B_4O_7) phosphors were synthesized by solid-state reaction method. X- ray diffraction (XRD) technique was used for the structural characterization of the prepared phosphors, whereas EDS was used for elemental composition confirmation. The diffraction pattern of the prepared samples is well matched with the standard XRD (JCPDS file no. 30–0204). Photoluminescence emission and excitation spectra for pure and rare earth (Sm^{3+})-doped Cd B_4O_7 phosphor were obtained. The emission spectra of Sm^{3+}-doped Cd B_4O_7 showed a characteristic intense emission band at 608 nm along with less intense band at 561 nm and 644 nm under the excitation wavelength of 403 nm. The doping percentage was varied from 1 mol% to 4 mol% of Sm^{3+}. The photoluminescence intensity of 2 mol% of Sm^{3+} was found to be highest. From the CIE diagram of the Sm^{3+} doped Cd B_4O_7 phosphor showed the calculated color coordinates in the orange region. The thermoluminescence studies of pure and Sm^{3+}doped samples were carried out. The results of both the samples showed good TL response. The highest TL intensity was observed for 2 mol% of Sm^{3+} concentration. The optimized UV exposure time was 25 min. Nearly 66% linear relation was recorded for total TL intensity and UV exposure time. The TL spectra fall in the orange region, similar to the recorded PL emission spectra.

1 Introduction

Many oxides, sulfides, selenides, tellurides, arsenides, phosphides borates, sulfates, fluorides, and silicates are the important luminescence materials that have been developed and used over many decades [1]. The optical properties of CdS/ZnS were studied most in earlier times [2]. The borate-based phosphors were studied extensively due to their use in industries and mineralogy. Borate

Address correspondence to E-mail: rvsharma65@gmail.com

https://doi.org/10.1007/s10854-023-10520-9

Received: 12 December 2022 | Revised: 23 January 2023 | Accepted: 9 March 2023
DOI: 10.1002/bio.4485

RESEARCH ARTICLE

LUMINESCENCE WILEY
The Journal of Biological and Chemical Luminescence

Luminescence investigation of $CaY_2Al_4SiO_{12}:Dy^{3+}$ phosphor synthesized by sol–gel method

Anita Verma[1] | Ravi Sharma[2] | Durga Prasad Bisen[1] | Nameeta Brahme[1] | Kamlesh Thakkar[1] | Shalinta Tigga[3] | Priya Chandrakar[4]

[1]SoS in Physics and Astrophysics, Pt. Ravishankar Shukla University, Raipur, (C.G.), India

[2]Department of Physics, Govt. Arts and Commerce Girls College, Devendra Nagar, Raipur, (C.G.), India

[3]Department of Pure and Applied, Physics, Guru Ghasidas Vishwavidyalaya, Bilaspur, (C.G.), India

[4]Department of Physics, Smt. P.G. Daga Girls College, Raipur, (C.G.), India

Correspondence
Anita Verma, SoS in Physics and Astrophysics, Pt. Ravishankar Shukla University, Raipur (C.G.)-492010, India.
Email: anitaverma999@gmail.com; rvsharma65@gmail.com

Funding information
No funding was received for conducting this study.

Abstract

Dy^{3+}-doped $CaY_2Al_4SiO_{12}$ phosphors were prepared using the sol–gel method. X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), and energy dispersive spectroscopy analyses (EDS) were used to analyse the crystal structure, morphology, and elemental composition of the prepared samples. The luminescence behaviour of the sample was investigated using photoluminescence (PL) and thermoluminescence (TL) techniques. The prepared $CaY_2Al_4SiO_{12}:xDy^{3+}$ phosphor showed a characteristic blue and yellow emission at ~480 and 583 nm, respectively, with an excitation wavelength of 350 nm. The most intense PL emission was found for a 4 mol% doping concentration of Dy^{3+} ions. The CIE diagram of the phosphor showed bluish-white colour emission. For TL studies, the prepared phosphors were irradiated with a ^{60}Co γ (gamma) source and the TL glow curve of the $CaY_2Al_4SiO_{12}:0.04Dy^{3+}$ phosphor showed three overlapped peaks. For the Gaussian peaks, Chen's peak shape method was applied to determine the kinetic parameters of the samples.

KEYWORDS
phosphor, photoluminescence, sol–gel method, thermoluminescence, XRD

1 | INTRODUCTION

In recent decades a marked evolution has been noticed in the field of optical and luminescence applications using phosphor materials [1, 2]. Garnet-based phosphor materials show superb luminescence characteristics, high thermal stability, good chemical, and physical stability, and other energy-efficient properties. Garnet acquires a cubic crystal structure with complicated positioning of different cations in the unit cell. The affability of the garnet structure allows the substitution of ions at the dodecahedral, octahedral, and tetrahedral sites. Garnet phosphor material can be used in different fields such as laser and white light-emitting diodes (WLEDs). For example, the yttrium aluminium garnet (YAG) host with lanthanide ions is a broadly used phosphor material for solid-state lighting applications [1–3].

Garnet-based phosphors have been explored by many research groups. Singh *et al.* and Katelnikovas *et al.* investigated the luminescence behaviour of the $CaY_2Al_4SiO_{12}:Pb^{2+}$ and yellow-emitting $CaY_2Al_4SiO_{12}:Ce^{3+}$ garnet phosphors respectively [4, 5]. Similarly YAG:Dy [6, 7], $Lu_1Gd_2Ga_2Al_3O_{12}$:Dy [8], $CaY_2Al_4SiO_{12}:Eu_{0.03}$ (CYASG:Eu) [9], Nd-doped YAG nano-powders [10], and Pr^{3+}–Cr^{3+} and Tb^{3+}–Cr^{3+} co-doped $Y_3Al_2Ga_3O_{12}$ (YAGG) phosphors [11] have been studied by other research groups. Trivalent dysprosium is the most preferred rare earth ion for producing white light-emitting luminescence materials. To explore specific luminescence host materials with better enhancement in intensity, trivalent dysprosium ions play a vital role [12].

In the present study, we synthesized $CaY_2Al_4SiO_{12}:xDy^{3+}$ phosphors using the sol–gel reaction method. The luminescence behaviour of the $CaY_2Al_4SiO_{12}:xDy^{3+}$ phosphors was studied in detail via the combined techniques of XRD, FESEM, EDS, photoluminescence excitation/photoluminescence (PLE/PL) spectroscopy, and thermoluminescence (TL) spectroscopy.

j Mater Sci: Mater Electron (2023) 34:644

Yttrium aluminum garnet based novel and advanced phosphor synthesized by combustion route activated by Dy, Eu, and Tb rare earth metals

Akshkumar Verma[1,*], D. P. Bisen[1], Nameeta Brahme[1], Ishwar Prasad Sahu[2], and Arun Kumar Singh[3]

[1]School of Studies in Physics and Astrophysics, Pt. Ravishankar University, Raipur, Chhattisgarh 492010, India
[2]Department of Physics, Indira Gandhi National Tribal University, Amarkantak, Madhya Pradesh 484887, India
[3]Department of Physics, Dr. Harisingh. Gour Vishwavidyalaya Sagar, Sagar, Madhya Pradesh 470003, India

Received: 14 December 2022
Accepted: 30 January 2023
Published online:
25 February 2023

ABSTRACT

In the present studies, rare earth (Dy, Eu, and Tb) activated garnet-based ($Y_3Al_5O_{12}$) phosphors were prepared using the combustion method at 550 °C. The formation of the compounds has been checked by powder X-ray diffraction and structural parameters were calculated. The crystallite/particle size has been measured using Scherrer formula as well as by transmission electron microscopy which show that the size of the particles is in the nanorange. In the photoluminescence emission spectra, YAG:$Dy_{0.05}$ emits two distinctive colors: blue and yellow, YAG:$Eu_{0.05}$ emits red color, whereas YAG:$Tb_{0.02}$ emits green phosphor. Thus, the combination of rare earth ($Dy_{0.05}$, $Eu_{0.05}$, $Tb_{0.02}$) with garnet gives BYRG (blue–yellow–red–green) emissions can produce white light. These discussed phosphors exhibit a strong absorption between 340 and 400 nm. The energy transfer mechanism was also discussed. The higher luminescence color purity (95.68%), Color Rendering Index (95), Correlated Color Temperature (5287 K), and Quantum efficiency (93.7%) are calculated, therefore, synthesized $Y_3Al_5O_{12}Dy_{0.05}Eu_{0.05}Tb_{0.02}$ phosphor material can be used as a WLED phosphor materials in solid-state lighting system.

1 Introduction

There are diverse field of Luminescence, luminescent materials and applications. Modern lighting system totally depends on advanced and novel materials for great efforts for enhancing display quality and visibility [1–3]. In the present scenario, the need and requirement of novel phosphor is one of the most important and urgent challenges to synthesize luminescent material for white light emitting diodes (WLED) for solid lighting devices [4–6]. Other requirement should be fulfillment by modern technology like that maximum quantum efficiency, high

Address correspondence to E-mail: akshverma89@gmail.com

https://doi.org/10.1007/s10854-023-10022-8

New Astronomy
Volume 97, November 2022, 101889

Tale of GRB 171010A/SN 2017htp and GRB 171205A/SN 2017iuk: Magnetar origin?

Amit Kumar [a b], Shashi B. Pandey [a], Rahul Gupta [a c], Amar Aryan [a c], Amit K. Ror [a], Saurabh Sharma [a], Nameeta Brahme [b]

Show more

https://doi.org/10.1016/j.newast.2022.101889

Abstract

We present late-time optical follow-up observations of GRB 171010A/SN 2017htp ($z = 0.33$) and low-luminosity GRB 171205A/SN 2017iuk ($z = 0.037$) acquired using the 4K×4K CCD Imager mounted at the 3.6m Devasthal Optical Telescope (3.6m DOT) along with the prompt emission data analysis of these two interesting bursts. The prompt characteristics (other than brightness) such as spectral hardness, T_{90}, and minimum variability time-scale are comparable for both the bursts. The isotropic X-ray and kinetic energies of the plateau phase of GRB 171205A are found to be less than the maximum energy budget of magnetars, supporting magnetar as a central engine powering source. The new optical data of SN2017htp and SN2017iuk presented here, along with published ones, indicate that SN2017htp is one of the brightest and SN 21017iuk is among the faintest GRB associated SNe (GRB–SNe). Semi-analytical light-curve modelling of SN2017htp, SN2017iuk and only known GRB associated superluminous supernova (SLSN 2011kl) are performed using the MINIM code. The model with a spin-down millisecond magnetar as a central engine powering source nicely reproduced the bolometric light curves of all three GRB–SNe mentioned above. The magnetar central engines for SN2017htp, SN2017iuk, and SLSN2011kl exhibit values of initial spin periods higher and magnetic fields closer to those observed for long GRBs and H-deficient SLSNe. Detection of these rare events at such late epochs also demonstrates the capabilities of the 3.6m DOT for deep imaging considering longitudinal advantage in the era of time-domain astronomy.

Introduction

Taylor & Francis

Integrated Ferroelectrics

An International Journal

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/ginf20

Photoluminescence Property of Erbium-Doped Yttrium Oxide: Doping Concentration and Its Effect

Prabhjot Singh, Manmeet Kaur, Nameeta Brahme, D. P. Bisen, Rofiqul Umam, V. R. Panse, Ahmad Said, Irzaman & Antomi Saregar

To cite this article: Prabhjot Singh, Manmeet Kaur, Nameeta Brahme, D. P. Bisen, Rofiqul Umam, V. R. Panse, Ahmad Said, Irzaman & Antomi Saregar (2022) Photoluminescence Property of Erbium-Doped Yttrium Oxide: Doping Concentration and Its Effect, Integrated Ferroelectrics, 230:1, 100-107, DOI: 10.1080/10584587.2022.2102803

To link to this article: https://doi.org/10.1080/10584587.2022.2102803

Published online: 06 Oct 2022.

Materials Chemistry and Physics 287 (2022) 126273

Contents lists available at ScienceDirect

Materials Chemistry and Physics

journal homepage: www.elsevier.com/locate/matchemphys

Analysis of thermoluminescence glow curve and evaluation of trapping parameters of cerium activated $M_2Al_2SiO_7$ (M= Ca and Sr) phosphor for TLD application

Tripti Richhariya [a], Nameeta Brahme [a], D.P. Bisen [b], T. Badapanda [c], Kanchan Tiwari [d], Ekta Chandrawanshi [b]

[a] Department of Physics, KalingaUniversity, Raipur (C.G.), 492101, India
[b] SoS in Physics and Astrophysics, Pt. Ravishankar Shukla University, Raipur (C.G.), 492010, India
[c] Department of Physics, C.V. Raman Global University, Bhubaneswar, Odisha, 752054, India
[d] Department of Physics, Govt. Nagarjuna P. G. College of Science, Raipur, 492010, India

HIGHLIGHTS

- Cerium doped Calcium and Strontium aluminosilicate phosphors was prepared by solid –state reaction method.
- Structural and morphological studies were carried out using X-Ray Powder diffraction and SEM analysis.
- Thermoluminescence spectra were analyzed using the glow curve E-T_{stop} method.
- Thermoluminescence spectra and fading were studied to find the applicability the phosphors in dosimetry.

ARTICLE INFO

Keywords:
Dosimetry
Trap distribution
Fading

ABSTRACT

A Series of Cerium activated aluminosilicate phosphors $M_2Al_2SiO_7$ (M — Ca and Sr) were synthesized and their thermoluminescence (TL) characterization was carried out to investigate the dosimetry properties. A conventional high-temperature solid-state reaction method was adopted for the synthesis of phosphors. The structural characterization was done by powder X-ray diffraction (PXRD) tool, which confirms the phase formation of prepared samples. Concentration-dependent TL studies reveal that maximum intensity was obtained at 2 mol% and 0.5 mol% in Cerium doped $Ca_2Al_2SiO_7$ (CASO) and $Sr_2Al_2SiO_7$ (SASO) respectively. The analysis of the TL glow curve was carried out at this optimized concentration using E T_{stop}, which represents that the glow curve is composed of six glow peaks superimposed on each other. The best-fit glow curve was carried out using the Glow Curve Deconvolution (GCD) methods and the best fit is observed with six superimposing peaks for both phosphors, which resemble with E-T_{stop}. TL curves in the E–T_{stop} method indicated that observed peaks are due to the existence of quasi-continuous distribution of traps. The trapping parameters were calculated and it reveals the presence of both shallow and deeper traps. Thermoluminescence responses vary linearly with dose rate and a very low fading was observed with storage time which suggests the application of the phosphors for low UV dosimetry.

1. Introduction

Thermoluminescence (TL) belongs to a stimulated type of luminescence in which the liberation of previously absorbed energy takes place in the visible region as a result of thermal excitation. It has been playing a vital role in various biological fields, radiation protection, and archeological dating. One of the major applications of TL is in the field of radiation dosimetry, for personal and environmental monitoring [,]. On the other hand, it also plays a significant role to study the defects structure, impurities level (also known as trapping centers), and their

* Corresponding author.
E-mail addresses: [illegible] (T. Richhariya), [illegible] (N. Brahme), [illegible] (D.P. Bisen), [illegible] (T. Badapanda), [illegible] (K. Tiwari), [illegible] (E. Chandrawanshi).

[illegible]
Received 5 March 2022; Received in revised form 16 May 2022; Accepted 16 May 2022
Available online 19 May 2022

Optical Materials
Volume 129, July 2022, 112459

Research Article

Microstructural, luminescence properties and Judd-Ofelt analysis of Eu^{3+} activated $K_2Zr(PO_4)_2$ phosphor for lighting and display applications

Bhuneshwar Verma [a], R.N. Baghel [b], D.P. Bisen [b], N. Brahme [b], V. Jena [c]

https://doi.org/10.1016/j.optmat.2022.112459

Abstract

A series of light emitting $K_2Zr(PO_4)_2$ [KZP] phosphors activated with Eu^{3+} were synthesized through a conventional solid state reaction method. The phase structure, luminescence properties and decay lifetime of the prepared samples were analyzed in detailed. Photo-luminescence (PL) spectra exhibit five emission bands under the excitation at 394 nm. Furthermore, the optimal doping concentration of Eu^{3+} ion was determined as 2 mol% and the mechanism of energy transfer between two adjacent Eu^{3+} ions was dominated by the dipole-dipole (d-d) interaction. The Ω_2 and Ω_4 parameters were estimated for phosphate phosphors using Judd-Ofelt (J-O) theory from the emission spectra. The derived and radiative parameters were also predicted from PL spectra for the prepared phosphors to check their applicability in lasing and photonic applications. The possible lattice sites occupied by Eu^{3+} ions were investigated using the fitting function type of decay curves. The calculated CIE chromaticity coordinate of KZP: Eu^{3+} (2 mol%) phosphor verified that its emission light was traced in the pinkish-red zone. Thermally stimulated luminescence (TSL) properties of synthesized samples were also explained in terms of glow curve and kinetic parameters. The aforesaid results revealed that the KZP: Eu^{3+} phosphors could be potential candidate for solid state lightning and display systems.

Introduction

Now a days, phosphate compounds have become promising potential phosphor due to their brilliant thermal stability, photo stability, charge stabilization, inexpensive cost, excellent luminescent and eco-

Materials Today Communications

Volume 31, June 2022, 103802

Investigation of structural, photoluminescence, and thermoluminescence properties of Praseodymium doped $CaWO_4$ phosphor

R. Paikaray [a], T. Badapanda [a], H. Mohapatra [a], T. Richhariya [b], Satya N. Tripathy [c], Nameeta Brahme [d]

See more

https://doi.org/10.1016/j.mtcomm.2022.103802

Abstract

The structural, optical, photoluminescence and thermoluminescence behaviors of Praseodymium doped $CaWO_4$ ($Ca_{1-x}Pr_{2x/3}WO_4$; x=0.01, 0.02, 0.03, 0.04, 0.05) phosphors prepared via conventional solid-state reaction route were reported in this paper. X-ray diffraction study revealed the fact that all the synthesized samples crystallize in a tetragonal structure with I41/a (88) space group and the structural parameters were obtained from the Reitveld refinement. The unit cell volume was found to rise with the increase in Pr concentration. The bandgaps of the prepared samples were obtained from the UV-Visible absorbance spectra by using the Wood-Tauc method. Bandgap and unit cell volume of the prepared samples were directly proportional to each other. Photoluminescence behaviors were investigated from the excitation and the emission spectra. The PL spectra highlight that the quenching occurs at x=0.02 and the critical distance for energy transfer of the phosphor was found to be 20Å. Dexter theory was applied to determine the mechanism of quenching and confirmed that the concentration quenching was caused by the dipole-dipole interaction. CIE Chromaticity denoted that the phosphors emit red color. Color purity and CCT of the material were calculated. Thermoluminescence behaviors were studied with different durations of UV dose for the composition x=0.02 and the kinetic parameters were calculated. Variations of TL emission intensity with temperature confirmed the second-order kinetics of the phosphor with a critical quenching concentration at x=0.02.

Graphical Abstract

Materials Today Chemistry 24 (2022) 100938

Contents lists available at ScienceDirect

Materials Today Chemistry

journal homepage: www.journals.elsevier.com/materials-today-chemistry/

Efficient white light-emitting $Mg_{21}Ca_4Na_4(PO_4)_{18}$: Dy^{3+}, Tb^{3+}, Eu^{3+} triple-doped glasses: a multipurpose glasses for WLEDs, solar cell efficiency enhancement, and smart windows applications

Toshi S. Dhapodkar [a], Abhijeet R. Kadam [a], Nameeta Brahme [b], S.J. Dhoble [a, *]

[a] Department of Physics, R. T. M. Nagpur University, Nagpur, 440033, India
[b] School of Studies in Physics & Astrophysics, Pt. Ravishankar Shukla University, Raipur (C.G.), 492010, India

ARTICLE INFO

Article history:
Received 10 March 2022
Received in revised form
31 March 2022
Accepted 5 April 2022
Available online 9 May 2022

Keywords:
White light emission
Solar cell efficiency enhancement
Lamp phosphor
Triple doping
Orthophosphate glass

ABSTRACT

As a kind of lanthanide-activated luminescent materials, the development of rare-earth-activated luminescent glasses is one of the promising trends in the modern luminescence research. In the proposed work, Dy^{3+}, Tb^{3+}, Eu^{3+} activated/co-activated/triple-activated $Mg_{21}Ca_4Na_4(PO_4)_{18}$ orthophosphate glasses have been prepared by melt quenching technique for the first time. XRD pattern of the proposed glass sample shows amorphous nature, but the most intense peak is get matched with the standard ICSD database of $Mg_{21}Ca_4Na_4(PO_4)_{18}$ material. Vibrational feature of the proposed glass sample has been investigated using FTIR analysis. SEM and EDS confirm the morphology and elemental analysis of the as-prepared glass. Photoluminescence study of triple-activated $Mg_{21}Ca_4Na_4(PO_4)_{18}$ glass sample shows multiple emission peaks under NUV excitations which covers complete white light emission. Other optical properties like UV–Vis DRS, the refractive index of the glass and molar refraction of glass sample were investigated. Moreover, this glass sample is crushed homogeneously and coated on solar cell using doctor blade method shows the efficiency of solar cell enhanced by 43.33% than the blank solar cell. These results of the proposed sample prove its worth in the WLEDs, solar cell efficiency enhancement, and smart windows applications.

1. Introduction

Rare-earth-activated inorganic materials have gained more importance in the field of recent technology such as solid-state lighting sources [1], solar cells [2], displays [3–5], and telecommunications [6] over the past decade. Solid-state lighting sources based on white light-emitting diodes (WLEDs) have gained massive significance because of their superior characteristics, for instance, less power utilization, high brightness, and longer lifespan in addition to environmentally friendly characteristics which present it as a sustainable and proficient substitution to the traditional fluorescent and incandescent lamps [7–9].

In the modern age of technology, one way to attain white light emission is to combine the near-ultraviolet LED chip with red, blue, and green phosphors which can offer tunable color temperature and high rendering index [10–14]. Conversely, the white light from the commercially available WLEDs obtained by encapsulation of phosphors in an epoxy resin excited by blue or NUV LED chips has some problems as weak white light and so on [15–18]. Rare-earth activated transparent glasses are produced to conquer this problem which exhibits admirable optical properties, good mechanical and thermal properties, low-cost production, high durability manufacturing process is easy in addition to epoxy resin-free [15–18]. Glasses are preferred over crystalline materials in WLEDs, since it performs the functions of encapsulation along with wavelength converter [19].

With time smart windows are getting more and more attention in the electrical field from the light due to their large optical modulation, low energy consumption, and their high weatherability [20,21]. Smart windows light is able to modulate the absorption and transmission of light in some transparent medium glass, thin film, and polymer coating [22]. These smart windows have various applications in modern buildings, manufacturing industry, clinical medicine, and military defense. A smart window that vigorously modulates light transmittance is vital in the demand for optical devices [23,24]. Comparing these smart

* Corresponding author.
E-mail address: [illegible] (S.J. Dhoble).

https://doi.org/10.1016/j.mtchem.2022.100938

Optical Materials 1?? (2022) 112141

Contents lists available at ScienceDirect

Optical Materials

journal homepage: www.elsevier.com/locate/optmat

Luminescence properties of a novel cyan-blue light emitting Ce^{3+}doped $SrZrSi_2O_7$ phosphor

Sanjay Kumar Baghel [a,*], Nameeta Brahme [a,b], D.P. Bisen [a], Yugbodh Patle [a], Tripti Richhariya [a], Ekta Chandrawanshi [a], Chitrkant Belodhiya [a]

[a] School of Studies in Physics & Astrophysics, Pt. Ravishankar Shukla University, Raipur, CG, 492010, India
[b] Centre for Nano Science and Nanotechnology, Pt. Ravishankar Shukla University, Raipur, CG, 492010, India

ARTICLE INFO

Keywords:
Photoluminescence
Thermoluminescence
$SrZrSi_2O_7$: Ce^{3+}
Phosphor
TL Emission

ABSTRACT

A novel Ce^{3+} doped $SrZrSi_2O_7$ (SZSO) phosphor with different doping concentration (0.05–1.5 mol %) were synthesized by conventional solid-state reaction method. To confirm crystal structure and phase purity of prepared phosphor X-ray diffractions (XRDs) have been done. Surface morphology, compositional and functional groups analysis were investigated using FE-SEM, EDXS & FTIR techniques. In order to study the optical properties of the synthesized phosphor photoluminescence and thermoluminescence were investigated in detailed. Photoluminescence studies of SZSO: Ce^{3+} phosphor shows strong broad excitation peak at 293 nm owing due to 4f → 5d transition and corresponding broad emission peak obtain at 480 nm due to 5d → 4f spin allowed transition. The optimum PL intensity obtain for 0.1 mol% Ce^{3+} doping concentration. CIE co-ordinate, color purity and CCT of prepared phosphor are also calculated which shows the SZSO: Ce^{3+} phosphor emits cyan-blue light, can be applicable for solid state lighting. Thermoluminescence of SZSO: Ce^{3+} phosphor shows two TL glow curve peaks at 56 °C and 130 °C temperature. The optimum TL intensity obtained for 0.2 mol% Ce^{3+} doped SZSO phosphor for 15 min UV irradiation time at 254 nm UV excitation source. TL emission spectra and fading effect are also analyzed. TL kinetic parameters are determined by peak shape method. Thermoluminescence properties shows that prepared SZSO: Ce^{3+} phosphor will be potential applicable for UV-dosimetry.

1. Introduction

In lighting technology, rare earth doped solid state lighting materials get much attention due to their wide range of applications as a white light emitting diodes (W-LEDs), LEDs, display devices, lasers, traffic signals, backlight display etc. Among traditional incandescent and fluorescent lighting sources, white light emitting diodes (WLEDs) possess many properties such as power saving, low energy consumption, higher luminous efficiency & brightness, long lifetime and eco-friendly [ ]. Commercially available W-LEDs are fabricating by combining blue LED (GaInN) chip with yellow (YAG: Ce^{3+}) phosphor which has high correlated color temperature (CCT) and poor color rendering index (CRI). Another way to fabricate W-LFDs by mixing of red, green and blue emitting phosphors with UV-LED chip. The emitted white light by this way are very good CRI (above 90) and high luminous efficiency [ ].

Different types of phosphor materials are namely such as-oxides, sulfides, aluminates, silicates, nitrides, oxy-nitrides, halides, phosphates, borates etc. [ ]. The choice of phosphor matrix plays very important key role to obtain highly phosphor conversion devices. Silicates based phosphor shows great attention due to low cost, low phonon energy, high physical-chemical stability, excellent weather resistance and variety of crystal structure [ ]. Also zirconium silicate based phosphor possesses excellent optical properties such as photo-thermal stability and low thermal conductivity. Additionally, zirconia has low phonon energy and it has been attractive to be used as support for rare-earth ion, since the transition probabilities are increased and creating this material suitable for photonic applications [ ].

In many host lattice rare earth ions are mostly used as dopant ion due to their 4f-4f and 5d-4f transitions. Generally, Cerium (Ce^{3+}) ion doped phosphors shows strong and broad absorption near UV region owing to spin-allowed 4f→5d transition of cerium ions. Since, cerium ions shows broad emission due to 5d→4f ($^2F_{7/2}$ and $^2F_{5/2}$) allowed transition and emission can vary from UV to red region, which strongly depends on host matrix [ ]. Some articles are reported on cerium doped

* Corresponding author.
E-mail address: (S.K. Baghel).

Received 6 August 2021; Received in revised form 24 January 2022; Accepted 21 February 2022
Available online 1 March 2022

International Journal of Hydrological and Environmental for Sustainability
Volume 1, Issue 1, 41 -53
e_ISSN: 2828-5050
https://www.journal.foundae.com/index.php/ijhes

The Effectiveness of Sump Dimension Design: A Case Study in Nickel Mining

Excellentia Riane Kapugu
Department of Mining Engineering, Institut Teknologi Nasional Yogyakarta, INDONESIA

AA Inung Arie Adnyano*
Department of Mining Engineering, Institut Teknologi Nasional Yogyakarta, INDONESIA

Rizqi Prastowo
Department of Mining Engineering, Institut Teknologi Nasional Yogyakarta, INDONESIA

Akhamd Zamroni
School of Environmental Science and Management, University of the Philippines Los Banos, PHILIPPINES

Manmeet Kaur
Dept of Applied Physics, Shri Shankaracharya Technical Campus, INDIA

Nameeta Brahme
Department of Physics and Astrophysics, Pt. Ravishankar Shukla University, INDIA

***Correspondence: E-mail:** inungarie@itny.ac.id

Article Info

Article history:

Received: January 05, 2022
Revised: February 01, 2022
Accepted: February 18, 2022

Abstract

The presence of water in mining activities is common, especially in tropical areas that have high rainfall, such as the research location at PT ANTAM Maluku Utara at the Moronopo Site. While the sump maintenance needs to be considered so that the sump can accommodate the incoming discharge. The purpose of this research is to calculate the total discharge entering the mine and to design the dimensions of the sump according to the incoming water discharge. The research method used is the Gumbel method starting from the analysis of rainfall data at the research location starting in 2004-2013 and then continuing with 2019-2020 data, the planned rainfall value is 96.56 mm/day, rainfall intensity is 15.63 mm/day hours with a rain return period of 25 years and a hydrological risk of 18.46 % and the total inflow of mine water is 17,556 m^3/hour. After calculating the sump capacity in the Danis 2 area, it still has not accommodated the incoming discharge with the remaining unaccommodated discharge of 2,319.1 m^3/hour.

Keywords: mine water discharge; sump; sump volume; sump dredge time; ANTAM

To cite this article: Kapugu, E, R., Adnyano, A, I, A., Prastowo, R., Zamroni, A., Kaur, M. and Brahme, N (2022). The Effectiveness of Sump Dimension Design: A Case Study in Nickel Mining. *International Journal of Hydrological and Environmental for Sustainability, 1*(1), 41-53. https://doi.org/10.58524/ijhes.v1i1.69

INTRODUCTION

PT Antam North Maluku has three sites, namely the Moronopo site, the Tanjung Buli site, and the Pakal site. The location of this research is at the Moronopo Site, Maba District, East Halmahera, North Maluku. This company uses the open pit method with a selective mining system in its mining activities. Open-pit mining operations will be significantly affected by weather conditions, especially rain (A. Chiarucci and A. J. M. Baker., 2007). The presence of water in mining activities is expected in various mining activities, especially in tropical areas with high rainfall (Gautama, 1999). In extreme weather conditions in the form of high rainfall, the water can inundate the ground floor and result in muddy mining fronts (A. Chiarucci and A. J. M. Baker., 2007). Observations in the field show that there is a significant rain catchment area that the problem that often occurs at the Moronopo site is the condition of the sump, which is not able to accommodate the incoming water discharge, resulting in overflowing water around the mine area which does not rule out the possibility of causing pollution in the coastal area near the Moronopo site. The presence of stagnant water on the ground floor of the

(19)

J Mater Sci: Mater Electron (2023) 34:1151

Luminescence studies of Sm^{3+} doped CdB_4O_7 phosphors

Kamlesh Thakkar[1], Ravi Sharma[2,*], Nameeta Brahme[1], D. P. Bisen[1], Anita Verma[1], and Tripti Richhariya[3]

[1] School of Studies in Physics and Astrophysics, Pt. Ravi Shankar Shukla University, Raipur, C.G., India
[2] Govt. Arts and Commerce Girls College Devendra Nagar, Raipur, C.G., India
[3] Department of Physics, Kalinga University, Naya Raipur, C.G. 492101, India

Received: 29 September 2022
Accepted: 21 April 2023
Published online: 16 May 2023

ABSTRACT

Rare earth Sm^{3+}-doped cadmium tetra borate (Cd B_4O_7) phosphors were synthesized by solid-state reaction method. X- ray diffraction (XRD) technique was used for the structural characterization of the prepared phosphors, whereas EDS was used for elemental composition confirmation. The diffraction pattern of the prepared samples is well matched with the standard XRD (JCPDS file no. 30–0204). Photoluminescence emission and excitation spectra for pure and rare earth (Sm^{3+})-doped Cd B_4O_7 phosphor were obtained. The emission spectra of Sm^{3+}-doped Cd B_4O_7 showed a characteristic intense emission band at 608 nm along with less intense band at 561 nm and 644 nm under the excitation wavelength of 403 nm. The doping percentage was varied from 1 mol% to 4 mol% of Sm^{3+}. The photoluminescence intensity of 2 mol% of $Sm^{3+}$was found to be highest. From the CIE diagram of the Sm^{3+} doped Cd B_4O_7 phosphor showed the calculated color coordinates in the orange region. The thermoluminescence studies of pure and Sm^{3+}doped samples were carried out. The results of both the samples showed good TL response. The highest TL intensity was observed for 2 mol% of Sm^{3+}concentration. The optimized UV exposure time was 25 min. Nearly 66% linear relation was recorded for total TL intensity and UV exposure time. The TL spectra fall in the orange region, similar to the recorded PL emission spectra.

1 Introduction

Many oxides, sulfides, selenides, tellurides, arsenides, phosphides borates, sulfates, fluorides, and silicates are the important luminescence materials that have been developed and used over many decades [1]. The optical properties of CdS/ZnS were studied most in earlier times [2]. The borate-based phosphors were studied extensively due to their use in industries and mineralogy. Borate

Address correspondence to E-mail: rvsharma65@gmail.com

https://doi.org/10.1007/s10854-023-10520-9

Optical Materials 123 (2022) 111787

Contents lists available at ScienceDirect

Optical Materials

journal homepage: www.elsevier.com/locate/optmat

Structural, luminescent properties and Judd-Ofelt analysis of $CaMgSiO_4:Eu^{3+}$ phosphor for solid state lighting

Bhuneshwar Verma [a,*], R.N. Baghel [b], D.P. Bisen [a], N. Brahme [b], V. Jena [c]

[a] Department of Physics, Govt. Nagarjuna PG College of Science, Raipur, 492010 India
[b] School of Studies in Physics and Astrophysics, Pt. Ravishankar Shukla University, Raipur, 492010, India
[c] Department of Chemistry, Govt. Nagarjuna PG College of Science, Raipur, 492010, India

ARTICLE INFO

Keywords:
$CaMgSiO_4:Eu^{3+}$
CCT
CRI
J O analysis
Decay life times
Thermoluminescence

ABSTRACT

A series of Eu^{3+} doped calcium magnesium silicate ($CaMgSiO_4$) phosphor samples were successfully prepared via solid state synthesis technique. Their structural and morphological studies were investigated by powder X-ray diffraction (PXRD), scanning electron microscopy (SEM) and energy dispersive X-ray analysis (EDX) measurements. Phase structure and phase purity of sample were investigated by Rietveld refinement method. The vibrational and bonding behavior of silicate groups were confirmed by Fourier transform infrared (FTIR) and Raman spectroscopy. The luminescent properties of prepared samples were studied by photoluminescence (PL) and thermoluminescence (TL) characteristics. The emission spectra recorded under the excitation wavelength $\lambda_{ex} = 396$ nm. The highest emission peak was observed at 595 nm which corresponds to the $^5D_0 \rightarrow {}^7F_1$ transition of Eu^{3+} ions with selection rule $\Delta J = 1$. The concentration quenching and energy transfer mechanisms were elucidated by Blasse and Dexter's formula. The photometric parameters correlated color temperature (CCT), color rendering index (CRI) and color purity (CP) were computed using CIE chromaticity co-ordinate diagram. In addition, Judd-Ofelt (JO) parameters (Ω_2, Ω_4) and other derived radiative parameters were calculated using Judd-Ofelt theory from the PL emission spectra. Time resolved fluorescence spectra were carried out to determine the decay lifetime of the samples. The prepared samples are expected to be suitable candidates for the applications as solid state devices, lighting and optical displays.

1. Introduction

Recent years, the solid state lighting (SSL) technology has played important role in the field of displays, indoor lighting, outdoor lighting, industrial lighting, agriculture and health care applications [1,2]. The solid state lighting has also developed as an essential tool for the next generation lighting industry [3]. Generally, phosphor enhanced white LEDs have materialized as the essential light sources in the solid state illumination owing to their high energy efficiency, less power consumption, broad color spectrum, long lifetime and environmental friendliness [,]. Conventionally, the mixing of blue LED and yellow phosphors ($YAG:Ce^{3+}$) is one of the popular method to produce white light with high correlated color temperature (CCT) and low color rendering index (CRI) [ ]. The performance of WLEDs can be described by the luminescent properties viz luminous efficacy, CRI, CCT and lifetime. Consequently, in order to realize WLEDs with the optimal properties, high efficiency luminescent materials having suitable morphology need to be investigated.

Luminescent materials (phosphors) are extensively used to produce visible light, mainly in the field of fluorescent lighting technology. There are two types of fluorescent lamp to produce white light: low-pressure and high-pressure mercury vapor lamps [ ]. Mostly, both lamps necessitate phosphors that absorb ultraviolet (UV) radiation and release a proper color set results in white emission. Presently, rare earth (RE) silicate phosphors have aroused substantial attention owing to their high stability, visible light transparency, relative easy preparation, low cost, water resistance and stable structure. Because of these properties, the silicates are widely investigated [9,10]. Until now, many researchers have focused on the photoluminescence (PL) properties of silicate compounds $M_3MgSi_2O_8$ (M = Ba, Sr, Ca):Eu^{2+} [ ], $M_2MgSi_2O_7$ (M = Ba, Sr, Ca):Eu^{2+} [ ], $CaMgSi_2O_6:Eu^{2+}$ [,] extensively. However, a less attention has been paid to the calcium magnesium silicate ($CaMgSiO_4$) host matrix because of higher physical, chemical and thermal stability and easier availability. Hence, this is selected as an

* Corresponding author.
E-mail address: [redacted] (B. Verma).

Received 16 October 2021; Received in revised form 8 November 2021; Accepted 10 November 2021
Available online 2 December 2021

ROYAL ASTRONOMICAL SOCIETY
MNRAS 521, 5207–5223 (2023)
Advance Access publication 2023 March 23
https://doi.org/10.1093/mnras/stad864

Type Ia supernovae SN 2013bz, PSN J0910 + 5003, and ASASSN-16ex: similar to 09dc-like?

S. Tiwari,[1]★ N. K. Chakradhari,[1,2]★ D. K. Sahu,[3]★ G. C. Anupama[3],[3] B. Kumar[4] and K. R. Sahu[1]

[1]*School of Studies in Physics & Astrophysics, Pt. Ravishankar Shukla University, Raipur 492010, India*
[2]*Centre for Mega Projects in Multiwavelength Astronomy, Pt. Ravishankar Shukla University, Raipur 492010, India*
[3]*Indian Institute of Astrophysics, Koramangala, Bangalore 560034, India*
[4]*Aryabhatta Research Institute of observational sciencES (ARIES), Manora Peak, Nainital 263001, India*

Accepted 2023 March 14. Received 2023 March 14; in original form 2022 November 4

ABSTRACT

We present optical photometric and spectroscopic studies of three supernovae (SNe): SN 2013bz, PSN J0910 + 5003, and ASASSN-16ex (SN 2016ccj). UV–optical photometric data of ASASSN-16ex obtained with the *Swift* Ultraviolet/Optical Telescope (UVOT) are also analysed. These objects were initially classified as 09dc-like type Ia SNe. The decline-rate parameters ($\Delta m_{15}(B)_{\rm true}$) are derived as 0.92 ± 0.04 (SN 2013bz), 0.70 ± 0.05 (PSN J0910 + 5003), and 0.73 ± 0.03 (ASASSN-16ex). The estimated B-band absolute magnitudes at maximum, −19.61 ± 0.20 mag for SN 2013bz, −19.44 ± 0.20 mag for PSN J0910 + 5003, and −19.78 ± 0.20 mag for ASASSN-16ex, indicate that all three objects are relatively bright. The peak bolometric luminosities for these objects are derived as $\log L_{\rm bol}^{\rm max} = 43.38 \pm 0.07$, 43.26 ± 0.07, and 43.40 ± 0.06 erg s^{-1}, respectively. The spectral and velocity evolution of SN 2013bz is similar to that of a normal SN Ia, hence it appears to be a luminous, normal type Ia supernova. On the other hand, the light curves of PSN J0910 + 5003 and ASASSN-16ex are broad and exhibit properties similar to 09dc-like SNe Ia. Their spectroscopic evolution shows similarity with 09dc-like SNe: strong C II lines are seen in the pre-maximum spectra of these two events. Their photospheric velocity evolution is similar to SN 2006gz. Further, in the UV bands, ASASSN-16ex is very blue, like other 09dc-like SNe Ia.

Key words: techniques: photometric – techniques: spectroscopic – supernovae: general – supernovae: individual: SN 2013bz – supernovae: individual: PSN J0910 + 5003 – supernovae: individual: ASASSN-16ex.

1 INTRODUCTION

Thermonuclear supernovae are an important class of supernovae (SNe): the progenitors are low-mass stars found in elliptical as well as spiral galaxies. They are commonly known as Type Ia SNe (SNe Ia) and populate the brighter side of the luminosity distribution of SNe. Most SNe Ia, referred to as 'normal SNe Ia', display uniform spectral and light-curve properties. Their luminosity is correlated with the width of their light curve (Phillips 1993; Phillips et al. 1999) and hence they are considered standardizable candles. This uniformity and high luminosity make them a vital probe for studying cosmic evolution (Riess et al. 1998; Perlmutter et al. 1999). SNe Ia are the primary source of iron-group elements (IGEs) and hence play an important role in enriching the interstellar medium (ISM) with IGEs (Matteucci & Greggio 1986; Matteucci et al. 2009; Nomoto, Kobayashi & Tominaga 2013).

Our understanding of the progenitor and explosion mechanism giving rise to these events still needs to be completed. From the theoretical and observational work, it is inferred that thermonuclear disruption of a carbon–oxygen (C/O) white dwarf (WD) in a binary system results in a Type Ia explosion (Hoyle & Fowler 1960); see Maoz, Mannucci & Nelemans 2014; Jha, Maguire & Sullivan 2019 for reviews). There are two possible progenitor models suggested for a WD to explode. In the first one, a WD accretes matter from a non-degenerate star, known as the single-degenerate (SD) model (Whelan & Iben 1973). In the double-degenerate (DD) model, the explosion results from the merger of two WDs (Iben & Tutukov 1984; Webbink 1984). Most SNe Ia are considered to be an explosion of a Chandrasekhar-mass WD (Mazzali et al. 2007) via delayed detonation (Khokhlov 1991). However, if the accumulated material is He-rich, the explosion can occur at a sub-Chandrasekhar mass through double detonation. With sufficiently rapid He accretion on the surface of a C/O WD, a detonation is first initiated within the helium layer. The emanating shock wave propagates through the WD and triggers carbon detonation at the centre of the WD (Woosley & Weaver 1994; Woosley & Kasen 2011; Ruiter et al. 2014; Tanikawa, Nomoto & Nakasato 2018). The donor star could be either a non-degenerate He star (SD channel), another C/O WD with He in the outer layer, or a He WD (DD channel). This mechanism can explain normal and fast-declining SNe Ia of different brightness distributions (Pakmor et al. 2013). Currently, it is difficult to identify which SN results from which channel (see Livio & Mazzali 2018; Wang 2018; Soker 2019; Ruiter 2020, for reviews).

With the increasing number of well-studied SNe Ia, it became clear that there is a considerable spread in the luminosity of SNe Ia. There are objects populating both the higher and lower luminosity end of normal objects (Li et al. 2011). Some have extreme properties

★ E-mail: shrutikatiwari7@gmail.com (ST); nkchakradhari@gmail.com (NC); dks@iiap.res.in (DS)

The Astrophysical Journal Letters, 938:L22 (9pp), 2022 October 20 https://doi.org/10.3847/2041-8213/ac940d

Can the Violent Merger of White Dwarfs Explain the Slowest Declining Type Ia Supernova SN 2011aa?

Anirban Dutta[1,2], G. C. Anupama[1], Nand Kumar Chakradhari[3], and D. K. Sahu[1]
[1] Indian Institute of Astrophysics, II Block, Koramangala, Bangalore 560034, India; anirban.dutta@iiap.res.in, anirbanamdutta@gmail.com
[2] Pondicherry University, R.V. Nagar, Kalapet, 605014, Puducherry, India
[3] School of Studies in Physics & Astrophysics, Pt. Ravishankar Shukla University, Raipur 492010, India
Received 2022 June 29; revised 2022 September 1; accepted 2022 September 1; published 2022 October 21

Abstract

We present optical observations and Monte Carlo radiative transfer modeling of the Type Ia supernova (SN Ia) SN 2011aa. With a $\Delta m_{15}(B)$ of 0.59 ± 0.07 mag and a peak magnitude M_B of -19.30 ± 0.27 mag, SN 2011aa has the slowest decline rate among SNe Ia. The secondary maximum in the I band is absent or as equally bright as the primary maximum. The velocity of C II is lower than the velocity of Si II. This indicates either the presence of C at lower velocities than Si or a line-of-sight effect. Application of Arnett's radiation diffusion model to the bolometric light curve indicates a massive ejecta M_{ej} 1.8–2.6 $M_\odot$. The slow decline rate and large ejecta mass, with a normal peak magnitude, are well explained by a double degenerate, violent merger explosion model. The synthetic spectra and light curves generated with SEDONA considering a violent merger density profile match the observations.

Unified Astronomy Thesaurus concepts: Supernovae (1668)

Supporting material: data behind figures

1. Introduction

Type Ia supernovae (SNe Ia) result from thermonuclear explosions of white dwarf (WD) stars in binary systems (Hoyle & Fowler 1960; Jha et al. 2019). The rate of decline in normal type Ia SNe ($0.85 < \Delta m_{15}(B) < 1.70$ mag) is correlated with the absolute magnitude in the B band (Phillips 1993). The radioactive decay of ^{56}Ni to ^{56}Co and finally to ^{56}Fe supplies the energy during the maximum of the light curve and its subsequent evolution (Pankey 1962; Colgate & McKee 1969; Branch & Wheeler 2017). In addition, the efficiency with which gamma rays and positrons from the decay of ^{56}Ni are trapped in the ejecta also plays an important role in the evolution of the light curve (Cappellaro et al. 1997). The luminosity also increases with more ^{56}Ni produced in the explosion. This increased luminosity causes the ejecta to have a higher temperature. The opacity increases with temperature, and the diffusion timescales for the photons increases. This results in slower decline and broader light curves (Hoeflich et al. 1996). Hence, the decline rate versus absolute magnitude relation can also be interpreted as an opacity effect (Baron et al. 2012). While a majority of SNe Ia follow the luminosity decline rate relation, it is important to note that a good fraction of SN events that are of thermonuclear origin do not follow this relation (Maeda & Terada 2016; Taubenberger 2017). The overluminous super-Chandrasekhar SNe Ia (Howell et al. 2006; Ashall et al. 2021) lie at the extreme end of the $\Delta m_{15}(B)$–M_B relation. They are slowly declining objects. The SNe Iax (SN 2002cx-like) are a peculiar class of thermonuclear explosions having low luminosity and low kinetic energy as compared to SNe Ia (Li et al. 2003; Dutta et al. 2022).

In the proposed progenitor scenario for SNe Ia, the exploding WD can have a nondegenerate star (single degenerate (SD)) or another WD (double degenerate (DD)) as its binary companion. In the SD scenario, the WD can accrete matter from a red-giant (Munari & Renzini 1992), sub-giant/main-sequence (van den Heuvel et al. 1992), or a He star (Liu et al. 2010). In the DD case, a violent merger of two similar-mass WDs (~0.9 $M_\odot$) has been shown to give rise to a subluminous type Ia SN explosion (Pakmor et al. 2010). However, more massive primary WDs, due to their higher densities will produce more ^{56}Ni and Fe group elements (IGEs) and give rise to brighter SNe Ia (Pakmor et al. 2012).

Using preexplosion Hubble Space Telescope images Li et al. (2011) has ruled out He stars or luminous red giants as the companion of SN 2011fe. But a main-sequence star (Nugent et al. 2011) or another WD as a companion cannot be ruled out. Observations of early UV emission in a thermonuclear SN iPTF14atg (Cao et al. 2015) hinted toward collision of ejecta material with its companion, supporting an SD scenario. The excess flux can also be explained by ^{56}Ni in the outer layers (Magee & Maguire 2020). Some circumstellar mass can be formed from ejection of mass in tidal tails before the merger of two WDs. The interaction of the SN ejecta with the tidal tail ejecta produces signatures in X-ray/UV/optical (Raskin & Kasen 2013). The persistent presence of hydrogen in the spectra of PTF11kx can be understood in terms of ejecta interacting with circumstellar mass indicating a nondegenerate companion (Dilday et al. 2012; Silverman et al. 2013; Graham et al. 2017). The detection of [O I] λλ 6300, 6364 in the nebular spectra of SN 2010lp indicates that oxygen is present close to the center, which is predicted by a violent merger scenario (Taubenberger et al. 2013; Kromer et al. 2013). So, the very question of single/double degenerate progenitor still persists. The observed diversity in the explosions along with different models proposed to explain the diversity makes it important to study these systems.

In this Letter, we present optical observations and radiative transfer modeling with SEDONA of the spectra and light curves of a peculiar SN Ia, SN 2011aa. SN 2011aa was discovered on 2011 February 6.3 in the galaxy UGC 3906 (PGC 021381) at α (J2000) = $07^h36^m42^s.63$ and δ (J2000) = $+74°26'34''.80$ (Puckett et al. 2011). There is another nearby galaxy PGC 021386

J. Astrophys. Astr. (2022) 43:66
https://doi.org/10.1007/s12036-022-09860-5

TRANSIENTS

Modeling the late-time merger ejecta emission in short gamma ray bursts

ANKUR GHOSH[1,2,*], KUNTAL MISRA[1], S. V. CHERUKURI[3,4], L. RESMI[3], K. G. ARUN[5], AMITESH OMAR[1], DIMPLE[1] and N. K. CHAKRADHARI[2]

[1]Aryabhatta Research Institute of Observational SciencES (ARIES), Nainital 263001, India.
[2]Department of Physics, Pt. Ravi Shankar Shukla University, Raipur 492010, India.
[3]Indian Institute of Space Science and Technology (IIST), Thiruvanthapuram 695547, India.
[4]Physical Research Laboratory (PRL), Ahmedabad 380009, India.
[5]Chennai Mathematical Institute, Siruseri 603103, India.
*Corresponding author. E-mail: ghosh.ankur1994@gmail.com

MS received 5 January 2022; accepted 25 April 2022

Abstract. The short gamma ray bursts (GRBs) are the aftermath of the merger of binary compact objects (neutron star–neutron star or neutron star–black hole systems). With the simultaneous detection of gravitational wave (GW) signal from GW 170817 and GRB 170817A, the much-hypothesized connection between GWs and short GRBs has been proved beyond doubt. The resultant product of the merger could be a millisecond magnetar or a black hole depending on the binary masses and their equation of state. In the case of a magnetar central engine, fraction of the rotational energy deposited to the emerging ejecta produces late-time synchrotron radio emission from the interaction with the ambient medium. In this paper, we present an analysis of a sample of short GRBs located at a redshift of $z \lesssim 0.16$, which were observed at the late-time to search for the emission from merger ejecta. Our sample consists of seven short GRBs, which have radio upper limits available from very large array and Australian telescope compact array observations. We generate the model light curves using the standard magnetar model incorporating the relativistic correction. Using the model light curves and upper limits we constrain the number density of the ambient medium to be 10^{-5}–10^{-3} cm^{-3} for rotational energy of the magnetar $E_{\rm rot} \sim 5 \times 10^{51}$ erg. Variation in ejecta mass does not play a significant role in constraining the number density.

Keywords. Gravitational waves—surveys—gamma-ray burst: general—stars: magnetars—stars: neutron.

1. Introduction

The most accepted progenitor model for the origin of short GRBs is the merger of binary compact objects (binary neutron stars (BNS) and neutron star–black hole (NS–BH)). These systems are also the prime candidates for producing gravitational waves and kilonovae. The joint detection of the GW 170817, GRB 170817A and AT2017gfo confirmed the connection among the three events (Abbott *et al.* 2017; Valenti *et al.* 2017; Savchenko *et al.* 2017; Andreoni *et al.* 2017; Drout *et al.* 2017; Tanvir *et al.* 2017). The most debated open question regarding the central engine of GRB is whether black hole, production is necessary for the emergence of short GRB jet or the central engine could be a highly magnetized and rapidly spinning magnetar (Zhang & Mészáros 2001; [illegible] 2008). In the case of a BNS merger, the nature of the remnant depends on the initial masses of the BNS and the equation of state of the NSs. The massive binaries ($\gtrsim 3\,M_\odot$) will directly collapse to a black hole whereas the less massive BNS merger creates a transient state in between the merger and the production of black hole which is a millisecond magnetar. In the Swift era, the X-ray light curves from X-ray telescope (XRT Gehrels *et al.* 2004) show a complex light curve morphology with an early-time X-ray excess ($\lesssim 10$ s), mid time flattening or plateau (10–1000 s) and late time X-ray excess followed by a sharp decay ($\gtrsim 1000$ s). The plateau phase in the X-ray light curves is thought to be powered by the magnetar (Rowlinson *et al.* 2013).

This article is part of the Special Issue on "Astrophysical Jets and Observational Facilities: A National Perspective".

Published online: 13 September 2022

MNRAS 000, 1–10 (2015) Preprint 21 July 2022 Compiled using MNRAS LATEX style file v3.0

Search for merger ejecta emission from late time radio observations of short GRBs using GMRT

Ankur Ghosh[1,2]*, C. S. Vaishnava[3], L. Resmi[3], Kuntal Misra[1], K. G. Arun[4], Amitesh Omar[1], N. K. Chakradhari[2]

[1] *Aryabhatta Research Institute of observational sciencES (ARIES), Manora Peak, Nainital 263 001, Uttarakhand, India*
[2] *School of Studies in Physics and Astrophysics, Pandit Ravishankar Shukla University, Raipur 492010, Chattisgarh, India*
[3] *Indian Institute of Space Science and Technology, Trivandrum 695547, Kerala, India*
[4] *Chennai Mathematical Institute, Siruseri, Chennai 603103, Tamilnadu, India*

Accepted XXX. Received YYY; in original form ZZZ

ABSTRACT

Short gamma-ray bursts (GRBs) are the aftermath of compact binary mergers involving neutron stars. If the merger remnant is a millisecond magnetar instead of a black hole, a significant proportion of the rotational energy deposited to the emerging ejecta can produce a late-time radio brightening from its interaction with the ambient medium. Detection of this late-time radio emission from short GRBs can have profound implications for understanding the physics of the progenitor. We report the radio observations of five short GRBs - 050709, 061210, 100625A, 140903A, and 160821B using the Giant Metrewave Radio Telescope (GMRT) at 1250, 610, and 325 MHz frequencies after $\sim 2-11$ years from the time of the burst. The GMRT observations at low frequencies are particularly important to detect the signature of merger ejecta emission at the peak. These observations are the most delayed searches associated with some of these GRBs for any late-time low-frequency emission. We find no evidence for such an emission. We find that none of these GRBs are consistent with maximally rotating magnetar with a rotational energy of $\sim 10^{53}$ ergs. However, magnetars with lower rotational energies cannot be completely ruled out. Despite the non detection, our study underscores the power of radio observations in the search for magnetar signatures associated with short GRBs. However, only future radio observatories may have the capabilities to either detect these signatures or put more stringent constraints on the model.

Key words: gravitational waves – surveys – gamma-ray burst: general – stars: magnetars – stars: neutron – gamma-ray bursts: Transients.

1 INTRODUCTION

Double neutron star (DNS) or a neutron star–black hole mergers have been argued to be the most promising progenitors for short-duration Gamma-Ray Bursts (short GRBs; Paczynski 1986; Narayan et al. 1992; Ruffert & Janka 1999). The Gravitational Waves (GWs) discovery from the DNS merger GW 170817 and simultaneous observation of a short GRB 170817A, along with the discovery of its electromagnetic counterparts in various bands, have revolutionised the era of multi-messenger astronomy (Abbott et al. 2017; Goldstein et al. 2017; Savchenko et al. 2017) and has strengthened the hypothesis that short GRBs result from the merger of compact objects.

However, there are uncertainties about the final phase of the merger as GW observations are not sensitive to the post-merger dynamics of neutron star mergers (see, for example, Fig. 1 of Bartos et al. 2013) given the current sensitivities of the detectors. Numerical simulations have shown that the merger remnant may form a supra-massive, rapidly spinning, highly magnetized neutron star (magnetar) before collapsing to a black hole (Ozel 2011; Giacomazzo & Perna 2013). Whether the situation occurs or not depends crucially on the resultant mass of the remnant and the extremely uncertain Equation of States (EoS) of dense neutron stars (Ozel 2011; Lasky & Glampedakis 2016; Özel et al. 2016; Lan et al. 2020). With the recent discovery of millisecond pulsar MSP J0740+6620 having the mass of $2.14^{+0.10}_{-0.09}\,M_\odot$ (Cromartie et al. 2020), this mass is often used as the lower limit of maximum neutron star mass. For a binary mass $< 3\,M_\odot$, a long-lived supra-massive neutron star remnant could be formed (Dai et al. 2006; Giacomazzo & Perna 2013) before collapsing to a black hole.

In the case of a DNS merger, the resultant product will be rapidly rotating with a spin period close to the centrifugal breakup value ($P \sim 1$ ms). The remnant could also acquire a strong magnetic field $\geq 10^{14} - 10^{15}$ G, which may be enhanced by the Kelvin-

* E-mail: ghosh.ankur1994@gmail.com (AG)

of the
ROYAL ASTRONOMICAL SOCIETY
MNRAS 510, 5854–5871 (2022)

https://doi.org/10.1093/mnras/stab3158

Study of chemically peculiar stars – I. High-resolution spectroscopy and *K2* photometry of Am stars in the region of M44

Santosh Joshi,[1]* Otto Trust ,[2]* E. Semenko,[3,4] P. E. Williams,[5] P. Lampens,[6] P. De Cat ,[6] L. Vermeylen,[6] D. L. Holdsworth ,[7] R. A. García,[8,9] S. Mathur,[10,11] A. R. G. Santos,[12,13] D. Mkrtichian,[3] A. Goswami,[14] M. Cuntz,[15] A. P. Yadav ,[16] M. Sarkar,[1] B. C. Bhatt,[14] E. Kahraman Aliçavus ,[17,18] M. D. Nhlapo,[19] M. N. Lund ,[20] P. P. Goswami,[21] I. Savanov,[21] A. Jorissen,[22] E. Jurua,[2] E. Avvakumova,[23] E. S. Dmitrienko,[24] N. K. Chakradhari,[25] M. K. Das,[26] S. Chowdhury,[17] O. P. Abedigamba,[19,27] I. Yakunin,[4] B. Letarte[19] and D. Karinkuzhi[28]

Affiliations are listed at the end of the paper

Accepted 2021 October 25. Received 2021 October 25; in original form 2021 April 16

ABSTRACT

We present a study based on the high-resolution spectroscopy and *K2* space photometry of five chemically peculiar stars in the region of the open cluster M44. The analysis of the high-precision photometric *K2* data reveals that the light variations in HD 73045 and HD 76310 are rotational in nature and caused by spots or cloud-like co-rotating structures, which are non-stationary and short-lived. The time-resolved radial velocity measurements, in combination with the *K2* photometry, confirm that HD 73045 does not show any periodic variability on time-scales shorter than 1.3 d, contrary to previous reports in the literature. In addition to these new rotational variables, we discovered a new heartbeat system, HD 73619, where no pulsational signatures are seen. The spectroscopic and spectropolarimetric analyses indicate that HD 73619 belongs to the peculiar Am class, with either a weak or no magnetic field, considering the 200-G detection limit of our study. The least-squares deconvolution profiles for HD 76310 indicate a complex structure in its spectra, suggesting that this star is either part of a binary system or surrounded by a cloud shell. When placed in the Hertzsprung–Russell diagram, all studied stars are evolved from the main sequence and situated in the δ Scuti instability strip. This work is relevant for further detailed studies of chemically peculiar stars, for example on inhomogeneities (including spots) in the absence of magnetic fields and the origin of the pulsational variability in heartbeat systems.

Key words: techniques: photometric – spectroscopic – polarimetric – stars: chemically peculiar – stars: activity – stars: binaries.

1 INTRODUCTION

The chemically peculiar (CP) stars are a group of main-sequence B-, A-, and F-type stars having peculiar surface elemental abundances; they are characterized by abnormal spectral line strengths (Preston 1974). The chemical anomalies in these stars are thought to be confined to the outer stellar layers and to arise from gravitational settling and radiative levitation of certain elements, a process known as atomic diffusion (Michaud 1970; Michaud, Charland & Megessier 1981). This study is confined to one subset of CP stars, the metallic-lined A (Am) stars, which are generally non-magnetic in nature and characterized by under-abundances of some light elements such as Ca and Sc, but with slight/moderate over-abundances of iron-peak elements, for example Zn, Sr, Y, Zr, and Ba. The projected rotational velocities of these stars are generally smaller than for ordinary A stars ($v \sin i$ typically $\lesssim 120$ km s^{-1}), with the majority of the Am stars being members of close binary systems. Rotational braking through tidal interaction is regarded as a possible cause of the low rotational velocities.

Using four years of high-precision photometry from the nominal *Kepler* mission and the *K2* campaigns, Balona et al. (2015) investigated the light variations in 29 Am stars and found that most of the Am stars in the *Kepler* field have light curves with the characteristics of rotational modulation arising from star spots or co-rotating structures. The origin of spots in Am stars seems to be different from that of solar-like spots, as these stars do not show any signs of the intense magnetic fields able to produce such magnetic features. Magnetic fields of the order of sub-Gauss strengths have been reported in some Am stars, for example Sirius A (Petit et al. 2011), Vega (Böhm et al. 2015), β UMa, and θ Leo (Blazère et al. 2015), Alhena (Blazère, Neiner & Petit 2016) and ρ Pup (Neiner, Wade & Sikora 2017). It is thought that for the majority of these stars, convective flows in the atmospheres may disrupt any spot-like features (Kupka 2003). Hence, the rotational modulation in some Am stars indicates either that a weak magnetic field may lead to surface inhomogeneities in the form of spots across the stellar surface or, alternatively, that there is some unknown mechanism(s) producing these spots. If a weak magnetic field is indeed present, then the basic processes operating in Am stars would need to be revisited because magnetic fields have been omitted from the diffusion models attempting to explain their unusual chemical abundances (Guzik 2021).

* E-mail: santosh@aries.res.in (SJ); otrust@must.ac.ug (OT)

Journal of MATERIALS RESEARCH

DOI:10.1557/s43578-023-00984-0

Effect of TiO_2 on ion transport properties and dielectric relaxation of sodium ion-conducting novel PEO/PAN-blended solid polymer electrolyte

[Niranjan Kumar] [redacted]

[1] Solid State Ionics Research Laboratory, School of Studies in Physics and Astrophysics, Pt. Ravishankar Shukla University, Raipur 492010, Chhattisgarh, India
[2] State Forensic Science Laboratory (SFSL), Raipur, Chhattisgarh, India
[a)] Address all correspondence to this author. e-mail: ykmahipal@gmail.com

Received: 5 December 2022; accepted: 8 March 2023

In the present manuscript, a comprehensive study of temperature-dependent ionic conductivity, dielectric behaviour, and thermal, structural, and morphological characteristics of nano-composite polymer electrolyte (NCPE) films has been performed. NCPE films were prepared by hot-press method from a blend of two polymers, Poly (ethylene oxide) (PEO) and Poly (acrylonitrile) (PAN), complexed with sodium perchlorate ($NaClO_4$) complexing salt and titanium dioxide (TiO_2) nanofiller. Electrochemical Impedance Spectroscopy (EIS) has been used to investigate electrical and dielectric properties and their correlations. The effect of TiO_2 concentration on ionic conductivity and dielectric relaxation has been investigated at different temperature ranges. Both the smoother surface and the presence of all essential components were verified by scanning electron microscopy (SEM) and energy-dispersive spectroscopy (EDAX), respectively. Thermogravimetric Analysis (TGA) revealed high thermal stability, and Differential Scanning Calorimetry (DSC) and X-ray Diffraction (XRD) confirmed enhanced amorphous phase. The cyclic voltammetry (CV) curve exhibits excellent reversibility and cyclability.

[redacted]

In materials, there are two types of conduction: due to electronic and ionic. Solid-State Ionics is a branch of Material Science, in which materials with high ionic transport characteristics are studied, these materials have a wide range of applications, one of them being for energy storage devices. The demand for safe, dependable, and effective energy storage devices to store electrical energy has increased [1]. In the modern era, portable electronic devices viz. mobile phones, fitness trackers, tablet computers, etc. become more widespread in our culture and many areas of our lives are now dependent on the functioning of electronic equipment directly or indirectly [2]. Furthermore, recent improvements in processing power, long durability, screen size, and the desire for ultra-thin and lighter gadgets have raised the demand for lighter batteries with improved energy density [3–6].

In the development of advanced energy storage systems and conversion devices, polymer electrolytes are more prominent materials due to their flexibility, desired shapes/sizes, mechanical/chemical/thermal stability over a wide temperature range, and light-weight, non-volatility, and corrosion free properties [7, 8]. Polymer electrolytes are chosen for energy storage applications such as high energy density solid polymer batteries because they allow for easy formation of close electrode/electrolyte contact [9, 10]. The primary function of polymer electrolytes in the battery is to serve as a separator between the anode and cathode materials [11, 12]. It also acts as an ion transport medium for the conduction of ions during electrochemical processes, like charging/discharging. The ions in the electrolyte are adsorbed/desorbed on the porous electrode, due to which fast charging/discharging of the solid polymer battery system has occurred and that provides a high energy density [13–15]. Polymer Electrolyte materials have mainly been classified into Gel Polymer Electrolyte (GPE) and solvent free/dry Solid Polymer Electrolyte (SPE). The GPE has higher ionic conductivity but exhibits poor mechanical stability, whereas the SPE is mechanically stronger and may be made into free standing electrolyte membranes [16, 17]. In SPE, instead of using an additional

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

Electrical and thermal analysis on Na^+ - ion conducting novel blended solid polymer electrolyte membranes

Niranjan Kumar, Manju Sahu, Y.K. Mahipal *

Solid State Ionics Research Laboratory, School of Studies in Physics & Astrophysics, Pt. Ravishankar Shukla University, Raipur 492010, Chhattisgarh, India

ARTICLE INFO

Article history:
Available online 24 January 2023

Keywords:
Solid Polymer Electrolyte
Ionic Conductivity
Hot-Press Method
A.C. Impedance Spectroscopy
Thermal properties

ABSTRACT

In this study, the hot press method has been used to synthesize a blended solid polymer electrolyte (BSPE), containing poly (ethylene oxide) and polyacrylonitrile (PEO/PAN) matrix complexed with sodium perchlorate ($NaClO_4$) salt. The film with varying salt concentration has been prepared, in which the BSPE OCC (optimum conducting composition) film exhibits the highest ionic conductivity is (σ_{rt}) ~ 2.10 × 10^{-3} Scm $^{-1}$ at room temperature. X-ray diffraction (XRD), impedance spectroscopy (IS), Differential Scanning Calorimetry (DSC) and Thermal Gravimetric Analysis (TGA) techniques have been adopted for the characterization. These investigations are demonstrated their utility and potential for all-solid-state device applications.

Selection and peer-review under responsibility of the scientific committee of the Recent Advances in Material Science and Organic Synthesis (RAMSOS 2020-2021).

1. Introduction

In the last few decades, polymer-based electrolytes have received a lot of interest for electrochemical applications such as batteries, supercapacitors and sensors [1–3]. The dissociated form of salt provides mobile ions, while the polymer facilitates ion transport and which gives the electrolyte a free-standing and flexible consistency. Due to their characteristics such as light weight, flexibility, geometric stability, increased safety, and no leakage, these systems are unquestionably superior to liquid electrolytes and brittle ceramic matrix electrolytes. Polymer electrolytes (PEs) have excited the interest of the scientific community as a feasible alternative to traditional liquid-based electrolytes as a result of this research and development [4,5]. Initially, gel polymer electrolytes (GPEs) were made by adding an organic solvent (such as EC, PC, DEC / DMC) to a polymer salt matrix as a plasticizer, and they exhibited superior properties over liquid electrolytes. However, due to weak mechanical properties and interfacial difficulties prohibited them from being used in a safe battery system. Solid polymer electrolyte (SPE) films appear the best alternative, with the ability to solve the problems associated with all traditional and GPE systems. The SPE has several advantages, including a simple and low-cost design method, flexibility, and device scale-down, which reduces both cost and weight. Because no liquid is used, the all-solid-state battery provides more safety than the existing one. The high ionic conductivity, a wide range of voltage, good mechanical stability with a wide temperature range, and interfacial qualities are desirable properties for SPE film membranes. Another significant advantage of SPE is that it may act as both an electrolyte and a separator in energy storage and conversion devices [6–8]. Since the beginning of polymer electrolytes, polyethylene oxide (PEO) is one of the most common polymers for the synthesis of electrolyte membranes. It's a semi-crystalline polymer that interacts with the cation of the salt and operates as a solid solvent due to the presence of ether oxygen in its main chain. Ion transport in PEO-based electrolytes is aided by the segmental motion of the polymer chains, which is highly dependent on the amorphosity of the system [9,10]. However, the semi-crystalline nature of PEO, reduces the ionic conductivity of these electrolytes, limiting their practical applicability. Various strategies such as polymer blending, crosslinking, and so on, have been adopted to improve the electrochemical characteristics of such systems, including reducing the crystallinity of PEO-based electrolytes and increasing ionic conductivity at ambient temperature. Polymer blending looks to be more convincing and effective in recognized ways, as it blends and enhances the properties of the particular host polymer. According to some recently published research SPEs have been used in a variety of formulations, i.e., poly (vinyl

https://doi.org/10.1016/j.matpr.2023.01.141
2214-7853/
Selection and peer-review under responsibility of the scientific committee of the Recent Advances in Material Science and Organic Synthesis (RAMSOS 2020-2021).

Materials Today: Proceedings 63 (2022) 64–74

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

Physical and electrical property studies on sodium (Na^+) – Ion conducting Nano–Composite Polymer Electrolyte membranes

Manju Sahu [a], Niranjan Kumar [a], Dinesh Kumar Sahu [b], R.C. Agrawal [a], Y.K. Mahipal [a,*]

[a] Solid State Ionics Research Laboratory School of Studies in Physics & Astrophysics, Pt. Ravishankar Shukla University, Raipur – 492010, Chhattisgarh, India
[b] State Forensic Science Laboratory, Raipur, C.G., India

ARTICLE INFO

Article history:
Available online 23 January 2023

Keywords:
Nano - Composite Polymer Electrolytes
Ion transport properties
All-solid-state battery
Differential Scanning Calorimetry

ABSTRACT

Present work reports that Polymer Electrolyte Membranes, [97PEO: $3NaCOOCH_3$] dispersed with ceramic filler SiO_2 have been synthesized using the hot-press casting technique. Ion transport properties have been evaluated in terms of the essential ionic conductivity (σ) and total ionic (t_{ion}) / cationic (t_+) transference numbers using different ac/dc techniques to evaluate its usefulness in all-solid-state battery applications.

Structural/thermal properties have been characterized using X-ray Diffraction (XRD), Differential Scanning Calorimetry (DSC) and Thermal Gravimetric Analysis (TGA) techniques. The thermal laminated pouch cell has been fabricated and tested by sandwiching the best optimized NCPE film between MnO_2 cathode and Graphite anode. Cyclic Voltammetry study of NCPE film exhibits good electrochemical behaviour and is more suitable for battery fabrication

Selection and peer-review under responsibility of the scientific committee of the Recent Advances in Material Science and Organic Synthesis (RAMSOS 2020-2021).

1. Introduction

Modern electrochemical power sources, viz. batteries, fuel cells, super-capacitors etc., developed by Polymer electrolyte membranes have great technological attention. Solid Polymer Electrolytes have several advantages over conventional solid/liquid/aqueous electrolyte systems [1–4]. These include size/shape flexibility, intimate electrode/ electrolyte contact/ compatibility, more comprehensive temperature range of operation, larger recharge cyclability, longer shelf life etc. In 1973, the first Solid Polymer Electrolytes (SPEs) film, that is, Poly (ethylene oxide) PEO complexed with alkali metal salt, was reported by Fenton et al. [5]. The first solid polymer electrolyte SPE film: PEO: Li^+-ionic salt-based battery, was practically demonstrated by Armand et al. in 1979 [6]. Polymer electrolyte materials with different mobile ion species viz. H^+, Ag^+, Cu^+, Li^+, Na^+, K^+, Mg^{2+}, Zn^{2+} etc., have been investigated and tested for their applications in electrochemical power sources [7–14]. However, most modern portable batteries are primarily based on Li^+-ion conducting polymer electrolytes and Lithium metal electrodes. Lithium chemicals are known for their several limitations. They are more reactive, difficult to handle in open ambience, toxic, expensive, low natural abundance etc.; hence, the batteries based on these chemicals involve several safety and environmental issues [15–16]. Thus, most of the researchers mainly focus their work on non-lithium-based battery technology [17–20], such as Na-ion batteries (NIBs), as compared to Li-ion batteries due to the materials advantages and low-cost resources [21–24].

The present paper reports the synthesis of Na^+-ion conducting Nano-Composite Polymer Electrolyte (NCPE) films: [97PEO: $3NaCOOCH_3$] + $xSiO_2$ in varying filler concentrations. These films were prepared by a completely dry/solution-free hot-press casting technique. The hot-press technique has advantages over traditional film casting procedures such as sol-gel and solution cast. Hot – press film casting technique is solvent-free, more rapid and cost-effective. Optimum Conducting Composition (OCC) NCPE film has been identified. NCPE OCC film was subjected to materials characterization and ion transport properties studies to evaluate its usefulness in all-solid-state battery applications. Materials and thermal property studies have been characterized by X-ray Diffraction (XRD), Differential Scanning Calorimetry (DSC), Thermal Gravimetric Analysis (TGA) and ion transport mechanism have been measured by AC Impedance Spectroscopy (IS). Finally, an

* Corresponding author.
E-mail address: ykmahipal@gmail.com (Y.K. Mahipal).

https://doi.org/10.1016/j.matpr.2023.01.148

Selection and peer-review under responsibility of the scientific committee of the Recent Advances in Material Science and Organic Synthesis (RAMSOS 2020-2021).

Journal of Solid State Electrochemistry (2022) 26:1613–1626
https://doi.org/10.1007/s10008-022-05195-x

ORIGINAL PAPER

Investigation of ZnO nano-filler-dispersed nano-composite polymer electrolytes and their ion transport property

Niranjan Kumar[1] · Manju Sahu[1] · Dinesh K. Sahu[2] · Y. K. Mahipal[1]

Received: 18 April 2022 / Revised: 12 May 2022 / Accepted: 19 May 2022 / Published online: 31 May 2022

Abstract

The present manuscript represents the comprehensive studies of the poly (ethylene oxide)-based sodium ion-conducting solid polymer electrolyte (SPE) and nano-composite polymer electrolyte (NCPE) membranes dispersed with different wt. (%) of ZnO nano-filler that have been synthesized by the hot-press method. This novel method gave rise to flexible, uniform/thin polymer electrolyte films which can be achieved in any desired shape/size. X-ray diffraction (XRD) was used to analyze the structural properties of the SPE host and the NCPE optimum conducting composition (OCC) film. Scanning electron microscopy (SEM) confirmed the smoother surface and energy-dispersive spectroscopy (EDAX) confirmed the presence of all key elements. Thermo-gravimetric analysis (TGA) and differential scanning calorimetry (DSC), respectively, indicated good thermal stability and an improved amorphous phase. The dispersion of the ZnO nano-filler particles has enhanced the ionic conductivity, thermal stability, and also mechanical integrity. Ion transport properties have been characterized by assembling symmetric cells: SS||SPE/NCPE||SS (SS stainless steel), the NCPE OCC membrane exhibits the maximum ionic conductivity (σ_{rt}) ~ 1.45×10^{-5} S/cm at room temperature, low activation energy (E_a ~ 0.35 eV), and ionic transference number (t_{ion} ~ 0.99) close to unity and also the cyclic voltammetry (CV) curve shows the good electrochemical stability so electrolyte has been found more suitable for device fabrication.

Keywords Solid polymer electrolyte · Nano-composite polymer electrolyte · Ionic conductivity · A.C. impedance spectroscopy · Thermal properties · Cyclic voltammetry

Introduction

In the era of advanced technology, the development of renewable energy sources, such as wind, solar, and nuclear energy sources, has become necessary due to the limited availability of traditional fossil fuels [1]. However, with the advancement of renewable energy sources, we have to focus on portable electrical energy storage devices to smooth the intermittency of the energy sources. Battery devices have the potential to provide a solution, especially as they can store energy from renewable energy sources such as wind and solar power. The rechargeable battery can store chemical energy as well as it can convert it into electrical energy with high efficiency [2, 3]. In the latest technology of electrical energy storage devices, lithium-ion battery (LIB) has been dominating the market of portable electronic devices, electric vehicles, and hybrid electric vehicles due to their high output voltages, high energy densities, and long durability. But due to very high cost, less abundance and the toxic nature of lithium are inhibiting the application of LIB in large-scale energy storage [4–9]. Therefore, many researchers are trying to develop sodium-ion secondary batteries parallelly which could be able to replace Li-ion associated energy storage devices successfully. The most believable and competitive element with comparable performance and very close chemical insertion properties that have the potential to replace lithium (Li) and eliminate the hurdles is sodium (Na). The abundance of sodium resources (1000 times more than Li), low price of starting materials, voltage versus SHE (2.7 V), and low toxicity are favorable for sodium-ion battery (SIB) technology enhancement in industrial applications, viz., portable electronic devices and for electric road

✉ Y. K. Mahipal
ykmahipal@gmail.com

1 Solid State Ionics Research Laboratory, School of Studies in Physics & Astrophysics, Pt. Ravishankar Shukla University, Raipur 492010, Chhattisgarh, India

2 State Forensic Science Laboratory (SFSL), Raipur, Chhattisgarh, India

Issue 3, 2022

From the journal
New Journal of Chemistry

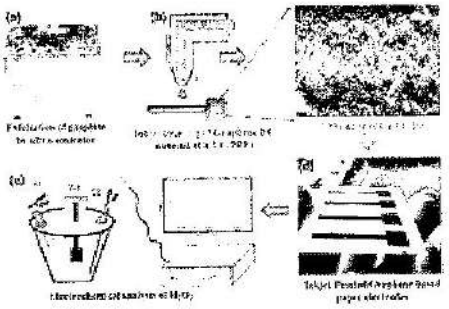
A graphene-printed paper electrode for determination of H_2O_2 in municipal wastewater during the COVID-19 pandemic†

Tushar Kant,[a] Kamlesh Shrivas,[*a] Indrapal Karbhal,[a] Monisha,[a] Sanjay Yadav,[a] Tikeshwari,[a] Sushama Sahu,[a] Yugal Kishor Mahipal[b] and Veliachamy Ganesan[c]

Author affiliations

Abstract

Recently, hydrogen peroxide (H_2O_2) has been used as a disinfectant in sanitizers for cleaning hands, and solid surfaces of hospitals, offices and homes to prevent the spread of the COVID-19 virus. The effluents from domestic, hospital and municipal waste should be monitored for their H_2O_2 content to avoid the entry of this toxic pollutant into the ecosystem. Therefore, we developed a low-cost graphene (Gr)-printed paper electrode for determination of H_2O_2 using cyclic voltammetry (CV). An office inkjet-printer and Gr nano-ink stabilized with ethyl cellulose (EC) were used for the fabrication of printed paper electrodes (PPEs) to determine H_2O_2 quantitatively. A stable Gr–EC nano-ink (2%) with viscosity and surface tension values of 12 mPa S^{-1} and 35 mN M^{-1}, respectively, was formulated to obtain conductive electrodes. A wide linear range (2 μM–25 mM) with a better limit of detection (0.28 μM) for the determination of H_2O_2 was obtained when the Gr–EC/PPE was used as a working electrode. Further, the Gr–EC/PPE was successfully employed for analysis of H_2O_2 in wastewater. The electrochemical determination of H_2O_2 using the Gr–EC/PPE as an electrode in CV is rapid, economical, flexible and eco-friendly when compared with previously reported methods.



ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022

The Effect of Mindfulness-Based Intervention on Caregivers of Person with Chronic Schizophrenia

Irish Sheikh[1], Dr Anoop Peter[2]*, Dr Basheer. Hasan[3], Dr Ashwani Pundeer[4]

[1]Ph.D. Scholar, Department of Psychology Pt. Ravishankar Shukla University Raipur, Chhattisgarh, India.

[2]Assistant Professor, Department of Clinical Psychology & Psychiatry, Santosh Deemed to be University, Ghaziabad, NCR Delhi, India.

[3]Professor, Department of Psychology Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, India.

[4]Assistant Professor, Department of Clinical Psychology, HIMS Swami Rama Himalayan University, Dehradun, Uttarakhand, India.

ABSTRACT:

When family members find out that a loved one has developed schizophrenia, they often feel helpless, angry, depressed, and anxious. As a result, the caregiver's psychological health is greatly affected, which increases both the caregiver's subjective and objective burden. As a result, they may require assistance and communication with mental health professionals at times. As a result, the study sought to assess the efficacy of mindfulness-based interventions on caregivers of people with chronic schizophrenia. **Objectives:** The study aimed to evaluate the effectiveness of a mindfulness-based intervention on various psychological parameters such as mindfulness, sense of control, and overall well-being in caregivers of people with chronic schizophrenia. **Methodology:** A total of 26 caregivers of persons with chronic schizophrenia, who fulfilled the inclusion and exclusion criteria were selected and formed into the Treatment As Usual (TAU) and Mindfulness Based Intervention with Treatment As Usual (MBITAU) groups. **The current intervention was found to be effective in increasing well-being and mindfulness, particularly action awareness, as the MBITAU group differed significantly from the TAU group in the post-assessment.** Thus, MBI can be an effective therapy to maintain the psychological health of caregivers.

Keywords: Mindfulness, General Well-being, Caregivers, Schizophrenia, Mindfulness Based Intervention

INTRODUCTION:

The initial reactions, a family has when one of its members is diagnosed with mental illness include shock, denial, blame, and suffering. The suffering of primary caregivers is exacerbated in the case of those with schizophrenia, the most prevalent serious disorder with a poor prognosis, by symptoms and signs, caregiving demands, an inability to accept the loved one's illness and the ensuing emotional distress, the financial burden of treatment, the

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved,** **UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

stigma associated with it, as well as other mental health conditions like anxiety, frustration, and a lack of coping mechanisms (Spaniol, Zipple & Lockwood, 1992). According to a review of the literature by Caqueo, Gutiérrez, and Miranda (2009), caretakers' quality of life can be negatively impacted by their own physical, emotional, and financial distress (Chenn et al., 2019), as a result of a variety of unmet needs, such as a lack of time for themselves, a significant financial burden, and a lack of improvement in the patient's capacity to perform family and social roles. Due to all of these circumstances, the stress levels of the primary caregivers are certain to increase and stay elevated. As a result, they may experience stress, worry, and depression, as well as high frustration, a loss of patience, and a lack of compassion for themselves and their patients (Chaddaa, 2014; Mehmood et al., 2022). Consequently, the expressed emotion towards the patient mounts, which could subsequently make the patient's condition worse. Thus, the vicious cycle of suffering is maintained, which hampers the psychological well-being of the caregiver.

Since expanded awareness of one's own feelings and experiences and acceptance are found to be predictors of psychological well-being (Lindsay & Creswell, 2017; McNall et al., 2021), an intervention that enhances these factors may be beneficial to improve the psychological well-being of the care givers. If the caretakers can accept, accommodate, and establish a non-judgmental attitude toward his moment-to-moment self-experience, they will not only secure their own well-being but also be able to get better control over their emotional reaction. As a result, they may be able to provide better care for the person suffering from schizophrenia.

The term "mindfulness-based intervention" refers to a variety of mindfulness therapy techniques that are often underpinned by a cognitive-behavioral perspective that promotes awareness, acceptance, and emotion control. John Kabat-Zinn made modern mindfulness psychotherapy popular by removing any religious components. According to Kabat-Zinn, mindfulness is "the consciousness that arises via paying attention on purpose, in the present, and non-judgmental acceptance of the unfolding of experience in the present moment" (Kabat-Zinn, 2003, p. 145). There are a few studies that have reported that MBI can reduce stress and increase mindfulness in caregivers (Putri & Bintari, 2018); Vignesh R., 2012). The study's main postulate is that MBI interventions that promote awareness and acceptance can aid in the primary enhancement of well-being and emotional regulation and, secondarily, prevent ill health of any kind in the caregiver, prevent the patient's relapse, and positively improve the emotional atmosphere for the patient's speedy recovery.

There is a scarcity of research on the effect of MBI on the psychological well-being of the same population. However, a number of studies done on caregivers of other psychological disorders and other serious physical illnesses with psychological symptoms reported that MBI improved mindfulness, psychological well-being, and emotional regulation. (Molero Jurado et al., 2020; Shapiro et al., 2007; Singh et al., 2004, 2016; Stjernswärd & Hansson, 2017). The caregiver burden and psychological distress are similar across caregiver types, though intensity and magnitude can vary. The positive effects of mindfulness on caregivers

ISSN PRINT 2319 1775 Online 2320 7876

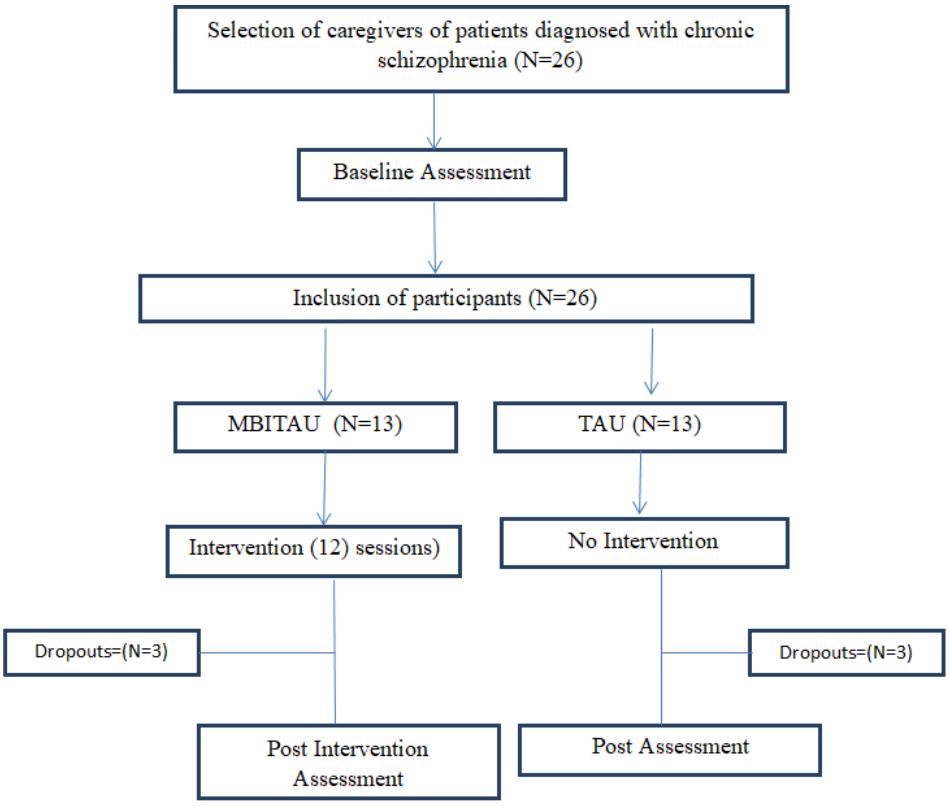
Research paper UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022

and the general population provide a foundation for the development of a mindfulness-based intervention for caregivers of people with schizophrenia. Thus, the present study aimed at assessing the effectiveness of mindfulness-based interventions on the well-being and sense of control of caregivers of patients with chronic schizophrenia.

METHODOLOGY:

Sample

The study was a hospital-based intervention with a pre- and post-control group design. In this study, caregivers of both genders who are significant caregivers in terms of parents, spouses, or first-order family members and who reside with patients aged between 20 and 55 years and who have at least primary education and basic proficiency in Hindi and English were included in the study. Other requirements included informed consent, the absence of any other mental illness or serious physical illness, and the willingness to attend all intervention sessions without fail. Caregivers of patients with schizophrenia who were diagnosed within the last two years, as well as patients with schizophrenia who have a significant history of substance abuse or any other psychiatric illness, as well as a history of epilepsy, neurological disorders, or mental retardation, were excluded. Through purposive sampling, 26 caregivers of patients with schizophrenia who fulfilled the inclusion and exclusion criteria were selected. Randomly, 13 participants were assigned to MBI with treatment as usual (MBITAU) and 13 to treatment as usual (TAU).



ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022

Measures

Clinical Interview Schedule (CIS): A semi-structured form used to get detailed information about the socio-demographics of the participants. It combined a clinical case history format with a checklist of anxiety symptoms. **The PGI general well-being scale-(PGIWBS) developed by S.K. Verma and Anita Verma in 1989, was used to assess caregivers' subjective general sense of well-being. The Five Facet Mindfulness Questionnaire(FFMQ)** was used to assess the mindfulness state of the participants, developed by Bear et al. in 2006. Deane H. Shapiro's (1994) **Shapiro Control Inventory** (SCI) was used to assess caregivers' sense of control. These measures were **used for pre- and post-assessment.** Reliability and validity were adequate for all the scales.

Mindfulness Based Intervention Package

A group-oriented, suitable intervention package was prepared for the caregivers of patients with schizophrenia, which included a guided interview with the caregivers and standardised techniques from existing modules and related literature. The module was developed by three registered clinical psychologists. On a weekly basis, 12 sessions lasting approximately one hour were conducted by one trained clinical psychologist. The outline of the module is as follows

Table 1; intervention package description

Sessions	Techniques/activities	Home work
1	• Group Orientation • Pre-assessment: tools administration • assessing understanding and psycho education about schizophrenia	1. Handouts on understanding schizophrenia and related burden
2.	• Feedback and discussion of previous session • Introduction of mindfulness and automatic pilot • Demonstration of raisin exercise	1. Hand out of mindfulness 2. Mindful eating exercise (breakfast, lunch and dinner)
3	• Feedback and discussion of previous session • Demonstration of body scan (sitting posture)	1. Mindfulness eating exercise (breakfast, lunch and dinner) 2. Practice of body scan with the help of audio track 2 times in a day (preferably while patient is sleeping) and just before sleeping in the night (lie-down posture)

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022

4	• Feedback and discussion of previous session • Group understanding related to effect and coping with difficult behaviour of patients • Demonstration of mindfulness of breath and discussing suitable time to practice it	1. Mindfulness of eating in routine life 2. Practice of body scan 3. Mindfulness of breath-3 times in a day with the help of audio track as well as when patient is having difficult emotions and behaviour
5	• Feedback and discussion of previous session • Learning alternative strategies to deal with difficult behaviour of patients • Practice of mindfulness of breath	1.Practice of body scan 2.Using alternative ways to deal with difficult behaviour of the patient in stress-full situation 3. Mindfulness of breath
6	• Feedback and discussion of previous session • Practice of self-guided body scan • Thought and feeling exercise	1.Practice of self-guided body scan once in a day and once before sleeping 2. Handout of mindfulness of thought and emotions 3. Practice of mindfulness of breath (Self-guided)
7	• Feedback and discussion of previous session • Demonstration of mindfulness of thought and emotions • Practice of mindfulness of breath	1. Practice of self-guided body scan 2. Mindful observation of thought and emotions once in a day(using audio track) 3 Practice of mindfulness breath (self-guided)
8	• Feedback and discussion of previous session • Practice of mindfulness of thought and emotions • Demonstration of 3MBS	1. Mindful observation of thought and emotions once in a day 2.Practice of 3MBS 3 Times in a day and in emergency or difficult situation (using audio track) 3. Self-guided body scan just before sleep
9	• Feedback and discussion of previous session • Practice of 3MBS • Demonstration of mindfulness of sound	1. Practice of 3MBS(using audio track) 2. Practice of mindfulness of sound (using audio track) 3 times in a day 3. Body scan

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved,** **UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

10	• Feedback and discussion of previous session • Practice of 3MBS • Practice of mindfulness of sound • Demonstration of *loving and kind meditation*	1.Practice of 3MBS(self-guided) 2 times per day and in emergency and difficult situation 2.Practice of loving and kind meditation (using audio track)
11	• Review of whole sessions • Practice of loving and kind meditation • Preparing a list of mindfulness activities in day to day life	1.Practice of mindfulness in day to day life
12	• Termination and post assessment	2.Mindfulness in day to day life

PROCEDURE OF THE STUDY:

This study was conducted with the aim of assessing the application and effectiveness of mindfulness-based interventions on the well-being and sense of control of caregivers of patients with chronic schizophrenia. The patients who fulfilled inclusion and exclusion criteria were identified, and their significant caregivers were contacted. Caregivers were given information about the study and the mode of intervention during personal interview sessions. The consent of caregivers was obtained after observing their strong willingness to participate in the intervention study. The caregivers were screened on the basis of inclusion and exclusion criteria, and a total of 20 caregivers were selected for the proposed study using purposive sampling techniques. 13 were assigned to the "Treatment As Usual group," and 13 were assigned to the "MBI with Treatment As Usual group." One week Prior to the intervention, a pre-assessment of both groups was conducted. The "MBITAU" was then subjected to an intervention package with necessary follow-up homework assessment and feedback. Having completed 12 sessions and related requirements, a post-session assessment of both groups was conducted. Both sets of data were examined, and data cleaning was performed. Having failed to fulfil their homework and not complying with the time and action plan of the session, two of them were removed from the intervention group, and due to incomplete assessment data, two were removed from the control group. One participant from each group left the hospital due to the discharge of their patients. The final data set included 20 patients' caregivers, with 10 in each group.

DATA ANALYSIS:

SPSS 24 was used to analyse the data. A descriptive statistic was used for analysing sociodemographic data. The mean score of all scales and subdomains on the pre- and post-assessment is also determined using descriptive analysis. The Shapiro-Wilk Z test of normality indicated that the data was not normally distributed, therefore, higher level non-

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved, UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

parametric tests were carried out to measure variance in order to test the hypotheses. The Kolmogorov-Smirnov Z test was done to test the significance of the difference between two groups on the means of scores obtained from the FFMQ, PGI Well-being, and SCI in the pre- and post-assessment periods. To compare pre- and post-test scores within the group, a Mann-Whitney U test was used.

RESULTS:

Table 2: showing descriptive statistic of socio- demographic variables

		Frequency TAU	% TAU	Frequency MBI TAU	% MBI TAU	Mean /SD
Gender	Male	7	70	7	70	
	Female	3	30	3	30	
SES	Lower	2	20	3	30	
	Middle	7	70	7	70	
	Upper	1	10	0	0	
Residence	Rural	7	70	6	60	
	Urban	3	30	4	40	
Duration of illness	2 to 3 years	4	40	5	50	
	4 to5 years	4	40	4	40	
	5years above	2	20	1	10	
Duration of treatment	2 to 3 years	7	70	7	70	
	4 to5 years	3	30	3	30	
	5years above	0	0	0	0	
Age	TAU					37.90 (± 19.35)
	MBI TAU					44.90 (± 19.66)
Education	TAU					14.4 (± 1.26)
	MBI TAU					11.1 (± 4.40)
Total		10		10		

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022

Table 3; showing descriptive statistics of study variables

Pre scores			**Post scores**		
Variables	Mean	S.D	Variables	Mean	S.D
V1 TAU	13.9000	3.78447	V1 TAU	14.1000	4.35762
V1 MBITAU	9.3000	3.59166	V1 MBITAU	17.5000	2.54951
V2 TAU	28.9000	6.13641	V2 TAU	27.7000	6.37791
V2 MBITAU	26.6000	5.33750	V2 MBITAU	27.3000	8.28721
V3 TAU	33.1000	4.88649	V3 TAU	32.5000	3.30824
V3 MBITAU	28.5000	4.17000	V3 MBITAU	31.3000	5.59861
V4 TAU	33.2000	5.13809	V4 TAU	32.2000	4.68568
V4 MBITAU	26.4000	5.35828	V4 MBITAU	36.7000	2.58414
V5 TAU	25.8000	4.46716	V5 TAU	27.0000	5.55778
V5 MBITAU	23.7000	7.33409	V5 MBITAU	25.2000	7.88529
V6 TAU	29.9000	3.63471	V6 TAU	27.0000	4.87625
V6 MBITAU	28.4000	3.09839	V6 MBITAU	28.6000	6.07728
V7 TAU	150.9000	11.00959	V7 TAU	146.4000	9.37135
V7 MBITAU	132.6000	15.24030	V7 MBITAU	149.7000	20.91278
V8 TAU	196.3000	46.05806	V8 TAU	177.6000	24.08872
V8 MBITAU	161.6000	36.13001	V8 MBITAU	182.8000	7.78603

*V1= PGI, V2= Observe, V3 = Describe, V4 = Act aware, V5 =Non -judge, V6 = Non- react, V7 = TFFMQ, V8 = SCI.

Table 4: Kolmogorov-Smirnov Z showing difference between the pre score TAU and MBI TAU and post score TAU and MBI TAU

The pre score TAU and MBI TAU									*The Post score TAU and MBI TAU*							
Variables	V1	V2	V3	V4	V5	V6	V7	V8	V1	V2	V3	V4	V5	V6	V7	V8
Z	1.34	.67	1.12	1.57	.89	.45	1.57	.89	.89	.45	.45	1.12	.67	.67	.89	.89
Asymp. Sig.	.06	.76	.16	**.02**	.40	.99	**.02**	.40	.40	.99	.99	.16	.76	.76	.40	.40

*V1= PGI, V2= Observe, V3 = Describe, V4 = Act aware, V5 =Non judge, V6 = Non react, V7 = TFFMQ, V8 = SCI.

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022

Table 5 Mann Witney U showing difference between the pre and post scores in TAU group and MBITAU group

Variables	*Assessment condition*	*The pre and post scores TAU*				*The pre and post scores MBITAU*			
		Mean Rank	Sum of Ranks	U	Asymp. Sig.	Mean Rank	Sum of Ranks	U	Asymp. Sig.
V1	1	4.83	14.50	-.085[b]	.932	5.50	55.00	-2.809[b]	**.005**
V1	2	3.38	13.50			.00	.00		
V2	1	4.40	22.00	-.060[c]	.952	4.25	25.50	-.356[b]	.722
V2	2	5.75	23.00			6.50	19.50		
V3	1	4.17	12.50	-.254[c]	.799	5.64	39.50	-1.226[b]	.220
V3	2	3.88	15.50			5.17	15.50		
V4	1	2.33	7.00	-.135[c]	.892	5.50	55.00	2.807[b]	**.005**
V4	2	4.00	8.00			.00	.00		
V5	1	5.75	23.00	-.059[b]	.953	5.50	27.50	-.595[b]	.552
V5	2	4.40	22.00			4.38	17.50		
V6	1	3.50	10.50	-1.423[c]	.155	3.50	10.50	-1.423[b]	.155
V6	2	5.75	34.50			5.75	34.50		
V7	1	4.00	16.00	-1.176[c]	.240	5.88	47.00	-1.988[c]	**.047**
V7	2	6.50	39.00			4.00	8.00		
V8	1	3.50	10.50	-1.734[c]	.083	7.00	42.00	-1.478[b]	.139
V8	2	6.36	44.50			3.25	13.00		

*V1= PGI, V2= Observe, V3 = Describe, V4 = Act aware, V5 =Non judge, V6 = Non react, V7 = TFFMQ, V8 = SCI.

** 1= Pre assessment, 2 = Post

Table 6: Cohen -d showing effect size

Variable	**Z score**	**N**	**Square root of N (√N)**	**Cohen d**	**Interpretation**
PGI	2.8	20	4.472	0.63	Moderate to High Sign.
Act Awareness	2.81	20	4.472	0.62	Moderate to High Sign.
TFFMQ	1.99	20	4.472	0.44	Small to Moderate Sign.

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved,** **UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

The total sample of 20 consisted of 14 males and 6 females, evenly distributed between the TAU (7 males and 3 females) and the MBI with treatment as usual (7 males and 3 females).Similarly, the duration of treatment for the patients in the sample was distributed equally between the two groups. Other socio-demographic variables were slightly different in both groups. The mean age of the control group was 37.90 (± 19.35) and that of the experimental group was 44.90 (± 19.66). The control group's mean education score was 14.4 (1.26), while the experimental group's mean score was 11.1 (4.40) (table 2).The mean scores of the outcomes in the pre assessment duration were relatively high in the TAU group. However, MBITAU group means increased after psychological intervention (Table 3).

The pre score of Total FFMQ was significantly different between the TAU and MBI with TAU (Z (8)= 1.565), p = 0.015), and one of the domains of FFMQ (act awareness) was also significantly different between the two groups (Z (8)= 1.565), p = 0.015. However, these significant differences observed in the pre score did not exist in the post score as there was no significant difference in the TAU and MBI with TAU in any of the outcome measures(Table 4). A significant difference was observed in the PGI scores between pre- and post assessment in the MBI with TAU. The act awareness domain of the FFMQ was significantly different between pre- and post assessment of MBI with TAU at (U (8) =-2.809), p > 0.001. The total score of the FFMQ was also significantly different between the pre- and post-assessment at U (8) =-1.988), p > 0.001 (Table 5). While the scores of pre post scores of TAU were not significantly different between pre and post assessment duration. Thus, it is obvious that there was a significant improvement in well-being and in total scores of mindfulness in the MBITAU group; however, sense of control and some domains of mindfulness did not improve significantly.

DISCUSSION:

The objectives of the study were to see the applicability of the mindfulness-based intervention on various psychological parameters like mindfulness, sense of control, and general well-being of the caregivers of patients with schizophrenia. The study was conducted on 20 caregivers of patients with chronic schizophrenia who were first degree relatives of the patients diagnosed with schizophrenia as per ICD-10 (DCR). The sample was divided into two groups: MBITAU and TAU. Along with treatment for the patient, the "MBITAU" group received 12 sessions of mindfulness intervention in a group format. Both groups underwent pre- and post-assessments on mindfulness, sense of control, and general well-being.

The results of the study indicate that MBI for caregivers is effective in improving mindfulness and wellbeing. Although the mean scores of the TAU group were higher than those of the MBITAU group in all outcome measures, the act-aware domain of the FFMQ and the total mean score of the FFMQ showed a significant difference. However, there was no significant difference in any of the outcome indicators when comparing the post-test scores between groups. As a result, the previously significant difference was reduced to

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved,** UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022

insignificance, suggesting that the intervention was successful. The outcome of the comparison conducted within the group provided further confirmation of the same. The MBITAU method shows a significant difference between two assessment periods in the outcome measures, which are mindfulness and well-being. The TAU group, on the other hand, did not show a significant difference between two assessment periods.

There was no significant difference in the TAU group's pre and post scores (cf; tables 4 and 5), indicating that the caregivers' mindfulness behaviour and psychological well-being were not improved as a result of the patient's compliance with the treatment and symptom management. It was apparent that medical attention or any psychological or physiological treatment provided for the patient's care and management had no direct effect on the caregiver's mindfulness behaviour or well-being. It can be understood that the caregiver's mindful behaviour was not the result of a random occurrence. If it was a coincidental or situational confounding variable, there should have been a considerable improvement in the TAU group, just as there was in the MBITAU group. Stjernswärd & Hansson (2017) finding that MBI increased mindfulness and reduced the stress of the caregivers of people with schizophrenia validates the findings of the present study. Although studies examining the effects of MBI on well-being in the same population were available to validate the present study's findings, a growing body of research with caregivers of people with a wide range of psychiatric disorders and serious medical illnesses who also experience psychological symptoms confirms the efficacy of MBI in improving both mindfulness and well-being. (Molero Jurado et al., 2020; Shapiro et al., 2007; Singh et al., 2004, 2016; Stjernswärd & Hansson, 2017).

The mindfulness intervention had an effect on the participants' general well-being. Table 5 shows significant improvement in the post-assessment. General well-being is probably one of the most important aspects of human beings, and the state of general well-being can be attained through a healthy body with a healthy mind. According to a review of the literature, caregivers of schizophrenia have poor quality of life and poor well-being, which is a construct referring to the harmonious functioning of the physical and psychological aspects of the personality, providing satisfaction to the self and benefit to society (Siwach, 2000).

Improvements in mindfulness and general well-being are concurrent. Theoretically, improving well-being may be explained by the improvement in mindfulness. A caregiver who had been lost in thought and worry about a patient's serious psychotic condition and related problems was not in touch with his own feelings, emotions, and psychological process. The attention was on the patient, but at the same time, the quality of attention was not maintained due to mechanical actions without having given any thought to personal emotions and feelings. In the intervention, participants started to focus more on self-awareness and act-awareness, a domain that was significantly different between the two groups. Thus, they were able to be in touch with their actions and related emotions and stress, and that probably increased their general well-being. The other possibility was that

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved,** **UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022**

mindfulness intervention helped the participant be more focused on their general well-being and, consequently, mindful actions evolved. Thus, well-being increased mindfulness. Mediation or moderation analysis could be a better measure of deciding what mediated or moderated the other variable. This was not in the scope of this research.

There was not any significant difference between MBITAU group and TAU group in sense of control of caregivers of patients with schizophrenia in pre & post assessment. However, table 3 indicated that there was a slightly higher score in the post-assessment of MBI with TAU in comparison to the pre-assessment, which suggested that self-control had upward progress but not enough to make statistical significance, which probably could have been achieved if there had been a follow-up assessment because sense of control is achieved through prolonged practice and it needs more time to develop into a habit or state. Surprisingly, there was downward progress in post-SCI scores for the TAU group, as shown in Table 3. The reasons are not known, but one could be assumed: a prolonged stay with the patient in the hospital and having no other personal resource to share the burden of caring for the patient caused a dwindling in self-resource to maintain a sense of control. However, with the help of a therapist and other participants, the MBITAU group participants were able to maintain a better sense of control than they had previously. This might be due to the feedback and discussions that take place in every session with the therapist and the participants as a whole. Though it was no way of a claim of effectiveness of this particular intervention but it was an indication that supportive therapy of this kind or any kind having same elements could be beneficial to caregivers to maintain or improves their sense of control.

CONCLUSION:

As a result of the findings, the study concludes that mindfulness-based intervention is an effective treatment strategy that can aid and assist caregivers of people with schizophrenia in improving their well-being and mindful disposition. Despite a few limitations, such as the small sample size and single location and setting for sample selection, as well as assessing only the immediate effect of the intervention and not looking into follow-up effects after a longer period of practise, the findings encourage clinicians to work with caregivers of people with schizophrenia using MBI. Since it was a treatment modality in the hospital, where their patient was receiving treatment for schizophrenia, the applicability was found to be high, as well as it could aid better patient care and the self-care of the caregiver.

REFERENCES:

1. Baer R, Smith G, Lykins E, Button D, Krietemeyer J, Sauer S, Williams MG. Construct validity of the Five Facet Mindfulness Questionnaire in meditating and nonmeditating samples. Assessment. (2008)15, 329–342 https://doi: 10.1177/1073191107313003.

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved,** UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022

2. Caqueo, A. U., Maldonado,J.G., & Castillo, C.M. (2009). Quality of life in caregivers of patients with schizophrenia: a literature review, 11, 7-84 https:// doi: 10.1186/1477-7525-7-84.

3. Chadda, R. (2014). Caring for the family caregivers of persons with mental illness. Indian Journal of Psychiatry, 56(3), 221. https://doi.org/10.4103/0019-5545.140616

4. Chen, L., Zhao, Y., Tang, J., Jin, G., Liu, Y., Zhao, X., Chen, C., & Lu, X. (2019). The burden, support and needs of primary family caregivers of people experiencing schizophrenia in Beijing communities: A qualitative study. BMC Psychiatry, 19(1), 75. https://doi.org/10.1186/s12888-019-2052-4

5. Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. Clinical Psychology: Science and Practice, 10(2), 144 56. https://doi.org/10.1093/clipsy.bpg016

6. Lindsay, E. K., & Creswell, J. D. (2017). Mechanisms of mindfulness training: Monitor and Acceptance Theory (MAT). Clinical Psychology Review, 51, 48–59. https://doi.org/10.1016/j.cpr.2016.10.011

7. McCarthy, B., Kuipers, L., Hurry, J., Harper, R. and LeSage, A. (1989) Counselling the relatives of the long-term adult mentally ill. I Evaluation of the impact on relatives and patients. British Journal of Psychiatry, 154: 768–775. https/ doi: 10.1192/bjp.154.6.775.

8. McNall, L. A., Tombari, J. M., & Brown, M. M. (2021). Exploring How Mindfulness Links to Work Outcomes: Positive Affectivity and Work-Life Enrichment. Applied Research in Quality of Life, 16(1), 167–182. https://doi.org/10.1007/s11482-019-09762-9

9. Mehmood, N., Talib, U., & Naeem, F. (2022). The Level of Depression and Anxiety among Caregivers of Patients with Schizophrenia. British Journal of Healthcare and Medical Research, 9(2), Article 2. https://doi.org/10.14738/jbemi.92.11984

10. Molero Jurado, M. del M., Pérez-Fuentes, M. del C., Barragán Martín, A. B., Soriano Sánchez, J. G., Oropesa Ruiz, N. F., Sisto, M., & Gázquez Linares, J. J. (2020). Mindfulness in Family Caregivers of Persons with Dementia: Systematic Review and Meta-Analysis. Healthcare, 8(3), 193. https://doi.org/10.3390/healthcare8030193

11. Putri, U. N., & Bintari, D. R. (2018). Mindfulness-Based Stress Reduction (MBSR) for Reducing Stress Among Informal Caregivers Of Schizophrenia. Proceedings of the 1st International Conference on Intervention and Applied Psychology (ICIAP 2017). 1st International Conference on Intervention and Applied Psychology (ICIAP 2017), Depok, Indonesia. https://doi.org/10.2991/iciap-17.2018.39

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **© 2012 IJFANS. All Rights Reserved,** UGC CARE Listed (Group -I) Journal Volume 11, S Iss 2, 2022

12. Shapiro, S. L., Brown, K. W., & Biegel, G. M. (2007). Teaching self-care to caregivers: Effects of mindfulness-based stress reduction on the mental health of therapists in training. Training and Education in Professional Psychology, 1(2), 105–115. https://doi.org/10.1037/1931-3918.1.2.105

13. Singh, N. N., Lancioni, G. E., Karazsia, B. T., Chan, J., & Winton, A. S. W. (2016). Effectiveness of Caregiver Training in Mindfulness-Based Positive Behavior Support (MBPBS) vs. Training-as-Usual (TAU): A Randomized Controlled Trial. Frontiers in Psychology, 7. https://doi.org/10.3389/fpsyg.2016.01549

14. Singh, N. N., Lancioni, G. E., Winton, A. S. W., Wahler, R. G., Singh, J., & Sage, M. (2004). Mindful caregiving increases happiness among individuals with profound multiple disabilities. Research in Developmental Disabilities, 25(2), 207–218. https://doi.org/10.1016/j.ridd.2003.05.001

15. Siwach, S. (2000). A correlation study of stress, coping skills, general well-being and joboutcome amongst police personnel. Unpublished Doctoral Dissertation, Department of Psychology. Maharishi Dayanand University, Rohtak

16. Spaniol, L., Zipple, A. M., & Lockwood, D. (1992). The Role of the Family in Psychiatric Rehabilitation. Schizophrenia Bulletin, 18(3), 341–348. https://doi.org/10.1093/schbul/18.3.341

17. Stjernswärd, S., & Hansson, L. (2017). Effectiveness and Usability of a Web-Based Mindfulness Intervention for Families Living with Mental Illness. Mindfulness, 8(3), 751–764. https://doi.org/10.1007/s12671-016-0653-2

18. Verma,S.K. & verma, A.(1989).“PGI general wellbeing Questionnaire”. Agra : National Psychology Center

19. Vignesh R. (2012). Effectiveness of Mindfulness Therapy on Stress Among Caregivers of Psychiatric Patients at Selected Hospital, Coimbatore [MSc.Thesis, The Tamilnadu Dr. M. G. R. Medical University,]. http://repository-tnmgrmu.ac.in/13050/1/300503412vignesh.pdf.

ISSN PRINT 2319-1775 Online 2320-7876, www.ijfans.org
Vol.11, Iss.12, Dec- 2022

PRO-SOCIAL BEHAVIOR AND ACADEMIC OUTCOME OF HIGH SCHOOL STUDENTS A SYSTEMATIC REVIEW

Pushpalata Bansode[1] , Basheer Hasan[2]

[1]Research Scholar, School of Studies : Psychology , Pt. Ravishankar Shukla University Raipur C.G.
[2]Professor, School of Studies : Psychology, Pt. Ravishankar Shukla University Raipur C.G.
Email- *pushpa.bansode07@gmail.com*

Abstract
Willingness to help others is an essential attitude by which one can lead an effective social life. The term "pro-social" refers to the behavior that is positive and intended to benefit other individuals. It is an internationally voluntary behavior (Eisenberg, 1990). The present review tries to find out the relationship between pro-social behavior and demographic variables like home and school environment, gender, self efficacy, self concept, waning personality traits, value orientation, subjective well being, empathy, locality, and academic outcome of high school students. A literature search using Google Scholar, Review Science Direct, Research Gate, and Academia, a database covering the period from 2000–2022, was conducted. The author reviewed studies with certain inclusion and exclusion criteria. Search terms were Pro-social Behavior, Academic Outcome, and High School Students. After examining different types of empirical papers, it was found that in most of the studies, this variable (pro-social behavior) has been ignored by the researchers working in this area of research in India. Methodological and theoretical issues have been discussed.
Keywords: pro-social behavior, academic outcome, locality, gender, school management.

Introduction

Pro-social behavior is defined as voluntary behavior that is intended to benefit another (Eisenberg et al. 2006).It is characterized by acts of kindness, compassion, and helping behaviors, which may be considered to be one of the finest qualities of human nature, foster positive traits that are beneficial for children and society. Encouraging pro-social behavior also require decreasing or eliminating undesirable social behavior. It is often associated with developing desirable traits in children and adults' behavior as well. (Eisenberg, et al. 2006).

Academic outcome: An academic outcome is a performance that is a measure of educational output (Adyemi 2008), the product of the interaction of the student, as an individual with their environment, namely, school, teacher, peers (Bhatnagar, R.P. 1969), multidimensional activity, involving a number of phases (Gupta & Kapoor, 1969). It is significantly designed by test scores or marks assigned by the teacher, mentor, guide, or any board and refers to the outcome of disciplined curricular and co curricular activities of students in the class as well as school.

Method for Review -

A Literature Search Procedure

Studies were identified through J-Store, Research Gate, Google Scholar and Science Direct. It covers the period from 2000 to 2022. The review was conducted using the search term Pro-social behavior, Academic outcome.

Inclusion Criteria

The following are the inclusion criteria: (1) empirical studies published in peer-reviewed journals (2) empirical studies in English only (3) quantitative research (4) peer-reviewed journal critical review article

Exclusion Criteria

The following are exclusion criteria: (1) Prior to the year 2000, (2) Students from primary and secondary schools, and (3) University students

Methodology

The present review is based on the following six parameters: (1) Research Plan: (2) Criterion variable validity: (3) Predictor variable reliability coefficient: (4) The validity and reliability coefficients of various predictor measures on their own data: Statistical analysis (6) Size of the effect.

Methodology of review studies

All studies are based on correlational research design. All the 100% (24) reviewed studies reported the validity coefficient of criterion measures on their own data in addition, 100% (24) reported the validity reliability coefficient of criterion measures on their own data. 100% (24) of the reviewed studies reported validity or reliability coefficients of different predictor measures on their own data. Further, 100% (24) of the reviewed studies controlled confounding variables by statistical analysis. Moreover, 100% (24) of the reviewed studies reported an effect size.

Table No. 1 Reviewed Studies

S.No.	Title	Source	Author/Authors	Research Design	Statistical Analysis	Sample Size	Results
1	Longitudinal Relations among Parenting styles, Pro-social Behavior and Academic Outcome.	Child Development,2017. (2), 577-592	Carlo, G. et al.	Longitudinal	MANOVA	462	Significant relationship among Pro-social behavior, parenting style and Academic Outcome.
2	Pro-social Behavior during Adolescence.	International Encyclopedia of the Social and Behavioral Science. 2015. 9(2), 221-227.	Brittian, A.S. & Humphries, M.L.	Correlational	--	_	Significant relationship among Pro-social behavior, Socialization and Cultural orientation.
3	Validation of Pro-social Tendencies Measure in Iranian Students.	Journal of Life Science. BioMed. 2012. 2(2), 34-42.	Azimpour, A.. & et al.	Correlational	Test,- Re-test	182	Significant relationship between Pro-social Tendencies measure and Iranian students, but not any significance difference between girls and boys.
4	Pro-social Behavior in Adolescence: Gender Differences in Development and Links with Empathy.	Springer: Journal of Youth and Adolescence. 2018. 47,1086-1099.	Graff, J.V. & et al.	Longitudinal	Measurement In variance Test	497	Results showed gender differences in the development of pro-social behavior. Earlier pro-social behavior predicts empathy related traits only for girls.
5	Humor Styles, self efficacy and pro-social tendencies in middle adolescents.	Procedia, Social and Behavioral Sciences.127 (2014)214-218	Falanga, R. et al.	Correlational	SPSS v-15	302	Significant relationship among Humor style, Self efficacy and Pro-social

							behavior were observed with differences for sex.
6	Development of Measure of Pro-social behaviors for Late Adolescents.	Journal of Youth and Adolescents. 2002, 31(1), 31-44.	Carlo, G. & Randall, B.A.	Correlational	Descriptive Analysis	249	Significant relationship between Pro-social Tendencies measure and late Adolescents.
7	Pro-social behavior and Big five Factor model of Personality:A Theoritical Review.	The International Journal Of Indian Psychology. 2016, 4(1) ISSN:2349-3429.	Shah, A.M.. & Rizvi, T.	Correlational	-	-	Agreeableness, extraversion and conscientiousness traits have found in pro-social people.
8	Determining relationship between Academic Achievement and Pro-social behavior of Secondary school student in Dhaka city.	International Journal of Research Review in Education. 2020	Shirin, A.	Correlational	Mean, S.D.	150	Higher prevalence of pro-social behavior among students and girls exhibited higher pro-social behavior than boys.
9	Pro-social behaviour and Academic Achievement of Higher Secondary Students in East Khasi Hills, District, Meghalaya, India.	IMPACT FACTOR: Review of Research U.G.C. approved Journal, No. 48514. 2018. 7(9).	Erigala, A.K. & Kharluni, L.	Correlational	ANOVA	-	Significant relationship between Pro-social behavior and Academic Achievement.
10	Pro-social behavior in Adolescents: The Role of Parental Encouragement	Man In India Serials Publications. 97(23), 743-750.	Kar, S.	Corelational	t-Test	120	Significant positive relationship between Parental encouragement and Pro-social behavior of adolescents.
11	Effect of Teacher student relationship on Pro-social behavior and academic Achievement of secondary school students.	Indian Journal of Economics and Business. 2022 21(2),	Jadoon, I.A., et al.	Correlation	Regression	250	Significant relationship among Teacher student relation, Pro-social behavior and Academic Achievement.
12	Pro-social behavior among Senior	An Int. J. of Education and	Mallick, M.K. & Cour,S.	Correlational	-	200	Pro-social behavior is not

	secondary students in relation to their Home environment.	Applied Social Sciences. V8(2), 2015.					influenced by the home environment in protectiveness, punishment, conformity,social isolation and reward and rejection.
13	Impact of Pro-social behavior on Happiness amongst Adolescents.	Alochna Chakra Journal. ,ix(vi), 2020. ISSN-2231-3990.	Pandey, N. & Hashmi, S..	Correlational	Regression	80	Altruist personality and happiness scores are higher in males as compared to females.
14	Social Emotional Learning Program to Promote Pro-social and Academic Skills Among Middle School Students with Disabilities.	Remedial and Special Education, 2016,37(6), 323-332.	Espelage, D.L.et al.	Correlational	ANCOVA, SPSSv-21	123	Proviide strong support for using special education longitudinal curriculum to prevent bullying among students with disabilities.
15	Positive Effect of Promoting Pro-social Behavior in early Adolescence: Evidence from a school based intervention.	International Journal of Behavioral Development. 2014,38(4),386-396.	Capara, G.V. ,et al.	Pre test, post test	Latent Growth Curve Approach(LGC, Bollen & Curran, 2006)	324	Increase of helping behavior along with a decrease of physical and verbal aggression across time, enhance academic achievement during adolescence.
16	Pro-social behavior the Waning Trait.	International Journal of Science and Research. 2017 6(2), 457-459	Sati, L.	Correlational	Regression	1401	Significant relationship between Pro-social behavior and sub dimensions.
17	Examination of Adolescent Pro-social behavior tendencies in terms of some variable: A City Sample.	International Journal of Turkish Literature Culture Education. 2021 10(10/1) , 304-320	Ata, S. & Artan, I.Z.	Correlational	ANOVA	5208	The public pro-social behavior of boys are higher than girls. Empathy skills of girls are higher than boys. Altruistic

							behavior increase with age and grade. Other variables family and teacher help, thinking status and number of siblings are significantly related .
18	Developing Students Pro-social behavior based on their Value Orientations.	Advances in Social Science, Education and Humanities Research 2017. v-174	Asrori, A.	Correlational	Correlation Coefficient	250	Scientific, economic, power, and religious values are having no significant effect and, art and slodarity values have significant effect on student pro-social behavior.
19	Analyzing the Pro-social behavior tendency of student studying at Physical Education and Sports Department	SHS web. of conferences 26, 01047, 2016.	Aytac,K.Y. & Kartal, M.	Correlational	ANOVA	139	Significant differences were determined in terms of gender variable in public, emotional and urgency sub dimensions.
20	Psychosocial Antecedents of Pro-social behavior and its Relationship with Subjective Well Being in Adolescents	Indian Journal of Positive Psychology 2018. 9 (1), 14-21	Sharma, S. & Tomer, S.	Correlational	Regression	200	Significant difference between males and females in terms of Pro-social behavior tendencies.
21	Effect of Parenting style on Pro-social behavior of Adolescents	The International Journal of Indian Psychology 2021. 9(2)	Habibi, Z.	Correlational	Regression	162	Significant correlation between Parenting style and Pro-social behavior. .
22	A construct divided : Pro-social behavior as helping sharing and comforting sub types	Front. Psychol .02 Sep. 2014	Dunfield, K.A.	Correlational	-	-	Individual difference factors do not necessarily exert the same influence on all varieties of

							pro-social behavior.
23	Pro-social Development in Adolescence	Current Opinion in Psychology 2022, 44, 220-225	Crone, E.A. & Achterberg, M.	Correlational	-	-	Significant relationship between Pro-social development in Adolescence.
24	Pro-social behavior in Adolescence: Gender differences in development and links with empathy.	Journal of Youth and Adolescence. 2018, 47(5) 1086-1099	Jolien, et al.	Longitudinal	-	497	Significant relationship among Pro-social behavior, gender differences and empathy.

Table No. 2 Methodological Assessment of Reviewed Studies

Studies			Parameters					
S. No.	Authors	Years	Research Design	Validity of Criterion Variable	Reliability Coefficient of Predictor Variable	Validity and Reliability Coefficient of Different Predictor Measure on Own Data	Statistical Analysis	Effect Size
1	Carlo,G., et al.	2018	1	1	1	1	1	1
2	Brittian, A.S. & ,Humphries, M.L.	2015	0	1	1	1	0	1
3	Azimpour, A. &, Neasi,.	2012	0	1	1	1	1	1
4	Graff, ,J.V.D. & et al.	2018	1	1	1	1	1	1
5	Falanga, R. et al.	2018	0	1	1	1	1	1
6	Carlo, G. & Randall, B.A.	2000	0	1	1	1	1	1
7	Shah, A.M. & Rizvi, T.	2016	0	1	1	1	1	1
8	Shirin, A.	2020	0	1	1	1	1	1
9	Erigala,A.K. & Kharluni, L.	2019	0	1	1	1	1	1
10	Kar, S.	-	0	1	1	1	1	1
11	Jadoon, I.A., et al.	2021	0	1	1	1	1	1
12	Mallick, M.K. & Cour, S.	2015	0	1	1	1	1	1
13	Pandey, N. & Hashmi, S.	2021	0	1	1	1	1	1
14	Espelage, D.L., et al.	2016	0	1	1	1	1	1
15	Capara, G.V., et al.	2014	0	1	1	1	1	1
16	Sati, L.	2017	0	1	1	1	1	1
17	Ata, S. & Artan, I.Z..	2021	0	1	1	1	1	1
18	Asrori, A.	2017	0	1	1	1	1	1
19	Aytec, K.V. .& Kartal, M.	2016	0	1	1	1	1	1
20	Sharma, S. & Tomer S.	2018	0	1	1	1	1	1
21	Habibi, Z.	2021	0	1	1	1	1	1
22	Dunfield, K.A.	2014	0	1	1	1	1	1
23	Crone, E. A. & Achterberg, M.	2022	0	1	1	1	1	1
24	Jolien, et al.	2018	1	1	1	1	1	1

Scoring Patterns :- Scoring patterns suggested by Tiwari, Behera & Hasan (2018), Tiwari et al.(2017), Khan & Hasan (2016), Behera & Hasan (2018), Shukla, Hasan & Mitra (2018). Research design (Longitudinal=1, Cross sectional=0), validity coefficient of criterion measure on own data (yes=1, No-0), reliability coefficient of criterion measure on own data(yes=1, No=0), validity or reliability coefficient of

different predictor measure(yes=1, No=0), statistical analysis viz-controlling of confounding variable (yes=1, No=0) and reported effect size(yes=1, No=0).

Discussion

The result revealed that the pro-social behavior factor is a significant predictor of the academic outcome of high school students. Academic outcome is positively related to variables like emotional intelligence, physical activity, pro-social behavior, cognitive abilities, etc. The research studies employed simple random techniques, while some other studies employed stratified area and incidental cumulate random sampling techniques. Most studies used various statistical analysis techniques like MANOVA, t-Test, ANOVA, descriptive analysis, standard deviation, hierarchical linear modeling, multiple regression analysis, and multivariate analysis. Reviewed studies employed both longitude and cross-sectional research designs, which provide evidence regarding the degree of relationship among factors as well as the degree of relationship among factors and causal relationship among factors. Several reviewed studies controlled confounding variables by different statistical analysis. Reviewed studies reported effect sizes. Studies also revealed that there are statistically small gender differences in pro-social behavior in girl and boy students, where girls show more pro-sociality than boy students. Pro-social behavior, emotional intelligence and cognitive abilities were found to be positively related to academic outcome.

Conclusion

This review paper provides a vivid view of various psychological and social factors that link the school environment and a student's personality, and how both impact a school student's academic outcome. (Hans,W. & Bierhoff, Helping, Pro-social behavior, and Altruism, chapter 09). Pro-social behavior may range from small favors to great deeds. It may be under the circumstances or express the personality of the deliver or helper. The findings of the studies on pro-social behavior show significant relationships with empathy, humor, self-efficacy, socialization and cultural orientation, emotional urgent, age, gender variables in public, moral cognition etc. Finally, this paper also considers the importance of the relationship between people and the social norms and values of human society. In such an area, there is a need to search and find out the better academic outcome of students.

References:

[1] Asrori, A., (2017) Developing student Pro-social Behavior based on their Value Orientations. Advances in Social science, Education and Humanities Research. V-174. https://www. creativecommons.org/licenses/by-nc/4.0/.

[2] Ata, S., & Artan, I.Z, (2021) Examination of Adolescents Pro-social Behavior Tendencies in terms of some Variables: A City Sample. International Journal of Turkish Literature Culture Education. 10 (10/1), 304-320. https://www.doi.org/ 10.7884/teke.5208.

[3] Aytac, K.Y. & Kartal, M. (2016) Analyzing the Pro-social Behavior tendency of students studying at physical Education and Sports Department. SHS web of Conferences. 26,01047. https//www.doi.org/ 10.1051/shsconf/20162601047.

[4] Azimpour, A., et al. (2012) Validation of Pro-social Tendencies Measure: In Iranian Students. *A Journal of Life science and Bio Medicines*. 2(2) 34-42. https://www.jisb.science-line.com

[5] Brittian ,A.S., & Humpfries, M.L.(2015) Pro-social Behavior during Adolescence. International Encyclopedia of the social and Behavioral Sciences. 19(2) 221-227.https://www.dx.doi.org/10.1016/B978-0-097086-823190-5.

[6] Capara, G.V., et al. (2014) Positive Effects of Promoting Pro-social Behavior in early Adolescence: Evidence from a school based Intervention. *International Journal of Behavioral Development*. 38(4), 386-396. https://www.doi.org/ 10.1177/0165025414531464.

[7] Carlo, G., & Randall, B.A.,(2002) The Development of Measure of Pro-social Behavior for late Adolescents. *Journal of Youth and Adolescence*.31(1), 31-44. https://www.doi.org/ 10.1023/A:1014033032440.

[8] Carlo, G., et al. (2018) Longitudinal Relations among Parenting Style, Pro-social Behavior and Academic outcome. Child Dev. 89(2); 577-592. https://www.doi.org/10.111/cdev.12761.

[9] Crone, E.A., et al. (2022) Pro-social Development in Adolescence. Current Opinion in psychology.44,220-225. https://www.doi.org/10.1016/j.copsyc.2021.09.020.

[10] Espelage, D.L., et al. (2016)Social Emotional Learning Program to Promote Pro-social and Academic Skills among Middle School students with Diabetes. Remedial and Special Education. 37(6) 323-332 https://www.doi.org/ 10.1177/0741932515627475.

[11] Dunfield, K.A. (2014) A Construct divided: Pro-social Behavior as helping sharing and comforting subtypes. Front.Psychol. https://www. doi.org/10.3389/psyg201400958.

[12] Erigala, A.K. & Kharluni ,L. (2019) Pro-social Behavior and Academic Achievement of Higher Secondary Students in east Khasi Hills District Meghalaya. *India Review of research. UGC. Approved Journal No. 48514, 7*(9) ISSN:2209-894.

[13] Falanga, R.,et al. (2014) Humor Style, Self-efficacy and Pro-social Tendencies in middle Adolescents. Procidia- social and Behavioral Sciences. 127, - 214-218. https://www.doi.org/ 10.1016/jsbspro.2014.03243.

[14] Graff, J.V.D., et al. (2018) Pro-social Behavior in Adolescence: Gender differences in Development and Link with Empathy. Springer, *Journal of Youth and Adolescence*.47:1086-1099.https://www.doi.org/ 10.10007/s10964-017-0786-1.

[15] Gupta, D. M. & Tripathi, J.P. (2015) Psychosocial problem among Young High School Adolescents in Chandigarh, North India. *India Journal of Public Health Research and Development*. 6(1): 11. https://www.doi.org/10.5958/0976-5506.2015.00003.0

[16] Gupta, D. & Thapliyal, G. (2015) A study of Pro-social Behavior & Self Concept of Adolescents. I-manager. July 2015. https://www.doi.org/10.26634/jpsy.9.1.3524.

[17] Habibi, Z. (2021) Effect of Parenting style on Pro-social Behavior of Adolescents. *The International Journal of Indian Psychology*. 9(2), https://www.doi.org/ 10.25215/0902.132.

[18] Jadoon, I.A.,et al. (2022) Effect of Teacher Student Relationship on Pro-social Behavior and Academic Achievement of Secondary school students. *Indian Journal of Economics and Business*.. 2(2) https;//www.ashwinanokha.com/IJEB.php.

[19] Jolien, V.G., et al.(2018) Pro-social Behavior in Adolescence: Gender difference in Development and Links with Empathy. *Journal of Youth and Adolescence*. 47(5) 1086-1099. https://doi.org.10.1007/s1.0964-017-0786-1.

[20] Kar, S. Pro-social Behavior in Adolescents: The Role of Parental Encouragement. Man In India Serials Publications. (7(23): 743-750.

[21] Kaur, R. (2019) A Review on Pro-social Behavior: Social Psychology. International Journal of Research in Engineering ,IT and Social Sciences. 9(1) 227-229. ISSN .2250-0588. https://doi.org/0.13140/RG.2.2.35397.91360.

[22] Lai, F.H., et al. (2015) Individual and Social Predictor of Pro-social Behavior among Chinese Adolescents in Hong Kong. Front. Pediatr.2015. https://doi.org/10.3389/fped2015.00030.

[23] Mallick, M.K. & Cour,S. (2015) Pro-social Behavior among Senior Secondary School Student in Relation to the Home Environment. Educational Quest: An In. J. of Education and Applied Social Sciences. 6(2) 2015.E-mail: mihir.mallick@gmail.com

[24] Pandey, N. & Hashmi, S. (2021) Impact of Pro-social Behavior on Happiness amongst Adolescents. Alochana Chakra Journal, ix (vi) 1990. ISSN No 2231-3990.

[25] Sati, L. (2017) Pro-social Behavior: A Wanning Trait.Human Development and Family Studies. *International Journal of Science and Research.* 6(2) 457-459. https://www.ijsr.net/get-id18121601.

[26] Shah, A.M.,& Rizvi, T. (2016) Pro-social Behavior and Big Five Factor Model of Personality: A Theoritical Review. *The International Journal of Indian Psychology*. ISSN 2348-5396(e), https://www.ijip.in,

[27] Sharma, S. & Tomer, S. (2018) Psychosocial Antecedents of Pro-social Behavior and its relationship with Subjective Well Being in Adolescents. *Indian Journal of Positive Psychology*. 09(1). 14-21. https:// doi.org/10.15614/ijpp.v.9i01.11736.

[28] Shirin, A. (2020) Determining the relationship between Academic Achievement and Pro-social Behavior of Secondary school student in Dhaka City. *International Journal of research and Reviews in Education.* ISSN-2056-9726. https://doi.org/1033500/:jrre 2020.6.002.

[29] Vilar,M.M.,et al. (2019) Systematic Review of Pro-social Behavior Measures. Revista de Psicologia. 37(1), 339-377. ISSN: 0254-9247. https://doi.org/10.18800/psico.201901.012.

[30] Xiaoping, P.,et al. (2019) Pro-social Behavior in Organizations: A Literature Review and Prospects. Foreign Economics and Management. 41(5), 114-127. https://doi.org/10.16538/ j.cnki.fem.2019.05.009.

The Predicting effect of Self-Esteem and Gender on Youth's Happiness

Falguni Verma[1*] and Meeta Jha[1]

[1] Psychometrics laboratory, School of Studies in Psychology, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, India.

[*]Corresponding author: falguniverma1993@gmail.com

Abstract:

Happiness has been researched over time and still is the subject of many studies; in this case, youth's happiness is more important because in higher education at present youths are covered with complex issues more than at any other time. The main objective of the study is to predict the effect of self-esteem and gender on youth's happiness. Data were collected from 100 youths (age range 17-26 years) studying in various colleges in Raipur, Chhattisgarh by using the Happiness Scale, and Self-esteem Scale. 50 subjects were male and the remaining 50 were female. SPSS version 22.0 was used for prediction analyses. The majority of youths (87%) had a high level of happiness; while above average (59%) had a moderate level of self-esteem. Findings revealed thatself-esteem has been discovered to be a strong predictor of happiness, while gender does not. Self-esteem improvement will help in the reduction of mental health problems in youth. Limitations, future directions, and implications were discussed.

Keywords: Happiness, self-esteem, youth, gender

Introduction:

At present in higher education youths are engulfed with complex issues more than at any other time. While the stage is viewed as a phase of conversion from childhood reliance to adulthood independence, many people have failed the adulthood independence test. (World Programme of Action for Youth, 2007). As a result, youth as a category is more variable than other established age groupings. Yet, when it comes to education and work, age is the easiest way to categorize this group, because 'youth' is commonly used to refer to a person between the ages of finishing mandatory education and getting first job (Mpaata, 2017).

What is happiness and self esteem?

Happiness is the ultimate objective of human beings, according to Abdel-Khalek (2005), and everyone strives and wishes to be happy. Happiness, like the tools and methods for reaching it, has various meanings for different people. As a result, human happiness cannot be definitefor the reason that individuals make their own decisions, which differ from one another.Self-esteem is a person'son the whole positive judgment of themselves and their ability to value themselves. Rosenberg (1965), a pioneer in the study of self-esteem, defined it as an individual's attitude towards themselves that reflects their self-image and self-worth.

 DOI: 10.52228/JRUA.2022-28-2-3

Operational definition of happiness and self-esteem:

According to Bhardwaj and Das (2017) happy living is a mode of life which ensures a quality of life to deal effectively in life situation, to enjoy the feeling and actualize his own self and identity. It should contain the following elements: getting along with others (Relationship), helping other to give happiness (Humanity), make better of own self (Self help), closeness with nature (Need) and a continual process of dealing with ones problems, difficulties and overcoming the existing stress, conflicts and frustration that one confronts in satisfying his needs of life (Adjustment). Gerring et al. (2015) defined self-esteem as a set of beliefs about basic nature, distinguishing characteristics, and typical behavior of people.It may have many dimensions of self-image such associal, emotional, academic and physical self-image (Singh &Srivastava, 2004).

Literature Review:

It has found in deferent researches that many factors associated with happiness i.e.self esteem, humour style, locus of control, optimism (Ford et al.,2016), income and gender (Chakraborty et al., 2019). Given that many variables have been shown to connect to one's experience of happiness, it is likely that self-esteem may contribute to happiness as well. Happiness level of adolescents was low with low self-esteem comparison to those with high self-esteem, according to Reddy et al. (2019), and improving self-esteem will help to decrease mental health difficulties in youngsters. According to Bajaj et al. (2019), the study's findings shed insight on the relationship between emotional stability and self-esteem as it relates to the process of mindfulness-happiness relationship.Satuf et al. (2018) discovered that on one's health, happiness, and self-esteem, occupation satisfaction had a protective influence. Kumar (2017) found insignificant difference in self-esteem across general, and reserved cast categories, and the study indicated that self-esteem is linked to happiness, life satisfaction, and welfare when compared to reviews. Erozkan et al. (2016) discovered that the sub-dimensions of self-esteem initiation, effort, persistence, self-efficacy, and self-confidence have a substantial impact on subjective happiness. While it was discovered that happiness has a moderately substantial positive relationship with self-esteem (Jaisri, 2015).

Some studies proved a strong association of self esteem with happiness. According to Amani (2016), self-esteem in the elderly can predict 42 percent of happiness. It's been proven that self-esteem has a strong link to happiness (Diener, 1984). Positive self-esteem was linked to a superior quality of life and health explored by Kermode & MacLean (2001). According to Baumeister et al. (2003), happiness is strongly linked to self-esteem, furthermore founddespite the data does not establishcausation; they are confident that high level of self-esteem lead better happiness. Banerjee and Das (2020) discovered a link between happiness and self-esteem. Malekiha (2012) discovered a substantial relationship between extroversion and intuition and happiness, and confirmed prior findings that self-esteem was for the most partinfluential direct predictor of happiness.

Along with association with happiness and self esteem some studies show gender differences. Sharma and Venkatesan (2021) found that positive connection of self-esteem with happiness, and that there was no gender differences. According to Hunagund and Hangal (2014) self-efficacy and happiness are positively and strongly associated, and there is no gender difference in happiness. While study of adolescents, Sharma and Gulati (2015) discovered in comparison

 DOI: 10.52228/JRUA.2022-28-2-3

to their male counterparts, female teenagers reported feeling substantially happier. Wani and Dar (2017) discovered a favourable relationship withself-esteem and happiness, gender is found to be negatively significant connected, but age does not. According to Patel et al. (2018), female student reported higher satisfaction with life comparison to male student. According to Furr (2005) males are more clearly separable than females in both variables.Malik (2013) looked at gender disparities in university students' happiness and self-esteem, and discovered a substantial positive association with happiness and self-esteem. Hill (2015) discovered that comparison to women,men had much higher on self-esteem, and self-esteem was highly linked to subjective satisfaction.

Objectives of the study

The objective of present study is the predicting effect of self esteem and gender on happiness in youth. In this regard, hypotheses have been formulated:

1. Self esteem would emerge as predictor of happiness.
2. There would be gender difference in happiness.

Rationale of the Study

However, happiness is widely researched topic even in the Indian context. After reviewed previous research it was observed that in somewhere gender differences and somewhere not, until far most of the study was conducted in adult population, relatively a small number of studies are on youth (Reddy et al., 2019). Furthermore there is no study on happiness in relation to self esteem in youth of central Chhattisgarh in Indian.The present study is an attempt to look at this concept, provide a useful data for future studies in this area, and increase the existing fund of knowledge on the association of self-esteem, and gender on youth's happiness of central Chhattisgarh in Indian.

Material and Methods

Participants: 100 youth (age range 17-26 years) purposively selected studying in various colleges in Raipur, Chhattisgarh, India. 50 subjects were male and the remaining 50 were female.

Tools: Happiness- Happiness Scale developed by Bhardwaj and Das (2017). This scale consists 28 items. The scale is believed to be uni-dimensional. The scoring of scale is very easy the quantitative analysis is based on the credit score given to each item on the basis likert scale.It has 0.71 to 0.94 reliability, and 0.84 to 0.88 validity. **Self-esteem**-Self-esteem Scale by Singh and Srivastava (2004). This scale is based on self-esteem scale originally developed by Eagly and revised by Robinson and Shaver (1973). The scale is uni-dimensional. It uses 5-point scaling. It has split -half reliability 0.86 and test-re test reliability 0.82 and validity 0.89.

Statistical Analysis: Linear regression used for Statistical analysisof the data. SPSS version 22.0 was used for prediction analyses.

 DOI: 10.52228/JRUA.2022-28-2-3

Result and Discussion

The majority of youths (87%) had a high level of happiness; while above average (59%) had a moderate level of self-esteem.

Statistical analyses procedure

All 100 cases were included for data calculation. To examine the predicting effect on criterion multiple regression models were used. Variable entered methods- Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

Table indicated that, predictors explained 20.20% of the total variances (R^2= 0.202, $F_{(2, 97)}$ = 12.288, p<0.01). Self esteem is positively associated with happiness (0.446, p<0.01). However, gender is not significantly associated with happiness (-0.45, p>0.05).

Table: Multiple regression models forprediction effect of self esteem and gender on happiness

Predicators	B	Std. Error	β	Sig
Self esteem	**0.721**	**0.147**	**0.446****	**.000**
Gender	-1.057	2.135	-0.45	.622
R2			0.202**	
F (2, 97)			12.288**	

**** p<0.01**

The present study investigated predicting effect of self esteem and gender on happiness in youth. The regression analysis indicatesthat there is significant effectof self esteem on happiness similar findings of Reddy et al. (2019); Bajaj et al. (2019); Satuf et al. (2018); Kumar (2017), and Erozkan et al. (2016), but if we talk about the same sample thenthis is constant result with findings of Bajaj et al. (2019). The result confirmed self esteem is powerful direct predictor of happiness, therefore first hypotheses is accepted.These findings support the result proposed by Malika (2012); Amani (2016); Diener, (1984); Kermode and MacLean (2001); Baumeister et al. (2003), and Banerjee and Das (2020). Self-esteem is the central and influential reason of happiness (Furnham & Cheng, 1997), and principal component of mental health; it has pervasive and powerful impact on human cognition, emotion, motivation, and behaviour (Campbell & Lavallee, 1993). People with high level of self esteem are likely to seek and receive more social support, experience low levels of stress and employ more adaptive coping strategies, which in turn promote good health (Orth, Robins, & Widaman, 2012). Low self esteem is related withserious behavioural problems like maladjustment, suicidal tendencies and also leads to various psychological problems like stress, anxiety loneliness, depression etc. (Bhattacharjee & Deb, 2007; Manani & Sharma, 2013; Leary, 2004).

However, the regression analysis indicates gender is not significantly associated with happiness, therefore second hypotheses is rejected. This means that happiness does not vary in males or female. The finding of Sharma and Venkatesan (2021), and Hunagund and Hangal (2014) support this result that no gender differences in happiness. While contradictory to our

 DOI: 10.52228/JRUA.2022-28-2-3

result, some studies have also found gender differences on happiness (Sharma and Gulati, 2015; Patel et al., 2018; Furr, 2005; Malik, 2013, and Hill, 2015). Generally happy persons have social, friendly personalities, bright and optimistic view about themselves, their competence and their future. Moreover, they are more vigorous and active and less tendency to be anxious (DeNeve & Cooper, 1998). Malik (2013) stated gender differences in self esteem in which male found higher self esteem than girls due to the traditional and social roles in the society in which boys are given more importance and privileges as compared to girls. In this research it was found that no gender differences in happiness the reason for this result may be equal treatment in traditionally and socially by their society on both genders.

Conclusion

Based on the result of the present study it may concluded that self esteem has a highly impact on happiness, whereas gender does not.Youths who reported high level in self esteem are happier than who had low level in self esteem. This shows that, increasing level of self esteem of the youth reported higher levels of happiness. It was also concluded that gender effect was not found on youth's happiness.

Limitations and suggestions

Because this was a correlational study in nature, no definite causal inferences should be formed. Small sample size is also a limitation. Despite these limitations, this studymay be considered to have added to our understanding on factors that influences youth's happiness. These findings suggest to youth in improving their self-esteem to be happier. Self-esteem improvement will help in the reduction of mental health problems in youth.

Directions for Future Research

The data could be explained by a different direction of causality. Future studies should also validate and broaden this finding.

Acknowledgement

All of the participants who volunteered to participate in this study are thanked by the authors.

Declaration of Conflicting Interests: None.

Funding: None.

References:

1. Abdel-khalek, A. M. (2005). Happiness and death distress: Two separate factors. *Journal of Death Studies, 29,* 949-958.
2. Amani, R. (2016). Happiness in the elderly the role of self-esteem. *Aging Psychology, 2*(1), 80-73.

 DOI: 10.52228/JRUA.2022-28-2-3

3. Bajaj, B., Gupta, R. & Sengupta, S. (2019). Emotional Stability and Self-Esteem as Mediators Between Mindfulness and Happiness. *Journal of Happiness Studies, 20*, 2211–2226.
4. Banerjee, P., & Das, J. (2020). Relationship between Happiness and Self Esteem among University Teachers. *PalArch's Journal of Archaeology of Egypt/Egyptology*, *17*(9), 3621-3631.
5. Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles?. *Psychological science in the public interest*, *4*(1), 1-44.
6. Bhardwaj, R. L. & Das, P. R. (2017). *Manual for Happiness Scale*, National Psychological Corporation, Agra (UP)**,** India.
7. Bhattacharjee, A., & Deb, S. (2007). Suicidal tendencies among depressive patients. *Journal of the Indian Academy of Applied Psychology*, 33(2), 213-218.
8. Campbell, J. D., & Lavalee, L. F. (1993). Who am I? The role of self concept confusion in understanding the behavior of people with low self-esteem. In R. F. Baumeister (Ed.), Self esteem: The puzzle of low self-regard (p. 3-20). New York: Plenum Press.
9. Chakraborty, B., Maji, S., Sen, A., Mallik, I., Baidya, S., &Dwibedi, E. (2019). A study on happiness and related factors among Indian college students. *Journal of Quantitative Economics*, *17*(1), 215-236.
10. DeNeve KM & Cooper H. (1998). The happy personality: a meta- analysis or 137 personality traits and subjective well- being. *Psychol Bull*, 124,179-229.
11. Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95*, 542-575.
12. Erozkan, A., Dogan, U., &Adiguzel, A. (2016). Self-Efficacy, Self-Esteem, and Subjective Happiness of Teacher Candidates at the Pedagogical Formation Certificate Program. *Journal of Education and Training Studies*, *4*(8), 72-82.
13. Ford, E., Lappi, K. & Holden, J. (2016). Personality, Humor Styles and Happiness: Happy people have positive humor styles. *Europe's Journal of Psychology*, *12*(3), 320-337.
14. Furr, R. M. (2005). Differentiating happiness and self-esteem. *Individual differences research, 3*(2).
15. Furnham A, Cheng H. (1997). Personality and happiness. *Psychological Reports*, 83,761-762.
16. Gerring, R. J., Zimbardo, P. G., Campbell, A. J., Cumming, S. R., & Wilkes, F. J. (2015). *Psychology and life*. Pearson Higher Education AU.
17. Hill, E. (2015). The relationship between self-esteem, subjective happiness and overall life satisfaction. *National College of Ireland.*
18. Hunagund, D. L., & Hangal, S. J. (2014). Self-efficacy and happiness in youth. *Journal of the Indian Academy of Applied Psychology*, *40*(1), 70-73.
19. Jaisri, M. (2015). Happiness and Self esteem among College Students. *International Journal in Management & Social Science*, *3*(5), 168-178.

 DOI: 10.52228/JRUA.2022-28-2-3

20. Kermode, S. & MacLean, D. (2001). A study of the relationship between quality of life, self-esteem and health. *Australian Journal of Advanced Nursing,19*(2), 33-40.

21. Kumar, N. (2017). Self-esteem and its impact on performance. *Indian Journal of Positive Psychology*, *8*(2), 142-147.

22. Leary, M. R. (2004). Understanding social anxiety: Social personality and clinical perspective.Beverly Hills, CA: Sage.

23. Malekiha, M. (2012). Personality, self-esteem predictors of happiness and depression among high school students in Iran, *Interdisciplinary Journal of Contemporary Research in Business, 3*(10), 569-580.

24. Malik, S. (2013). Gender differences in self-esteem and happiness among university students. *International Journal of Development and Sustainability,2*(1), 445-454.

25. Manani, P., & Sharma, S. (2013). Self-esteem and suicidal ideation: A correlational study. MIER Journal of Educational Studies, Trends and Practices, 3(1), 75-83.

26. Mpaata, A.K. (2017). Youth personality development and the ultimate character: the neglected role of educators. *International Journal of Youth Economy,1*(1), 105-108.

27. Orth, U., Robins, R. W., & Widaman, K. F. (2012). Life span development of self esteem and its effects on important life outcomes. *Journal of Personality and Social Psychology*, 102(6), 1271-1288.

28. Patel, A. K., Tiwari, S. K., Singh, S., & Lindinger-Sternart, S. (2018). Self-Esteem and life satisfaction among university students of eastern uttarpradesh of india: a demographical perspective. *Indian Journal of Positive Psychology*, *9*(3), 382-386.

29. Reddy, B., Mane, S., &Agarkhedkar, S. R. (2019). Assessment of Self-Esteem and its Correlation with Happiness in Adolescents. *Indian Journal of Youth and Adolescent Health, 6*(2), 3-6.

30. Robinson, J. R. & Shaver, P. R. (1973). Measures of social psychological attitudes. Ann Arbor, MI Institute of Social Research, 79-80.

31. Rosenberg, M. (1965). *Society and the adolescent self- image*. Princeton, NJ: Princeton University Press.

32. Satuf, C., Monteiro, S., Pereira, H., Esgalhado, G., Marina Afonso, R., & Loureiro, M. (2018). The protective effect of job satisfaction in health, happiness, well-being and self-esteem. *International journal of occupational safety and ergonomics*, *24*(2), 181-189.

33. Sharma, N., & Gulati, J. K. (2015). Gender differences in happiness, Self-esteem and personality traits in adolescents living in socio-economic ardship. *Adolescence, 54*(78), 75.

34. Sharma, U., & Venkatesan, M. (2021). A Study of Personality, Self-Esteem and Happiness Among Graduates. *IUP Journal of Management Research*, *20*(1), 35-55.

35. Singh, R.N. & Srivastava, A. (2004). *Adaptation of self-esteem scale*. Deparment of psychology, T. D. College Jaunpur, U. P.**,** India.

36. Wani, M., & Dar, A. A. (2017). Optimism, happiness, and self-esteem among university students. *Indian Journal of Positive Psychology*, *8*(3), 275-279.

 DOI: 10.52228/JRUA.2022-28-2-3

37. World Programme of Action for Youth (2007, December).http://social.un.org/index/Youth/WorldProgrammeofActionforYouth.aspx.

 DOI: 10.52228/JRUA.2022-28-2-3

International Journal of Statistics and Reliability Engineering
Vol. 9(2), pp. 201-205, 2022 (ISSN(P): 2350-0174 ; ISSN(O):2456-2378)
IARS

ORIGINAL ARTICLE

An Estimator of Population Mean Using Auxiliary Information for Small Samples

Vyas Dubey[1] and Yeesha Verma[2]

[1, 2] School of Studies in Statistics, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh- 492010, India
[1]*E-mail: dubey_vyas@rediffmail.com*
[2]*E-mail: yeeshav11@gmail.com*

Received: 13 January 2022 / Revised: 23 July 2022 / Accepted: 28 July 2022

Abstract

In this paper a new class of estimators for estimating population mean under general sampling design has been proposed. The expressions of bias and mean square error of the suggested estimator are derived. For the optimum choice of constants it is more efficient than other existing estimators. Further properties of the proposed estimator are discussed under simple random sampling without replacement procedure. Numerical illustrations have been made.

Keywords: Auxiliary Information; Bias; Mean Squared Error (MSE); Relative Efficiency; Simple Random Sampling without Replacement (SRSWOR); Order of Approximation.

1. Introduction

In sample survey literature, the use of information on auxiliary variable is a common practice to find out more precise estimate of population parameters .If study and auxiliary variables are highly positively correlated, the ratio method of estimation is used while in case of negative correlation, product method of estimation is used. If such variable are linearly related difference method [Hansen, Hurwitz and Madow (1953)] of estimation is applied.

Let $U=\{U_1,U_2,.....U_N\}$ be a finite population of size N, Let a sample of size n is drawn from the population using simple random sampling without replacement. Further, let y and x be study and auxiliary variables taking values y_i and x_i on the ith unit of U respectively. Let sample means $\bar{y}$ and $\bar{x}$ be unbiased estimators of population mean $\bar{Y}$ and $\bar{X}$ of variables y and x respectively. Then, for estimating $\bar{Y}$ ratio, product and difference estimators are defined as

$$\bar{y}_r=\frac{\bar{y}}{\bar{x}}.\bar{X} \tag{1.1}$$

$$\bar{y}_p=\frac{\bar{y}}{\bar{X}}.\bar{x} \tag{1.2}$$

$$\bar{y}_d=\bar{y}+\beta(\bar{X}-\bar{x}) \tag{1.3}$$

where β is regression coefficient of y on x. In general, difference estimator is known to be more precise than ratio and product estimators.

For improving efficiency of above estimators, Chakraborty (1967), Srivastava (1971), Reddy (1974), Ray and Sahai (1980) and others proposed generalized ratio-cum-product estimators. Further, Bhal and Tuteja (1991), Singh and Vishwakarma (2007), Kadilar (2016) and others discussed exponential type estimators. But all such estimators have minimum mean square error equal to difference estimator up to first order of approximation.

Under the assumption that population variance of auxiliary variable is known, Das and Tripathi (1981), Shrivastava and Jhajj (1981) suggested

$$t_1=\bar{y}+\alpha_1(\bar{X}-\bar{x})+\alpha_2(S_x^2-s_x^2) \tag{1.4}$$

Where $s_x^2=\frac{1}{(n-1)}\sum_{i=1}^{n}(x-\bar{x})^2$ is an unbiased estimator of $S_X^2=\frac{1}{(N-1)}\sum_{i=1}^{N}(x_i-X)^2$. The estimator t_1 is more efficient then all the above estimators for asymmetric populations.

In section 2, we propose a new estimator of population mean. It is seen that the proposed estimator is more efficient than all the above estimators.

2. Proposed Estimator

Let $\hat{\bar{Y}}$ and $\hat{\bar{X}}$ be unbiased estimators of $\bar{Y}$ and $\bar{X}$, respectively, under any sampling design and let $V(\hat{\bar{X}})$ be variance of $\hat{\bar{X}}$ which is assumed to be known. Then we propose an estimator of $\bar{Y}$

$$T_g=\hat{\bar{Y}}+w_{1g}(\hat{\bar{X}}-\bar{X})+w_{2g}\{(\hat{\bar{X}}-\bar{X})^2-V(\hat{\bar{X}})\} \tag{2.1}$$

Where, w_{1g} , w_{2g} are suitably chosen statistics so that MSE of proposed estimator is minimum.

3. Properties of Proposed Estimator

It can easily be seen that the proposed estimator is unbiased

i.e. $B(T)=0$

For getting MSE of T , let

$V_{ij}=E(\hat{\bar{Y}}-\bar{Y})^i(\hat{\bar{X}}-\bar{X})^j$, $(i,j)=0,1,2,3,4$

Thus, $M(T_g)=V_{20}+w_{1g}^2V_{02}+w_{2g}^2(V_{04}-V_{02}^2)+2w_{1g}V_{11}+2w_{2g}V_{12}+2w_{1g}w_{2g}V_{03}$ (3.1)

For getting optimum values of w_{1g} and w_{2g} for which (3.1) will be minimum, we have

$\frac{\partial M(T_g)}{\partial w_{1g}}=0$ and $\frac{\partial M(T_g)}{\partial w_{2g}}=0$, which yield

$w_{1g}V_{02}+V_{11}+w_{2g}V_{03}=0$ (3.2)

$w_{2g}V_{04}-w_{2g}V_{02}^2+V_{12}+w_1V_{03}=0$ (3.3)

On solving (3.2) and (3.3), we have

$w_{1g}=\frac{V_{11}V_{04}-V_{11}V_{02}^2-V_{12}V_{03}}{V_{03}^2-V_{04}V_{02}+V_{02}^3}$ (3.4)

$w_{2g}=\frac{V_{12}V_{02}-V_{11}V_{03}}{V_{03}^2-V_{04}V_{02}-V_{02}^3}$ (3.5)

Multiplying equation (3.2) by w_{1g} and (3.3) by w_{2g} and adding, we get

$w_{1g}^2V_{02}+w_{2g}^2(V_{04}-V_{02}^2)+w_{1g}V_{11}+w_{2g}V_{12}+2w_{1g}w_{2g}V_{03}=0$ (3.6)

Subtracting (3.6) from (3.1), we get

$M(T_g)=V_{20}+w_{1g}V_{11}+w_{2g}V_{12}$ (3.7)

Substitute value of w_{1g} and w_{2g} in (3.7) we get minimum MSE of proposed estimator T_g as

$M_0(T_g)=V_{20}-\frac{V_{11}^2V_{04}-V_{11}^2V_{02}^2+V_{12}^2V_{02}-2V_{11}V_{12}V_{03}}{V_{04}V_{02}-V_{03}^2-V_{02}^3}$ (3.8)

Let $\beta_{1g}=\frac{V_{03}^2}{V_{02}^3}$, $\beta_{2g}=\frac{V_{04}}{V_{02}^2}$

$K_{12g}=\frac{V_{12}}{\sqrt{V_{20}}.V_{02}}$, $\phi_g^2=\frac{\left(\rho_g\sqrt{\beta_{1g}}-k_{12g}\right)^2}{\beta_{2g}-\beta_{1g}-1}$

ρ_g = Correlation coefficient between y and x

Then equation (3.1) reduce to

$M_0(T_g)=V_{20}\left[1-\rho_g^2-\phi_g^2\right]$ (3.9)

4. Special Case: Simple Random Sampling

Let sample units be selected by SRSWOR procedure, we have

$T_g=T$, $\hat{\bar{Y}}=\bar{y}$, $\hat{\bar{X}}=\bar{x}$, $w_{1g}=w_1$, $w_{2g}=w_2$, $V(\hat{\bar{X}})=\theta S_x^2$, $\theta=\frac{N-n}{Nn}$

Then equation (2.1) reduce to

$T=\bar{y}+w_1(\bar{x}-\bar{X})+w_2\{(\bar{x}-\bar{X})^2-\theta S_x^2\}$ (4.1)

Following Sukhatme et al. (1984), we have

$V_{20}=\theta_1\mu_{20}$, $V_{02}=\theta_1\mu_{02}$, $V_{11}=\theta_1\mu_{11}$,

$V_{03}=\theta_2\mu_{03}$, $V_{12}=\theta_2\mu_{12}$,

$\theta_1=\frac{(N-n)}{(N-1)n}$, $\theta_2=\frac{(N-n)(N-2n)}{(N-1)(N-2)n^2}$

$V_{04}=\frac{N-n}{n(N-1)}\left[\theta_3\mu_{04}+\theta_4\mu_{02}^2\right]$

$\theta_3=\frac{N^2+N-6nN+6n^2}{n^2(N-2)(N-3)}$

$\theta_4=\frac{3(n-1)(N-n-1)N}{n^2(N-2)(N-3)}$

$$M(T)=\theta_1\begin{bmatrix}\mu_{20}+w_1^2\mu_{02}+2w_1\mu_{11}+2w_1w_2\theta_2^{'}\mu_{03}\\+2w_2\theta_2^{'}\mu_{12}+w_2^2A\end{bmatrix} \quad (4.2)$$

where, $A=\theta_3\mu_{04}+\theta_4\mu_{02}^2-\theta_1\mu_{02}^2, \theta_2'=\frac{\theta_2}{n}$

The optimum values of w_1 and w_2 are given by

$$w_1=\frac{(\theta_2')^2\mu_{12}\mu_{03}-A\mu_{11}}{A\mu_{02}-(\theta_2')^2\mu_{03}^2} \quad (4.3)$$

$$w_2=\frac{(\theta_2')\mu_{11}\mu_{03}-(\theta_2')\mu_{12}\mu_{02}}{A\mu_{02}-(\theta_2')^2\mu_{03}^2} \quad (4.4)$$

Thus the minimum MSE $M_0(T_g)$ reduce to

$$M_0(T)=\frac{N-n}{Nn}S_y^2\left[1-\rho^2-G^2\right]$$

Where, $G^2=\frac{\left(\rho\sqrt{\beta_1(x)}-k_{12}(y,x)\right)^2}{A^*\beta_2(x)-\beta_1(x)}$

$$K_{12}(y,x)=\frac{\mu_{12}(y,x)}{\sqrt{\mu_{20}(y,x).\mu_{02}(y,x)}}$$

$\rho=$ Correlation coefficient between y and x

$\beta_1(x)=\frac{\mu_{03}^2(y,x)}{\mu_{02}^3(y,x)}$, $\beta_2(x)=\frac{\mu_{04}(y,x)}{\mu_{02}^2(y,x)}$ are coefficient of skewness and kurtosis of x.

$$A^*=\frac{(N^2+N-6nN+6n^2)(N-2)}{(N-3)(N-2n)^2}+\frac{3}{\beta_2(x)}\frac{(n-1)(N-n-1)N(N-2)}{(N-3)(N-2n)^2}-\frac{1}{\beta_2(x)}\frac{(N-n)(N-2)^2.n}{(N-1)(N-2n)^2}$$

5. Efficiency Comparisons

For comparing efficiency, we have

$$M(\bar{y}_d)=\frac{N-n}{Nn}S_y^2(1-\rho^2) \quad (5.1)$$

$$M(t_1)=\frac{N-n}{Nn}S_y^2\left[(1-\rho^2)-\frac{\left(K_{12}-\rho\sqrt{\beta_1(x)}\right)^2}{A\beta_2(x)-B-\beta_1(x)}\right] \quad (5.2)$$

Where, $A=\frac{(N-1)(Nn-N-n-1)}{(n-1)N(N-3)}$

And $B=\frac{(N-1)(N-n-1)}{(n-1)(N-3)N}$

$M(t_1)<M(\bar{y}_d)$, if (5.3)

$$\left[\frac{\left(K_{12}-\rho\sqrt{\beta_1(x)}\right)^2}{A\beta_2(x)-B-\beta_1(x)}\right]>0$$

But for symmetric population this estimator t_1 is equally efficient as difference estimator.

$M_0(T)<M(t_1)$, if (5.4)

$\beta_2>\frac{(2n^2-5n+2).n}{(Nn-N-n^2-1)}$, $f=\frac{n}{N}$, $n>2$

For large N, it is difficult to compare the minimum MSE of proposed estimator with $M(t_1)$

So for large N, followed by Biradar and Singh (1998)

$V(S_x^2)=fS_x^4\beta_2^*(x)$

Where, $\beta_2^*(x)=\left(K\beta_2(x)-M\right)$

$f=\frac{(N-n)}{n.(N-2)}$, $K=\frac{(N-1)(nN-N-n-1)}{(n-1)N(N-3)}$

$M=\frac{(N^2n-3N^2+6N-3n-3)}{(n-1)N(N-3)}$, $\beta_2(x)=\frac{\mu_{04}}{\mu_{02}^2}$

The exact expression of the mean square error of the estimator is:

$$M(t_1)_{ext} = \frac{N-n}{Nn} S_y^2 \left[(1-\rho^2) - \frac{\left(K_{12} - \rho\sqrt{\beta_1(x)}\right)^2}{A^{**}\beta_2(x) - B^* - \beta_1(x)} \right] \quad (5.5)$$

Where $A^{**} = \frac{N^2n^2(N-2)}{(N-2n)^2(N-1)} \cdot \frac{(N-1)(nN-N-n-1)}{(n-1)N(N-3)}$

$B^* = \frac{N^2n^2(N-2)}{(N-2n)^2(N-1)} \cdot \frac{(N^2n-3N^2+6N-3n-3)}{(n-1)N(N-3)}$

$M_0(T) < M(t_1)_{ext}$, if (5.6)

$A^{**}\beta_2(x) - B < A^*\beta_2(x)$

Combining equations (5.4) and (5.6), we have

$M_0(T) < M(t_1)_{ext} < M(\bar{y}_d)$

Thus estimator T is more precise than all the other existing estimators.

6. Empirical Study

Population -1

The data consider from Tripathi et al. (2002) where data under consideration were taken from Census (1961), (West Bengal, District Census Hand Book Midnapore). The population consists of 353 Villages or town or ward under panskura polish station. The characters y and x are number of persons, area of villages or town/ ward in acres respectively.

N = 353, $\overline{Y}$ = 670.0764, $\overline{X}$ = 274.3728, μ_{11} = 128958.0531, μ_{02} = 40420.85387, μ_{20} = 411425.7336, μ_{12} = 110629942.8, K_{12} = 4.266989, ρ = 0.7528, β_1 = 3.9748, β_2 = 16.3895.

Population -2 [Cochran (1963), pp- 203]

An experienced farmer makes an eye estimate of the weight of peaches on each tree in an orchard of 200 trees.

N = 200, $\overline{Y}$ = 54.3, $\overline{X}$ = 56.9, μ_{11} = 4.55415, μ_{02} = 4.36945, μ_{20} = 4.9905, μ_{12} = 12.9019, K_{12} = 1.3269, ρ = 0.975, β_1 =4.19, β_2 = 50.4977.

Population –3 [Census Hand Book 1991, Series (ii)]

Data relates to the Tehsil wise households and population of females. The characters y and x are population of females and the number of households of a Tehsil.

N = 144, $\overline{Y}$ = 76499.208, $\overline{X}$ = 27934.923, μ_{11} = 1.33 x 10^{10}, μ_{02} =7.4398 x 10^{10}, μ_{20} = 3492111888, μ_{12} = 1.34 x 10^{14}, K_{12} = 0.0304, ρ = 0.8269, β_1 = 0.000353, β_2 = 0.00253.

Population –4[Daroga Singh, pp-194]

For estimating the total cattle population, a random sample with replacement villages was selected from the total 1238 villages. The number of cattle obtained in the survey is given for each sample village, together with the corresponding census figure relating to a previous period.

N = 1238, $\overline{Y}$ = 568.25, $\overline{X}$ = 1091.68, μ_{11} = 4760.92609, μ_{02} = 10063.55798, μ_{20} = 5180.329968, μ_{12} = - 646752.597, K_{12} = -0.86812703, ρ = 0.65938, β_1 = 31.932105, β_2 = 69.50594.

Relative efficiency (RE) of the estimators with respect to $\bar{y}$, defined by $\frac{V(\bar{y})}{M(.)} \times 100$ is given in Tables 1, for various sample sizes.

Table 1: Relative Efficiency (RE) of the Estimators with Respect to $\bar{y}$

Population	Sample Size	Relative Efficiency		
		Estimator		
		$\bar{y}_d$	t_1	T
1	10	229.9908	232.329	552.4317
	20	229.9908	230.506	338.5676
	30	229.9908	230.191	290.1883
	50	229.9908	230.0447	256.9984
	70	229.9908	230.0103	244.2773
2	10	2040.816	2046.41	2831.221
	20	2040.816	2041.92	2548.558
	30	2040.816	2041.19	2374.502
	50	2040.816	2040.88	2179.613
	70	2040.816	2040.82	2085.304

3	10	316.2155	316.213	316.2248
	20	316.2155	316.215	316.2187
	30	316.2155	316.215	316.2170
	50	316.2155	316.2155	316.2158
	70	316.2155	316.2155	316.2155
4	10	176.9235	177.864	573.8383
	20	176.9235	177.1497	355.8824
	30	176.9235	177.0206	290.3803
	50	176.9235	176.9561	217.9768
	70	176.9235	176.939	204.5421

7. Conclusion

From the above table, it is clear that proposed estimator T is more efficient than difference estimator $\bar{y}_d$ and Das and Tripathi estimator t_1, for all the populations.

8. Acknowledgement

Authors are thankful to the referee for his suggestion which made quite improve in the paper.

9. References

1 A. K. Das and T.P.Tripathi; A Class of Sampling Strategies for Population Mean using Information on Mean and Variance of an Auxiliary Character, Proceeding of the I.S.I. Golden Jublies Inter. Confer. On Statistics: Applications and New Direction, Calcutta, 16-19, 174-181 (1981).

2 Daroga Singh and F.S. Chaudhary; Theory and Analysis of Sample Survey Designs, Wiley, (1986).

3 G. O. Kadilar; A New Exponential Type Estimator for the Population Mean in Simple Random Sampling, Journal of Modern Applied Statistical Methods, 15(2), 207-214 (2016).

4 H.P. Singh and G.K. Vishwakarma; Modified Exponential Ratio and Product Estimators for Finite Population Mean in Double Sampling, Austrian Journal of Statistics, 36(3), 217-225 (2007).

5 P.V. Sukhatme; B.V. Sukhatme, S. Sukhatme and C. Ashok; Sampling Theory of Survey with Application, Iowa University Press, Ames Iowa, U.S.A., 2nd Edition (1984).

6 R.P. Chakraborty; Contribution to the Theory of Ratio-Type Estimators, Ph.D thesis, Texas A and M University College Station. U.S.A. (1967).

7 R.S. Biradar and H.P. Singh; Predictive Estimation of Finite Population Variance, Calcutta Statistical Association Bulletin, 48 (1998).

8 S. Bahl and R. Tuteja; Ratio and Product Type Exponential Estimators, Journal of Information and Optimization Sciences, 12(1), 159-164 (1991).

9 S. K. Ray and A. Sahai; Efficient Families of Ratio and Product Type Estimators, Biometrika, 67, 215-217 (1980).

10 S. K. Srivastava; Generalized Estimator for Mean of a Finite Population using Multi Auxiliary Information, Journal of the American Statistical Association, 66, 404-407 (1971).

11 S. K. Shrivastava and H. S. Jhajj; A Class of the Population Mean in a Survey Sampling using Auxiliary Information, Biometrika, 68, 341-343 (1981).

12 V. N. Reddy; On a Transformed Ratio Method of Estimation. Sankhya: The Indian Journal of Statistics. Series C, 36, 59-70 (1974).

13 W. G. Cochran; Sampling Techniques. John Wiley and Sons, New York, 3rd Edition (1977).

Vol.65: e22210559, 2022
https://doi.org/10.1590/1678-4324-2022210559
ISSN 1678-4324 Online Edition

Article - Engineering, Technology and Techniques

Epileptic Seizure Detection Using Deep Learning Based Long Short-Term Memory Networks and Time-Frequency Analysis: a Comparative Investigation in Machine Learning Paradigm

Sunandan Mandal[1]
https://orcid.org/0000-0001-5461-7637

Bikesh Kumar Singh[2]*
https://orcid.org/0000-0002-5052-9768

Kavita Thakur[1]
https://orcid.org/0000-0001-7570-1694

[1]Pandit Ravishankar Shukla University, School of Studies in Electronics and Photonics, Raipur, Chhattisgarh, India; [2]National Institute of Technology, Department of Biomedical Engineering, Raipur, Chhattisgarh, India.

Editor-in-Chief: Alexandre Rasi Aoki
Associate Editor: Fabio Alessandro Guerra

Received: 29-Aug-2021; Accepted: 05-Nov-2021.

*Correspondence: bsingh.bme@nitrr.ac.in; Tel.: +91-9826469522 (B. K. S.)

HIGHLIGHTS

- A hybrid approach using time frequency analysis and deep learning for risk stratification of epileptic seizure is proposed.
- An extensive comparative study of various machine learning and feature selection techniques is conducted.
- Implemented andevaluatedthedeep learning based long short-term memory networks.

Abstract: Epilepsy is a noncontagious brain abnormality, which causes electrical distraction and strains the neural system. Generally, epilepsy is treated and diagnosed through continuous examination and interpretation of the electroencephalography (EEG) signals. This is a very time-consuming and tedious job. Further, it is subjected to observational errors and observer variability. Hence, the development of an efficient automatic alarm system to recognize epileptic seizure signals is of important concern. The objectives of the present study are to investigate deep learning based long short term memory (LSTM) networks for the classification of epileptic EEG signals using time-frequency analysis. Additionally, a comparative investigation is carried out to evaluate the various state-of-the-art feature selection and classification models for automatic classification of EEG signals for Epilepsy detection. Features based on statistics, entropy, and fractal were extracted from both the time domain and frequency domain. The extracted features were supplied to LSTM networks and traditional machine learning models for epileptic EEG classification. High classification accuracy of 100% (under hold out and 10-fold protocol) and 99.80% (under 10-fold protocol) is achieved by the proposed LSTM strategy followed by the Back Propagation Artificial Neural network (BPANN) which achieves 99.6% classification accuracy when all the 150 EEG biomarkers were used as input to the classifier

Study of the Enhanced Efficiency of Crystalline Silicon Solar Cells by Optimizing Anti Reflecting Coating using PC1D Simulation

Mohnish Kumar Sahu, Naman Shukla*, Sanjay Tiwari

School of Studies in Electronics and Photonics, Pt. Ravishankar Shukla University, Raipur

***Corresponding Author:** naman.shukla43@gmail.com

Abstract:

In this paper, simulation of a mono crystalline silicon solar cell was done using PC1D software. The impact of different solar cell parameters, with their effects on power and efficiency, has been investigated. It is seen that the textured surface reduces reflection and increases the efficiency of the solar cell at least 2–3%. From the simulation, it is seen that the optimum value of p-type doping concentration 1×10^{16} cm^{-3}, n-type doping concentration 5×10^{18} cm with pyramid height of 2–3 μm and equal angles of 54.74 degrees produces the best result in simulation. An anti-reflective coating with a refractive index of 1.38 and a thickness of 84 nm is considered optimal. By optimizing the effective parameters, a solar cell with an efficiency of 24.45% was achieved through simulation. For a p-type mono crystalline silicon wafer, with an area of 10×10 cm^2 and a thickness of 200 μm, initial simulation shows a 24.45% efficient solar cell.

Keywords*:* Anti reflection coating, c-Si Solar Cell, Doping Concentration, Efficiency, PC1D.

Introduction

Anti-reflection coatings minimize the reflection of one or many wavelengths and are typically used on the surface of lenses so that small amount of light is lost. A simple coating can be designed to minimize the reflection on an interface between two materials by providing an extra material for light to interact with absorption layer. This can reduce the total reflection coefficient of the system by having light reflect from two interfaces where each interface has a smaller difference in refraction indices than the original interface. This type of coating is an anti-reflection coating, and the optimum refractive index of the coating (n_c) to minimize the total reflection coefficient is given by the geometric mean of the two materials that made up the original interface. In the case of air and glass, the optimum antireflective coating would have a refractive index of approximately 1.23. No real material has this ideal index, but magnesium fluoride (MgF_2) is often used because of its refractive index (1.38) which is close to the ideal value.

Nowadays, not only the solar cells have an anti-reflective coating, but such a coating can also be used on the glass surface (substrate) of solar modules. Anti-reflective coatings on the glass of the solar modules improve light transmission and thus increase the overall efficiency of the PV module. Another advantage is that the glare from the glass will get reduced. This allows the panels to blend in more easily with its surrounding. Also, it clears the path for installations nears airports (a panel without anti-reflective coating might blind a pilot). PC1D is commercially available software most commonly used for solar cell modeling (PVEducation, 2009). This software is currently used by many companies and universities such as the University of New South Wales, Australia. Here the PC1D version 5.9 has been used to simulate an energy efficient mono crystalline silicon solar cell. The simulation also gives insight about the range and impact

 DOI: 10.52228/JRUB.2023-35-2-1

of doping concentration, diffusion length, texturing and anti-reflection coating the simulation of PSC. This software tool has executed the semiconductor equation, the continuity equation of carrier, poisson equation, carrier transport equations etc..

Theory

Efficient and accurate modeling requires all the parameters of the solar cell to be involved, but for simplicity and to understand the impact of the parameters, some of the parameters like texturing and anti-reflection coating are not considered at first. Typically, a solar cell as shown in Figure 1, thickness varies from 100 to 500 nm and normally the area is of 10×10 cm^2 or. So, a p-type silicon wafer, with an area of 10 × 10 cm^2 and thickness of 200 μm was selected for solar cell simulation. The doping concentration of a mono crystalline silicon wafer varies from 5 × 10^{12} cm^{-3} to 5 × 10^{18} cm^{-3}. High doping concentration in a p-type wafer increases V_{oc} (open circuit voltage) but at the cost of damaging the crystal. So, moderate doping is generally used in a p-type silicon wafer. Thus, the doping concentration of the p-type silicon wafer has been randomly adjusted to 5 × 10^{16} cm^{-3} at first.

By using a four-point probe instrument it is seen that normally p-type wafer sheet resistivity varies from 0.01 to 10 cm. Because of variation in doping concentration, the sheet resistivity varies. The sheet resistivity decreases with the increase of doping concentration. For doping concentration 5 × 10^{16} cm^{-3}, the p-type wafer sheet resistivity is 0.3441.cm. So, 0.3441 .cm was considered at first for simulation. The doping level of the emitter (n type) has been randomly adjusted to 5×10^{18} cm^{-3} to form a p-n junction. For 5 ×$10^{18}$$cm^{-3}$ the emitter (n-type) sheet resistance is 26.11 / (ohms/square). 26.11 / was considered as the sheet resistance of the emitter. Normally the thickness of the emitter (n-type) varies from 1–2 μm.

So in this simulation, the thickness of the emitter was adjusted to 2 μm and uniform doping profile condition has been assumed. Diffusion length must be less than the thickness of the p-type material. The thickness of the p-type wafer is selected as 300 μm and, at first, diffusion length was randomly considered, 144.3 μm. To observe the impact of the anti-reflection coating (ARC), ARC was not applied at first. To emulate the sun, AM (Air Mass) −1.5 G condition was selected. Also, to see the time progression, the number of time steps was selected as 50. After running the simulation, it is seen that the efficiency of the solar cell is 12.10%. Doping Concentration [cm^{-3}] Low doping moderate doping heavy doping.

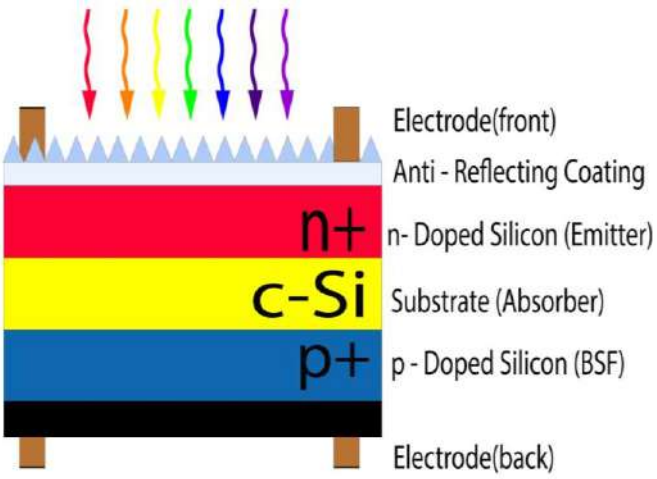


Figure 1. c-Si Solar Cell with ARC Coating.

DOI: 10.52228/JRUB.2023-35-2-1

Simulation of c-Si Solar cell with arc

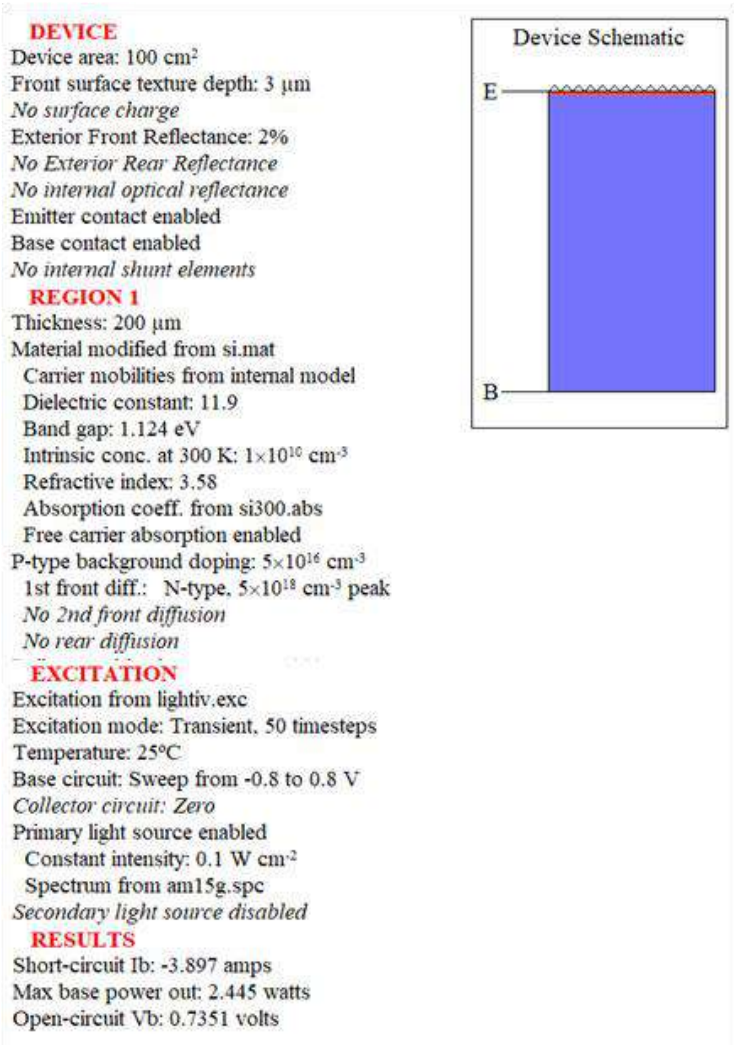


Figure 2. PC1D simulator Front Panel

The anti-reflection coating (ARC) shows the most significant change in efficiency in this simulation. To design the ARC layer the following equations were used to determine, the thickness and refractive index of the ARC layer.

Refractive index of ARC is

$$\eta_{AR} = \sqrt{\eta_{air} \times \eta_{si}(\lambda)}$$

And the thickness of ARC is

$$d = \frac{\lambda}{4 * \eta_{AR}}$$

Using both equations, thickness and refractive index of the ARC layer are tabulated in Table 1. Varying the refractive index and thickness the simulation efficiency of the solar cell was calculated and tabulated. It is seen that if the thickness of the ARC layer is 84 nm then the

DOI: 10.52228/JRUB.2023-35-2-1

maximum efficiency of 24.45% can be achieved. If the thickness of the ARC layer is higher (e.g. 100 nm) than or lower than (e.g. 68 nm) 84 nm then the efficiency decreases. That is for 84 nm thickness the solar spectrum is absorbed more effectively.

In the PC1D simulation tool, crystalline Si (c − Si) solar cell device simulations are carried out using the following numerical equations representing the quasi-one-dimensional transportation of electrons and holes of a semiconductor material (Solar cells). Equations gives us a clear-cut idea of creating a model of a silicon cell and optimizing various process parameters including the ARC coating layer properties (Hashmi, 2018)

$$Jn = \mu n \cdot n \cdot EFn \quad (1)$$

$$Jp = \mu p \cdot p \cdot EFp \quad (2)$$

The current densities of the electrons and the holes are represented as J_n and J_p respectively and they are numerically formulated as indicated in Equations (1) and (2). In which, the parameters n and p are the electron and hole density, μn and μp is the mobility of the electron and holes. The 5 EF_n and 5 EF_p are the diffusion coefficients that represents the difference in electron and hole quasi-Fermi energies EFn and EFp. (Hashmi, 2018)

$$\frac{dy}{dt} = 5 \cdot J_{nq} + G_L - Un \quad (3)$$

$$\frac{dy}{dt} = 5 \cdot J_{pq} + G_L - Up \quad (4)$$

$$\Delta 2\varphi = qe\_x0010\_\, n - p + N_{-acc} - N_{+donar} \quad (5)$$

Equations (3) and (4) are derived from the law of conservation of charge or the continuity equation. where GL and Un are generation rate and recombination rate. Equation (5) represents Poisson's equation for solving the electrostatic field problems.

where N_{-acc} and N_{+don} are acceptor and donor doping concentrations.

$$n = NCF1/2q\psi + Vn - q\varphi$$

Here N_c and N_v are the effective density of states in the conduction and valence bands. To describe the type of material used, Fermi-Dirac statistics directly related to the band edges and N_c and N_v carrier densities are expressed. The infinite element approach is used to solve the three basic equations that assist in simulating the solar cell behaviors using the PC1D modelling tool.

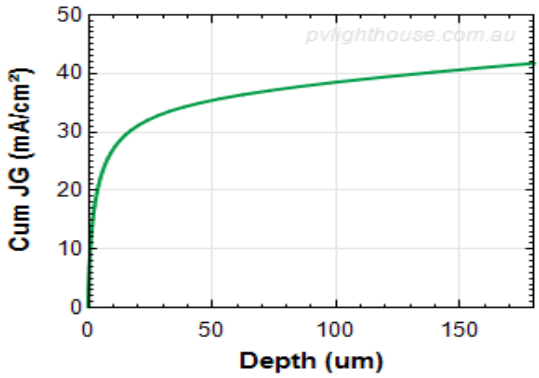


Figure 3. Current density of ARC (MgF_2)

DOI: 10.52228/JRUB.2023-35-2-1

Many other process parameters are optimized using the *PC1D* simulation tool in the literature, but the proposed research aims to optimize the design process characteristics of the *ARC* layer used in the fabrication of the $c - Si$ solar cells as shown in figure 3. Finally, the efficiency of *c-Si* solar cells is calculated using the following equations-

$$\eta = \frac{P_{max}}{I_{in}} = \frac{J_{mpp}V_{mpp}}{I_{in}} = \frac{J_{sc}V_{oc}FF}{I_{in}}$$

where, η represents the efficiency of the solar cell which is calculated using P_{max}, I_{in}, J_{mpp}, V_{mpp}, J_{SC}, V_{OC} and FF that indicates the maximum power, incident power, current at maximum power point, voltage at maximum power point, saturation current density, Open circuit voltage and fill factor. In this present study, we have considered *p*-type wafer with resistivity of 1 Ω − cm (doping of 5×10^{16} cm), device area of 100 cm^2, front surface textured with 3 µm depth. The *n*+ emitter and *p*+ back surface field was formed with doping concentration of 5×10^{16} cm^{-3} and 5×10^{18} cm^{-3} respectively. Bulk lifetime of 1000 µs and front and rear surface recombination velocity of 10,000 cm/s were considered for solar cell simulation by PC1D. Numerous simulations were performed to study the impact of different parameters on the solar cell device performance. Base resistance (0.015 Ω), internal conductance (0.3 S), light intensity (0.1 W/cm^2) used in this modelling.

Table.1 Parameter of PC1D Simulation

S.No.	Parameters	Value
1	Device area	100 cm^2
2	Front Surface Texture Depth	3 µm
3	Front Reflectance	2%
4	Thickness of Si Solar Cell	200µm
5	Dielectric Constant	11.9
6	Energy Band Gap	1.124 eV
7	Background Doping P-type	5×10^{16} cm^{-3}
8	First Front Diffusion N-type	5×10^{18} cm^{-3}
9	Refractive index	3.58
10	Excitation Mode	Transient
11	Temperature	25℃
12	Other Parameter	Internal model of PC1D
13	Primary Light Source	AM15g. Spectrum
14	Bulk Recombination	1000µs
15	Constant Intensity	0.1 W/cm^2

Result and Discussion

ARC is one of the important parameters to enhance the efficiency of PV module. The increasing demand of efficient solar panel makes the researchers to explore the best ways to improve light traction. Many researchers proved experimentally the performance of material and their impact in enhancing the transmittance in wide range of wavelength spectrum. This review paper has given the investigation about ARC, which can be well suited with silicon solar cell and glass substrate in order to reduce reflection.

DOI: 10.52228/JRUB.2023-35-2-1

Maximum efficiency of 24.45% is achieved with p-type doping concentrations of $5\times10^{16}cm^{-3}$ and 5×10^{18} cm^{-3}, diffusion lengths of 200.3 μm, both sides of textured wafers (pyramid height of 2-3 m and equal angle of 54.74), anti-reflection coating thicknesses of 74 nm, and refractive indices of 1.38, as shown in the figure 4. Figure 5 shows a band diagram for the Nc and Nv energy levels. These optimum parameters are compared with published literature and it is found that the values are feasible as shown in result section.

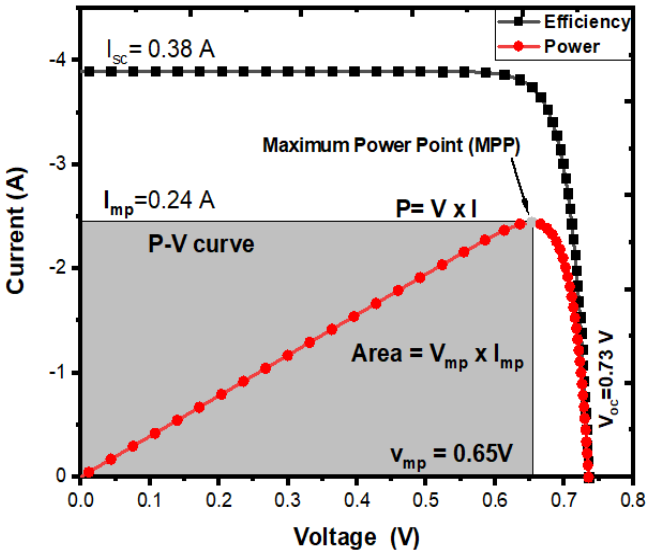


Figure.4- V-I plot of output of c-Si solar cell

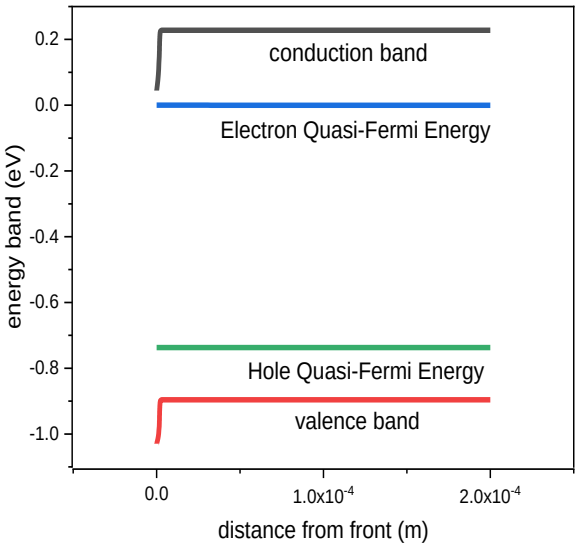


Figure.5- band diagram of Nc and Nv

Conclusion

Simulation of a mono crystalline silicon solar cell has been done by PC1D software. All the optimum solar cell parameters used in the simulation are compared with published literature and it is found that the values are feasible. With the assist of experimentally obtained values, the all process has been thoroughly investigated in the PC1D simulation. The most significant accomplishment, it may be said, was the development of a solar cell with an efficiency of more than 20% through careful examination of another process, specifically through the optimization of several parameters in the PC1D simulation. It is adequate to say that by applying the Doping effect on the solar cell at least 1–2% increase in efficiency is to be expected in a real-world solar cell fabrication scenario Simulation facilitates us by making better decisions, thus it is one of the cost saving strategies for engineering. Promoting simulation of the solar cell before actual fabrication may minimize a cost and gives an in-depth reason of what to expect by changing the parameters.

Acknowledgements

I am thankful for research facilities provided by Photonics Research Laboratory, School of Studies in Electronics and Photonics, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, India.

DOI: 10.52228/JRUB.2023-35-2-1

References

Kumaragurubaran, B., Anandhi, S., (2014).Reduction of reflection losses in solar cell using anti-reflective coating," International conference on computation of power, energy, information and communication ICCPEIC.

Muhammad Aleem Zahid . Muhammad Quddamah Khokhar (2021).Optimization_of Antireflection Coating Design Using PC1D Simulation for c-Si Solar Cell Application,Electronics.

National Renewable Energy Laboratory, Best research-cell efficiencies.https://www.nrel.gov/pv/assets/pdfs/best-research-cell-efficienciesrev220126.pdf .

PC1D, PVEducation (2009) [Online]. Available: http://www. pveducation.org/pvcdrom/characterisation/pc1d. Accessed date: 16 march 2022.

Silicon solar cell parameters | PVEducation, Pveducation.org (2017) [Online]. Available: http://www.pveducation.org/pvcdrom/ design/solar-cell-parameters.

Keshavarz Hedayati, M., Elbahri M., (2016).Antireflective coatings: Conventional stacking layers and ultrathin plasmonic metasurfaces, a mini-review," Materials, 9.6 .

Thirunavukkarasu G.S, Seyedmahmoudian ,M.(2021).Optimization of Mono-Crystalline Silicon Solar Cell Devices Using PC1D Simulation. Energies.

Hashmi, G.; Akand, A.R.; Hoq, M.; Rahman, H. (2018).Study of the Enhancement of the Efficiency of the Monocrystalline Silicon Solar Cell by Optimizing Effective Parameters Using PC1D Simulation. Silicon.

Cai, X.; Zhou, X.; Liu, Z.; Jiang, F.; Yu, Q.(2018). An in-depth analysis of the silicon solar cell key parameters'optimal magnitudes using PC1D simulations,Optik.

Subramanian, M.; Aldossary, O.M.; Alam, M.; Ubaidullah, M.; Gedi, S.; Vaduganathan, L.; Thirunavukkarasu, G.S.; Jamei, E.; Seyedmahmoudian, M.; Stojcevski, A.; et al. (2021).Optimization of Antireflection Coating Design Using PC1D Simulation for c − Si Solar Cell Application. Electronics.

.

.

DOI: 10.52228/JRUB.2023-35-2-1

Review Article

Plants' Steroidal Saponins - A Review on Its Pharmacology Properties and Analytical Techniques

Sudha Porte[a], Veenu Joshi[a], Kamal Shah[b], Nagendra Singh Chauhan[c]

[a]Center for Basic Sciences, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, India, [b]Institute of Pharmaceutical Research, GLA University, Mathura, Uttar Pradesh, India, [c]Drugs Testing Laboratory, Avam Anusandhan Kendra, Raipur, Chhattisgarh, India

Abstract

The plant is a rich repository of useful secondary metabolites with profound medicinal potential. Saponins, one type of bioactive compound, are amphitheatric glycosides with one and more hydrophilic sugar and hydrophobic steroidal and terpenoid part. The former is known as steroidal saponin, and the latter is called terpenoid saponins. Steroidal saponin is mostly distributed among monocotyledon families such as *Asparagaceae*, *Amaryllidaceae*, *Dioscoreaceae*, *Smilacaceae*, and *Liliaceae*. Even though it is unusual, it could also be detected to some extent by dicotyledonous angiosperms, such as *Plantaginaceae*, *Zygophyllaceae*, *Fabaceae*, *Asteraceae*, and *Solanaceae*. It exhibits diverse pharmacological ability including antimicrobic, anti-inflammatory, cAMP phosphodiesterase inhibitory, antiadipogenic, bactericide, cardioprotective, antitumor, antidiabetic, cytotoxic activity, antifungal, antiviral, antioxidant, and hepatoprotective. Steroidal saponin timosaponin AIII from *Anemarrhena asphodeloides* has been found to possess antitumor activity. Diosgenin, another steroidal sapogenin, has the potential of preventing neurological diseases by affecting different signaling pathways, increasing bone formation, and increasing antithrombotic activity. Spicatoside A from *Liriope platyphylla* possesses anti-inflammatory, antiasthma, and antiosteoclastogenic activities. TTB2 from *Trillium tschonoskii* exhibits anticancer potential. The cell cycle arrest and ROS-dependent autophagy are induced by polyphyllin I. These diverse biological activities of steroidal saponins are attributed to the variability of their structural features. Analysis of steroidal saponins in plant materials mainly utilizes classically and advances thin layer chromatography (TLC) on normal and reverses-phase (high-performance thin-layer chromatography, densitometric TLC), gas chromatography, LC, UPLC, ultra-high-performance liquid chromatography (HPLC), supercritical fluid chromatography, and HPLC coupled to ultraviolet detector and diode array detector. HPLC coupled with MS and Nuclear magnetic resonance is used for online identification of separated saponins. The present review aims to furnish a comprehensive account of the recent advances in analytical methods of determination and medicinal applications of steroidal saponins.

Keywords: Steroidal, Saponins, Glycosides, Antitumour, Antioxidant, Analytical techniques

Introduction

Since bioactive compounds occurring in the herbal plant are popular as traditional medicine for different diseases. Currently using phytochemicals are treated to be secure and friendly for the human body. Phytochemicals are bioactive compounds naturally occurring which act as medicine and nutrient for the benefits of the human health.[1] Plants are a versatile source of different organic chemicals or phytochemicals. They comprised two groups in respect of their activity in plants as primary and secondary metabolites. The metabolites that are required to complete plant basic metabolic processes are known as primary metabolites, such as fats, carbohydrates, proteins, nucleic acid, and chlorophyll. They found throughout the plant kingdom. They are produced in large quantities and can easily extract. Secondary metabolites are not involved in primary metabolic processes but play a role to protect against abiotic and biotic stresses and ensure their existence in the environment. They usually produced in minor concentration and extraction often difficult and expensive.[2] Some examples are alkaloids, phenolics, terpenes, saponins, flavonoids, glucosides, lignans, curcumins, and plant steroids.[3,4]

Access this article online

Quick Response Code:

Website: www.wjtcm.net

DOI: 10.4103/2311-8571.353503

Address for correspondence: Dr. Nagendra Singh Chauhan, Drugs Testing Laboratory Avam Anusandhan Kendra, Raipur (CG) India. E-mail: chauhan.nagendra@gmail.com

Received: 30-06-2021, **Accepted:** 07-07-2021, **Published:** 05-08-2022

How to cite this article: Porte S, Joshi V, Shah K, Chauhan NS. Plants' steroidal saponins - A review on its pharmacology properties and analytical techniques. World J Tradit Chin Med 2022;8:350-85.

Journal of Scientific & Industrial Research
Vol. 81, November 2022, pp. 1173-1180
DOI: 10.56042/jsir.v81i11.60811

Isolation and Screening of Potent Cellulolytic Soil Fungi from Raipur City of Chhattisgarh State, India

Ajay James[1], Srishti Pandya[1], Priya Sutaoney[1], Veenu Joshi[1] & Prabir Ghosh[2]*

[1]Center for Basic Science, Pt Ravishankar Shukla University, Raipur 492 010, Chhattisgarh, India
[2]Department of Chemical Engineering, NIT Raipur, Raipur 492 010, Chhattisgarh, India

Received 24 February 2022; revised 10 October 2022; accepted 10 October 2022

The current research focuses on the diversity of fungal isolates obtained from the soil and their ability to produce cellulolytic enzymes. Out of 76 colonies obtained, 11 fungal colonies were isolated viz. *Aspergillus*, *Humicola* and *Rhizopus* being the major genera of the isolates. From the 11 isolates, the identification of potent cellulase producing cultures was done using qualitative carboxy methyl cellulase screening test. Following the preliminary screening, five cultures viz., *Aspergillus sydowii*, *Humicola* sp-1, *Aspergillus niger*, *Aspergillus ustus*, *Aspergillus flavus* were identified to be potent with enzymatic indices ranging from 1.25 to 2.29. These were further selected for quantitative enzyme analysis. *Aspergillus sydowii* was found to have highest enzymatic activity and *Aspergillus flavus* was found to have the least enzymatic activity. Our findings revealed that *Aspergillus sydowii* appeared to be a promising candidate for cellulase production and can be utilized for waste recycling and other biotechnological applications.

Keywords: *Aspergillus*, Carboxy methyl cellulase, Endoglucanase, *Humicola*, Lignocellulose

Introduction

Population explosion has resulted in increased industrialization, which has escalated annual waste production. In the current economic scenario, the production of energy is also becoming an issue. Hence, there is a need to find new sources of raw materials for the generation of energy. One of the most promising forms available is a lignocellulosic waste. Due to their wide existence in nature, they have been exploited for the production of biofuels. Lignocellulosic biomass is the most abundant biological material derived from the biosphere. The major contribution to the cellulose pool is made by plants through photosynthesis.[1,2] Even though cellulose has numerous applications in fields such as paper manufacturing, nanomaterials, and bioenergy production, it is estimated that 1.5×10^{12} tonnes of cellulose gets wasted each year.[3] The main source of cellulosic waste is from industries such as forestry, agriculture, and municipal waste. However, 35–45% of cellulosic wastes are present in these residues.[4] Since, the tropical and sub-tropical region hosts the majority of agriculture, the zone inputs a large quantity of cellulosic waste in form of agricultural residues, which is either burned or removed from the site. This leads to the downfall in productivity, soil quality, and organic sources and indirectly causes some health issues in humans, loss of biodiversity and climate change.[5] Scientifically, rapid accumulation of this residual waste makes its management challenging. Hence, to cope up with upcoming environmental challenges, bioconversion of lignocellulosic waste into valuable biobased products can be achieved by a significant class of enzymes termed cellulases.[6,7] Cellulases are complexes of hydrolytic enzymes capable of hydrolyzing cellulosic residues into smaller sugar units like glucose. This complex shows high breakdown action on crude natural cellulosic residues and is found most commonly in fungi. Cellulase is a complex enzyme system that contains endo-1,4-β-D-glucanase (endoglucanase), exo-1,4-β-D-glucanase (exoglucanase) and β-D-glucosidase (β-D-glucoside glucanhydrolase).[8–10] The endoglucanase attacks randomly in the internal glycosidic bonds, producing glucan chains of different lengths, while the exoglucanase breaks down cellulose from the end of the chain. Endoglucanase also acts on cellodextrins and converts them into cellobiose and glucose. The completion of the hydrolysis process is mediated by β-glucosidase which cleaves cellobiose and removes glucose from the non-reducing end of the oligosaccharide.[11] The combination of cellulases is also used with other enzymes for the breakdown of biomass into simple sugars, which are further fermented to

*Author for Correspondence
E-mail: prabirg.che@nitrr.ac.in

Journal of the Science of Food and Agriculture / Volume 103, Issue 9 / p. 4275-4292

Review

Therapeutic potential and novel formulations of ursolic acid and its derivatives: an updated review

Priya Namdeo, Bina Gidwani, Sakshi Tiwari, Vishal Jain, Veenu Joshi, Shiv Shankar Shukla, Ravindra Kumar Pandey, Amber Vyas

First published: 03 January 2023
https://doi.org/10.1002/jsfa.12423
Citations: 2

Abstract

Plants produce biologically active metabolites that have been utilised to cure a variety of severe and persistent illnesses. There is a possibility that understanding how these bioactive molecules work would allow researchers to come up with better treatments for diseases including malignancy, cardiac disease and neurological disorders. A triterpene called ursolic acid (UA) is a pentacyclic prevalent triterpenoid found in fruits, leaves, herbs and blooms. The biological and chemical aspects of UA, as well as their presence, plant sources and biosynthesis, and traditional and newer technologies of extraction, are discussed in this review. Because of its biological function in the creation of new therapeutic techniques, UA is a feasible option for the evolution and medical management of a wide range of medical conditions, including cancer and other life threatening diseases. Despite this, the substance's poor solubility in aquatic environments makes it unsuitable for medicinal purposes. This hurdle was resolved in many different ways. The inclusion of UA into various pharmaceutical delivery approaches was found to be quite effective in this respect. This review also describes the properties of UA and its pharmacokinetics, as well as therapeutic applications of UA for cancer, inflammatory and cardiovascular diseases, in addition to its anti-diabetic, immunomodulatory, hepatoprotective and anti-microbial properties. Some of the recent findings related to novel nano-sized carriers as a delivery system for UA and the patents related to the applications of UA and its various derivatives are covered in this review. The analytical study of UA, oleanolic acid and other phytoconstituents by UV, HPLC, high-performance thin-layer chromatography and gas chromatography is also discussed. In the future, UA could be explored *in vivo* using various animal models and, in addition, the regulatory status regarding UA needs to be explored. © 2023 Society of Chemical Industry.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

REFERENCES

1 Kaps A, Gwiazdon P and Chodurek E, Nanoformulations for delivery of pentacyclic triterpenoids in anticancer therapies. *Molecules* **26**: 1764 (2021). https://doi.org/10.3390/molecules26061764 .

2 De Oliveira JR, Camargo SEA and de Oliveira LD, *Rosmarinus officinalis* L. (rosemary) as therapeutic and prophylactic agent. *J Biomed Sci* **26**: 5 (2019). https://doi.org/10.1186/s12929-019-0499-8 .

3 Swiezewska E and Danikiewicz W, Polyisoprenoids: structure, biosynthesis and function. *Prog Lipid Res* **44**: 235– 258 (2005). https://doi.org/10.1016/j.plipres.2005.05.002 .

4 Thimmappa R, Geisler K, Louveau TO, Maille P and Osbourn A, Triterpene biosynthesis in plants. *Annu Rev Plant Biol* **65**: 225– 257 (2014). https://doi.org/10.1146/annurev-arplant-050312-120229 .

ISSN 2063-5346

MATHEMATICAL ATTITUDE OF CONTINUOUS MUTATION OF COVID-19 VIRUS

Satpal Panika[1] , Govind Prasad Sahu[2]

[1] Assistant Professor, Kalinga University, Nava Raipur, Chhattisgarh.

[2] Center for Basic Sciences, Pt. Ravishankar Shukla University, Raipur, Chhattisgarh, India-492010

satpal.panika@kalingauniversity.ac.in

govind3012@gmail.com

Article History: Received: 02.04.2023 **Revised:** 20.05.2023 **Accepted:** 24.06.2023

Abstract

The COVID-19 pandemic has had a profound impact on global health and economy. One of the significant challenges in managing the pandemic is the continuous mutation of the SARS-CoV-2 virus, the causative agent of COVID-19. In this paper, we explore the mathematical attitude towards understanding and modeling the continuous mutation of the COVID-19 virus. We discuss the relevance of mathematical modeling in tracking viral mutations, analyzing their impact on transmission dynamics, and assessing the effectiveness of control measures. We present various mathematical models that have been developed to study the mutation patterns, predict future mutations, and evaluate the potential consequences of these mutations on public health.

Key words: Spread, New mutant strains, Incorporating, Mutation rates, Selection pressures, Mathematical equations.

1 Introduction

1.1 Brief overview of the COVID-19 pandemic and the role of virus mutation.

The COVID-19 pandemic, caused by the novel coronavirus SARS-CoV-2, has had a profound global impact since its emergence in late 2019. The virus spreads primarily through respiratory droplets, leading to a wide range of symptoms from mild to severe respiratory illness. As the pandemic progressed, scientists discovered that the virus undergoes continuous mutation, giving rise to various genetic variants or strains.

The role of virus mutation in the COVID-19 pandemic is multifaceted. Mutations occur naturally as the virus replicates, leading to genetic changes in its RNA. Some mutations are neutral and have no significant effect on the virus's behavior or its interaction with the host. However, certain mutations can result in altered characteristics of the virus, such as increased transmissibility, enhanced virulence, or evasion of the immune response. These mutated strains can potentially have a substantial impact on the dynamics of the pandemic, including transmission rates, disease severity, and vaccine efficacy.

1.2 Importance of mathematical modeling in understanding and predicting viral mutations.

Mathematical modeling plays a crucial role in understanding and predicting viral mutations in the context of the COVID-19 pandemic. By formulating mathematical

UGC Approved Journal No. 49321 Impact Factor : 6.125 ISSN : 0976-6650

Shodh Drishti

An International Peer Reviewed Refereed Research Journal

Vol. 13, No. 8 Year - 13 August, 2022

PEER REVIEWED JOURNAL

Published by
SRIJAN SAMITI PUBLICATION
VARANASI
E-mail : shodhdrishtivns@gmail.com, Website : shodhdrishti.com, Mob. 9415388337

अनुक्रमणिका