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Value Education in Schools for National Integration—An Urgent Need

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ABSTRACT

Every nation has its own soul, which forms the foundation of its identity. Our nation has always been rich in its traditions, cultures, and values. Values in our Indian culture and society have always been held in the utmost regard. However, in the last few decades, the race for advancement in science, technology, and industries has given a very narrow scope for human values to develop. India is inhabited by people belonging to different religions, cultures, languages, races, castes, etc., representing a diversity of people with different styles of intellectual thinking, behaviour, and emotions. In addition, this has resulted in problems connecting youth with national reconstruction, building national economies, maintaining a standard of living, and developing national sentiment. The purpose of this paper is to investigate the elements that have contributed to a deterioration in national values, which has resulted in an increase in indiscipline and insurgency in the system, as well as to identify workable solutions.

Introduction

National integration represents a connection that exists amongst citizens of a country belonging to different castes, creeds, religions, and genders. It is the sense of oneness, brotherhood, and social togetherness that exists within a country's communities and society. Despite the diversity of a country, national integration serves to maintain the nation's unity and make it powerful from within. National integration is extremely important for a country since the integrity of a nation has been jeopardised several times throughout history. It has faced significant internal obstacles such as communalism, regionalism, and so on as well as external attacks. Terrorism on a global scale is also a big danger to national integration. While just a few individuals with radical ideas are able to persuade and manipulate the whole public. They incite them to rebel against their own country. As a result, national integration is crucial in the formation of a country. It ensures that the country's heritage is preserved while still allowing for growth.

The education system appears to be a factory that produces a large number of educated people who are inefficient in the real world. In today's world, education means learning how to make money or get a job, and the importance of values and morality is completely overlooked. This strategy has exacerbated a number of long-standing issues in the Indian educational system. The majority of antisocial behaviours are committed by the well-educated young generation. The teacher-student relationship is characterised by a lack of trust in one another. In this age of technology breakthroughs and social media accessibility. It is incredibly simple to be deceived. National integration aids in the obfuscation of these issues. It develops intellectual ability and tolerance among people.

Modernization and technological developments are contributing factors to the changing value patterns of our country. Children are no longer considered passive learners. They are more aware of their environment, have easy access to information, and are opinionated on every topic of discussion. The education system was once considered a place where old values would be replaced with new ones. The

child would be helped to adapt to the new values accordingly, but today no attempt is made to persuade young individuals to accept human values. The increase in indiscipline, violence, disobedience, use of substances, indifference, dishonesty, etc. among students has led to the question "where do values in our education system stand?"

Teaching Values for National Integration - A need of the hour

Today, we live in a materialistic society where the quality of living has improved but the quality of life continues to decline. The erosion of moral codes in our culture has become a major source of concern. Values are the collection of principles that we use to determine whether something is right or wrong. These values might originate from one's own self, family, community, religion, government, or any other entity that has an impact on one's thinking. Let us discuss some of the primary causes behind our youth's eroding values.

1. **Political Scenario:** Political parties have trapped today's youth and are exploiting them for their own benefit. In colleges and universities, there exist student unions groups that encourage students to engage in unethical behaviour, immoral conduct, such as cheating, assaulting faculty if they fail during exams or organising strikes to meet their unfulfilled demands, leading to degradation of society's ethical and moral principles.
2. **Family factors:** Family factors in today's society, the involvement of family is critical for the development of a child's personality. Parents are generally more concerned with their children's education than with fostering strong moral principles in them. Working parents fail to teach their children character traits and etiquette. The majority of working parents have no clue as to what their children do when they're not at home. Excessive freedom can lead to youths indulging in a variety of undesirable behaviours such as going to a nightclub, gambling, smuggling, etc. Parents today are unable to monitor their children's

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A Study of Value Patterns of Secondary Schools Teachers in Darjeeling District

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Value, Value Patterns, Secondary School Teachers, Gender

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ABSTRACT

The role of a teacher is to make decisions about how to best facilitate their students' learning in the conditions in which they teach. They do it skillfully, intelligently, and with suitable modifications, taking into account their own values as well as those of their pupils and other stakeholders. The present study has been conducted to study the value patterns of secondary school male and female teachers. The purpose of this study is to investigate at the teacher value patterns of male and female secondary school teachers in the Darjeeling district. A random sampling approach was employed with a sample size of 100 secondary school teachers. The religious, social, political, economic, theoretical, and aesthetic values have all been explored. The researcher employed the Teacher Value Inventory established Singh and Ahluwalia(2008) A significant disparity in the political, economic, and social worth of male and female secondary school instructors has been discovered.

Introduction

Basic human characteristics like empathy and tolerance receive relatively less attention in our materialistic society. This oversight leads us to believe that information will be exploited without regard for context or priorities established by beliefs. We pay very little attention to the beliefs that make up the information or how informed we are of it. Digitalisation of education has aided students in their studies, but it does not replace the teacher's emotions in getting pupils through school or knowledge in assisting the intellectual development of the child. Teachers have an important influence in students' psychological and physical well-being by keeping them focused and aware in class. Teachers play a significant role in the teaching and learning process; they are indeed the biggest contributor of quality in education of any country. In ancient times, a teacher was considered one of the most distinguished figures and erudite scholar in the society with high morals and principles but it is not the same in today's modern society. If a teacher is unmotivated, apathetic, uncommitted, uninspired, dishonest, indiscipline, and indifferent, the country will struggle to progress. Teachers' role and responsibilities include more than just transmitting knowledge through the use of classroom practices; it should also include teacher's behaviour, attitudes, and character, as the interpersonal relationship between the teacher and the learners, will determine the development of the child and his environment. According to Dixit and Singh (2015), factors such as the locality of the school and the gender of the teachers influence the value pattern. Kumar (2012) found a statistically significant difference in the social and aesthetic value of male and female trained graduate secondary school teachers. Female secondary teachers have high aesthetic value than their male counterparts. Sharmila's (2016) Gender and family type had no significant differences in their Value Pattern of Higher Secondary Teachers, but locality, teaching subject, and teaching experience did. According to the findings of Kaur (2014), men and female teachers differ in their value patterns. Male teachers do much better in theoretical, political, and social values, but female teachers perform better in economic, aesthetic, and religious values. On the basis of their

multiple value dimensions, Singh (1992),Dutt (1986),Yero (2001), and Nitasha (2013) revealed significant differences between male and female teachers. In many countries across the world, including India, the increase of indiscipline, a lack of principles, and a degradation of social and moral principles in the younger generation has sparked significant concern in recent years. For the young of today, the past is irrelevant, the present is uncertain, and the future is confusing and frightening. Today's value erosion has become a relevant issue.

Statement of the Problem

A Study on the Value Patterns of Secondary School Teachers

Objective of the study:

1. To determine the value patterns of male and female secondary school teachers.
2. To examine the value patterns of male and female secondary school teachers with respect to each of the six values

Research Questions:

1. Does the value pattern of male teachers differ from female teachers of secondary school?

Hypotheses:

The hypotheses of the study are:

1. There is no significant difference in the different value patterns of male and female secondary school teachers.

Delimitations of the study:

The scope and time constraints have delimited the present study to the following.



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An association study of severity of intellectual disability with peripheral biomarkers of disabled children in a rehabilitation home, Kolkata, India

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Aaveri Sengupta¹, Ujjal Das¹, Krishnendu Manna¹, Sushobhan Biswas¹, Siddhartha Datta¹, Amitava Khan², Tuhin Bhattacharya¹, Samrat Saha¹, Tapashi Mitra², Swapan Mukherjee², Anup K. Sadhu³, Suhrita Paul⁴, Saurabh Ghosh⁵, Rakhi Dey Sharma⁶ & Sanjit Dey¹

The current investigation has identified the biomarkers associated with severity of disability and correlation among plethora of systemic, cellular and molecular parameters of intellectual disability (ID) in a rehabilitation home. The background of study lies with the recent clinical evidences which identified complications in ID. Various indicators from blood and peripheral system serve as potential surrogates for disability related changes in brain functions. ID subjects (Male, age 10 ± 5 yrs, $N = 45$) were classified as mild, moderate and severe according to the severity of disability using standard psychometric analysis. Clinical parameters including stress biomarkers, neurotransmitters, RBC morphology, expressions of inflammatory proteins and neurotrophic factor were estimated from PBMC, RBC and serum. The lipid peroxidation of PBMC and RBC membranes, levels of serum glutamate, serotonin, homocysteine, ROS, lactate and LDH-A expression increased significantly with severity of ID whereas changes in RBC membrane β -actin, serum BDNF, TNF- α and IL-6 was found non-significant. Structural abnormalities of RBC were more in severely disabled children compared to mildly affected ones. The oxidative stress remained a crucial factor with severity of disability. This is confirmed not only by RBC alterations but also with other cellular dysregulations. The present article extends unique insights of how severity of disability is correlated with various clinical, cellular and molecular markers of blood. This unique study primarily focuses on the strong predictors of severity of disability and their associations via brain-blood axis.

Intellectual disability (ID) refers to significantly sub-average intellectual functioning, resulting in concurrent impairments in adaptive behavior and manifests during the developmental period^{1,2}. Recent clinical evidences have identified complications in ID to be reflected in blood cells. But the mechanistic link between disease severity and alterations in blood cell markers has not been untangled so far. ID has causal association with genetic or non-genetic factors such as, infection or intoxication during pregnancy, complications of delivery, or postnatal infection or trauma. Genetic causes are responsible for more than 50% of severely mentally disabled persons³. Intellectually disabled generally have reduced cognitive abilities and limited basic verbal abilities. The brain areas associated with social adaptation, motor and daily living skills are impaired more in generalized developmental disturbances⁴. Depending on the severity of the disease, they fail to decide or motivate themselves about their regular work and coping up with systemic stress.

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**THE REFLEXIVITY OF HYPEREXPANSIONS
AND THEIR CAUCHY DUAL OPERATORS**

SHUBHANKAR PODDER* AND DEEPAK KUMAR PRADHAN

(Communicated by V. Bolotnikov)

Abstract. We discuss the reflexivity of hyperexpansions and their Cauchy dual operators. In particular, we show that any cyclic completely hyperexpansive operator is reflexive. We also establish the reflexivity of the Cauchy dual of an arbitrary 2-hyperexpansive operator. As a consequence, we deduce the reflexivity of the so-called Bergman-type operator, that is, a left-invertible operator T satisfying the inequality $TT^* + (T^*T)^{-1} \leq 2I_{\mathcal{H}}$.

1. Introduction

Completely hyperexpansive operators were introduced independently by Aleman [2] and Athavale [5]. It has been extensively studied by several authors (see, for example, [38], [26], [27], [3], [4]). It is worth mentioning that the class of completely hyperexpansive weighted shifts is antithetical to that of contractive subnormal weighted shifts, in the sense that its Cauchy duals are contractive subnormal weighted shifts (see [5, Remark 4]). The present paper investigates the class of hyperexpansions with a focus on reflexivity. It is to be noted that by a result of Olin and Thompson [29, Theorem 3], any subnormal operator is reflexive. Although the Cauchy dual of a completely hyperexpansive operator is not necessarily subnormal (refer to [4, Examples 6.6 and 7.10]), surprisingly, Proposition 3.1 ensures the reflexivity of the Cauchy dual of any 2-hyperexpansive operator.

We set below the notations used throughout this text. Let \mathbb{N} denote the set of positive integers. Let \mathbb{C} be the complex plane, while \mathbb{D} stand for the open unit disk in \mathbb{C} centered at the origin. All the Hilbert spaces to occur below are complex and separable. For a Hilbert space \mathcal{H} , we use $B(\mathcal{H})$ to denote the algebra of bounded linear operators on \mathcal{H} . Unless stated otherwise, the Hilbert spaces are infinite-dimensional. The kernel, range, adjoint and spectrum of an operator $T \in B(\mathcal{H})$ are denoted by $\ker T$,

Mathematics subject classification (2010): 47B20, 47A16.

Keywords and phrases: Completely hyperexpansive operator, Dirichlet-type operator, Cauchy dual, reflexivity.

A part of this paper was written while the first author visited the Department of Mathematics and Statistics, IIT Kanpur. He expresses his gratitude to the faculty and the administration of this unit for their warm hospitality. The authors would like to thank Sameer Chavan for his continual support and encouragement throughout the preparation of this paper. In particular, Case II in Proposition 3.3 was pointed out by him. The authors are also extremely grateful to the referee of this paper whose suggestions have substantially improved the presentation of this work.

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OPEN Mechanistic study of attenuation of monosodium glutamate mixed high lipid diet induced systemic damage in rats by *Coccinia grandis*

Arnab Banerjee¹, Debasmita Das¹, Rajarshi Paul¹, Sandipan Roy¹, Ujjal Das², Samrat Saha², Sanjit Dey², Arghya Adhikary³, Sandip Mukherjee¹ & Bithin Kumar Maji¹✉

In the context of failure of treatment for non alcoholic fatty liver disease (NAFLD)-mediated systemic damages, recognition of novel and successful characteristic drug to combat these anomalous situations is earnestly required. The present study is aimed to evaluate protective value of ethanol extract of *Coccinia grandis* leaves (EECGL), naturally occurring medicinal plant, on NAFLD-mediated systemic damage induced by high lipid diet along with monosodium glutamate (HM)-fed rats. Our study uncovered that EECGL significantly ameliorates HM-induced hyperlipidemia, increased lipogenesis and metabolic disturbances (via up regulation of PPAR- α and PPAR- γ), oxidative stress (via reducing the generation of reactive oxygen species and regulating the redox-homeostasis) and inflammatory response (via regulating the pro-inflammatory and anti-inflammatory factors with concomitant down regulation of NF- κ B, iNOS, TNF- α and up regulation of eNOS). Furthermore, EECGL significantly inhibited HM-induced increased population of cells in sub G0/G1 phase, decreased Bcl2 expression and thereby loss of mitochondrial membrane potential with over expression of Bax, p53, p21, activation of caspase 3 and 9 indicated the apoptosis and suppression of cell survival. It is perhaps the first comprehensive study with a mechanistic approach which provides a strong unique strategy for the management of HM-induced systemic damage with effective dose of EECGL.

Nowadays, younger generation children are too much fond of fast food from nearby cafe or from the local restaurant which are exceptionally alluring and extremely fiery too. This food contains saturated fat, hydrogenated fats which are fundamentally found in high lipid diet (HLD)¹ and in combination with flavor upgrading substance monosodium glutamate (MSG) popularly known as ajinomoto is the silent killer of various organs of animal models and in human. Lack of physical activity or absence of dynamic work with high consumption of the above combinations of food constituents may at last generate situation of dyslipidemia as well as hyperglycemia. These combinations may help in the generation of reactive oxygen species (ROS) and likewise cause asymptomatic non alcoholic fatty liver disease (NAFLD) which ultimately leads to the progression of necrosis, hepatic steatosis, fibrosis, cirrhosis, programmed cell death and finally progression of liver malignancy. In the present time, NAFLD immensely set apart as a basic medical issue everywhere throughout the World which at last prompts cardiovascular disorders (CVD) and non-insulin-dependent diabetes mellitus (NIDDM)²⁻⁴. Improvement of NAFLD is a convoluted procedure and relying upon a few variables and particularly relating to a condition or ailment coming about because of the cooperation of numerous qualities which depends on the "two-hit" theory and it expresses that either triglycerides or fatty acids aggregated in hepatic tissue, event of insulin resistance (IR), inflammatory response and generation of ROS may cause the hepatic injury. Moreover, recently "multiple-hit model" have been widely acceptable hypothesis instead of the outdated "two-hit" hypothesis; it is mainly based

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RESEARCH ARTICLE

High-casein diet restores the redox balance in the liver and pancreatic health of mice when exposed to radiation during call mode from mobile phones

Prerona Biswas¹, Debajyoti Bhattacharya^{1,2}, Somnath Gangopadhyay², Mausumi Sikdar (née Bhakta)^{1,3}

ABSTRACT

Introduction: The current lives of human beings cannot be imagined without cellular phones and electronic gadgets. Still, the probability of being exposed to their harmful radiation is unabated which demands an immediate intervention to shield humankind from being affected by using such devices. In our current investigation, we aimed to check the role of a high-casein diet as a protective measure against the biological effects of electromagnetic radiation (EMR) emerging from mobile phones on hepatic and pancreatic systems. **Methods:** Swiss albino mice (n=24) were fed on a standard laboratory diet (ND; n=12) and an isocaloric high-casein diet (HCD; n=12). Six mice from each dietary group were exposed to mobile phone radiation for 3 hours/day within a 3 months span. Histopathological alterations were studied in hepatic and pancreatic tissues by using periodic acid-schiff (PAS)-hematoxylin and routine H&E staining methods. Biochemical evaluation of total serum protein, lipid profile and glucose, total glutathione, oxidized glutathione, and antioxidant enzymatic activities of hepatic tissues were performed. **Results:** Hyperglycemia was noticeable along with a reduced number and area of islets of Langerhans in radiation-exposed mice when compared to other groups. This was supported by the observation of depleted glycogen reserves in their liver. Additionally, distorted hepatic morphology with nuclear degeneration was suggestive of apoptotic progression. The total glutathione pool was reduced on radiation exposure, hint at redox imbalance. HCD was competent in preserving the normal pancreas and liver functioning in radiation-exposed mice.

Keywords: Casein, Electromagnetic radiation, Glutathione, Karyorrhexis, Redox imbalance, Triglyceride.

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INTRODUCTION

The rise in mobile phone usage in the modern world was inevitable since its inception but digitalization and the recent global pandemic have increased its usage exponentially. The resourcefulness and multitasking facilities of mobile phones have proven to be addictive over due course of time. However, it has now been converted into an indispensable commodity along with other electronic gadgets for adults who have to work from home and children who depend on online classes and exams. Therefore, the propensity to be exposed to its irradiated electromagnetic waves has heightened noticeably and culminated in its fatal effects at the system, cellular, and genetic levels.¹ With the introduction of 5G technologies, the issues of pre-existing electromagnetic radiation (EMR) exposure will exacerbate at environmental and personal levels. Safety limits of the exposure to non-ionizing radiation, stipulated by the responsible bodies, merely protect the industry that manufactures electronic gadgets, thereby neglecting environmental homeostasis and human health.²

Electrohypersensitivity (EHS) is now a recognized clinical condition in many countries of the European Union and Canada, and Sweden with the soaring electropollution.³ The term EHS was primarily coined by William Rea in 1991 and designated a new clinical condition where patients reportedly complained of health issues when exposed to electromagnetic fields.⁴ It has been estimated that 3-5% of the population in several countries is affected by EHS, so millions of people worldwide may be affected by EHS.⁵

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EMR from mobile phones can manifest adverse effects on cerebral blood flow⁶ and the permeability of the blood-brain barrier (BBB)⁷ in humans. Their repercussions are observed as the loss of attention and immediate memory, tinnitus, elevated levels of anxiety, emotivity, and impairment of other cognitive functions. Recent reports have claimed increased aggression among teenagers addicted to games on mobile phones.⁸ *In-vivo* studies have shown that mobile radiation affects different regions of the brain, induces diabetes-like changes, and disrupts redox balance in hepatic

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Trends of alterations in pulmonary function and symptoms in garment workers of Garden-Reach-Metiabruz area of Kolkata

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ABSTRACT

Introduction and Aim: In spite of being the 2nd highest contributor in foreign exchange earning of the country, the work environment of most of the units of textile industry including readymade garment manufacturing is unsafe and unhealthy for the workers resulting in several health problems. Information, though available for other parts of our country regarding impacts on respiratory health and pulmonary functional status, are completely inadequate for the workers of Garden Reach-Metiabruze area of Kolkata. The present study was undertaken to investigate the physical characteristics, pulmonary functional status and to identify the presence of any respiratory symptoms among the workers of the said area.

Materials and Methods: A total of 80 male workers were selected as experimental subjects and divided into two age groups, namely, 18-35 years and 36-49 years and an age-matched control subjects were selected (n= 50) from the same area with no exposure of the work environment. The physical characteristics i.e., height, weight, body surface area (BSA) and body mass index (BMI) were evaluated for all the subjects. Pulmonary function test (PFT) was performed through spirometry for Forced Vital Capacity (FVC), Forced Expiratory Volume 1 % (FEV1%), Slow Vital Capacity, Maximum Voluntary Ventilation and Peak Expiratory Flow Rate. A questionnaire was used to evaluate the respiratory symptoms.

Results: All the PFT parameters were significantly decreased in the workers compared to control though there was no difference in physical characteristics in the subjects of both the age groups. Respiratory symptoms were also prevalent among the workers and even temporary work cessation led to improvement of the symptoms in most of the subjects.

Conclusion: Together these results indicate that these workers are also having poor, altered and deranged pulmonary functional status having obstructive and mixed (obstructive plus restrictive) type that may develop several pathologic conditions, breathing difficulties and respiratory symptoms. Shifting of duties or decreased time of exposure to the work environment, use of personal protective equipment etc. might have some beneficial effects on the symptoms. Further studies and interventions are needed to combat the severe health consequences and improve workers' health with maintenance of optimal productivity.

Keywords: Garment manufacturing industry; pulmonary functional status; respiratory symptoms; cotton dust.

INTRODUCTION

Workers of industry, agriculture, mining and other working environments often encounter occupational health hazards. If the work stresses reach beyond the level of human tolerance, it may lead to ill-health. Occupational diseases and injuries may result from specific exposures at work. Additionally, work exposures may aggravate certain illnesses or be a factor in causing diseases of multiple etiologies (1). In India, textile industry including readymade garment manufacturing is the 2nd highest contributor of export (2). About 3million workers are employed in more than 70,000 garment manufacturing units in the country (3).

In most of the unorganized garment manufacturing units, the work environment is unhealthy and unsafe for the workers resulting in several health problems, among which respiratory health is maximally compromised (4). The development of the industry in

our country occurred at several zones centering the cities like Lucknow, Pune, Delhi, Ahmedabad, Varanasi, Mumbai, Kolkata etc., In Kolkata, large-scale manufacturing of garments has flourished in the region of South-Western suburb of the city, namely Garden-Reach-Metiabruz. Several studies have been performed to assess the respiratory health and other health hazards of the workers in the cities mentioned above (5-9), but no study have been found to be conducted in the fore-mentioned region of Kolkata, excepting a single recent sociological study on these workers reported about their poorer conditions and worse status with increased tie of local market with global market (10).

Therefore, the purpose of our present investigation is to evaluate the physical characteristics, pulmonary functional status including Forced Vital Capacity (FVC), Forced Expiratory Volume in 1 second (FEV1), FEV1/FVC ratio, Peak Expiratory Flow Rate (PEFR), Slow Vital Capacity (SVC) and

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Short Communication

Arnab Banerjee, Bithin Kumar Maji and Alok Chattopadhyay*

***Terminalia arjuna* induced testicular assault through Leydig cell derangement: an *in vitro* approach**

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Abstract

Objectives: *Terminalia arjuna* (TA) has been widely used as folk medicine since ancient times. Apart from its therapeutic properties it also has anti-spermatogenic activity, but its effectiveness and mode of action on male gonadal activity remains to be revealed.

Methods: TA bark extract was dissolved in 1% dimethyl sulfoxide and applied in primary Leydig cell culture from rat testis in dose dependent manner. After 24 h of treatment cellular toxicity marker, cytokines, steroid 5-alpha-reductase 1 (SRD5A1) and androgen receptor (AR) were measured.

Results: Present study first proposed the cytotoxic impacts of TA on Leydig cells via leakage of lactate dehydrogenase and inflammatory responses by altering the pro- and anti-inflammatory cytokines in dose-dependent manner. Furthermore, down regulation of SRD5A1 and AR indicated inhibition of normal steroidogenesis which well corroborated with cytotoxicity and inflammation related parameters to promote damage of Leydig cell function. Nevertheless, it can be speculated that the inhibition of normal steroidogenesis and thereby spermatogenesis induced by TA is possibly due to the presence of β -sitosterol.

Conclusions: Therefore, the dose and duration of treatment should be carefully monitored in cases of its medicinal uses and longer duration should be avoided to protect reproductive health and fertility.

Keywords: cytotoxicity; inflammation; Leydig cells; steroidogenesis; *Terminalia arjuna*.

Introduction

Male reproductive function is primarily mediated by the male gonads testes, along with the involvement of other accessory sex organs and glands including epididymes, prostate etc. and associated hormones. Testis performs two highly organized and intricate events, namely, spermatogenesis and steroidogenesis. Though a powerful intrinsic defense system protects the spermatozoa from the injuries caused by intrinsic or extrinsic factors during its spermatogenic or post-spermatogenic journey, still it is very vulnerable to assaults which is reflected by the adverse trend in male reproductive health including infertility [1]. The male reproductive system is extremely sensitive to various environmental factors or xenobiotic compounds. These are reported to target the testes either at steroidogenesis or spermatogenesis or both ultimately leading to reproductive dysfunction and infertility, since, Leydig cell steroidogenesis is a pre-requisite for the maintenance of qualitatively and quantitatively optimal spermatogenesis [2, 3].

From ancient times plants have been used globally across varied cultures as folk medicine with ethnopharmacological relevance. *Terminalia arjuna* (TA) is a well-known medicinal plant, the fruits, leaves and barks of which are widely used for healing properties. Bark extracts of this plant has antidiarrhetic, antipyretic, astringent, hepatoprotective, hypocholesterolemic and most importantly cardiotoxic properties. Though the bark extract has several therapeutic properties, it has also been reported to

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Research Article

A Comparison of Antibacterial Effects of *Catharanthus roseus* and *Camellia sinensis* (Black Tea) and Their Synergistic Effect along with Antibiotic against Multiple Antibiotic Resistant Strains of *Staphylococcus aureus*

Aparna Shil, Sushmit Mukherjee, Biswadev Bishayi & Mausumi Sikdar (Nee) Bhakta

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ABSTRACT

Community associated strains of *Staphylococcus aureus* were isolated and treated with extracts of *Catharanthus roseus* and *Camellia sinensis* (black tea) to examine their antibacterial potential, either alone or in combination with an antibiotic, ampicillin. Results of MIC values (Minimum Inhibitory Concentration), growth inhibitory patterns, SEM images of the clinical and standard strains in the presence of their ethanolic extracts indicated that *C. roseus* root had greater antibacterial potential than black tea. The FIC (Fractional Inhibitory Concentration) values suggested that the combination of

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ORIGINAL ARTICLE



Ovarian follicular atresia and uterine toxicity after subchronic oral exposure of postpubertal rats to sodium arsenite

Rubia Mondal¹ · Aparna Mukhopadhyay¹ · Alok Chattopadhyay² · Amit Bandyopadhyay³ · Prabir Kumar Mukhopadhyay¹

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Abstract

Exposure to inorganic arsenic is a notable health issue featuring several incidents of female reproductive dysfunctions. This study was designed to explore the extent of damages of sodium arsenite on female reproductive system of rats. Forty adult Wistar nulliparous rats having 3 months of age were grouped into four where the treated groups (Gr II, III, and IV) were gavaged with sodium arsenite (1, 3, and 5 mg/kg/day, respectively) for 30 consecutive days and a vehicle-fed group (Gr I) served as control. The treatment resulted in decrease of body weight (Gr III and IV) and weight of ovary and uterus (Gr II, III, and IV). Marked decrease of the pre-antrum, antral, and Graafian follicle pools with concomitant enhancement of follicular atresia (Gr III and IV) was noted but primordial and primary follicle pools remained unaltered. Compromised antioxidant defense in both the tissues was noted by altered enzymatic and non-enzymatic markers. The toxicity also resulted in the reduction of serum estradiol, LH, FSH and prolonged diestrus index. Alterations of uterine histoarchitecture with marked presence of shrunken endometrial glands, apoptotic bodies in the epithelium, and degenerated perimetrium were also noted. Elevated oxidative stress was further documented by increased presence of ROS in both the tissues. The subchronic exposure of sodium arsenite at higher doses caused progressive damages of folliculogenesis and uterine degeneration. This study demonstrates that the reproductive system of female rats is a target to sodium arsenite-induced ROS generation at higher doses.

Keywords Sodium arsenite · Ovary · Uterus · Follicular atresia · Sub-chronic toxicity · Tissue oxidative stress

Introduction

Toxic effects of inorganic arsenic compounds on mammalian ovary and uterus during exposure have been reviewed (Wang et al. 2006). Exposure to inorganic arsenic resulted in suppression of ovarian steroidogenesis, continuous diestrus, degeneration of ovarian follicle and uterine cells, and increase in the rate of meiotic aberrations in oocytes with concomitant reduction in preimplantation development (Navarro et al. 2004). Duration-dependent study in murine

model of chronic exposure to sodium arsenite ($NaAsO_2$) revealed that compromised reproductive function was due to the inhibition of ovarian steroidogenesis and reduction of gonadotropin secretion (Chattopadhyay et al. 1999). Exposure to $NaAsO_2$ resulted in disruption of circulating gonadotropins and estradiol with degeneration of uterine tissues (Akram et al. 2010). Low serum estradiol and down-regulation of estrogen signaling pathway influence uterine histoarchitecture and concomitant suppression of female reproductive functions (Chatterjee and Chatterji 2010). After prenatal exposure to sodium arsenite, morphological alterations in uterine tissue architecture with post-implantation loss were reported (Souza et al. 2020).

Arsenic toxicity was associated with oxidative stress in the liver, kidney, and blood of animals (Mondal et al. 2016; Sharma et al. 2021), and we hypothesized that oxidative damage to the ovaries and uteri of animals exposed to $NaAsO_2$ might contribute to female reproductive dysfunction. Therefore, the objective of our study was to explore the array of toxic events underlying the $NaAsO_2$ -mediated

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Existence of continuous maps from d -spheres ($d \geq 1$) to its various triangulations having the disjoint support property



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ABSTRACT

If Δ^{d+1} is the $(d+1)$ -simplex and K is its boundary complex, then K is a triangulation of S^d having $d+2$ maximal faces. It is an important result that for each $d \geq 1$, there is a continuous map $f : S^d \rightarrow |K|$ with the disjoint support property. Recently, we proved that there are triangulations L_n of S^d having a large number n of maximal faces for which there exists a continuous map $f : S^d \rightarrow |L_n|$ having the disjoint support property, but there is no homeomorphism having the disjoint support property. On the other hand, we also proved that there are triangulations K_n of S^d having a large number n of maximal faces for which there is a homeomorphism $h : S^d \rightarrow |K_n|$ having the disjoint support property. These results were proved only for the case of S^1 and S^2 . In this paper, we prove this result for all spheres S^d , $d \geq 1$.

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1. Introduction

Let Δ^d be a d -simplex for all $d \geq 1$ and let $x \in \Delta^d$. The smallest face of Δ^d containing x is called the *support* [2] of x in Δ^d . The following result is an important observation made by Bárány, Shlosman and Szűcs.

Theorem 1.1. ([2]) *There exists a continuous map $g : S^d \rightarrow \partial\Delta^{d+1}$ such that for every $x \in S^d$ the supports of $g(x)$ and $g(-x)$ are disjoint.*

Various proofs of the above theorem can be found in [1], [8], [9], [11]. For any triangulation K of S^d , let us define the *support* of any point $x \in |K|$, denoted by $\text{supp}(x)$, as the smallest face of $|K|$ containing x .

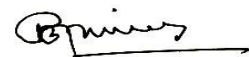
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Prog Health Sci 2021, Vol 11, No 2 Prevalence of community-associated S. aureus strains among students

Prevalence of community-associated *Staphylococcus aureus* strains among university students

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A - Conception and study design; B - Collection of data; C - Data analysis; D - Writing the paper; E - Review article; F - Approval of the final version of the article; G - Other (please specify)

ABSTRACT

Purpose: Colonization of multiple antibiotic resistant *Staphylococcus aureus* (*S. aureus*) in nasal cavity is associated with heightened risk of infections. The emergence and spread of multiple antibiotic resistant community-associated (MAR-CA) *S. aureus* strains has worsened the situation. The aim of this study was to assess the rate of prevalence and patterns of antibiotic resistance in *S. aureus* strains isolated from members of the student community in Presidency University, Kolkata, India.

Materials and methods: *S. aureus* isolates from university students were subjected to phenotypic and genotypic identification, construction of phylogenetic tree and submission of 16S rRNA sequences to GeneBank. Statistical analysis was done using Chi-square test to evaluate the significance of risk factors on the prevalence of community-associated (CA) and multiple antibiotic resistant *S. aureus* strains.

Results: Outcome of this study discloses the highest nasal colonization rate is that of CA- *S. aureus* strains

(51.11%), followed by CA-MRSA strains (13.08%). 9.66% of the colonized strains are MAR (Multiple Antibiotic Resistant) CA- *S. aureus*.

Conclusions: High nasal carriage rates of CA and MAR *S. aureus* strains point to increased risk of development of life threatening infections whenever these commensal microorganisms come in contact with carrier's blood. They can raise mortality rates by damaging cardiovascular and respiratory systems by causing endocarditis and pneumonia respectively, which are difficult to treat using antibiotics. This study conveys an alarming message, since it points to the insufficiency of antibiotics for the treatment of infectious diseases. Awareness about the prudent use of antibiotics, restricted and judicious antibiotic use and alternative therapeutic measures can help to keep the situation under control.

Keywords: *Staphylococcus aureus*, Community-associated methicillin-resistant, Multiple antibiotic resistant, Nasal carriage.

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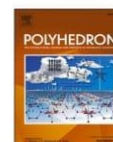
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2D paddle wheel lanthanide metal-organic framework: Synthesis, structure and exploration of catalytic *N*-arylation reaction

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ABSTRACT

Novel lanthanide based two-dimensional metal-organic framework (MOF) compound $[Dy(NDC)(NO_3)(DMA)_2]_n$ (**1**) [$H_2NDC = 2,6$ -naphthalenedicarboxylic acid and $DMA = N,N$ -dimethylacetamide] has been synthesized through solvothermal route and structurally characterized. Structural analysis reveals that compound is crystallized in the orthorhombic crystal system with space group *Pbca*. MOF features "paddle-wheel" (PW) core building units which are constructed via carboxylato oxygen coordinated to lanthanide atoms. Remaining coordination sites of the octa-coordinated metal center are occupied by oxygen atoms of DMA and NO_3^- ions. Paddle-wheel cores of **1** are interconnected to each other to give rise to layered network structure. The morphology of the MOFs as well as different types of weak interactions possessed by the framework have been assessed using Hirshfeld surface analysis and fingerprint plots have been drawn to understand various interactions. Notably, compound **1** can efficiently catalyze the *N*-arylation reaction heterogeneously.

1. Introduction

Metal-organic frameworks (MOFs) and coordination polymers (PCPs) are a significant new class of two-dimensional (2D) or three-dimensional (3D) crystalline materials with infinite lattice [1–5]. These solids are made of metal cations or clusters, multifunctional polydentate organic ligands through formation of secondary building unit (SBU) which further interconnected to afford the tertiary framework structure. The last few decades have witnessed an upsurge of research activities related to MOFs in different fields because of their multifunctional applications viz. in gas adsorption and separation [6,7], optics [8,9], magnetism [10], photoluminescence [11], drug delivery carriers [12–14] and in catalysis [15–18]. Recently, designing of porous and high dimensional lanthanide metal-organic frameworks through self-assembly process have received a lot of attention [19]. Unlike transition metal ions, mainly of 3d transition series, lanthanide ions are good choice to build multi-dimensional MOFs due to their large ionic radii presenting high coordination number which facilitates flexibility in coordination environments. In addition, lanthanide metal-organic frameworks (Ln-MOF) have attracted special interest for application in electronic devices [20], controllable luminescence [21], clean energy technologies [22–23], medical imaging [24] and catalysis [25–28].

Since the discovery of graphene, 2D materials [29,30] have quickly emerged as a distinct class of functional materials for their elegant electronic structure and ultrathin morphology, such as metal dichalcogenides, boron nitride, 2D MOFs etc. [31]. Design and synthesis of 2D MOFs, particularly, receiving widespread interest in a variety of fields like energy conversion and storage [32–34], imaging or sensing application [35–37], biomedical procedure [38] and catalytic fields like electro-catalysis [39], photo-catalysis [40] and thermo-catalysis [41]. The catalytic performance of these materials can be judiciously tuned by choosing diverse organic ligands with conjugated structure or functional groups and controlling the unsaturated metal nodes [42–43]. To date, mainly the transition metal based 2D MOFs are reported in the literature [32–35,37–41,44]. Reports of two-dimensional lanthanide MOF (Ln-MOF) are fewer than transition metal MOF [45–48]. By virtue of many unique advantages of Ln-MOF, such as high color purity, excellent luminescence properties and large Stokes shifts originating from the "antenna effect", undisturbed emissive energy, relatively long decay life time, and interesting pore variety studies on Ln-MOFs are mainly concentrated on photoluminescence applications [49]. Besides, Ln-MOFs are becoming the promising candidate for heterogeneous catalyst as well. In contrast to transition metal, lanthanide ions have abundant coordination geometry and large coordination number that in

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Research article

Comparative evaluation of the antibacterial and cytotoxic activity of green synthesized and commercially available ZnO nanoparticles

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ABSTRACT

Introduction and Aim: Emergence of different applications of metallic nanoparticles in various field leads to innovation of new synthetic strategies. Besides being non-toxic to mammalian cells, zinc oxide nanoparticles (ZnONPs) has gained paramount attention due to its excellent antibacterial potential. This study illustrates a comparative analysis of antibacterial and cytotoxic activity of both phytochemically synthesized and chemically synthesized commercially available ZnONPs.

Materials and Methods: As a source of reducing agent, leaf extract of *Coriander sativum* was employed in case of green synthesis of ZnONPs. Several techniques, such as X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Dynamic light Scattering (DLS) and Field emission Scanning Electron Microscopy (FESEM) were performed to characterize both green synthesized and commercial ZnONPs. Antibacterial potential of both the ZnONPs were investigated on Gram-positive and Gram-negative bacterial strains to draw a correlative outcome. Hepatocellular cell line was used to determine the cytotoxic activity of both ZnONPs.

Results: Both the nanoparticles showed antibacterial and cytotoxic activity with measurable degree of difference.

Conclusion: From these studies it can be concluded, the green synthesized nanoparticles showed greater antibacterial as well as cytotoxic activity in comparison to the commercial ZnONPs.

Keywords: Green synthesis; ZnONPs; *Coriander sativum*; antibacterial; cytotoxic activity.

INTRODUCTION

Extensively tiny size and unique properties of nanomaterial intensified their acceptance in the field of biomedical research. Emergence of nanoscience creates a possibility to encounter unique properties of various substances and also enhanced the scope of capping and doping technology (1). Among the several metal oxides, ZnONPs are worth of appreciation due to its unique electrical, optical, and chemical properties. Large excitation binding energy, large band gap (3.3eV), high electron mobility and high transparency equip it appropriate for serving the field of diagnostics, drug delivery, bio-molecular detection, DNA labelling, optoelectronics, biosensors, solar cells, cement ceramic sensors (2) etc., In addition, purification of water by removal of impurities such as, sulphur, arsenic along with waste water treatment also prospered by application of ZnONPs (3). Excellent antibacterial activity of ZnONPs have also been reported against high temperature and pressure resistant spores apart from its anticancer potential. Electrostatic adsorption of the particles to the bacterial surface and formation of Hydrogen peroxide are considered to be the reason of efficient antibacterial activity of ZnONPs (4). Based on this

potent antibacterial efficacy, ZnONPs gained enough advantage in the arena of food and wood preservation, wound dressing, nano-medicines, cosmetics and disinfectant agents. These innumerable numbers of applications of ZnONPs build up the demand for different synthetic strategies (5). Till date, multiple physical chemical and physical synthesis procedures are reported, of which all comprised of hazardous chemicals, resulting in usage of toxic substances. In addition, performing these synthesis protocols are tedious and expensive. Acceptability of microorganism-based synthesis procedure could have been universal, if the criterion of maintaining highly aseptic conditions were avoidable. Besides, necessity of conducting several purification steps has become a major hindrance for application at industrial scale. Green synthesis emerged as an inexpensive and eco-friendly alternative for synthesis of well structured, biocompatible and potent ZnONPs (6). Several plants such as *Azadirachta indica*, *Cassia auriculata*, *Ocimum sanctum*, *Aloe vera*, *Coriandrum sativum* etc., have been exploited for synthesis of ZnONPs from extract of their different parts (7). For this study, leaf extract of *Coriandrum sativum* was employed as the plant source and reducing agent to achieve green synthesized ZnONPs. *Coriandrum*



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RESEARCH ARTICLE

High-casein diet restores the redox balance in the liver and pancreatic health of mice when exposed to radiation during call mode from mobile phones

Prerona Biswas¹, Debajyoti Bhattacharya^{1,2}, Somnath Gangopadhyay², Mausumi Sikdar (née Bhakta)¹

ABSTRACT

Introduction: The current lives of human beings cannot be imagined without cellular phones and electronic gadgets. Still, the probability of being exposed to their harmful radiation is unabated which demands an immediate intervention to shield humankind from being affected by using such devices. In our current investigation, we aimed to check the role of a high-casein diet as a protective measure against the biological effects of electromagnetic radiation (EMR) emerging from mobile phones on hepatic and pancreatic systems. **Methods:** Swiss albino mice (n=24) were fed on a standard laboratory diet (ND; n=12) and an isocaloric high-casein diet (HCD; n=12). Six mice from each dietary group were exposed to mobile phone radiation for 3 hours/day within a 3 months span. Histopathological alterations were studied in hepatic and pancreatic tissues by using periodic acid-schiff (PAS)-hematoxylin and routine H&E staining methods. Biochemical evaluation of total serum protein, lipid profile and glucose, total glutathione, oxidized glutathione, and antioxidant enzymatic activities of hepatic tissues were performed. **Results:** Hyperglycemia was noticeable along with a reduced number and area of islets of Langerhans in radiation-exposed mice when compared to other groups. This was supported by the observation of depleted glycogen reserves in their liver. Additionally, distorted hepatic morphology with nuclear degeneration was suggestive of apoptotic progression. The total glutathione pool was reduced on radiation exposure, hint at redox imbalance. HCD was competent in preserving the normal pancreas and liver functioning in radiation-exposed mice.

Keywords: Casein, Electromagnetic radiation, Glutathione, Karyorrhexis, Redox imbalance, Triglyceride.

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INTRODUCTION

The rise in mobile phone usage in the modern world was inevitable since its inception but digitalization and the recent global pandemic have increased its usage exponentially. The resourcefulness and multitasking facilities of mobile phones have proven to be addictive over due course of time. However, it has now been converted into an indispensable commodity along with other electronic gadgets for adults who have to work from home and children who depend on online classes and exams. Therefore, the propensity to be exposed to its irradiated electromagnetic waves has heightened noticeably and culminated in its fatal effects at the system, cellular, and genetic levels.¹ With the introduction of 5G technologies, the issues of pre-existing electromagnetic radiation (EMR) exposure will exacerbate at environmental and personal levels. Safety limits of the exposure to non-ionizing radiation, stipulated by the responsible bodies, merely protect the industry that manufactures electronic gadgets, thereby neglecting environmental homeostasis and human health.²

Electrohypersensitivity (EHS) is now a recognized clinical condition in many countries of the European Union and Canada, and Sweden with the soaring electropollution.³ The term EHS was primarily coined by William Rea in 1991 and designated a new clinical condition where patients reportedly complained of health issues when exposed to electromagnetic fields.⁴ It has been estimated that 3-5% of the population in several countries is affected by EHS, so millions of people worldwide may be affected by EHS.⁵

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EMR from mobile phones can manifest adverse effects on cerebral blood flow⁶ and the permeability of the blood-brain barrier (BBB)⁷ in humans. Their repercussions are observed as the loss of attention and immediate memory, tinnitus, elevated levels of anxiety, emotivity, and impairment of other cognitive functions. Recent reports have claimed increased aggression among teenagers addicted to games on mobile phones.⁸ *In-vivo* studies have shown that mobile radiation affects different regions of the brain, induces diabetes-like changes, and disrupts redox balance in hepatic



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Dialogic Classroom & Text Comprehension: Towards A Pedagogy of Reading

Dr. Goutam Naskar¹

Abstract

Though the concept of dialogic classroom is not new, it has found many proponents in recent educational research (Sedova, 2017). It has been proposed by researchers that there should be enough opportunity for learners to take part in classroom talk as much as possible for the appropriation of existing knowledge and construction of new knowledge. In second language classroom, in Indian context, reading skill has remained one of the thrust areas of research for researchers and language practitioners. For obvious reasons, it has been emphasised how to read and interpret a text so that comprehension might take place, and discussion around the text has been found to be one of the most effective ways in achieving comprehension (Almasi, 2002). Recent research also opines that there should be a shift from 'monologic classroom' to 'dialogic classroom' for maximization of learning. This paper makes an attempt to establish a connection between a dialogic classroom and comprehension of text. Along with the possible opportunities that a dialogic classroom might provide for comprehending a text, the paper also probes into the possible problems that might arise in particular contexts and suggests implications of dialogic classroom in teaching and learning.

Keywords: dialogic classroom, reading, comprehension, second language learning.

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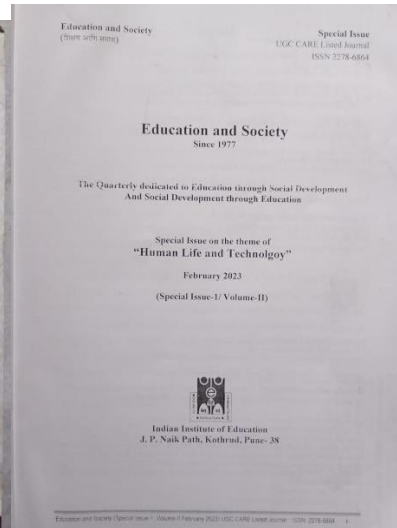
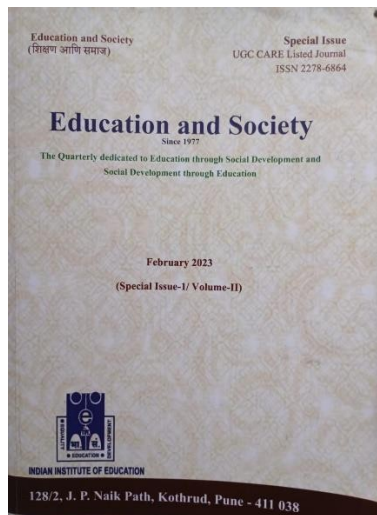
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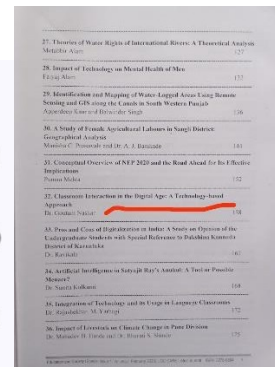
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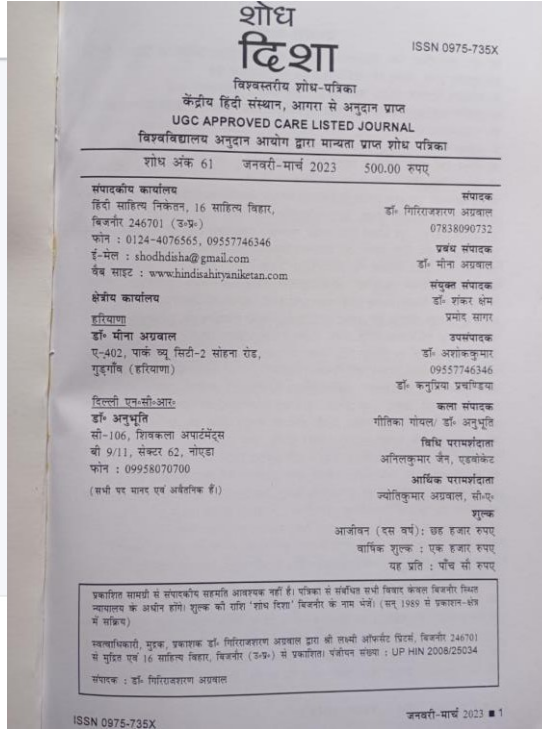
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Multiple antibiotic resistant *Staphylococcus aureus* induced hepatocellular anomaly: A possible amelioration by *Catharanthus roseus* (L.) G.Don

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ABSTRACT

In the absence of a viable strategy for treating multiple antibiotic-resistant *Staphylococcus aureus* (SA)-mediated infections, botanicals are being investigated for their effectiveness and safety. *Catharanthus roseus* (L.) G. Don (CR), belonging to the family Apocynaceae, has been used traditionally as a medicine since ancient times as a treatment for bacterial infections, diabetes, ulcers, hypertension, diarrhea, and dyslipidemia. This study evaluated the preliminary outcome of CR on the killing of SA, and also investigated the mechanism by which CR offered protection against SA-induced hepatocellular degeneration in rats. We have analyzed the quantitative phytochemical profile of the different parts of CR and determined the functionally most significant extract by their chemical analysis. Moreover, antibacterial and anti-inflammatory activities of CR were investigated by *in vitro* and *in vivo* experiments. Results showed that the ethanol extract of CR root (EECRR) have different phytochemicals, with ursolic acid (UA) as one of the bioactive components; this composite extract significantly ameliorates SA-induced altered redox-equilibrium and inflammation by inhibiting the efflux pump activity of SA. Since EECRR inhibits the efflux pump present in the SA membrane, the bacterial cells become incapable of ejecting antibiotics, free radicals, and other bactericidal substances from the interior of the cell to the exterior, thereby, reducing antibiotic resistance. Consequently, EECRR, due to the presence of UA, provides hepatoprotective effects against SA-induced hepatocellular anomalies. Further studies are required to analyze the roles of other bioactive components of CR, so that it may be used as a hepatoprotective supplement for the treatment of SA-induced infections.

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1. Introduction

Number of microorganism mediated infections is increasing worldwide due to various causes. In 2020, the pandemic due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has caused widespread morbidity and mortality. Additionally, SARS-CoV-2 infected patients are more susceptible to other infections and vice-

SA mediated pathogenesis in case of patients admitted in intensive care units (Garrouste-Orgeas et al., 2001), those undergoing surgery (Bode et al., 2010) or dialysis (Nouwen et al., 2005). Nasal carriage can increase the risks of skin and soft tissue infections (SSTIs) like bullous impetigo, furunculosis, abscesses and staphylococcal scalded syndrome, as well as systemic infections such as blood stream infection or bacteremia, endocarditis and pneumonia. It is also responsible

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RESEARCH



Attenuation of sodium arsenite mediated ovarian DNA damage, follicular atresia, and oxidative injury by combined application of vitamin E and C in post pubertal Wistar rats

Rubia Mondal¹ · Priyanka Pal¹ · Sagnik Biswas¹ · Alok Chattopadhyay² · Amit Bandyopadhyay³ · Aparna Mukhopadhyay¹ · Prabir Kumar Mukhopadhyay¹ 

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Abstract

Arsenic being a toxic metalloid ubiquitously persists in environment and causes several health complications including female reproductive anomalies. Epidemiological studies documented birth anomalies due to arsenic exposure. Augmented reactive oxygen species (ROS) generation and quenched antioxidant pool are foremost consequences of arsenic threat. On the contrary, Vitamin E (VE) and C (VC) are persuasive antioxidants and conventionally used in toxicity management. Present study was designed to explore the extent of efficacy of combined VE and VC (VEC) against Sodium arsenite (NaAsO₂) mediated ovarian damage. Thirty-six female Wistar rats were randomly divided into three groups (Grs) and treated for consecutive 30 days; Gr I (control) was vehicle fed, Gr II (treated) was gavaged with NaAsO₂ (3 mg/kg/day), Gr III (supplement) was provided with VE (400 mg/kg/day) & VC (200 mg/kg/day) along with NaAsO₂. Marked histological alterations were evidenced by disorganization in oocyte, granulosa cells and zona pellucida layers in treated group. Considerable reduction of different growing follicles along with increased atretic follicles was noted in treated group. Altered activities of Δ^5 3 β -Hydroxysteroid dehydrogenase and 17 β -Hydroxysteroid dehydrogenase accompanied by reduced luteinizing hormone, follicle-stimulating hormone and estradiol levels were observed in treated animals. Irregular estrous cyclicity pattern was also observed due to NaAsO₂ threat. Surplus ROS production affected ovarian antioxidant strata as evidenced by altered oxidative stress markers. Provoked oxidative strain further affects DNA status of ovary. However, supplementation with VEC caused notable restoration from such disparaging effects of NaAsO₂ toxicities. Antioxidant and antiapoptotic attributes of those vitamins might be liable for such restoration.

Keywords Sodium arsenite · DNA damage · Granulosa cell · Vitamin E · Vitamin C

Introduction

Various natural and anthropogenic substances on earth crust affect reproductive health of both animals and human by altering the structure and functions of

reproductive organs even at low dose (Goralczyk 2021). Arsenic (As) is such a contaminant, widely exists in nature and humans are exposed to such pollutant through contaminated drinking water and food (Biswas et al. 2021). Presence of arsenic in food and water above the permissible limit (Rice: 200 μ g/Kg for polished rice, 250 μ g/Kg for parboiled; Water: 10 μ g/L) set by regulatory authorities like FAO (FAO 2017) and WHO (WHO 2011) can cause in several physiological consequences (Martínez-Castillo et al. 2021). A research report illuminated multiple systematic disorders like melanosis, gastro enteritis, chronic liver disease, chronic kidney disease along with peripheral vascular disease (Jain and Chandramani 2018) caused by arsenic poisoning. Reproductive health outcomes due to arsenic ingestion drawn the attention of scientific communities in past decades

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