

Antioxidant Analysis and Phytochemical Screening of *Colocasia Esculenta* Leaf Extract

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Abstract:

Aim: To analyse and understand the antioxidant activity and phytochemicals present in the *Colocasia esculenta* leaf extract.

Materials and Methods: The *Colocaceae esculenta* leaves were taken from Indian Institute of Horticulture Research (IIHR), Bangalore. Free radical scavenging activities of the extract was assessed using FRAP, DPPH and ABTS scavenging assay. Phytochemical screening was carried out on the aqueous, methanolic, acetone and petroleum ether extract of the leaves.

Results: The antioxidant property of leaf extracts were confirmed by their excellent free radical scavenging activity. The phytochemical analysis of all the four extracts showed the presence of alkaloids and proteins.

Conclusion: Various phytochemicals present in the *Colocasia esculenta* leaf extracts may contribute to the free radical scavenging and other pharmacological activities.

Key words: Antioxidant, *Colocasia esculenta*, Medicinal plant, Phytochemicals.

INTRODUCTION:

Plants play a significant role in maintaining human health and enhancing the quality of life since long and have been beneficial to human because of their potential uses as alternative remedies for the treatment of many infectious diseases and also served as valuable components of medicine, seasonings, beverages, cosmetics, and dyes [1]. They have always been used as a common source of medicaments, may be either in traditional preparations or as pure active principles forms which are referred to be Medicinal plants [2]. The medicinal plant extracts have wide range of scope in the biological activities thus forming the basis for the drug discovery [3]. Extracts from plant source are used in the treatment of cardiovascular diseases, central nervous system, liver and other metabolic disorders [1]. The ethno botany provides a rich sources for the drug discovery and drug development. The emphasis on the use of the plants is on the treatment than the prevention of diseases [4].

One such medicinal plant that is known to us as a potential medicinal herb is *Colocasia esculenta* Linn, commonly known as Taro. *Colocasia esculenta* Linn. is a tall herb, tuberous or with a stout short caudex, flowering and leafing together. Various parts of *Colocasia esculenta* are traditionally used to treat many diseases, is a green leafy vegetable which is rich in proteins, carbohydrates and vitamins and microminerals like iron, potassium, zinc etc., [5]. It is commonly known as "Taro" in (English), Arvi, Kachalu (Hindi), Alupam, Alukam (Sanskrit) and also known as *Arum esculentum* L. and *Colocasia antiquorum* Schott which belongs to the Araceae family which is an annual herbaceous plant. The plant is known for its medicaments of various ailments like asthma, arthritis,

diarrhea, internal hemorrhage, neurological disorders and skin diseases [1]. The parts used mainly are Leaves and Corms. The juice extract of corm of *Colocasia esculenta* is use for baldness, stimulant, expectorant, used to arrest arterial hemorrhage and as a body pain reliever [1]. The taro tuber is rich in carbohydrates, proteins however low in the fat content. The starch which is gluten free present in the Taro are fine and small which can be easily digested. It is also noted that the Vitamin B-complex present in the Taro is greater than the whole milk [6]. The objective of the present study was to assess the free radical scavenging activities Ferric Reducing Antioxidant Power (FRAP), 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid (ABTS) assay identifying the phytochemicals present in the methanolic, acetone, petroleum ether, water extract of *Colocasia esculenta* leaves by qualitative analysis.

MATERIALS AND METHODS

Collection of Sample

The *Colocasia esculenta* leaves were bought from the fields of Indian Institute of Horticulture Research (IIHR), Hessaragatta Road, Bangalore. It was authenticated by a Botanist, from the Department of Botany, Bangalore University, Bangalore.

Sample Preparation

Colocasia esculenta leaves were washed thoroughly with distilled water and were cut into small pieces. Then the leaves were dried at room temperature for 48 h. The dried leaves were then crushed using a mixer to a fine powder and stored at room temperature for further analysis. Approximately 20 g of powder was obtained from 100 g leaves.

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Visible light driven reduced graphene oxide supported ZnMgAl LTH/ZnO/g-C₃N₄ nanohybrid photocatalyst with notable two-dimension formation for enhanced photocatalytic activity towards organic dye degradation

K. Bhuvanewari, G. Palanisamy, G. Bharathi, T. Pazhanivel, ... Nora Hamad Al-Shaalan

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Abstract

Abstract

In this study, 2D/2D/2D heterostructured r-GO/LTH/ZnO/g-C₃N₄ nanohybrid were synthesized through hydrothermal method. The strong electrostatic interaction between the negatively charged g-C₃N₄ and r-GO nanosheets with positively charged layered triple hydroxide (LTH) nanosheets are effectively influences the successful formation of heterojunction. The LTH nanosheets are well spread on the g-C₃N₄ nanosheets combined with r-GO. In particular, the as prepared heterojunction shows a better photocatalytic degradation activity compared to pristine samples and the significant enhancement in the photocatalytic performance is mainly accredited to the large interfacial charge transition of photogenerated charge carriers under the visible irradiation. Although the 2D/2D/2D heterojunction effectively hinders the charge carrier recombination resulting high photocatalytic activity with good stability. In addition, the r-GO supported LTH/ZnO/g-C₃N₄ heterojunction shows high photo-



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Visible light driven reduced graphene oxide supported ZnMgAl LTH/ZnO/g-C₃N₄ nanohybrid photocatalyst with notable two-dimension formation for enhanced photocatalytic activity towards organic dye degradation

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Layered triple hydroxide
Reduced graphene oxide

ABSTRACT

In this study, 2D/2D/2D heterostructured r-GO/LTH/ZnO/g-C₃N₄ nanohybrid were synthesized through hydrothermal method. The strong electrostatic interaction between the negatively charged g-C₃N₄ and r-GO nanosheets with positively charged layered triple hydroxide (LTH) nanosheets are effectively influences the successful formation of heterojunction. The LTH nanosheets are well spread on the g-C₃N₄ nanosheets combined with r-GO. In particular, the as prepared heterojunction shows a better photocatalytic degradation activity compared to pristine samples and the significant enhancement in the photocatalytic performance is mainly accredited to the large interfacial charge transition of photogenerated charge carriers under the visible light irradiation. Although the 2D/2D/2D heterojunction effectively hinders the charge carrier recombination resulting high photocatalytic activity with good stability. In addition, the r-GO supported LTH/ZnO/g-C₃N₄ heterojunction shows high photo-stability after sequential experimental runs with no obvious change in the dye degradation process. Consequently, the role of active species was investigated over the r-GO/LTH/ZnO/g-C₃N₄ heterojunction with the help of different scavengers.

1. Introduction

In recent years, the environmental pollution devours grow into one of the significant social problems. Various pollutants, including organic and inorganic compounds are cause water pollution. The extensive production and uses of many toxic elements by numerous industries like textile, paint, leather and paper printing industries spoils the quality of water and affects the environment. The dyeing wastes from the fabric manufacturing industries are the major source of water pollution and also causes serious ecological problems. The industries release a pigment/dye and other toxic pollutants are the source of pollution which causes ground and surface water sources. Even though the organic dyes of artificial origin are very stable and non-bio-degradable.

Water bodies are polluted by organic matter, industrial dyes, heavy metals and microbes which are harmful to animals, plants, human beings and other living aquatic organisms (Zhang et al., 2019). Organic dyes are recognized as significant contaminants among various water pollutants, which can cause severe health impact even at low concentrations. In addition to that the direct negative health impacts of existence of dyes in wastewater will minimize water transparency, absorb the existing oxygen molecules, increase biochemical demand for oxygen and hence kill aquatic life. To solve these ecological problems, several methods have been proposed to overcome these environmental problems including numerous biological, chemical and physical methods. Compared to other conventional methods the photocatalytic degradation are highly effective method for the removal of organic pollutants in

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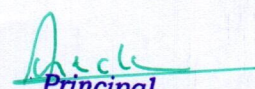
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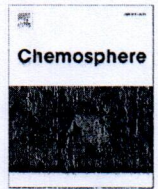
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Au integrated 2D ZnO heterostructures as robust visible light photocatalysts

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 Photocatalyst
 Solar light irradiation
 Methylene blue
 Au/ZnO heterojunction

ABSTRACT

Integration of semiconducting nanostructures with noble metal nanoparticles are turning highly desirable for cost efficient energy and environmental related applications. From this viewpoint, we report on a facile aqueous synthesis of polymer capped gold (Au) nanoparticles on free standing 2D layered structures of zinc oxide (ZnO) to result with ZnO/Au nanocomposites. Concentration of Au nanoparticles were observed to promote the preferential growth of ZnO along the (002) wurtzite plane. The ZnO/Au structures and their morphological dissemination was noted to be of few. This flake like structure was also noted to be greatly influenced by the concentration of Au in the colloidal blend. Optical band edge transformations noted in the absorption spectra across the lower wavelength region and the shift in surface plasmon resonance (SPR) towards the red region of the visible spectrum signify the improved absorptivity of the heterostructures along the visible spectrum. These heterostructures exhibited remarkable visible light driven photocatalytic activity (99% efficiency) on par with pristine ZnO. The findings also attest this new class of composite structures to open up new openings in diversified solar energy conversion related functions.

1. Introduction

Development of highly efficient semiconductors is the foremost task for implementing the solar driven applications in practical. Recently, plasmonic metal nanostructures while integrated with semiconducting materials were recognized as an advanced component for solar energy driven functions (Wu, 2018; Zhang, 2013). Incorporation of plasmonic

noble metal particles in potential semiconductor nanostructures were found to greatly influences the basic electronic properties in semiconductors. To be specific, the band bending phenomenon that occurs across the interface of metal and semiconductor is of crucial importance (Kochuveedu, 2013; Linic, 2011). Additionally, the concept of surface plasmon resonance (SPR) occurring in noble metal particles (e.g., Au, Ag) assist in improvising the absorbance of semiconductor to visible

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absorption. The significant outcome from this work showed that the fluorinated-polymer has more capability for adsorption due to the presence of fluorine-hydrophobic sites while the non-fluorinated polymer has shown almost constant behavior with time.

[Full Text](#)
[2020](#)

Assembly of Ni-Based Metal-Organic Framework through Interconnected Adamantane like Cages

Asha K.S.

Page No. 31-35

[2019](#)
[2018](#)
[2017](#)

Metal-Organic Frameworks (MOFs) are promising class of crystalline materials that have attracted great research interest due to their extraordinary properties such as intriguing architecture and topology, unrivalled degree of tunability and exceptionally large surface area. A Nickel based micro scale Metal Organic Framework (MOF) [Ni(BPE)(BPDC)], 4DMF where BPE is 1,2-Di(4-pyridyl) ethylene and BPDC is Biphenyl-4,4'-dicarboxylic acid, was synthesized through solvothermal synthesis method.

[2016](#)

Structural characterization using X-ray diffraction techniques revealed the crystal to follow "dia" topology with repeating adamantane molecule like units. Another interesting feature observed in the structure was the four-fold interpenetration leading to a compact cage like assembly. The structure was made even more rigid by the presence of solvent molecules in the cage and it imparts stability to the structure.

[2015](#)
[2014](#)
[2013](#)
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[2012](#)

Application potential of chemically modified mixed banana and orange fruit peels as adsorbents for chromium (VI) from aqueous solution

Mamo Kebede, Gupta Neeraj K., Ananda Murthy H.C. and Wondemagegnehu Eshetu Bekele

Page No. 36-49

[2011](#)
[2010](#)
[2009](#)
[2008](#)

Mixed fruit peels of banana and orange modified by using phosphoric acid (H₃PO₄) were investigated as adsorbent for hexavalent chromium Cr (VI) remediation. The powdered peels were mixed in 1:1 ratio to yield mixed banana and orange (RBO) after drying in an oven and powdered to pass a micro sieve (250 μm). A portion of this mixed powder was chemically modified by using H₃PO₄ to yield chemically modified mix of banana and orange (CMBO). The characterization techniques such as infrared, scanning electron and energy dispersive X-ray spectroscopic methods were employed to know the functional group, pore properties and composition of the adsorbents respectively. The residual concentration of chromium was measured at 540nm by UV-VIS spectrophotometer. SEM images confirmed the enhanced adsorption sites in the modified biomass adsorbents. The obtained optimum values of solution pH, dosage, initial concentration and contact time are 2, 0.5 g, 60 mg/L and 60 minutes for the adsorbents respectively. The maximum chromium removal efficiencies obtained for CMBO and RBO are 99.8% and 96.5% respectively. The kinetics data were best fitted to Freundlich adsorption isotherm model for both CMBO and RBO. Results indicated a good fit (R² > 0.97) of the experimental data with the second-order kinetic equation. Moreover, the kinetics result correlated very well with pseudo second order process. The result confirmed that Cr (VI) removal efficiency of fruit peels was enhanced by mixing fruit peel biomass and subsequent chemical modification.

[2007](#)
[2006](#)
[2005](#)
[2004](#)
[2003](#)
[2002](#)
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[2001](#)

Synthesis of novel 2-sulfonyl benzothiazole containing isoxazole derivatives as potent antioxidant and antibacterial agents

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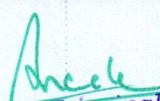
Authors: Sukhendu Mandal, Akashdeep Nath, and Asha K S

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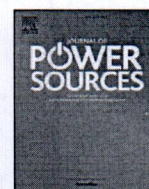

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Compressive strain induced by multiple phase distribution and atomic ordering in PdCu nanoparticles to enhanced ethanol oxidation reaction performance

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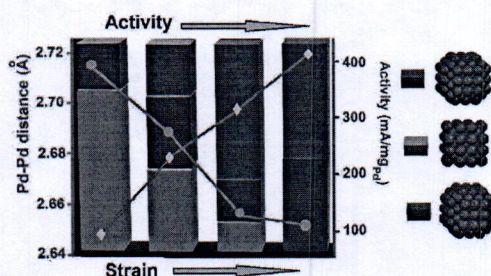
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HIGHLIGHTS

- Multi-phase distribution in Pd_{1-x}Cu_x system were obtained by solvothermal method.
- Atomic ordering and compressive strain introduced upon optimized phase distribution.
- Ethanol oxidation reaction activity and stability enhanced in comparison to Pd/C.

GRAPHICAL ABSTRACT



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Fuel cell
Ethanol oxidation
Structural ordering

ABSTRACT

The catalytic properties of the materials can be altered with different arrangements of atoms, either in ordered or disordered manner. To study this behavior in detail, we have selected compounds based on Pd and Cu with different atomic arrangements and phase distribution. Nanoparticles of Pd_{1-x}Cu_x with different atomic ratios and phase states are obtained by a facile one pot solvothermal method. The multiple combinations of structurally ordered and disordered phases are tuned by optimizing several synthetic strategies, which are qualitatively and quantitatively characterized by X-ray diffraction, X-ray photoelectron spectroscopy, X-ray absorption spectroscopy and transmission electron microscopy measurements. Electrocatalytic ethanol oxidation reaction (EOR) is carried out in alkaline medium for all these synthesized Pd_{1-x}Cu_x nanoparticles. It is observed that the EOR activity and stability are enhanced in comparison to the commercial Pd/C catalyst, which can be attributed to the atomic ordering and compressive strain introduced upon optimized phase distribution.

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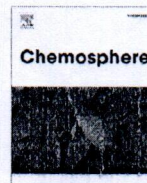
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A facile and green synthesis of CuO/NiO nanoparticles and their removal activity of toxic nitro compounds in aqueous medium

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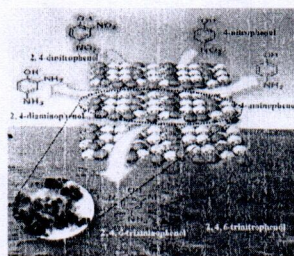
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HIGHLIGHTS

- Mixed bimetal oxide CuO/NiO NPs were synthesized through hydrothermal process.
- The spherical CuO/NiO nano crystals (25 nm) was achieved by calcination process.
- The CuO/NiO NPs completed the reduction of NP, DNP and TNP within 2, 5 and 10 min.
- CuO/NiO NPs showed the excellent kinetic rate constant k value about 1.519, 0.5102, 0.4601 min^{-1} .

GRAPHICAL ABSTRACT



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ABSTRACT

In this present work, we report the green synthesis of mixed bimetal oxides (CuO/NiO) for the efficient reduction of toxic nitrophenols (NP, DNP and TNP) in aqueous medium. The CuO/NiO NPs were synthesized by green hydrothermal method combined calcination process. The physicochemical properties of the synthesized CuO/NiO NPs were systematically characterized by using XRD, XPS, FTIR, SEM, and HR-TEM techniques. The calcinated CuO/NiO NPs XRD pattern and SEM morphology show the high crystalline nature than the non-calcinated. Whereas, the XPS and FTIR results confirmed the formation of the metal oxide bonding and the interaction of the bimetals. The HR-TEM images showed the spherical crystals with average particle size about 25 nm. In addition, the SAED pattern confirmed the polycrystalline nature of CuO/NiO NPs. The catalytic reduction of nitro compounds to amino derivative was studied with reducing agent (NaBH_4). The CuO/NiO NPs showed the high catalytic activity and completed the reduction reaction of NP, DNP and TNP with in 2, 5 and 10 min respectively. In addition, CuO/NiO NPS exhibited the excellent kinetic rate constant k value about 1.519, 0.5102, 0.4601 min^{-1} for NP, DNP and TNP respectively. Furthermore, the conversion product aminophenol was observed for these three nitro compounds. The proposed CuO/NiO NPs showed excellent crystal stability after the nitrophenol reduction reactions. An inexpensive CuO/NiO NPs is a promising catalysts for reduction of toxic nitro compounds to useful products in aqueous or non-aqueous medium.

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Novel Synthesis of Baclofen

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Abstract : Baclofen is a Gama amino Butyric acid (GAMA) agonist used as a skeletal muscle relaxant, it is known to be particularly useful in treating muscle spasticity. We now report the synthesis of Baclofen with patent non-infringing novel route, starting from 4-chlorobenzaldehyde when treated with sodium cyanide gave cyanohydrin with 70% yield. This cyanohydrin on treatment with an oxidizing agent Pyridinium ChloroCromate gave 4-chlorobenzoylcyanide which when further reacted with triphenyl phosphonium ethyl acetate gave a product, which on base hydrolysis followed by catalytic hydrogenation yielded baclofen though in poor yield, the identity of this has been established by mass spectral analysis and confirmed by comparing with standard Baclofen.

Keywords : GABA agonist, Spasticity, 4-Chlorobenzaldehyde, Cyanohydrin, Oxidising agent, Pyridinium chlorochromate, Triphenyl phosphonium ethyl acetate. Hydrolysis, Catalytic hydrogenation, mass spectral analysis and Baclofen.

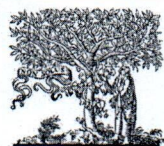
Introduction

The anticonvulsants are a group of drugs primarily used to treat disorders like epilepsy and they are also effective in regulating mood swings that come with bipolar disorder. They act by suppressing the rapid and excessive release of neurons that start a seizure by rejuvenating neurotransmitters in the central nervous system viz., γ -aminobutyric acid (GAMA) and L – Glutamic acid⁽¹⁾. A number of GABA analogues such as Gabapentin, Pregabalin, Levetracetum and 3 – phenibut are used as anticonvulsant. (S) – pregabalin (S – 3 – aminomethyl – 5- methyl hexanoic acid) has more potent than gabapentin in treating anxiety⁽²⁾ and epilepsy^(3,4). The pregabalin synthesis was first reported by Hoeksts et al⁽⁵⁾ in Warner – Lambert laboratories. Methods for the synthesis of racemic pregabalin^(6 – 8) and asymmetric synthesis of pregabalin^(9 – 12) are reported, pregabalin has also prepared by different methods using 5 – methylhexenoate⁽¹³⁾, Lossen rearrangement⁽¹⁴⁾ involvement in the synthesis of pregabalin, Baclofen and 3 – phenbut using 4 – substituted glutaric anhydride as the starting material reported.

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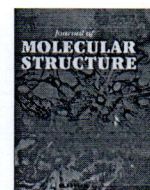
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Synthesis, characterization, pharmacological evaluation and molecular docking studies of benzothiazole azo derivatives

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ABSTRACT

A series of novel benzothiazole based azo dyes were synthesized and fully characterized by using different analytical techniques. The antioxidant activity of synthesized azo dyes was studied with the DPPH, hydrogen peroxide, metal chelating and nitric oxide radical methods and compared with the known antioxidant ascorbic acid. Further, the anticancer properties of synthesized azo dyes were carried out against breast cancer (MCF-7) cell lines by MTT assay and results revealed that the synthesized compounds exhibited good anticancer property in micro-molar range. Additionally, the anti-inflammatory activities of target compounds were also investigated by protein denaturation method and were found to have effective anti-inflammatory property. In order to predict the binding modes and binding affinity of synthesized compounds, they were docked into the active sites of protein B-cell lymphoma-extra-large (Bcl-xL) to predict their anticancer property. The synthesized compounds were found to have good affinity for B-cell lymphoma-extra-large (Bcl-xL). A good correlation was found between in-silico docking analysis and in biological screening of all synthesized azo dyes with less binding energies and higher inhibition constants value against the target protein.

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1. Introduction

When looking up early dyestuff industry, we saw the discovery of the principal dye chromogens employs various amines with benzene analogous [1]. In the last five decades of the dyestuff research trends have been focused on improved cost effectiveness and increased technical excellence in terms of brightness, high tinctorial strength and high fastness properties [2,3]. Therefore, in the earlier decades dyes were generally made by anthraquinone unit have excellent fastness properties. Although, the intrinsic disadvantages of anthraquinone dyes is having less tinctorial strength and production cost is higher [4]. Azo dyes are synthetic organic colorants bearing a chromophoric azo group ($-N=N-$). Commercially, these colorants are the largest and most versatile class of organic dyestuffs. The fine tuned taylor made properties of the azo dyes and their widest usage is due to the number of the variations in the chemical structures of starting materials and the

methods of synthesis and their applications which are generally not complex [5,6]. Azo compounds, containing two phenyl rings separated by an azo ($-N=N-$) bond, are also versatile molecules and have received much attention in both fundamental and applied research areas. It is well known that these are used in many practical applications such as colouring fibers [7], photoelectronics [8], printing systems [9], optical storage technology [10], textile dyes [11] as well as in many biological reactions [12] and in analytical chemistry. Recently, heterocyclic azo dyes have attracted considerable interest and have played an important role in the development of the chemistry of dyes and dyeing process. Many of the heterocyclic azo dyes shows bathochromic shifts combined with brilliance of shade and high tinctorial strength compared with conventional anthraquinone dyes and aminobenzene azo dyes [13]. Among aryl hetero azo colorants, benzothiazole derivatives are relatively recent heterocyclic intermediates for the preparation of azo dyes because benzothiazole based azo dyes produce bright hues and are suitable for dyeing polyester, cotton, nylon fabrics etc.

Further, these classes of dyes have higher tinctorial strength and give relatively brighter hues than those derived from aniline-based diazo components and also provide a pronounced bathochromic

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Electrochemical behavior of Heat treated Al 356 Alloy using N2-phenyl-1, 3, 5-triazine- 2, 4-diamine compound in 3.5% NaCl solution

Rakshitha B.K., Pruthviraj R.D. and Prasanna Kumar S.G.

Page No. 59-65

In the present research work, corrosion behavior of heat treated Al 356 alloy in 3.5% NaCl with and without heat treatment in different concentration of inhibitors is studied. Rectangular specimen 2cm X 1cm X 1mm was subjected heat treatment for 2h, 4h and 6 hours in Muffle furnace at 5500C. The specimen were tested for corrosion characterization of Electrochemical studies test. The result obtained is compared with heat treated and non-heat treated specimen. It was found that the heat treated specimen exhibits excellent corrosion Resistance when compared to non-heated specimen.

[Full Text](#)

Synthesis, spectral studies and antimicrobial evaluation of bivalent transition metal complexes of NNO donor hydrazone ligands

Sudesh and Sonika

Page No. 66-74

The complexes of transition metals have been developed by the reaction of metal chlorides of Zn(II), Ni(II), Co(II), Cu(II) with the three Schiff base hydrazones named as 4-methyl-benzoic acid (phenyl-pyridin-2-yl-methylene)-hydrazide [L-1], 2-nitro-benzoic acid (phenyl-pyridin-2-yl-methylene)-hydrazide [L-2], 2-nitro-benzoic acid (methyl-pyridin-2-yl-methylene)-hydrazide [L-3] The ligands were synthesized by reacting 2-benzoyl pyridine and 2- acetyl pyridine with derivatives of benzhydrazide. The synthesized ligands and metal complexes were analysed by using various spectroscopic methods like IR spectroscopy, Proton-NMR, 13C-NMR, ESR, mass spectrometry, electronic spectroscopy and elemental analysis. Thermogravimetric analysis of the complexes was also done to examine their thermal behavior.

It has been observed that the linkage with metal occurs through two nitrogen and one oxygen atoms present in the ligand. The antifungal and antibacterial activities of the synthesized Schiff base hydrazone ligands and their metal complexes were also assessed against number of bacterial species like gram negative Escherichia coli, gram negative Pseudomonas aeruginosa, gram positive S. aureus, gram positive B. subtilis and two fungi namely C. albicans, A. niger. The results of antimicrobial activity reveal that all the metal complexes have better inhibitory action against complete range of the tested microorganisms as compared to the parent free ligands.

[Full Text](#)

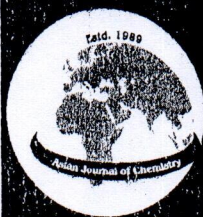
Geochemical Signatures and Chemical Toxicity Assessment of Groundwater Uranium in the Agricultural Dominated Tehsil after Indian Summer Monsoon

Pandey Shwetank Shashi, Singh Bholey, Barwa Manjeet Singh, Gautam Y.P. and Pani Balaram

Page No. 75-82

The present study deals with the determination of uranium in drinkable groundwater samples by LED fluorimeter, contour analysis, PCA analysis and chemical toxicity assessment. The concentrations were found to be between 0.11 to 39.76 ppb with an average of 4.78 ppb. 7.14 % of samples exceed the WHO limits (30 ppb).

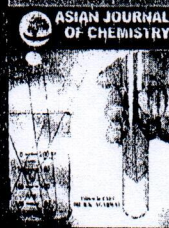
The calculated maximum hazard quotient was 0.64 which lies in the safe range value. Mean LADD was observed



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Role of NH_4Cl as Flux on Photoluminescence Properties of $\text{Ca}_{1-x}\text{ZrO}_3:\text{Eu}_x$ ($x = 0.05$) Synthesized by Solution Combustion Route

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CaZrO_3 ceramics exhibits high chemical, thermal and structural stability. However, its application as a host for various luminophores/activators has not been clearly explored. In present study, CaZrO_3 doped with Eu^{3+} , as a potential orange-red phosphor and the effect of NH_4Cl as flux during combustion synthesis is investigated. $\text{Ca}_{1-x}\text{ZrO}_3:\text{Eu}_x$ ($x = 0.05$) nanophosphor was prepared through a low temperature, one pot solution combustion synthesis approach using glycine as fuel. Various wt.% of NH_4Cl (wt.% = 0, 1, 3, 5, 7) as flux added to the reaction mixture and combustion reaction was performed. X-ray diffraction results showed that the addition of flux has significant effect on the crystallite size and the crystallinity of $\text{Ca}_{1-x}\text{ZrO}_3:\text{Eu}_x$ ($x = 0.05$) phosphor. From SEM morphology, the particles were found to be significantly agglomerated. The extent of agglomeration varies with varying the wt.% of flux. The photoluminescence excitation and emission spectra were recorded under similar condition to evaluate the effect of flux on the optical properties. Interestingly, the amount of flux was found to have significant effect on the photoluminescence emission characteristics. The photoluminescence intensity was found to be the maximum when the flux used was 5 wt.% and further increase in flux amount the photoluminescence intensity decreases. The mechanistic aspects of effect of flux on the photoluminescence were also discussed.

Keywords: Calcium zirconate, Solution combustion, Photoluminescence, Flux.

INTRODUCTION

Current phosphors in use for various applications are mostly made of inorganic materials, owing to easier production, better stability and cost effectiveness. Proven that the low temperature synthesis is the most desired due to economic considerations, the material requires calcination or annealing at high temperatures post synthesis for phase formation [1,2]. Hence, work on ceramic based host materials are of the most importance as the material offers better resistance to degrade in terms of thermal and mechanical aspects. CaZrO_3 as a choice of host in this work is not only a ceramic but also a perovskite. Inherently disordered perovskites tend to exhibit some distinct excitation and emission due to the defects in the perovskite phases [3]. Oxide phosphors are more thermally stable and most likely used in applications such as field emission and plasma panel displays

[4]. These are the reasons which makes CaZrO_3 an interesting host material.

The absorption of incident energy in phosphors is done by either the host material or the intentionally doped impurity. The doped impurity is also known as the localized emission center. The impurity is chosen as a dopant, usually a transition metal ion or a rare earth ion. Rare earth ions are more preferable over the transition metal ions as in case of former the f -electron energy level responsible for the luminescence, which are shielded from the external fields by outer shell s - and p - electrons, in contrast in transition metal ions the outer d - electrons are affected by crystal electric fields [5]. Rare earth doped phosphor materials also enhance the performance of the devices in many cases [6]. Hence, the rare earth doping is considered as important for luminescent materials.

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Dr. Hareesh Kumar P



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Novel Synthesis of Baclofen

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Abstract : Baclofen is a Gama amino Butyric acid (GAMA) agonist used as a skeletal muscle relaxant, it is known to be particularly useful in treating muscle spasticity. We now report the synthesis of Baclofen with patent non-infringing novel route, starting from 4-chlorobenzaldehyde when treated with sodium cyanide gave cyanohydrin with 70% yield. This cyanohydrin on treatment with an oxidizing agent Pyridinium ChloroCromate gave 4-chlorobenzoylcyanide which when further reacted with triphenyl phosphonium ethyl acetate gave a product, which on base hydrolysis followed by catalytic hydrogenation yielded baclofen though in poor yield, the identity of this has been established by mass spectral analysis and confirmed by comparing with standard Baclofen.

Keywords : GABA agonist, Spasticity, 4-Chlorobenzaldehyde, Cyanohydrin, Oxidising agent, Pyridinium chlorochromate, Triphenyl phosphonium ethyl acetate. Hydrolysis, Catalytic hydrogenation, mass spectral analysis and Baclofen.

Introduction

The anticonvulsants are a group of drugs primarily used to treat disorders like epilepsy and they are also effective in regulating mood swings that come with bipolar disorder. They act by suppressing the rapid and excessive release of neurons that start a seizure by rejuvenating neurotransmitters in the central nervous system viz., γ -aminobutyric acid (GAMA) and L - Glutamic acid ⁽¹⁾. A number of GABA analogues such as Gabapentin, Pregabalin, Levtracetum and 3 - phenibut are used as anticonvulsant. (S) - pregabalin (S - 3 - aminomethyl - 5- methyl hexanoic acid) has more potent than gabapentin in treating anxiety ⁽²⁾ and epilepsy ^(3,4). The pregabalin synthesis was first reported by Hoeksts et al ⁽⁵⁾ in Warner - Lambert laboratories. Methods for the synthesis of racemic pregabalin ^(6 - 8) and asymmetric synthesis of pregabalin ^(9 - 12) are reported, pregabalin has also prepared by different methods using 5 - methylhexenoate ⁽¹³⁾, Lossen rearrangement ⁽¹⁴⁾ involvement in the synthesis of pregabalin, Baclofen and 3 - phenbut using 4 - substituted glutaric anhydride as the starting material reported.

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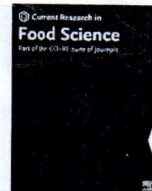
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Resveratrol, cancer and cancer stem cells: A review on past to future

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ABSTRACT

Cancer remains to be an unresolved medical challenge despite of tremendous advancement in basic science research and clinical medicine. One of the major limitations is due to the side effects of chemotherapy which remains to be palliative without offering any permanent cure for cancer. Cancer stem cells (CSCs) are the sub-population of cells in tumors that remain viable even after surgery, chemo- and radio-therapy that eventually responsible for tumor relapse. Hence, by eliminating non-stem cancer cells and cancer stem cells from the patient, permanent cure is expected. Phytochemicals have been under the intensive study to target these CSCs effectively and permanently as they do not cause any side effects. Resveratrol (RSV) is one such compound attaining lot of interest in recent days to target CSCs either alone or in combination. RSV has been used by several researchers to target cancer cells in a variety of disease models, however its CSC targeting abilities are under intensive study at present. This review is to summarize the effects of RSV under *in vitro* and *in vivo* conditions along with advantages and disadvantages of its uses against cancer cells and cancer stem cells. From the first reports on phytochemical applications against cancer and cancer stem cells in 1997 and 2002 respectively followed by later reports, up to date observations and developments are enlisted from PubMed in this comprehensive review. RSV is shown to be a potential compound having impact on altering the signal transduction pathways in cancer cells. However, the effects are variable under *in vitro* and *in vivo* conditions, and also with its use alone or in combination with other small molecules. Past research on RSV is emphasizing the importance of *in vivo* experimental models and clinical trials with different prospective combinations, is a hope for future promising treatment regimen.

1. Introduction

Resveratrol (RSV), is 3,4',5 - trihydroxy stilbene, a phytoalexin is widely distributed in variety of plants including red grapes, berries, peanuts, etc. Highest levels of RSV are found in Japanese knotweed (*Polygonum cuspidatum*) and muscadine grapes (*Vitis rotundifolia*) (Shrikanta et al., 2015). Though its occurrence is widely distributed about more than 70 plant species, its bioavailability is challenging upon its consumption (Gambini et al., 2015). Tome-Carneiro et al. (2013) have further shown, different levels of RSV concentrations are attributed for differential health impacts. Szekeres et al. (2010) in their review demonstrated that, due to the presence of three hydroxyl groups, it was

known to act as a potent anti-oxidant by interfering with intracellular redox signaling. In many studies with different model organisms, RSV is shown to increase healthy life span mediated by SIRT1 (NAD-dependent deacetylase sirtuin-1) (Bhullar and Hubbard, 2015). RSV can reduce inflammatory stress through its effects on mitochondria. It activates a group of mitochondrial proteins of sirtuin family, particularly SIRT1. Lagouge et al. (2006) had shown that activation of sirtuin family protein can in turn related to the blood sugar stabilization in the body.

RSV effects on nitric oxide cycle were well known, through which it maintains the health of immune, nervous and vascular system. Nitric oxide in the body is synthesized by the enzyme Nitric Oxide Synthase (NOS) which has a critical role in inflammation. NOS can occur in

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Fluorescence studies of Lanthanum (III) complexes of N, N' bis-(alkyl/aryl)-substituted oxamides and phenanthroline bases

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Abstract

The photoluminescent properties of the Lanthanum complexes greatly depend on the nature and geometry of the coordinated ligands. The fluorescence ability is induced to the non-luminescent lanthanum metal complex by coordinating chromophoric ligands such as substituted oxamides. These oxamides containing auxochromic groups such as O, N through amide bonds sufficiently induce fluorescence to the La(III) metal ion through ligand to metal charge transfer. Of all the synthesized complexes, La(oxae)(phen)](NO₃)₃ was found to be highly luminescent complex with quantum efficiency reaching almost to unity.

Among all the tested La(III) complexes, mononuclear La(III) complexes show good fluorescence efficiency than hetero-binuclear La(III) complexes. Also, fluorescence efficiency of the complexes was found better in solid state rather than in DMF.

Keywords: Lanthanum(III) complex, alkyl/aryl substituted oxamides, quantum efficiency.

Introduction

Luminescence is a physical phenomenon in which light emits by stimulation of the absorbed energy. This can be of any kind: photoluminescence, thermoluminescence, bioluminescence, chemiluminescence or electroluminescence. Photoluminescence is the emission of energy in the form of photons due to the absorption of light. Photoluminescence is basically of two types: fluorescence and phosphorescence. "Fluorescence" is spin allowed emission which occurs without change in spin, typically S₁ → S₀ and for "phosphorescence" transitions implying a change in spin, typically T₁ → S₀.

The electronic configuration of the lanthanide (Ln) atoms and their derived ions in aqueous solutions is their trivalent state Ln^{III} ([Xe]4fⁿ, n = 0 – 14) due to various degrees of stabilization experienced by the 4f, 5d, and 6s orbitals upon ionization. The shielding of the 4f orbitals by the filled 5p⁶6s² sub-shells results in parity-forbidden 4f – 4f absorptions having very low molar absorption coefficients (typically < 3 M⁻¹ s⁻¹) and characteristic narrow-line emission, mostly in the visible and near infrared ranges.^{1,2} Since Ln based metal ions are weak emitters as the f-electrons are shielded by 5p⁶6s² subshells, they require a

linker or chromophoric organic molecules to enhance the emission by transferring their energy. These linkers are generally organic molecules with conjugated aromatic system. When chromophores such as N,N-heterocyclic bases coordinate to Ln(III) ion, they function as UV-light collectors. These ligands absorb light in the UV-region, can sufficiently transfer their energy into the excited energy levels of lanthanide ions by a process called "antenna effect" through coordination. For the efficient transfer of energy, the ligand triplet energy states must closely match or slightly above the metal ion's resonance energy levels.^{3,4}

The unique physical properties of Ln(III) ions are greatly dependent on geometrical and molecular structures of their complexes. The overall quantum yields depend on the sensitivity of the 4f-excited states to the coordinating chromophoric groups bearing N, O and C–H oscillators which suppress non-radiative deactivation and also enhance efficient energy transfer between the antenna and the coordinating Ln(III) ions.⁵⁻⁸

The sensitization of the Ln(III) ions using ligands containing O, N atoms has resulted in high quantum efficiencies that can be employed in the field of various immunoassays and hybridization technology by probing the former with various antibodies. The luminescent materials have long lifetime (millisecond) and narrow width emission bands. They are hypersensitive to the change in coordination environment⁹.

The luminescent Ln(III) complexes are of considerable interest in current research as they find their potential applications in the field of chemo and bio sensing technology, labeling probes in cellular and bioimaging, contrast agents in MRI technology and organic light emitting diodes (OLEDs).^{10,11} The luminescent Ln(III) complexes are also utilized in labeling nucleic acids/ proteins and thus are proved to be efficient diagnostic tools in biological field.^{1,9,12,13} Among rare earth complexes, La(III) complexes are less employed in the field of luminescent technology because of the absence of f–f electronic transitions.

Only very few reports on luminescent properties of La(III) complexes are available. La(III) complexes containing salen moiety¹⁴, 2,2'-bipyridine-3,3'-dicarboxylic acid¹⁵, bis(oxazolinyphenyl)amide¹⁶, Schiff bases⁵ etc. have shown significant fluorescence properties. La(III) ions when doped with other cations such as Eu(III), Tb(III) and Cd(II) have enhanced their luminescence properties.^{17,18}

Antioxidant Analysis and Phytochemical Screening of *Colocasia Esculenta* Leaf Extract

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Abstract:

Aim: To analyse and understand the antioxidant activity and phytochemicals present in the *Colocasia esculenta* leaf extract.

Materials and Methods: The *Colocasia esculenta* leaves were taken from Indian Institute of Horticulture Research (IIHR), Bangalore. Free radical scavenging activities of the extract was assessed using FRAP, DPPH and ABTS scavenging assay. Phytochemical screening was carried out on the aqueous, methanolic, acetone and petroleum ether extract of the leaves.

Results: The antioxidant property of leaf extracts were confirmed by their excellent free radical scavenging activity. The phytochemical analysis of all the four extracts showed the presence of alkaloids and proteins.

Conclusion: Various phytochemicals present in the *Colocasia esculenta* leaf extracts may contribute to the free radical scavenging and other pharmacological activities.

Key words: Antioxidant, *Colocasia esculenta*, Medicinal plant, Phytochemicals.

INTRODUCTION:

Plants play a significant role in maintaining human health and enhancing the quality of life since long and have been beneficial to human because of their potential uses as alternative remedies for the treatment of many infectious diseases and also served as valuable components of medicine, seasonings, beverages, cosmetics, and dyes [1]. They have always been used as a common source of medicaments, may be either in traditional preparations or as pure active principles forms which are referred to be Medicinal plants [2]. The medicinal plant extracts have wide range of scope in the biological activities thus forming the basis for the drug discovery [3]. Extracts from plant source are used in the treatment of cardiovascular diseases, central nervous system, liver and other metabolic disorders [1]. The ethno botany provides a rich sources for the drug discovery and drug development. The emphasis on the use of the plants is on the treatment than the prevention of diseases [4].

One such medicinal plant that is known to us as a potential medicinal herb is *Colocasia esculenta* Linn, commonly known as Taro. *Colocasia esculenta* Linn. is a tall herb, tuberous or with a stout short caudex, flowering and leafing together. Various parts of *Colocasia esculenta* are traditionally used to treat many diseases, is a green leafy vegetable which is rich in proteins, carbohydrates and vitamins and microminerals like iron, potassium, zinc etc., [5]. It is commonly known as "Taro" in (English), Arvi, Kachalu (Hindi), Alupam, Alukam (Sanskrit) and also known as *Arum esculentum* L. and *Colocasia antiquorum* Schott which belongs to the Araceae family which is an annual herbaceous plant. The plant is known for its medicaments of various ailments like asthma, arthritis,

diarrhea, internal hemorrhage, neurological disorders and skin diseases [1]. The parts used mainly are Leaves and Corms. The juice extract of corm of *Colocasia esculenta* is use for baldness, stimulant, expectorant, used to arrest arterial hemorrhage and as a body pain reliever [1]. The taro tuber is rich in carbohydrates, proteins however low in the fat content. The starch which is gluten free present in the Taro are fine and small which can be easily digested. It is also noted that the Vitamin B-complex present in the Taro is greater than the whole milk [6]. The objective of the present study was to assess the free radical scavenging activities Ferric Reducing Antioxidant Power (FRAP), 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid (ABTS) assay identifying the phytochemicals present in the methanolic, acetone, petroleum ether, water extract of *Colocasia esculenta* leaves by qualitative analysis.

MATERIALS AND METHODS

Collection of Sample

The *Colocasia esculenta* leaves were bought from the fields of Indian Institute of Horticulture Research (IIHR), Hessaragatta Road, Bangalore. It was authenticated by a Botanist, from the Department of Botany, Bangalore University, Bangalore.

Sample Preparation

Colocasia esculenta leaves were washed thoroughly with distilled water and were cut into small pieces. Then the leaves were dried at room temperature for 48 h. The dried leaves were then crushed using a mixer to a fine powder and stored at room temperature for further analysis. Approximately 20 g of powder was obtained from 100 g leaves.

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A Review on Intimidation of E-tool in Pandemic

Dhanashri Vaishali, Lakshmi pathi V, Naveen Kumar. R, Prathiba V K

Abstract

In the period of Science and innovation where individuals are compelled to remain at home because of the flare-up of pandemic Covid-19, we locate an uncommon requirement for the electronic substance to be given to the students to make them more educated with more intuitive apparatuses without leaving their homes for example by sitting in their home itself they can share/gain information. There are heaps of mechanical gadgets accessible in the field of Teaching and learning. This paper with the title "E-Content improvement The Urge of time" centers around the requirement for the advancement of electronic substance which makes instructing and learning measure intelligent and fascinating. It additionally centers around the fundamental things to be remembered while building up the E-Content.

Full Text:

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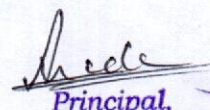
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Title of the Monograph: Green Channel Logistics and Analytics

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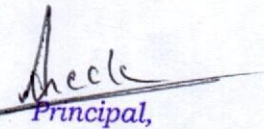
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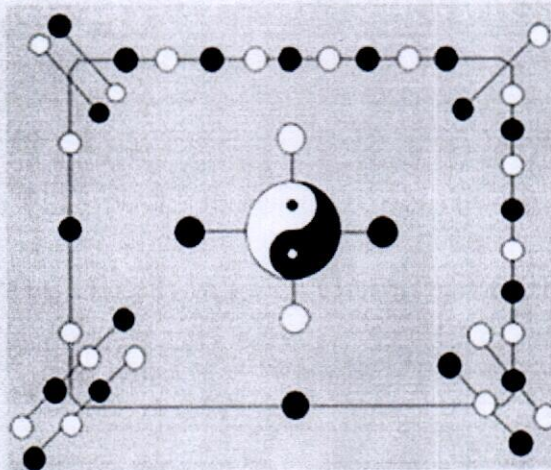
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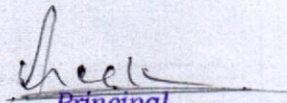
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A Proof of Reciprocity Theorem by Use of Loop Integrals

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Abstract: In this paper, we give a proof of the reciprocity theorem of Ramanujan using loop integrals.

Key Words: Reciprocity theorem, loop integrals, residue calculus.

AMS(2010): 33D15, 32A27.

§1. Introduction

In his lost notebook [12], Ramanujan recorded the following beautiful reciprocity theorem

$$\rho(a, b) - \rho(b, a) = \left(\frac{1}{b} - \frac{1}{a} \right) \frac{(aq/b, bq/a, q)_{\infty}}{(-aq, -bq)_{\infty}}, \quad (1)$$

where

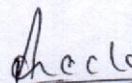
$$\rho(a, b) = \left(1 + \frac{1}{b} \right) \sum_{n=0}^{\infty} \frac{(-1)^n q^{n(n+1)/2} a^n b^{-n}}{(-aq)_n}$$

and a, b are complex numbers other than 0 and $-q^{-n}$. Throughout this paper, we assume $|q| < 1$ and employ the customary notations

$$(a)_{\infty} := (a; q)_{\infty} := \prod_{n=0}^{\infty} (1 - aq^n),$$
$$(a)_n := (a; q)_n := \frac{(a)_{\infty}}{(aq^n)_{\infty}}, \quad n \text{ is an integer.}$$

The first proof of (1) was given by Andrews [2] by employing his four-variable identity and the well-known Jacobi's triple product identity which is a special case of (1). Somashekara and Fathima [13] used Ramanujan's ${}_1\psi_1$ summation formula and Heine's transformation formula to establish an equivalent version of (1). Bhargava, Somashekara and Fathima [5] provided another proof of (1). Kim, Somashekara and Fathima [10] gave a proof of (1) using only q -binomial theorem. Guruprasad and Pradeep [8] also have devised a proof of (1) using q -binomial theorem.

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INFLUENCING SOCIAL MEDIA TO DRIVE THE BUSINESS AND THE ECONOMY

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ABSTRACT

Business is among the most important activities that drive the country's economy. If there is a tool that can drive business, the said tool, by extension, will drive the economy too. One such tool which has emerged lately but swiftly is social media. It is a tool that is seemingly rooted in egalitarian principles since it gives equal opportunities to all the stakeholders associated with it – be it the marketer, be it the customer, potential or existing, be it the government, be it the local community, etc. An emerging market economy (EME) like India which is always on the lookout for opportunities to grow its economy through its business community, among other things, will therefore ignore social media at its own peril. The researcher, through this study, seeks to identify the factors that justify the statement that social media, through business promotion, can drive the country's economy. Further, the researcher infers that there is a flip side to the promotion of business undertaken through the social media route. The researcher concludes that marketers should be careful before disseminating any content that seeks to promote business through the social media. Otherwise the business concerned may end up achieving the opposite of what it intended to achieve in the first place.

Key words: democratic; flip side; social media; dissemination

1.1 Theoretical background of the problem

Social media has virtually emerged as a virtual forum that can accommodate the views of all stakeholders associated with society and their various activities. Remindful of egalitarian ideals, it ensures free and seamless flow of information across the said stakeholders. Unbelievably these efforts do not involve any cost and what is more, the information flow occurs in real time. Judicious exploitation of social media would therefore be of great help to all the stakeholders associated with the society and the country the society is part of.

1.2 Statement of the problem

A lot has been said about social media's potential to drive the country's economy by revving up the country's business, among other things. However, social media can also harm the business community as a whole or the individuals associated with the business concerned, if the stakeholders associated with it are not careful while exploiting social media to grow their business. It could even prove counterproductive. Hence a careful scrutiny of the issues involved is called for so the business and by extension the economy of the country it operates in, can be promoted in a healthy manner to the advantage of all stakeholders.

1.3 Review of literature

1. Social listening refers to the marketer making a note of the comments being made about the brand concerned (Emily, 2016).
2. Facebook India is helping brands convert campaigns and ads posted on its platforms to business in its drive to become even more productive to its advertisers (Shelley, 2016).

Exploration and evaluation of bioactive phytochemicals against BRCA proteins by *in silico* approach

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Communicated by Ramaswamy H. Sarma

ABSTRACT

The proteins encoded by the two major breast cancer genes (BRCA1 and BRCA2), ensure the stability of DNA and prevent uncontrolled cell growth; mutation of these genes is linked to the development of hereditary breast cancers. Exploration of human breast cancer inhibitors plays a vital role in the drug discovery process. In the current work, *in silico* studies were performed which involves a computational approach for the identification of active phytochemicals from the diverse set of medicinal plant products against the BRCA receptor. The *in silico* study through pharmacokinetics and pharmacodynamics properties shown promising outcomes for these phytochemicals data set as breast cancer inhibitors. It was observed that the compounds conformed to the Lipinski's rule of five and had good bioavailability. The drug-likeness model score and ADMET profile of the designed ligands also established their potential as a drug candidate. The docking study provided useful insights on potential target-lead interactions and indicated that the newly designed leads had a good binding affinity for BRCA targets. A pharmacophore model was built to explore the scaffolds for BRCA inhibitory activity. An effort is made to screen an inhibitor against BRCA targets by combining the use of ADMET, docking score, and pharmacophore model.

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Received 23 May 2020
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KEYWORDS

Phytochemicals; docking; drug-likeness; *in silico*; BRCA; anti-breast cancer; ADMET



1. Introduction


Cancer is projected as the leading cause of death worldwide. There were an estimated 18.1 million new cancer cases and 9.6 million deaths due to cancer as reported in 2018. Among females, breast cancer is the most commonly diagnosed cancer and it is the primary cause of cancer mortality, followed by colorectal and lung cancer (Bray et al., 2018). Most of the new cases are frequently found to be female breast cancer in the majority of countries and cervical cancer is the primary cause in remaining countries. In developed and developing countries, the mortality profile of women is heterogeneous with respect to breast and cervical cancer (Bray et al., 2018). The incidence of breast cancer in India is expected to be more than 90,000 in the coming years and over 50,000 women die each year (Suganya et al., 2014). There is a significant increase in the incidence and cancer-associated illness and mortality in the Indian subcontinent as pronounced in global and Indian studies. Earlier cervical cancer was the most commonly found cancer in Indian women but now the incidence of breast cancer has surpassed cervical cancer and is the leading cause of cancer deaths (Malvia et al., 2017).

Breast cancer is characterized by the uninhibited growth of malignant abnormal cells. Epithelial tissues are the most affected part of the breast due to cancer. Identification and

early detection of breast cancer through signs or symptoms had helped in the reduction of the mortality rate of the disease. In the case of women carrying breast cancer susceptibility gene type 1 (BRCA1) mutations, the risk of having breast cancer in their lifetime was found to be at 80%, on the other hand in the case of breast cancer susceptibility gene type 2 (BRCA2) variant the breast cancer risk stands at about 6% (Ikhuoria & Bach, 2018). BRCA1 and BRCA2 play a crucial role in maintaining genome integrity by repairing double-strand DNA breaks, through homologous recombination repair (HRR) pathway. Mutations in BRCA1 and BRCA2 genes cause functional disruption of BRCA proteins, which play a crucial role at a higher risk of developing breast and ovarian cancer in women (Godet & Gilkes, 2017, Sukanya et al., 2018).

There are various treatments available to cure cancer such as chemotherapy, radiotherapy, and chemically derived drugs. The U.S. Food and Drug Administration (FDA) has approved the use of Lynparza (Olaparib) for the treatment of metastatic and tumour in breast cancer patients, that have specifically inherited BRCA gene mutations. Treatments such as chemotherapy can put patients under a lot of strain and further damage their health (Greenwell & Rahman, 2015). Regardless of their initial efficacy, the majority of the patients develop acquired resistance to the therapy, along with major

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In silico screening of phytochemicals to explore potent anti-breast cancer inhibitors against estrogen receptors

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Abstract

Breast cancer is the second most common cancer across the globe, there is a need for the development of effective therapeutic agents. Current computational studies play a significant role in identifying new leads for disease treatment. This study was performed to screen the effective bioactive molecules against estrogen receptors. A dataset of plant-based natural anti-breast cancer compounds was selected. Molecular docking was performed to estimate the spatial affinity of target compounds for the active sites of the estrogen receptor. The *In silico* ADMET studies were performed for the lead molecules. Results showed that Genistein, Daidzein and Panaxadiol are having the best docking score and good binding affinity than other ligands. Hence, Genistein, Daidzein and Panaxadiol can be considered as a better drug candidate for anti-breast cancer inhibitors against estrogen receptors which can be explored further.

Keywords: ADMET, breast cancer, estrogen receptor, molecular docking, phytochemicals

1. Introduction

Breast cancer is strangely common among the population across the globe. An estimated 2.1 million cancer cases accounted for in 2018, found to be a fifth leading cause among cancer mortality worldwide. A ratio of persons suffering from breast cancer to healthy population was found to be 1 out of every nine women among the developed nations and 1 in every 20 persons in less developed nations as reported in 2018 (Dolatkhah, *et al.*, 2020) [9]. Different types of breast cancers exist, few may have hormone receptors like estrogen or progesterone (others may have both) and are called ER+ or PR+ breast cancer, respectively. The main driver among, the majority of breast cancer cases is the estrogen receptor ER since it is found to exist among 75% of overall breast cancer cases (Masoud and Pagès, 2017) [17].

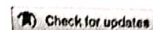
For the normal female physiology, reproduction and behavior, the steroid hormone estrogen is essential, because of its effects on cellular processes together with cell proliferation and cell survival. The nuclear estrogen receptors (ER α and ER β) facilitate these effects. The ER α and ER β estrogen receptors are encoded by separate genes, positioned on different chromosomes. ER α -positive cells make a vital involvement in mammary development. On the contrary, normal development happens for the mammary glands of ER β mice. When the two receptors are co-expressed in breast cancer cell lines, ER β functions as an adversary of ER α , harming the ability of estrogen to arouse proliferation. Minimum 70% of the breast cancers are categorized as ER-positive breast cancers and meddling with estrogen action has been a linchpin of breast cancer therapeutics for over a century (Musgrove and Sutherland, 2009) [18].

Herbal medicine has turned out to be a very safe, non-toxic, and easily accessible source of compounds used in cancer treatment. Phytochemicals are thought to counteract the effects of diseases in a body due to the possession of various

biomolecular characteristics (Khan, *et al.*, 2020) [12]. Exploration of human breast cancer inhibitors executes a vital part in the drug discovery method. Based on previous *in silico* studies, a review shows that 131 phytochemicals were selected from 51 plant families (Prabhavathi, *et al.*, 2020) [23]. These plant families comprises Apocynaceae (Richard, *et al.*, 2015; Omogbadegun, 2013) [25, 19]. And Euphorbiaceae family (Dasaroju and Gottumukkala, 2014) [7]. Has got 4.58% of plant compounds from each family respectively, followed by Lamiaceae has got 6.10% phytochemicals (Akhtar and Swamy, 2018; Kim, *et al.*, 2016; Preethi and Padma, 2016; Woźniak, *et al.*, 2015; Wang, *et al.*, 2012) [1, 13, 24, 28, 27]. From Asteraceae family, 9.92% of plants compounds (Omogbadegun, 2013; Csupor-Löffler, *et al.*, 2011) [19, 3]. And rest of the compounds are grouped as other plant families (Lee, *et al.*, 2017; Levitsky and Dembitsky, 2015; Pierpaoli, *et al.*, 2015; Gladys, *et al.*, 2013; Bhoopat, *et al.*, 2011) [14, 15, 20, 10, 3]. From these plants, the active phytochemicals were identified from a varied set of medicinal plants as anti-breast cancer agents.

Virtual screening thousands of compounds is made possible using the *in silico* approaches, in a very reasonable time. This drastically reduces the costs involved in the identification of hits and further increasing the probabilities of finding the anticipated drug candidates. One of the widely popular and systematic structure-based *in silico* methodology is molecular docking studies. Molecular docking is among one of the most popular and successful structure-based *in silico* methods, which help predict the interactions occurring between molecules and biological targets. It helps to find the interactions happening among the molecules and biological targets. This methodology is normally achieved by first predicting the molecular orientation of a ligand within a receptor, and then assessing their complementarity through the use of a scoring function (Pinzi and Rastelli, 2019) [22]. This study aims at screening a set of phytochemicals which could inhibit ER. The study

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Molecular docking and dynamic simulation to identify potential phytochemical inhibitors for EGFR and HER2 as anti-breast cancer agents

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ABSTRACT

Breast cancer is the most prevalent cancer in women worldwide. To treat human breast cancer by inhibiting EGFR and HER2 targets is an important therapeutic option. Phytochemicals are found to have beneficial health effects in treating various diseases. An effort has been made to virtually screen phytochemical inhibitor by molecular docking and dynamic simulation in the current studies. The docking scores analysis resulted in a common hit Panaxadiol ligand with a low dock score for EGFR and HER2 targets. The inhibitory action of the phytochemicals was also validated by comparing it with the reference compounds Erlotinib for EGFR and Neratinib for HER2. Molecular dynamic simulation of EGFR and HER2 lead complexes ensure the ligand's appropriate refinement in the dynamic system. The target and ligand complex interaction motif established a high affinity of lead candidates in a dynamic system similar to molecular docking results. This study reveals that Panaxadiol hit molecule can be developed as a novel multi-target EGFR and HER2 target inhibitor with greater potential and low toxicity.

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KEYWORDS

Breast cancer; EGFR; HER2; molecular docking; molecular dynamic simulation



1. Introduction

Breast cancer is one of the widespread types of cancer in women and accountable for the high number of cancer mortality cases worldwide. Every year ~1.7 million people are identified with breast cancer, and >0.5 million women die from breast cancer worldwide (Ren et al., 2020). Breast cancer is a diversified disease mainly of three types, the first being hormone receptor-positive breast cancer includes 60% in the presence of Estrogen receptor (ER) and Progesterone receptor (PR). The second type consists of 15–20% of cases in the presence of Human Epidermal growth factor Receptors 2 (HER2), belongs to HER family such as HER-1, HER-2, HER-3, and HER-4 and the third type is triple-negative breast cancer (TNBC) which lacks ER, PR, and HER2 receptors (Tripathi et al., 2018). Highly significant HER protein families are most widely considered protein-tyrosine kinase due to their role in cell proliferation, differentiation, and migration, leading to several downstream signaling pathways. Breast cancer is caused by overexpression, aberration, mutation, and abnormal signal transduction in HER protein.


The widely discussed first member of HER family protein is the epidermal growth factor receptor (EGFR/HER1) because of its role in cell signaling and oncogenesis (James &

Ramanathan, 2018). It is 170 kDa glycoprotein and plays a significant role in signal transduction involving apoptosis and cell proliferation. EGFR gene amplification results in the overexpression and deregulation of signaling pathways. Cell growth, development, cell migration, and metastasis were influenced by overexpression and genetic mutation on EGFR (Singh & Bast, 2014). In the natural progression of breast cancer development, HER2-overexpression tumors also play an important role. The HER2-HER3 heterodimer triggers an oncogenic signaling pathway and is extensively activated in different human cancers. Downstream signaling pathways that mediate HER2 and its tumorigenic functions are complex. As a result, HER2 was considered a major target for anti-cancer drug development (Iqbal & Iqbal, 2014).

HER-2 positive breast cancer treatment is more effective with the use of both EGFR and HER-2 targets inhibitors. The limitations of the single target treatments are overcome by multi-target therapeutics. Multi-target drug therapy is more effective and less susceptible to resistance (Tripathi et al., 2018). Gefitinib, Erlotinib, Afatinib, and Osimertinib are Tyrosine kinase inhibitors that specifically target EGFR and are currently approved by the FDA. These four drugs are associated with adverse effects that can effectively impact

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सकारात्मकता और सतर्कता: कोरोना से बचने के उपाय

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क्या कोरोना के आतंक को भी हम सकारात्मकता में बदल सकते हैं? आज हमारी पीढ़ी डर के माहौल में जीवन ब्यतीत कर रही है। इन दिनों की शुरुआत में ही हमें इस बात का एहसास हो गया कि जितना हम जनता को समझाए शिखरों को अपने पैरों के नीचे लाकर जीत का ऐलान करते हैं, उतना ही जितने अपने आपको और अधिक सिकुड़ा हुआ महसूस कर रहे हैं। अंतरिक्ष में भी हमें आसानी से अपनी जीत का परचम लहराया, किंतु आज एक अदृश्य अति सूक्ष्म विषाणु से डरकर स्वयं को बाहर की दुनिया से अलग-थलग कर लिया है। किसी विद्वान ने कहा है कि हम शेर से डरकर भी उसे पिंजरे में डालते हैं, जो अपने इशारों पर नचाते हैं, लेकिन एक सामान्य मनुष्य के डर से खूद को जाली के अंदर समेट लेते हैं।

कोरोना के आतंक ने हमारे शरीर से ज्यादा मन को उन्मत्त कर दिया है। एक दिन की छुट्टी के लिए हम पूरे छः दिनों तक काम करते थे। इतबार को आशा के बाद अगले छह दिनों तक हमारा मन-मन नहीं उठती से घर जाता था लेकिन लगातार 50 दिनों तक छुट्टी मिलने के बाद भी हम सुख नहीं हैं। एक वीडियो सा डर हमारे मन में घर कर गया। 'हवा में फैली बिना' यह हमारी पीढ़ी के डर का वर्णन करने का बहुत सटीक तरीका माना जाता है। ए.पी.ए.ए. में मनोविश्लेषक के प्रोफेसर डॉ. विद्यो रंजित ने 'सोर्स एंथ्रोपिक गैरमंग' में लिखा था 'बैकटीरिया और अन्य सूक्ष्म विषाणु, जिसके संचारण लोगों को ज्यादा आसानी से रोबी बना सकते हैं। अगर इन तक को सही काम लिया जाए, तो आज कोरोनासूत लोगों की संख्या बढ़ने के सूक्ष्म कारणों में से एक कारण यह भी तो हो सकता है। क्या इस डर को हमेशा-हमेशा के लिए अपने दिली दिमाग से निकालना आवश्यकता के साथ-साथ हमारा कर्तव्य नहीं होगा?'

**Isolation and characterization of endophytic bacterium
Bacillus cereus in detoxification of Mycotoxin-Aflatoxin B₁**

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ABSTRACT: Aflatoxins bring great significant cause to food, feed industry and detrimental effects on humans including carcinogenic, mutagenic and teratogenic. The research mainly focuses on efficiency of *Bacillus sp. Strain AIGN8* to degrade aflatoxin B₁ concentration of (2µg/mL) as a sole carbon source isolated endophytic bacteria from Neem (*Azadirachta indica*) belonging to family Meliaceae. The residual AFB₁ determined by chromatographic methods. *Bacillus sp. Strain AIGN8* had strong ability to degrade the highly toxic AFB₁ of 68.9% by culture supernatant compared cell extracts and viable cells at 48hrs of incubation. Moreover, the results implied that the activity of aflatoxin B₁ detoxification was significantly noticed in the cell supernatant rather than cell extract and viable cell culture. The cell supernatant was characterized by considerable activity at wide range of temperature and pH. Aflatoxin B₁ degraded products were identified by GCMS, the compound BETA-MONOSTEARINE with retention time 38.844 of molecular weight 358.56 Da is the major degradative compound with good biological properties. The morphological, biochemical and 16S rRNA sequencing of the isolate AIGN8 revealed that belongs to *Bacillus cereus* and nucleotide sequence was provided with a GenBank accession number MG957213. Biosafety results indicated that AFB₁ detoxification is an enzymatic and could have promising potential in industrial applications. First time we reported endophytic bacterium *Bacillus cereus* in the degradation of AFB₁ by this research work.

KEY WORDS: Detoxification; Aflatoxin B₁; HPLC; GCMS; *Bacillus cereus*


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Article


Ameliorated Antibacterial and Antioxidant Properties by *Trichoderma harzianum* Mediated Green Synthesis of Silver Nanoparticles

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Abstract: Biosynthesis of silver nanoparticles using beneficial *Trichoderma harzianum* is a simple, eco-friendly and cost-effective route. Secondary metabolites secreted by *T. harzianum* act as capping and reducing agents that can offer constancy and can contribute to biological activity. The present study aimed to synthesize silver nanoparticles using *T. harzianum* cell filtrate and investigate different bioactive metabolites based on LC-MS/MS analysis. The synthesized silver nanoparticles (AgNPs) from *T. harzianum* were characterized by ultraviolet–visible spectrophotometry, Fourier transform infrared spectrometry (FT-IR), energy-dispersive spectroscopy (EDS), dynamic light scattering (DLS), X-ray powder diffraction (XRD) and scanning electron microscopy (SEM). The surface plasmon resonance of synthesized particles formed a peak centered near 438 nm. The DLS study determined the average size of AgNPs to be 21.49 nm. The average size of AgNPs was measured to be 72 nm by SEM. The cubic crystal structure from XRD analysis confirmed the synthesized particles as silver nanoparticles. The AgNPs exhibited remarkable antioxidant properties, as determined by DPPH and ferric reducing antioxidant power (FRAP) assay. The AgNPs also exhibited broad-spectrum antibacterial activity against two Gram-positive bacteria (*S. aureus* and *B. subtilis*) and two Gram-negative bacteria (*E. coli* and *R. solanacearum*). The minimum inhibitory concentration (MIC) of AgNPs towards bacterial growth was evaluated. The antibacterial activity of AgNPs was further confirmed by fluorescence microscopy and SEM analysis.

Keywords: silver nanoparticles; bioactive metabolites; antibacterial activity; MIC; antioxidant activity; *T. harzianum* filtrate

1. Introduction

Nanotechnology has evolved as an interesting part of research because of its ability to produce nanoparticles (NPs) possessing uniformity and special properties that make them valuable in optical sensors, drug delivery, catalysis, adsorption, water treatment and nanomedicine [1]. These NPs can be produced from different chemical, physical

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Biological Control of Fusarium Wilt of *Cajanus cajan*

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ABSTRACT

Cajanus cajan (L.) Millsp. commonly called Pigeon Pea a leguminous plant grown extensively for food, feed, fodder, fuel also grown as an intercrop and in crop rotation to improve the fertility of the soil in sustainable organic farming. This plant gets infected by the pathogen *Fusarium udum* causing wilt disease which is one of the major constraints in the production and productivity of pigeon pea. This pathogen is reported throughout the world infecting *C. cajan*. The extensive use of chemical fungicides results in environmental pollution, the resistance of pathogens towards fungicides, hazardous to humans and animals. This necessitated the need to adopt eco-friendly and sustainable management of diseases, like using antagonistic fungi against the pathogen. In our present study, 15 different fungal isolates were isolated from different rhizosphere soil and used for Our present study involved the in vitro - dual culture assay as well as in vivo - greenhouse bioassay was performed to analyze the antifungal efficacy of antagonistic fungi against *F. udum*. The in vitro and in vivo investigations showed that *Cephalosporium acremonium*, *Lasiodiplodia pseudothecobromae*, *Penicillium frequentans* and *Epicoccum sorghinum* equally inhibited *F. udum* when compared to various *Trichoderma* spp. Also, under greenhouse conditions, the root length, shoot length, and the number of leaves of plants was found to be increased significantly ($p < 0.05$) in treatments with the talc-based biopesticide formulations of the antagonistic fungi. Hence these fungal isolates can also be used as a potential biocontrol agent for sustainable wilt diseases management caused by *Fusarium udum* and the extensive usage of chemical fungicides can be avoided to control the wilt disease of *Cajanus cajan*.

KEY WORDS: BIOCONTROL, EPICOCIMUM SORGHINUM, FUSARIUM SP., LASIODIPLODIA PSEUDOTHEOBROMAE, WILT DISEASE.

INTRODUCTION

Cajanus cajan is an important constituent in the category of pulses among all Indians due to the availability of

20-21% protein providing an energy-rich cereal diet. According to FAO statistics, this crop is cultivated in an area covering 4.6 million hectares globally and India accounted for about 73% of the global production in the year 2007. It is also an important crop of Karnataka contributing about 18% and 12% to total area and production respectively (GOI, Agricultural statistics, 2013). This protein rich legume is prone to a multitude of diseases of which fungal diseases lead to a productivity loss of approximately 22 - 25 % each year amounting to a loss of up to Rs. 50,000 crores annually. Among the fungal diseases, *Fusarium* wilt disease caused by a soil borne pathogen *Fusarium udum* (Fu) Butler is associated with extensive yield losses of pigeon pea in India. *Fusarium*

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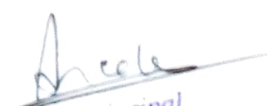
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ORIGINAL ARTICLE

Molecular characterization of non-biogenic amines producing *Lactobacillus plantarum* GP11 isolated from traditional pickles using HRESI-MS analysis

V. Priyanka¹ · A. Ramesha¹ · Devaraja Gayathri¹ · M. Vasudha¹

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Abstract Fungal spoilage and toxic biogenic amine production is a major risk in fermented products. Therefore, the selection of nontoxic biogenic amines producing probiotic bacteria plays a vital role in the fermentation pro-

when compared to traditional one. Therefore *L. plantarum* GP11 could be developed as an ideal starter culture for the fermented production of a pickle.

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Article

Mycosynthesis of ZnO Nanoparticles Using *Trichoderma* spp. Isolated from Rhizosphere Soils and Its Synergistic Antibacterial Effect against *Xanthomonas oryzae* pv. *oryzae*

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Abstract: The Plant Growth Promoting Fungi (PGPF) is used as a source of biofertilizers due to their production of secondary metabolites and beneficial effects on plants. The present work is focused on the co-cultivation of *Trichoderma* spp. (*T. harzianum* (PGT4), *T. reesei* (PGT5) and *T. reesei* (PGT13)) and the production of secondary metabolites from mono and co-culture and mycosynthesis of zinc oxide nanoparticles (ZnO NPs), which were characterized by a UV visible spectrophotometer, Powder X-ray Diffraction (PXRD), Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM) with Energy Dispersive Spectroscopy (EDAX) and Transmission Electron Microscope (TEM) and Selected Area (Electron) Diffraction (SAED) patterns. The fungal secondary metabolite crude was extracted from the mono and co-culture of *Trichoderma* spp. And were analyzed by GC-MS, which was further subjected for antibacterial activity against *Xanthomonas oryzae* pv. *Oryzae*, the causative organism for Bacterial Leaf Blight (BLB) in rice. Our results showed that the maximum zone of inhibition was recorded from the co-culture of *Trichoderma* spp. rather than mono cultures, which indicates that co-cultivation of beneficial fungi can stimulate the synthesis of novel secondary metabolites better than in monocultures. ZnO NPs were synthesized from fungal secondary metabolites of mono cultures of *Trichoderma harzianum* (PGT4), *Trichoderma reesei* (PGT5), *Trichoderma reesei* (PGT13) and co-culture (PGT4 + PGT5 + PGT13). These ZnO NPs were checked for antibacterial activity against Xoo, which was found to be of a dose-dependent manner. In summary, the biosynthesized ZnO NPs and secondary metabolites from co-culture of *Trichoderma* spp. are ecofriendly and can be used as an alternative for chemical fertilizers in agriculture.

Keywords: fungal nanotechnology; *Trichoderma* spp.; ZnO nanoparticles; antibacterial activity *Xanthomonas oryzae* pv. *oryzae*; co-cultivation; secondary metabolites



Research Article

SN

Biosorption of heavy metal arsenic from Industrial Sewage of Davangere District, Karnataka, India, using indigenous fungal isolates

D. Abhijna Tanvi² · K. M. Pratam² · R. T. Lohit² · B. K. Vijayalakshmi² · T. N. Devaraja³ · M. Vasudha¹ · A. Ramesh¹ · Prashantkumar S. Chakra¹ · Devaraja Gayathri¹

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Abstract

Contamination of soil and water bodies with heavy metals like arsenic (As) is of major concern, since arsenic is non-biodegradable, toxic and causes ill effects to gastrointestinal system, skin, liver, kidney or neurological functions. In addition, animals affected by arsenic pollution through fodder enter to food chain. Hence, there is an urgent need to address heavy metal arsenic pollution especially through bioremediation. In this context, biosorption with indigenous microbiota has gained more interest in recent years as it is cost-effective, eco-friendly approach and with no adverse effects. In the present study, arsenic (As III)-resistant strains of fungi were isolated from soil samples collected from various locations of industrial sewage disposal sites of Davangere District, India, and screened. Among five fungal isolates, *Aspergillus* spp APR-1 and APR-2 showed greater resistance to arsenic in the laboratory conditions. In order to increase the surface area for biosorption, APR-1 and APR-2 isolates were immobilized on *Luffa aegyptiaca* (sponge gourd) (an agro-waste as biosorbent). With 250 mM arsenic solution, *Aspergillus* spp APR-1 and APR-2 showed biosorption of 53.94 and 52.54%, respectively, on inductively coupled plasma-optical emission spectrometry analysis and the adsorption of the fungal isolates on sponge gourd was confirmed using scanning electron microscopy. APR-1 isolate was further characterized by 18 s rDNA typing and identified as *Aspergillus niger*. Industrial scale application perhaps is taken up using selected fungal strains and mitigates the arsenic pollution in urban sewage.

Keywords Biosorption · *Luffa aegyptiaca* · *Aspergillus niger* · Arsenic

1 Introduction

A major deal of concern has been articulated over problems of soil and water contamination with heavy metals, due to overexploitation of natural resources: rapid industrialization and urbanization [1]. These heavy metals may originate from different sources in urbanized areas, such as vehicle emissions, textile, leather, tannery, mining,

electroplating, galvanizing, pigment and dyes, metallurgical and paint industrial discharges, heavy metal-containing fertilizers, and pesticides in agricultural fields, sewage sludge and urban soil sludge. These are typical contaminants as well as useful indicators of environment pollutions.

Arsenic (As) is a frequent and naturally occurring element that is found in the earth's crust, organic world,

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Homology Modelling and *in silico* Characterization of Laccase from *Lentinula edodes*

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ABSTRACT

Introduction: Laccases are phenol oxidases which belong to the superfamily of multicopper oxidases. Laccases are found in almost all wood rotting fungi. There is evidence that laccases can play an important role in lignin degradation, fruiting body formation, pigment formation during sexual development, competitor interactions and pathogenesis. *Lentinula edodes* is used in variety of applications like to reduce toxicity, partial decolorization of effluent water and decolorization of different dyes like Remazole brilliant blue R, bromophenol blue, methylene blue and naphthol blue black. The objectives of this study include prediction of three-dimensional (3D) structure of laccase from *Lentinula edodes* using homology modelling, *in silico* characterization and analysis of protein from this organism using computational methods. **Methods:** The laccase gene of laccase from *Lentinula edodes* was retrieved from UniProt database and sequence analysis was carried out using BLAST for the selection of template. The protein 3D structure was modelled using *RasMol* viewer. The obtained 3D model of the laccase from *Lentinula edodes* was visualized and analyzed using *RasMol*. The quality of the 3D structure of protein was verified by its energy and stereochemical properties. The favoured regions were remodelled by loop modelling using *SWISS PDB Viewer*. Further, the *in silico* characterization of the laccase from *Lentinula edodes* was computed. **Results:** The 3KW7 A of *Trametes*

Sp AH28-2 is used as template for model building of laccase from *L. edodes*. The atom model obtained in PDB format showed unstable region in the model. These unstable regions were selected and remodelled by loop modelling. The remodelled structure was further evaluated by its stereochemical quality and energy. The quality of the remodelled structure was found to be improved. **Conclusion:** Evaluated 3D structure of laccase from *L. edodes* shows that predicted model was of good quality because maximum residues are present in favoured region which indicates that stereochemical quality of predicted 3D structure was reasonably good. It suggests that this model can be used to understand molecular interaction of this laccase with the other proteins.

Key words: Laccase, *Lentinula edodes*, Homology modelling, *In silico*, BLAST, MODWEB, Swiss PDB Viewer.

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INTRODUCTION

Laccases are copper containing oxidase enzymes found in many plants, fungi and many organisms. Laccases were also found in various basidiomycetes and ascomycetous fungi.¹ The first report of a bacterial laccase was from the Gram-negative soil bacterium *Azospirillum lipiformis* and the enzyme was believed to be involved in melanisation.² The enzyme can be used for textile finishing or textile dyeing, teeth whitening and also it has industrial, environmental, diagnostic and synthetic uses. Laccases can also be used in bioremediation.³ *Lentinula edodes* (Shiitake) is one of the world's second largest cultivated medicinal and edible mushrooms used as functional foods. It is used in the treatment of tumors, flu, heart diseases, high blood pressure, obesity, prostatic disease, sexual dysfunction and ageing, diabetes, liver ailments, respiratory diseases, exhaustion and weakness.⁶ *L. edodes* is considered to be one of the most valuable medicinal mushrooms.^{7,8} The experimental methods to determine the protein 3D structure like X-ray crystallography, nuclear magnetic resonance spectroscopy are technically demanding and consuming and may not keep with which new protein sequences are being discovered by genomics research. Although a large number of genes are being discovered, the number of protein structures being solved by experimental methods is limited.

Alternative solutions for structure prediction and modelling of proteins are available and methods. The major computational methods for prediction of structure of proteins are *ab initio* methods and homology

modelling. Homology modelling remains the most accurate prediction method.⁹ It helps to bridge the gap between the available sequences and structural information by providing reliable and accurate protein models. Homology modelling is a technique for predicting or generating detailed 3D structures of proteins based on coordinates of known homologues.

The main steps to create a Homology model are as follows: 1) Identification of structural homologues. 2) Selection of structural homologues used as templates for modeling. 3) Alignment of templates with the protein sequence to be modelled. 4) Model building. 5) Evaluation and refinement of the model.

The objectives of this present study are to predict the three-dimensional (3D) structure of laccase from *Lentinula edodes* using homology modelling, *in silico* characterization and analysis of laccase from this organism using computational methods.

MATERIALS AND METHODS

Retrieval of laccase sequence of *Lentinula edodes* from UniProt database

The sequence details of the laccase from *Lentinula edodes* was retrieved from UniProt database. The UniProt Knowledgebase (UniProtKB) is the central hub for the collection of functional information on proteins, with accurate, consistent and rich annotation.¹⁰

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**“AN ANALYSIS ON THE EFFECTS OF DIGITALISATION ON HIGHER EDUCATION
IN BENGALURU URBAN”**

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ABSTRACT

In an era where most segments of the society have adopted its working to suit the internet of things, the sector of education is only a novice to this state of affair. Only on the onset of pandemic has the sector of education began cruising on the erstwhile third wave of digitalisation. The current scenario of pandemic has forced the education sector to adopt digitalisation. Virtual meeting rooms have effectively replaced physical classroom interaction. This has an impact both positive and negative on all players, i.e., students, faculties and management. The effect can be sensed on a spectrum of social economic physiological and cultural aspects. This paper aims to quantitatively analyse the data on such impact categorically collected, synthesised and evaluated by the authors. This paper is a normative study with plausible positive solutions for a more equipped education system and analyses the effect of technology in this digital era towards teaching. The study is restricted geographically to Bengaluru urban area thus enabling the authors to compare and contrast reputed entities of higher education system.

Key Words – Digitalisation, Pandemic, Higher Education, Bengaluru Urban

INTRODUCTION

In India Ministry of Human Resource Development (MHRD) develops the higher education system. The overall growth of the higher education system is well planned and executed by MHRD. Digital initiative is one of such development in the higher education system. Yet the digital initiative has not reached to all levels of people in the education industry. Many institutions with fewer infrastructures with less capital found it difficult to provide education using the Information Technology (IT) tools. It could not be implemented entirely because it is filled with infrastructural and human resource limitation.

MHRD with the view of providing high quality education launched National mission on education through Information Communication Technology (ICT) on February 3rd 2009¹.

In this digital era, very few institutions were adopting the ICT initiatives. During pre-pandemic period the graduates with less digital literacy is viewed as the disadvantage towards the development of the higher education system in the digital era. The current situation has forced all institutions to adjust with the drastic changes and is forced to accept the changes.

Pandemic is driving the digitalisation vehicle towards the new age of transformation. During this hardship significant developments are happening in India and in the whole world for the wellbeing of every single individual. Pandemic has affected every industry all over the World. It has not even left the education Industry. Many schools and colleges faced a tough time during this Pandemic. Schools and colleges with less infrastructure, without the proper Information Communication Technologies (ICT) initiatives were been forced to shut down their operations.

THE OVERVIEW OF DIGITALISATION DURING PANDEMIC

Digitalization refers to the use and integration of new technologies into everyday life, across all industries and sectors. It is a combination of connecting and combining of physical and digital things in new ways, and many consider it to be one of the defining characteristics of modern life².

The technology, the information literacy, digital skills have nourished the people lives. It has drastically changed their way of working, learning, playing and even acquiring knowledge and skills. The past two decade's digitalisation is changing the world. We can see the complete transformation towards the nature of the work globally. Even the standard of living of the people has come up with lots of changes. Digitalisation has become the part of every single individual life. In the


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Caenorhabditis elegans larvae undergo early developmental arrest on a diet of Gram-positive bacterium *Enterococcus faecalis*

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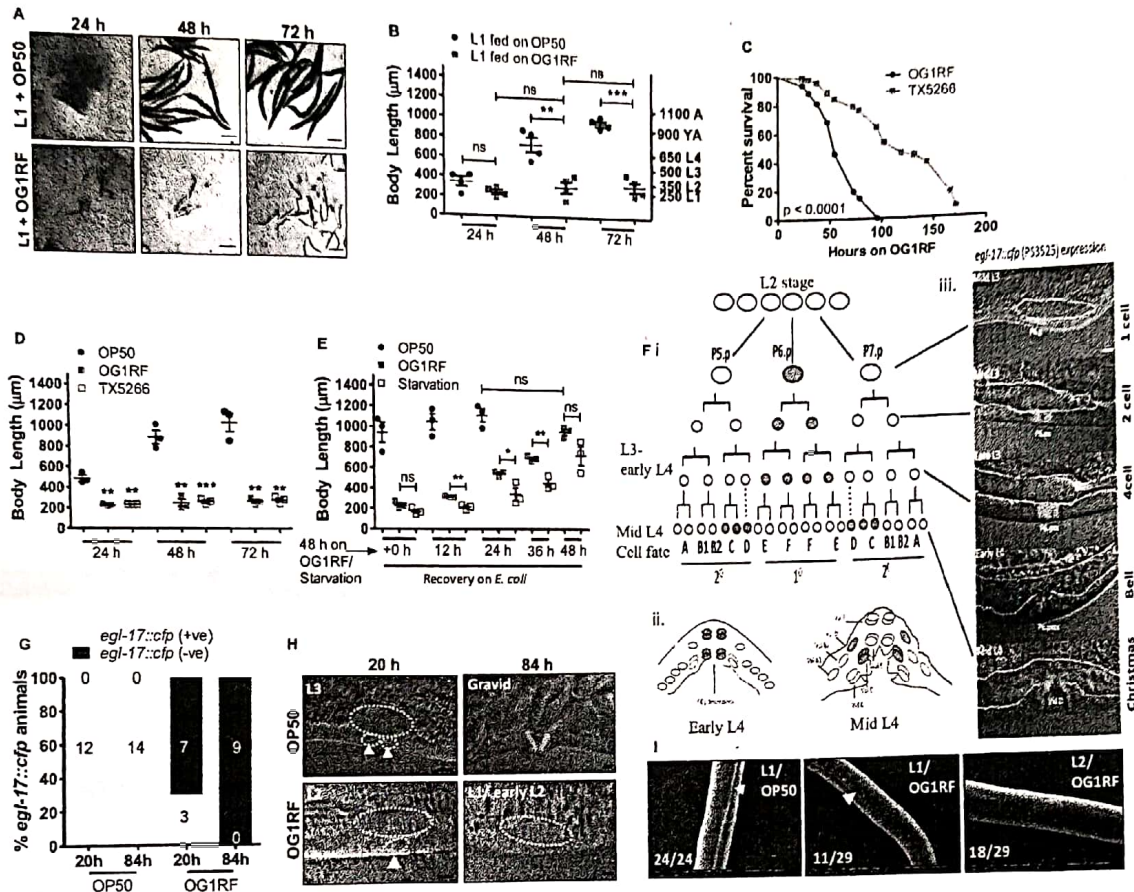


Figure 1. *E. faecalis* induces early larval arrest in *C. elegans*: (A) Images of *C. elegans* L1 larvae fed *E. coli* OP50 (Top) or *E. faecalis* OG1RF (Bottom) for 24 h, 48 h and 72 h. Scale bar, 100 µm. (B) Mean ± SEM of body length in populations of L1 larvae fed OP50 or OG1RF for 24 h, 48 h and 72 h. Reported length of L1, L2, L3 and L4 larvae is indicated on the right y axis. (C) Kaplan Meier survival curves for wild type animals fed on OG1RF and $\Delta fsrB$ *E. faecalis* (TX5266). Also see Table 1. (D) Mean ± SEM of body length in populations of L1 larvae fed OP50, OG1RF or TX5266 for 24 h, 48 h and 72 h. (E) Mean ± SEM of body length in populations of 48 h starved, *E. faecalis*-fed and *E. coli*-fed larvae transferred to *E. coli* plates and measured at regular intervals of 12 hours. n=15-20 animals/ treatment/experiment in panels 1B, 1D and 1E where each point represents the mean of body length of a population of animals (N>3 experiments). *, p less than equal to 0.05; **, p less than equal to 0.01; ***, p less than equal to 0.001; ns-non-significant. In panel D, * indicates significance with respect to OP50-fed animals at the same time point. (F) (i) Cartoon showing vulval invariant cell lineages and morphogenesis in wild-type hermaphrodites (Burdine *et al.*, 1998; Sulston and Horvitz, 1977; Cui and Han, 2003). At larval stage, L3, vulval precursor cells P(5-7).p adopt primary (1°) or secondary (2°) cell fates and undergo invariant cell divisions to produce 22 cells organized into toroids, VulA, vulB1, vulB2, vulC, vulD, vulE, and vulF, shown by A, B1, B2, C, D, E, and F cell types (Sharma-Kishore *et al.*, 1999). Blue coloured oval cells indicate *egl-17::cfp* expression in specific lineages. (ii) Cartoon showing early L4 vulva, when *egl-17::cfp* is exclusively seen in granddaughters of P6.p (1°), and mid-L4 stage, where the expression is shifted to 2° lineage cells, vulC and vulD. (iii) Merged DIC and fluorescence images showing stage specific *egl-17::cfp* in vulval cells. P6.p (1 cell stage/L2), P6.px (2 cell/midL3), P6.pxx (4 cell/mid to late L3), and P6.pxxx (8 cell/early L4 onwards), x denotes one round of mitotic division. Gonads are demarcated with white line. In all animals, anterior is to the left. Scale bar, 5 µm. (G) Expression of *egl-17::cfp* in *C. elegans* L1 larvae fed OP50 or OG1RF for 20 h and 84 h. Duration of feeding on *E. coli* or *E. faecalis* are shown on X-axis and the bars represent % positive or negative *egl-17::cfp* in vulva cells. Numbers

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Research Article

PHYTOCHEMICAL SCREENING AND PROTECTIVE EFFECT OF ADHATODA VASICA LEAF EXTRACTS AGAINST FREE RADICAL DAMAGE

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Article Received: July 2020

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Abstract:

Background: In the past few decades there has been assumption on the medicinal values and the beneficial potential of medicinal plants in therapeutic components. Cellular metabolism produces Reactive Oxygen Species (ROS). free radicals' forms cascade leading to homeostatic disruption of living tissues. The shift in balance between oxidants and antioxidants in favor of oxidants is termed as 'oxidative stress', leading to chronic and degenerative disorders.

Objective: The present study was undertaken to analyze the antioxidant's free radical scavenging effects of Adhatoda vasica leaves and to screen the phytochemicals of the plant.

Methodology: The three solvents extract with increasing polarity (Hexane, Ethylacetate and Isopropanol) were prepared by following successive extraction. The scavenging effect of extracts against free radicals like hydrogen peroxide radical and hydroxyl radicals was analysed. The chelating property and phytochemicals of the plant extract was screened. The DNA protective action against oxidative damage was also analysed.

Results: Isopropanol and ethyl acetate extracts of the leaves exhibited high levels of hydrogen peroxide and hydroxyl radical scavenging activity followed by hexane. All the three extracts showed significant chelating property. The Adhatoda vasica exhibited protective action against oxidative damage caused by the free radicals. The leaves indicated the presences of alkaloids, phenolics and flavonoids.

Conclusion: Normally body can fight radicals by means of antioxidant system. The radical scavenging effects of plant plays major role in protecting living organisms against damage. Adhatoda vasica leaf extract revealed the effective protection of DNA against radicals.

Keywords: Adhatoda vasica, Radical Scavenging, Phytochemicals, Chelating property, Antioxidants.

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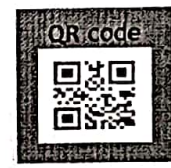
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Original Research Article

Radical Scavenging, Preliminary Phytochemical Screening and DNA Protective Effect of *Carissa Carandas* Linn Plant Leaves

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Abstract: Free radicals (ROS) are highly reactive and unstable compounds. In a normal cell there is a balance between formation and removal of free radicals. However, this balance can be shifted towards the formation of more free radicals, when levels of antioxidants are diminished. This oxidative stress can result in oxidative damage to cellular components such as DNA, proteins and lipids etc which act as a mediator of pro-inflammatory and carcinogenic events. The free radical scavengers prevent formation of reactive species or remove them before they can damage vital components of the cell. Phytochemicals are also important to manage pathological conditions of those diseases caused by free radicals and a large number of phytochemicals exhibit strong inhibitory effects on the broad spectrum of microorganisms. The present study was formulated to study the radical scavenging (H₂O₂ and hydroxyl) and DNA protective effect of *Carissa carandas* leaf extracts. Three solvent extracts (Hexane, Ethyl acetate and Isopropanol) were prepared and 100 mg/ml was used for the assay. The results showed that *Carissa carandas* exhibited strong radical scavenging ability and also showed considerable DNA protective effect under oxidant induced stress conditions. The phytochemical screening was also conducted which revealed the presence of flavonoids, phenols and alkaloids. Various studies showed that flavonoids act as valuable antioxidants because of their chelating properties. Phytochemicals bind to the Fe (II), thus preventing this pro-oxidant cation from reacting with hydrogen peroxide or promote the oxidation of the less stable ferrous complexes into more stable ferric ones (i.e., auto-oxidation) that cannot participate any longer to the Fenton reaction. So, we also conducted a chelating assay and the results revealed that the plant extract also possesses a good chelating effect.

Keywords: Free radical scavenging, phytochemicals, oxidative damage, *Carissa carandas* leaves, DNA protection, Chelating property.

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Zirconia: as a biocompatible biomaterial used in dental implants

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ABSTRACT

Zirconia is a bioinert ceramic biomaterial. Zirconia having composition of 97% Zirconia oxide and 3% Yttria oxide finds its vital application in the field of dental ceramics as an implant material for having good inert characteristics like minimum interaction with the adjacent tissues and exhibits good aesthetic property. This paper presents the *in-vitro* tests conducted to evaluation toxicity by cell culturing on zirconia biomaterial used in the dental implant by both direct contact and extraction method. In the present study, *in-vitro* assessment of tissue-biocompatibility was conducted on L929 cell line (mouse fibroblast). *In-vitro* test, the toxicity of Zirconia specimen was done by computing percentage of viability in a cell-cultured medium. An MTT system was used to measure the active cell activities with mitochondrial dehydrogenases, which is an easy method which gives accurate and precision results. The results of biocompatibility *in-vitro* test by both Direct and Extraction methods confirmed that Zirconia exhibits the highest cell growth of 93.17% and resulted with zero-grade cytotoxicity. Zirconia having good aesthetic characteristics, i.e. colour of the implant matches with the tooth colour. Hence Zirconia is a candidate implant material than other metal implants.

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KEYWORDS

Zirconia; biomaterial; cytotoxicity; *In-vitro*; dental implant; MTT

Introduction

Zirconia or zirconium oxide is the oxide of zirconium metal, which occurs as a natural mineral found in igneous rocks such as granites and syenites. Zirconia is used as an important bi-inert material in the field of dental implantation. Zirconium material has good strength as similar to metals and matches with the colour of the tooth [1,2]. Pure Zirconia is extracted from baddeleyite by hydrothermal concentration process and it contains small amounts of silica and iron as impurities. Baddeleyite contains Zirconia levels ranging from 96.5% to 98.5%. At room temperature, zirconia is monoclinic structure. Zirconia naturally occurs in oxide form that undergoes purification process and synthesised to form cubic structure at high temperatures known as cubic crystal structure. Hence, it is also known as 'ceramic steel,' which poses good biomechanical properties as a single piece implant. Zirconia has been used in dentistry since 1989 and first used as fixed dental prostheses in 1998 [3].

Phases of Zirconia

Zirconia usually occurs in three phases: (M) Monoclinic, (T) Tetragonal and (C) Cubic. Purest Zirconia at



room temperature will be monoclinic and this stable phase exists up to 1170°C. Heating above, it will transform from (M) Monoclinic to (T) Tetragonal at 2370°C. Further, continued heating above 2370°C, it will transform to (C) Cubic as shown in Figure 1.

a. Unstabilised Zirconia

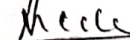
Unstabilized Zirconia is known as pure Zirconia. Pure Zirconia is monoclinic (m) at room temperature below 1170°C; hence, it has low thermal shock resistivity. Pure Zirconia as a bulk refractory is not feasible due to the large volume change of tetragonal to monoclinic phase transformation. The problem has been alleviated by the use of alloys of Zirconia with other oxides, preventing the transformation.

b. Partially stabilised Zirconia (PSZ)

A partially stabilised Zirconia will be formed when stabiliser concentration in the material is such that it consists of tetragonal, cubic (and monoclinic) mixture at a temperature between 1170°C and 2370°C. The higher temperature phases may thus be stabilised by the addition into a solid solution of specific cubic oxides.

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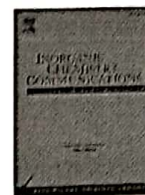
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Short communication

CuO nanoflakes anchored polythiophene nanocomposite: Voltammetric detection of L-Tryptophan

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ABSTRACT

This research paper describes the detailed study of selective electrochemical determination of L-Tryptophan (L-Try) based on electrostatically interacted copper oxide (CuO) nanoflakes with polythiophene (PT). The purity and geometrical structure of PT-CuO nanocomposite was certified using different characterization techniques, including X-ray diffraction (XRD), UV-Vis spectroscopy, RAMAN spectroscopy, Fourier transform infrared spectroscopy (FT-IR) and scanning electron microscopy (SEM). L-Try is a naturally occurring amphipathic and essential amino acid serving for various purposes like nitrogen balance and neurotransmitter. Also, L-Try is having complex chemical characteristics and side chain dipoles which could be noteworthy for functionalization. The sulfur groups of PT interact effectively with free α -amine group and α -carboxylic acid group of L-Try, which results in increased conductance of the PT-CuO modified glassy carbon electrode (GCE). Under optimized conditions, the peak current of L-Try is increased linearly with concentration range of 100 nM to 1 mM and its limit of detection is 15 nM with $3515.62 \mu\text{A M}^{-1} \text{cm}^{-2}$ sensitivity. It is observed that, the PT-CuO modified GCE exhibited admirable electro-catalytic activities, reproducibility, rapid response and high selectivity towards the oxidation of L-Try. Also, the PT-CuO modified GCE is used to determine L-Try concentration in real sample like milk with satisfactory results.

1. Introduction

Among the various aromatic oxidizable amino acids, L-Tryptophan (L-Try) is a kind of significant for neuronal balancing mechanism. It is an essential constituent of proteins and mandatory in human nutrition for establishing and keeping a positive nitrogen balance. Also, this compound is a precursor for serotonin, melatonin, niacin as well as other physiologically important biomolecules [1,2]. L-Try is normally ingested from diet and also can be taken in the form of protein rich food or supplements such as eggs, cheese, meat, vegetables, and fruits. A number of human diseases result from disruption of L-Try metabolism [3]. The biochemical balance of human brain is monitored through the concentration of L-Try. The level of L-Try in blood is intimately related to serotonin and melatonin level in the brain; inadequate level of serotonin in human brain are in part of responsible for depression, obsessive/compulsive behavior, muscle pain and sores in the mouth [4]. Thus it is indispensable to establish an effective method for the detection of L-Try with high selectivity since it has wide application in food,

biotechnology, clinical and pharmaceutical industries [5,6]. Hitherto, the methods including high performance liquid chromatography (HPLC) [7], gas chromatography [8], spectrophotometry [9], capillary electrophoresis [10], chemiluminescence [11] reveal convincing report but they are much complicated, expensive equipment, require multi-step treatment of the sample, and time-consuming. In contrast, the electrochemical method attracts much attention due to the unique qualities of high sensitivity, relative simplicity, inexpensive, high accuracy and rapid response. [12]

In recent research, various materials have been used to modify the working electrode surface, including metal/metal oxide nanoparticles, conductive polymers and carbon based materials etc., which are the vital platform to achieve better electrochemical performance towards the analyte detection. Transition metal oxides are generally used because of their high catalytic activity and semiconductive properties. Among several transition metal oxides, copper oxide (CuO) is a p-type semiconductor with better ability to promote electron transfer process in biosensor application [13–17]. Also, CuO is of great attention due to its

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Ozone exposure promoting growth of *Oryzae sativa* (Rice) seedlings and inhibiting its pathogen *Xanthomonas oryzae*

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Abstract

A laboratory study was undertaken to find the effect of ozone on the growth of rice seeds (*Oryzae sativa* Linn.) and also on the viability of its pathogen *Xanthomonas oryzae* that causes bacterial blight disease. We used a commercial ozone generator to produce ozone and tested its effects in our laboratory studies. Our results showed that ozone at a concentration of 0.2 ppm inhibited the rice pathogen *X. oryzae* and promoted growth of rice seedlings. We observed that inhibition of bacterial cells by ozone is attributed to altered membrane permeability leading to leakage of cellular constituents and resulting in possible cell death.

Furthermore, reduced Oxygen Uptake Rate (OUR) was also observed in ozone-treated bacterial cells indicating the inhibition of respiratory enzymes. Interestingly, ozone exposure increased both the root length and shoot length in rice seedlings that appeared healthier compared to untreated seeds. Thus, our study demonstrated that ozone at low concentrations could be used in agriculture both as a growth enhancer and for pathogen control.

Keywords: Ozone, Rice seeds, *Oryzae sativa*, *Xanthomonas oryzae*, Cell permeability, Oxygen uptake rate.

Introduction

Atmospheric ozone is formed by the interaction of oxygen with electrical discharges and by the action of ultraviolet (UV) radiation. On the other hand, anthropogenic ozone occurs due to inefficient internal combustion of millions of automobiles which release pollutants in the form of hydrocarbons and nitrogen dioxide¹. Ozone (O₃) is an allotrope of oxygen (O₂) and is a trioxygen molecule containing 3 oxygen atoms instead of 2. It is well known that O₃ if used under controlled conditions has a variety of industrial and medical applications such as water disinfection, air purification, bleaching of textile dyes, pollutant treatment, vegetable cleaning², cleaning of seafood³ and as disinfectant⁴.

In the industrial perspective, disinfectant action of ozone does not release any toxic by-products or potential health hazards when compared to the commonly used disinfectant chlorine which is used for sanitizing agricultural food commodities⁵. In addition, ozone can effectively kill bacteria

through antimicrobial action and 4–5 times more effective than chlorine^{6,7}. Unlike the chemicals that leave residual compounds with carcinogenic properties, ozone quickly decomposes into oxygen without any traces⁸. For this reason, ozone has received 'Generally Recognized as Safe (GRAS)' status in the United States and was also approved by US-FDA (2001) for use in the food industry.

In the medical perspective, inhibitory effect of ozone on bacteria and fungi has already been reported⁹⁻¹¹. Several studies have been conducted to analyse the effect of ozone on human pathogenic bacteria such as *Escherichia coli*, *Pseudomonas fluorescens*, *Salmonella typhi* and *Klebsiella pneumoniae* and of them, *E. coli* showed high sensitivity¹².

The mode of action of ozone on inactivation of bacteria and fungi is more complex owing to the unsaturated lipids of cell membrane and cytoplasmic components of the microbes¹³. Majority of the microbial components are cell membrane constituents (proteins, respiratory enzymes and unsaturated fatty acid), cell envelopes (peptidoglycans), cytoplasm (enzymes, nucleic acids), spore coats and virus capsids (proteins and peptidoglycan)¹⁴⁻¹⁶. Restino et al¹⁷ have also reported ozone as an abiotic control to arrest the growth of several food-related microorganisms. In addition, the rate of synthesis of various enzymes would be curtailed by ozone leading to a decline in metabolism and subsequent death of cells².

Further, ozone has a very high oxidation and reduction potential, it acts as an oxidant of constituent elements of cell walls of bacteria. Thus, continuous exposure of ozone causes destruction of large number of membrane barriers in bacteria causing cell lysis and eventually cell death. According to Kim et al¹⁸ cellular leakage occurs due to the degradation of unsaturated lipids present in the membrane. Heavy damage in the nucleic acids also leads to cell death. Among nucleobases, rather than cytosine or uracil, thymine is found to be more ozone sensitive¹⁴.

In the agriculture perspective, ozone is considered as both phytotoxic and growth stimulant. Ozone acts as a phytotoxic air pollutant and causes extensive damage to crops like soybean, cotton, peanut, sorghum, corn, winter wheat and also detrimental to forest trees at higher concentration¹⁹. Interestingly, it has been shown that at low concentrations and controlled environments, ozone acts as a fumigant²⁰. In tomatoes, low ozone exposure for 2 min/day for 10 days showed a positive effect on the growth parameters of the


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HUMAN ISOLATION AND SUFFERING: A STUDY OF MAYA ANGELOU'S *ALONE*.

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Abstract: This research article intends to analyse Maya Angelou not merely as a feminist but also to look at how she brings out the need to concentrate much on mind and human values. In her expressions we find not only the condition of a female also what each human irrespective of gender, class, nationality and race, should be in future. Our reading of Maya Angelou's poem *Alone* intends to portray the quarantined situation of every individual and the suffocation which every human being is experiencing in these days. The poem *Alone* might convey many themes that appear in other Angelou poems as well: human suffering, isolation, love, and a need for solidarity in order to rise above the pain and problems that people face inevitably. The study intends to look at this suffering in contemporary contexts and a solution to it.

Keywords: Human Suffering, Loneliness, Race, Vulnerability.

Reading the Text with New Contexts:

Maya Angelou's *Alone* was originally published in 1975 in her second volume of verse, *Oh Pray My Wings Are Gonna Fit Me Well*. In *Alone* a surface reading of the text definitely drives in a pensive mood from the poet to the reader along with a serious contemplation over our existence. When laid down 'last night', Angelou tries to 'find my soul a home'; a serious thought creeps into our minds as well. Are we all at home? Are we happy and living a life of contentment? Probably yes; probably no! At the outset, Angelou seems to address one of the gravest concerns and the problem of the contemporary world- that is 'isolation'. With all of our computers and Facebook pages, Twitter accounts and cell phones, we think that we are more connected than ever. As it turns out, though, technology doesn't compensate for the fact that most people feel disconnected from their communities, or even the people they love the most.

The covid-19 pandemic has given all of us a compulsive re-thought and we all due the forced lockdown sat back into our homes suspending all our outdoor activities. Were we really connected to all our beloved ones before the pandemic emerged? Surely we weren't, as we realised how even after being connected well through the digital world during lockdown we were yet feeling so caged and helpless. Self-quarantine was disturbing our mental health. This is probably what Angelou meant to convey when she wrote,

How to find my soul a home (3)

She expresses her discontentment towards the fact that she is lonely and she finds her soul feeling edgy as she urges to connect with people and this quarantine situation imposed upon her due to race,



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Research article / Научная статья

Locating reality through visual narratives: Marjane Sartapi's surfacing in "Persepolis"

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Abstract. The innovative way of telling stories by using visuals with a motive of imparting a message to an audience has influenced several writings. The use of visual narratives turns out to be a profound technique of illustrating stories that has existed and continues to exist even today. From oral narratives to visual ones the art of storytelling has always been efficacious and more absorbing. Impressing upon what, how, where, and in what manner the event took place through graphics is fascinating. There is substantial writing that primarily deals with research on visual stories. One such is Marjane Sartapi's "Persepolis" told through the eyes of a young girl, and this unique perspective of graphic narration offers distinctive insight into the perseverance to retain one's identity in tumultuous times. Nations and homelands play an important part in one's identity formation. Associating oneself to national sentiments and signs, individuals feel themselves part of the nation. However, identity becomes problematic for those in diaspora. This research paper intends to look at Marjane Sartapi's "Persepolis" as an attempt of the author to surface through many of her inner-outer conflicts. The paper shall trace her journey of self-approval from Iran to Vienna and finally to France. The trauma and the identity crisis she faces during her childhood in Iran and later in Vienna is an experience which she decides to narrate using animated comic images. The use of visual narrative form has helped her convey the trauma and pain she long carried. Finding a homeland and an identity became challenging.

Keywords: visual narration, identity crisis, veil, diaspora

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Обнаружение реальности в повести М. Сартапи «Персеполис»

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Аннотация. В статье раскрывается новаторский способ рассказывания истории жизни с помощью визуальных эффектов с целью передачи сообщения читательской аудитории. Использование визуальных нарративов оказывается продуктивной техникой

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Effect of radiation and antioxidant diet on the efficacy of silk synthesis of the silkworm, *Bombyx Mori*

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Abstract

Bombyx mori is a beneficial and environment friendly insect reared commercially for silk. In today's scenario, the silk farming shows a great downfall due to the promotion of synthetic materials. Thereby it is necessary to upsurge the production of silk fibres. The efficacy of silk is achieved through the growth and development of silkworms at a higher rate through supplementing their feed with antioxidant from the plant sources. Later the same worms were exposed to low dose radiation from the gamma source. These are considered as experimental groups while the worms without the supplement of antioxidant and radiation exposure, control group. The adaptability of the insects in terms of growth and economic parameters viz., silk filament, cocoon weight, shell weight and pupal weight was recorded. The total proteins in hemolymph and silk gland were assessed.

The present study results indicated the increase in the efficacy of silk as well as economic traits in all the experimental groups compared to the control group. The assessed total proteins showed an increment in the silk gland and hemolymph was statistically significant. The larvae exposed to gamma radiation at low doses reflects hormesis that has exerted stimulatory and beneficial effects on the efficacy of silk production.

Keywords: Sericulture, Radiation, Antioxidants, Total proteins, Economic traits, Silk.

Introduction

Silkworms are oligophagous insects which feed on mulberry leaves, spin cocoons; later cocoons are used to extract silk fibers. The silk thread extracted from cocoons depends on the silkworm feed that is on the quality of mulberry leaves, the sole source of the nutrients¹ which is not adequate for optimal silk performance. The growth and development of silkworms should be improvised significantly to result in the good cocoon varieties thereby leading to increase the silk yield. As a result, healthy and good quality mulberry leaves along with supplemented nutrients is a dire need for high and quality cocoon production. The pertinent studies² have shown that the efficiency of silk can be augmented by increasing the nutrients in the silkworm's diet. Besides, Bhattacharyya et al³ concluded that the novel method of rearing silkworms by feeding worms with good quality of

mulberry leaves and the diet supplemented with the high amount of nutrients is a pre-requisite to increase the silk production. The supplemented diet through feeding may increase the growth and development of silkworms which has a critical role in increasing the efficiency of silk. Besides the environmental factors such as temperature, humidity, light, air, feed quality⁴ are also of prime importance to produce quality silk.

Fernandes et al⁵ studied the effect of different concentrations (5, 10, and 20%) of Bordeaux mixture included in the diet of the silkworm caterpillars improved the cocoon production and structural and mechanical properties of the silk⁵. Besides, studies of Muniandy et al⁶ showed fortification of mulberry leaves with supplementation of nutrients and feeding silkworms, a useful modern protocol to increase the economic value of cocoon. Each cocoon can produce 1000 to 2000 feet of silk filament made up of fibroin (75% - 90%) and sericin (10-25%). Furthermore, investigations of Saad et al⁷ indicated the red beet supplement upsurges the silk performance along with improved traits such as weight of mature larvae, silk gland, fresh cocoon, pupae and cocoon shell significantly.

Radiation exposure at high dose levels was considered highly hazardous while radiation at low levels indicated favourable effects reflected as radiation hormesis shows an adaptive response⁸. The growth of silkworms was promoted and even bodyweight showed an increase upon continuous exposure to low-dose radiation⁹. Keeping in view the importance of silk performance and understanding the role of small cottage industries to uplift the rural economy, we hypothesized, the efficacy of silk production can be increased by supplementing the feed of worms with antioxidants and the exposure of worms to low dose radiation that enhances the growth, development and metabolism of *B. mori*.

Material and Methods

Chemicals/Labware: All chemicals (AR-grade) with chemical abstracts service registry number (CASRN) were purchased from Sigma-Aldrich Ltd. Spectrophotometer, Cooling REMI centrifuge, Geiger Muller counter (GM counter), Caesium 137- radioactive source, Microscope, Weighing scale, Screw gauge and Vernier calipers, rearing stands and trays, nylon nets, rotary or bamboo mountages or chandrike were used while rearing silk worms.

Antioxidants from the plant source: Silk filament, the animal fiber is white to begin with, later dyed with the



Gestational and lactational exposition to di-*n*-butyl phthalate increases neurobehavioral perturbations in rats: A three generational comparative study



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ABSTRACT

Di-*n*-butyl phthalate (DBP) cause significant deficits in cognition and memory, however the neuroanatomical basis for impairments remain poorly understood. This study evaluates neurobehavioral changes in rats for three successive generations between non-siblings by administering DBP at 500mg/kg bw dose through oral gavage from gestation day-6 to 21 and lactation (3-weeks). Weaning period evaluations and developmental deficits assessed showed variations specific to generation and the toxic potential of DBP was confounded by behavioral deficits that include changes in sensorimotor development reflex response, poor performance, low memory retention and greater latency period. The cytoarchitectural alterations witnessed in hippocampus include condensed nuclei, vacuole formation and remarkable degeneration, shrinkage of pyramidal neurons in CA1 and CA3 regions; disorganized hilar cells and hyperplasia in dentate gyrus. Comparatively, the enlisted changes were high in subsequent generations than preceding and correlates assessed between cognitive impairment(s) and endocrine function confirm a link indicating vulnerability of immature animals as target to disrupt neural and endocrine functions.

1. Introduction

Di-*n*-butyl phthalate (DBP) is a ubiquitous environmental contaminant and widely used plasticizer, it is an additive to adhesives or printing inks [1]. Recent findings of De Toni et al. [2] reported the presence of phthalates as well as quantified phthalates namely, DEHP, DEP, DBP in pre-packed coffee capsules. Katsikantami et al. [3] in their review article have reported the maternal exposure to phthalates are able to cross the placental barrier and cause many health issues in humans. Its exposure to food and other materials at higher levels potentially induce abnormal fetal development [4]. Case studies reported by Colón et al. [5] have indicated anomalies such as premature breast development in female subjects while reduced anogenital distance [6], hypospadias [6] and decreased serum testosterone observed in male rats [7]. Arbuckle et al. [8] studies linked adverse reproductive effects and attention deficit disorders upon bisphenol-A exposure. Di (2-ethylhexyl) phthalate exposure shown to cause neurodevelopmental and behavioral deficits in rats [9]. Age-related effects reported upon exposure to phthalates are twice as high in children as adults with 40 % of children (age two to six years) showing higher urinary

concentrations of phthalate metabolites [10]. Findings of Chopra et al. [11] indicated attention deficit disorder and learning disabilities in children of six to fifteen years upon exposure to phthalates. We have previously reported *in utero* and lactational exposure of DBP for three generations brought neuroanatomical perturbations in discrete brain regions and the severity of the effect was higher in subsequent generations [12].

Limited data available on cognitive aspects suggest that higher levels of phthalates adversely affect learning abilities in mice [13] and few studies reported an association between prenatal phthalate exposure and neurological impairments [14], however, the available information on phthalates is biased and inconclusive, especially on aspects of cognitive behavior. The brain weight in rodents was affected by di-2-ethylhexyl phthalate (DEHP) exposure [15,16]; in contrast, Rhodes et al. [17] observed no difference in brain weight upon phthalate-exposure in marmoset monkeys, suggesting changes in brain weight restricted only to rodents, while limited information available on cognitive aspects suggest DBP's toxic potential to cause distinct neurodegenerative changes in the hippocampus of neonatal and immature rats [14]. McIntyre et al. [18] indicated acetylcholine (ACh)

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Hepatotoxic evaluation of Di-*n*-butyl phthalate in Wistar rats upon sub-chronic exposure: A multigenerational assessment



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ARTICLE INFO

Keywords:

Di-*n*-butyl phthalate
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Oxidative stress

ABSTRACT

The extensive use of di-*n*-butyl phthalate (DBP) as a plasticizer in medical devices, personal care products, and industries, which is a major threat to humankind as it leaches out easily from the plastic matrix into the environment. Health risks posed to adults and children from the broad usage of DBP in cosmetics and infant toys observed predominantly due to repeated and prolonged exposure. Hence, this study was undertaken to evaluate the potential effect of DBP in the hepatic tissue of rats up to three generations. Wistar rats were induced at a dose of 500 mg DBP /kg body weight dissolved in olive oil by oral gavage throughout gestation (GD 6–21), lactation and post-weaning and reared by crossing intoxicated rats up to three generations. Results of the present study showed a significant increase in the relative weight of liver, while decreased levels of antioxidant enzymes *viz.*, superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), and reduced glutathione (GSH) was evident in DBP treated rats at $P < 0.05$. Besides hepatic marker enzymes *viz.*, alanine transaminase (ALT) and aspartate transaminase (AST) were elevated significantly in experimental rats compared to those of the control group. Furthermore, histological studies revealed congested central veins and dilated sinusoids in F₁ progeny while mild to severe focal inflammatory infiltrations were evident in F₂ & F₃ rats. Negative correlation observed between the levels of antioxidant enzymes and transaminase activity. In brief, DBP exposure elicits oxidative stress and alters the transaminase activity levels causing damage in hepatic tissue. F₃ progeny found to high vulnerability to the exposure of DBP than F₂ & F₁ rats.

1. Introduction

Phthalate esters (PE) are synthetic organic molecules extensively used as plasticizers in consumer products and has become indispensable in the human routine lifestyle. They are utilised as additives in production of PVC products, cosmetics and perfume industries owing to their nature of flexibility, stabilizer [1], adhesiveness [2], fixative and denaturing property [3]. Phthalate esters are classified into high molecular weight (MW) phthalate esters with 7–13 carbon atoms [Diisodecyl phthalate (DIDP), diisononyl phthalate (DINP), di-2-propylheptyl phthalate (DPHP), diisoundecyl phthalate (DIUP) and diisotridecyl phthalate (DTDP)] and low molecular weight phthalate esters with 3–6 carbon atoms [di-*n*-butyl phthalate (DBP), diisobutyl phthalate (DIBP), butyl benzyl phthalate (BBP) and di-2-ethylhexyl phthalate (DEHP)] in their backbone. As the usage of plasticizers is on the rise and their non-degradability has led to their ubiquitous presence in the environment. This has caused humans' exposure of phthalates through air, water,

food, and dermal contact leading to many health hazards [4–8]. Recent investigations by Bi et al. [9] detected the presence of phthalates *viz.*, DEHP, BBP, DBP, and DIBP in the dust of various indoor environment. Once phthalates gain entry into the body through air [4], water [5], and food [6], dermal contact [8], later transform into their corresponding metabolites rapidly and eliminate through urine and feces. However their presence is detected in body fluids namely plasma, amniotic fluid, breast's milk and urine of humans [10,11]. The latest investigations indicated that the frequent usage of cosmetics during and before pregnancy was linked with the detection of phthalate metabolites in the hair [12]. Furthermore, many studies have shown that phthalates interfere with the endocrine system by acting as anti-androgens or mimic hormone (estrogen and androgen) which bring alteration(s) in the normal functioning of the reproductive system [13–16]. Phthalates along with their metabolites have the potential to cause toxicity in the reproductive system. For instance, a decline in sperm count, incidence of cryptorchidism, and hypospadias have been reported [16,17].

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Regulation of Jun and Fos AP-1 transcription factors by JNK MAPKs signaling cascade in areca nut extract treated KB cells

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ABSTRACT

The edible endosperm of *Areca catechu* is recognized as a potent carcinogenic agent either consumed alone or in combination with tobacco. Habitual chewing of areca nut leads to orally potential malignant disorders which are highly effective in malignant transformation and thereby lead to oral carcinogenesis. Human buccal epithelial KB carcinoma cells were used as an experimental cell system to inspect the mechanistic act of aqueous extract of areca nut on biochemical status and their implications on transcriptional activation of cancer signaling cascade that could possibly trigger numerous oncogenic players and finally decides the cells fate. Extract treated cells showed reduced viability with altered balance between oxidants and antioxidants which lead to redox status and which is known to distort various biological processes within the cell system. Results of RT-PCR demonstrated decreased expression of BCL2, cell cycle regulators along with Activator Protein -1 (AP-1) components. While Bax, p16 and p21 mRNAs showed increased expression in extract treated KB cells. Likewise, the translational levels of proliferation cell nuclear antigen (PCNA), tumor suppressor p53, retinoblastoma (Rb) and cyclin dependent kinase 4 (CDK4) were decreased along with AP-1 subunits (c-Jun/c-Fos) with increased protein levels of p21 in extract treated KB cells. Further, the downstream activation and regulation of AP-1 transcription factors could be through stress activated c-Jun - N terminal Kinase (JNK) Mitogen Activated Protein Kinases (MAPKs) which downregulated both Jun and Fos mRNA transcripts in areca nut extract exposed KB cells. Thus, outcome of the study provides insights into mechanistic path of pathogenesis of areca related disorders. Further, it could aid in designing new therapeutic modalities that specific targets these oncogenic players and help in disease management.

1. Introduction

Mitogen-Activated Protein Kinases (MAPKs), a class of protein kinases that auto phosphorylate their own serine and threonine residues or phosphorylate their transcriptional substrates, to activate or to suppress their downstream target genes which are actively involved in modulation of numerous biological progression [1]. There are ubiquitously expressed and evolutionarily conserved in eukaryotes and are involved in signaling cascade that modulate physiological and pathophysiological

cellular responses [2]. MAPKs are known to regulate key cellular processes such as proliferation, stress responses, apoptosis, and immune defense [3]. Extracellular signal regulated kinases (ERK), c-Jun N-terminal kinase (JNK), and p38 isoforms of MAPKs are grouped according to their activation motif, structure, and function [4]. Growth factors, hormones and proinflammatory cytokines activate ERK, whereas JNK and p38 MAPKs are activated by cellular and environmental stressors [4, 5]. Further MAP Kinases also regulate numerous transcription factor that are stimulated either by mitogens, growth factor, cellular or

Abbreviations: AP-1, Activator Protein-1; MAPK, Mitogen Activated Protein Kinase; ERK, Extracellular signal regulated kinases; JNK, c-Jun-N terminal Kinase; CDK, Cyclin Dependent Kinase.

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Shree

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स्थिति निर्भर करती है। यदि समाज कृषि प्रधान है तो कृषि-शिक्षा पर बल दिया जायेगा। साथ ही व शिक्षा के अधिक अवसर नहीं प्रदान कर पायेगा। यदि समाज उद्योग प्रधान है तो विभिन्न व्यवसायों की शिक्षा पर बल दिया जायेगा साथ ही समाज, शिक्षा के लिए अधिक अवसर प्रदान करने में सफल होगा।

रामानंद जी के शब्दों में "एक समुदाय के रूप में हमें खुद को परिस्थितियों से निपटने के लिए तैयार करना होगा, हमें ऐसी शिक्षा मिलना चाहिए जो हमें बुनियादी आवश्यकताओं के लिए आत्मनिर्भर बनाए, गांधीजी की बुनियादी शिक्षा का प्रारूप न केवल इस समय सामुदायिक आत्मनिर्भरता के लिए बहुत उपयोगी है।

उपसंहार : कोरोना संकट के दौर में शैक्षणिक संस्थानों के आगे जो चुनौतियां हैं उसमें ऑनलाइन एक स्वाभाविक विकल्प है, ऐसे समय में विद्यार्थियों से जुड़ना समय की जरूरत है, लेकिन इस व्यवस्था को कक्षाओं में आमने-सामने दी जाने वाली गुणवत्तापूर्ण शिक्षा का विकल्प बताना भारत के भविष्य के लिए अन्याय पूर्ण है। कोरोना संकट में शारीरिक दूरी बनाए रखकर शिक्षा के लिए तकनीकी का प्रयोग एक बात है, वैसे भी तकनीकी के विकास के साथ ही शिक्षा में भी उसका उपयोग होता रहा है, यह होना जरूरी भी है। ब्लैकबोर्ड से लेकर के स्मार्ट बोर्ड तक बदलती तकनीकी का उपयोग वर्तमान टीचिंग को मजबूत और रुचिकर बनाने के लिए किया जा सकता है। ई-लाइब्रेरी का डिजिटल होना उसी प्रक्रिया एक रूप है। अध्यापकों को व्याख्यान को रिकॉर्ड करना और उन्हें ऑनलाइन उपलब्ध कराना भी तकनीकी का उपयोग करना ही है, इन तकनीकों का उपयोग कर सामाजीकरण की प्रक्रिया को शिक्षा के द्वारा बढ़ाया जाता है

संदर्भ ग्रंथ :

- | | |
|----------------------------|---------------------------|
| 1. हिंदी साहित्य का इतिहास | बाबू गुलाब राय |
| 2. हिंदी भाषा शिक्षण | श्री दिनेश चंद्र भारद्वाज |


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के बाह्यभ्यंतर जगत तथा आंतरिक जगत के संघर्ष का चित्रण करना, आकाश कथाकार अपना प्रमुख कर्तव्य समझता है।

नाट्य साहित्य : हिंदी नाट्य साहित्य का उद्भव काल भारतेंदु युग से होता है। भारतेंदु हरिश्चंद्र ने दो प्रकार के नाटकों की रचना की प्रथम मौलिक तथा दूसरे अनुदिता उनके मौलिक नाटकों में जीवन के समस्त क्षेत्रों की झलक है। शिल्प की दृष्टि से उनके नाटक संस्कृत तथा बंगला से प्रभावित हैं। परंतु यह मानना पड़ेगा कि वे सर्वप्रथम हिंदी के नाटककार थे, जिन्होंने राष्ट्रीय तथा सामाजिक चेतना को अपने नाटकों का विषय बनाया।

आधुनिक नाटक का कायाकल्प करने का श्रेय प्रसाद जी को है। उन्होंने अपने नाटक पूर्णतया साहित्यिकता की दृष्टि से लिखे। प्रसाद के नाटक ऐतिहासिक हैं, इस युग में हिंदी नाटक में क्रांतिकारी परिवर्तन आए। उन्होंने अपने नाटकों में अतीत के गौरव को तथा भारतीय संस्कृति के सुंदरतम स्थलों को विशेष स्थान दिया है। वर्तमान समय में एकांकी नाटकों का विशेष प्रचलन है। रामकुमार वर्मा ने एकांकी नाटकों की रचना में विशेष योगदान दिया है। अशक ने भी पर्याप्त एकांकी नाटक लिखे हैं। एकांकी नाटकों में जनसाधारण की समस्याओं को ही प्रदर्शित किया जाता है। देश के विभिन्न भागों में नाट्य मंच की स्थापना हो चुकी है और आज भी इस दिशा में पर्याप्त प्रयास हो रहे हैं।

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Biomarkers for Hepatocellular Carcinoma—An Updated Review

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ABSTRACT: Hepatocellular carcinoma (HCC) stands third among cancer-related deaths globally. Owing to its high incidence and linked mortality, early diagnosis is alarming for patient survival and the management of patients with developing HCC requires immediate attention. Advances in the knowledge of cancer biology and recognizing unique molecular candidates, including genomic and proteomic profiles, substantiate our understanding about several biological signatures connected with HCC. Precise identification and differential diagnosis of early HCC can remarkably improve patient survival. Currently, detection of HCC in clinical practice is performed by diagnostic imaging and noninvasive methods such as evaluation of serum biomarkers, growth factors, and the like. In this review, we discuss recent developments in targeting biomarkers for HCC.

KEY WORDS: hepatocellular carcinoma, biomarker, diagnosis, prognosis, targeting, therapy


ABBREVIATIONS: AF, alpha-fucosidase; AFP, alpha-fetoprotein; ANXA2, annexin A2; CT, computed tomography; DCP, des gamma carboxyprothrombin; DKK1, Dickkopf-1 protein; EGF, epidermal growth factor; EGFR, EGF receptor; GGT, gamma-glutamyl transferase; GP73, Golgi protein 73; GPC, 3-Glypican-3; HBV, hepatitis B virus; HCC, hepatocellular carcinoma; HCV, hepatitis C virus; HGF, hepatocyte growth factor; HOTAIR, HOX transcript antisense intergenic RNA; LncRNA, long noncoding RNA; MALAT-1, metastasis-associated lung adenocarcinoma transcript 1; miRNA, microRNA; MMP, matrix metalloproteinase; MRI, magnetic resonance imaging; NEAT-2, noncoding nuclear-enriched abundant transcript 2; OPN, osteopontin; SCCA, squamous cell carcinoma antigen; TGF, β -transforming growth factor- β ; VEGF, vascular endothelial growth factor

I. INTRODUCTION

Liver cancer is the third most common cancer-associated death globally.¹ It includes hepatocellular carcinoma (HCC) and cholangiocarcinoma (CCA) and accounts for around 90% and 10% of such deaths, respectively.² It varies significantly by geographical location and gender. Hepatitis B virus (HBV), metabolic factors, hepatitis C virus (HCV), alcohol, and tobacco are some of the prominent risk factors for liver cancer.³ In patients suffering from chronic hepatitis/cirrhosis, the activation of stellate cells leads to enhanced oxidative stress, growth factors and cytokine synthesis that triggers inflammation and hepatocyte regeneration, finally resulting in development of HCC.^{4,5}

Apart from these factors, the major signaling cascades linked to HCC are Wnt/ β -catenin, c-Met, PI3K/Akt, myc, and hedgehog. Most of them are associated with the stimulation of protein kinases and their receptors. Tumor formation is promoted by the stimulation of Akt signaling by inhibiting apoptosis induced through TGF- β , which further activates the Wnt/ β -catenin pathway leading to hepatocarcinogenesis. Multiple drugs that modulate these signaling mechanisms, including KU-0060648, anastroquinol, and sorafenib, are currently employed for the management of HCC.⁶

For several years, liver biopsy was considered the gold standard of liver fibrosis and cancer staging assessment. It provides vital information concerning the degree of liver injury, particularly the


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