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Inhibitory kinetics and mechanism of pentacyclic triterpenoid from endophytic *Colletotrichum gigasporum* against pancreatic lipase

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ABSTRACT

The burden of obesity is increasing all over the world. Except for Orlistat, no effective anti-obesity drug is currently available. Therefore, a search for the new anti-obesity compound is need of time. This study demonstrates macromolecular interaction and inhibitory effect of pentacyclic triterpenoids (PTT) on pancreatic lipase (PL). In the present study PTTs from endophytic *Colletotrichum gigasporum* were found to show significant inhibitory activity against PL with IC_{50} of 16.62 ± 1.43 μg/mL. The PTT isolated through bioassay-guided isolation showed a dose-dependent ($R^2 = 0.915$) inhibition against porcine PL and the results were comparable with the standard (Orlistat). Based on inhibition kinetic data, the gradual increase in $K_{m\ (app)}$ with increasing PTT concentration indicated that the mode of interaction of PTT with PL was a competitive type, and it directly competed with the substrate (*p*NPB) for the active site of PL. *In vivo* studies in Wistar rats at the oral dose (100 mg/kg body weight) of PTT significantly decreased ($p < 0.05$) incremental plasma triglyceride levels as compared to group B and TG absorption was down-regulated up to 49.18% *vis a vis* group D animals. The isolated PTT was identified as lupeol based on chromatographic and spectral data. The endophytic isolate was identified as *Colletotrichum gigasporum* based on morphology and ITS gene sequencing. The present study indicated that PTT had the potential to be used as a natural PL inhibitor in the treatment of obesity and the isolated endophyte can be a valuable bioresource for it.

1. Introduction

Obesity has been a major health concern worldwide in recent decades. Excessive energy intake, physical inactivity, and low energy expenditure are important contributors leading to the accumulation of fat in the body. Diverse gastrointestinal lipases including pancreatic lipase (PL) play important role in lipid digestion. Among all, PL is the most important lipolytic enzyme in humans that carry out the hydrolysis and absorption of over 70% of total dietary fats [1]. Because of its key role in lipid metabolism, PL has been the key target for synthetic anti-obesity drugs including Orlistat. Several studies have been conducted in the search of potent PL inhibitors of synthetic and natural origin compounds in the past few decades [2].

However, prolonged application of synthetic drugs has various side effects such as liver toxicity, oily stools, fecal urgency, flatulence, and abdominal distention [3]. Therefore, there is a need to explore natural products for new, effective, and safe anti-obesity compounds.

Natural products from ethnomedicinal plants and microorganisms have provided effective therapeutic drugs and lead compounds for the treatment of many metabolic diseases. The World Health Organization (WHO) estimates that 80% of the people of developing countries rely on traditional medicines, mostly plant-derived drugs for their primary health needs. Several studies have demonstrated that natural products of plant and microbial origin hold the promise for new PL inhibitors with minimum adverse effects. For example, inhibitors like platycodin D from the fresh roots of *Platycodon grandiflorum* has shown potent PL Inhibitory potential in an *in vivo* study [4]. PL inhibitors with various scaffolds (such as flavonoids, panclicins, triterpenoids, phenolics, β-lactones, and triacylglycerol analogs) have been identified from microbial, plants, and marine sources [5].

Medicinal plants harbor a hidden treasure of diverse microbial communities- the endophytes in their internal tissues. Endophytes include both; fungi and bacteria but fungi being more ubiquitous, diverse, versatile, and widespread microorganisms that colonize the plants growing in various geo-climatic conditions [6]. The endophytic microflora of medicinal plants is a cheap source of diverse bioactive compounds with varied bioactivities [7]. Endophytes have the unique property that they can produce the same and rare secondary metabolites as their plant host. For example, the bark of *Terminalia arjuna* (Combretaceae), a widely studied Indian medicinal plant known for its antioxidant and cardioprotective role, was found to be rich in many

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Research Article

Microbial transformation of crop residues into a nutritionally enriched substrate and its potential application in livestock feed

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Abstract
Bioconversion of three different agro-residues (groundnut shells, pigeon pea husk and wheat straw) was studied using endophytic fungi with a view to increasing the nutritive value and to evaluate its feasibility as poultry feed. An endophytic fungal isolate obtained from *Celastrus paniculatus,* effectively biotransformed selected agro-residues in solid state fermentation. After 21 days incubation, isolate CPL-1significantly altered the nutritional values of all tested agro-residues. Cellulose, hemicellulose, and lignin content were significantly reduced ($P < 0.05$) whereas, total carbohydrates were significantly increased in the biotransformed waste as compared to untreated residues. Of the three agro-residues studied, the groundnut shells were found to have maximum carbohydrate content (13.92 ± 0.7 g/100 g) after the treatment. Similarly, the total crude protein and total nitrogen contents of the treated waste were also significantly improved ($P < 0.05$) as a function of treatment with the isolate CPL-1 with their highest contents (24.95 ± 1.4 and 15.53 ± 1.2 g/100 g, respectively) recorded in the treated groundnut shells. The isolate CPL-1 was identified as *Colletotrichum* spp. based on the morphology. The tannins and phytate contents were found to be significantly lower ($P < 0.05$) in the processed wastes. Application of treated agro-residues in poultry diets revealed that the biotransformed groundnut shells and pigeon pea waste can be added up to 20 and 10%, respectively to the commercial poultry diet used in the study without any adverse effects. The results showed that the treated residues of groundnut shells can be used as a partial substitute to the conventional poultry diets as they are rich in enzyme phytase and other nutrients and have good digestibility.

Keywords Bioconversion · Agro-residues · Endophytic fungi · Crude protein · Poultry diet

1 Introduction

Feed is the most important factor in the poultry business which constitutes around 70% of the total production cost [1]. A number of ingredients are used to formulate the poultry diet. It mainly uses maize and soybean meal as the carbon and protein source, respectively. Several countries use other grains such as wheat, sorghum, canola and sunflower meal as well as animal-derived protein ingredients like fish and meat meal [2]. Mineral supplements play a vital role in the development of poultry. Poultry, being the monogastric animal, cannot fully assimilate the inorganic supplements which are provided in the form of calcium and phosphorus supplements that includes dicalcium phosphate, rock phosphate and bone meal [3]. The increasing cost and decreasing feed production are the major hurdles in the progress of poultry industry in the developing countries. Moreover, diversion of food grains such as maize and sorghum from feed market to ethanol production has dramatically increased their cost globally [4, 5]. Therefore, there is the urgent need to use alternative feedstuffs and look into the possibilities of bioconversion of agro-residues into feed in a sustainable way. Globally, 140 billion metric tons of lignocellulose biomass

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Research Article

Green synthesis of silver nanoparticles using *Eulophia herbacea* (Lindl.) tuber extract and evaluation of its biological and catalytic activity

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Abstract
The present work is a report on phytosynthesis of silver nanoparticles (AgNPs) carried out using an aqueous extract of the tuber of *Eulophia herbacea* Lindl. (Orchidaceae) and evaluation of its antimicrobial and catalytic potential. The extract efficiently reduced aqueous silver ions and generated stable and bioactive nanoparticles. The maximum reduction of $AgNO_3$ was achieved when 1 mM $AgNO_3$ was incubated with 2% w/v extract for 5 h. The biosynthesized AgNPs exhibited surface plasma resonance at 447 nm. The zeta potential was − 15 mV. Scanning electron microscopy study showed that the average particle size of the AgNPs was 11.70 ± 2.43 nm and that they were non-agglomerated. An Energy Dispersive X-ray study provided support for the presence of elemental silver. X-ray diffraction studies confirmed that the AgNPs were crystalline and had a face-centered cubic geometry. The AgNPs showed excellent antibacterial and antifungal activity against common human pathogens. This activity was comparable with that of standard antibiotics. The catalytic potential of the AgNPs was studied through the reduction of methylene blue and congo red. The results showed that the AgNPs synthesized using the present method are biologically and catalytically active.

Keywords *Eulophia herbacea* · Silver nanoparticles · Antimicrobial activity · Antifungal activity · Synergistic effect · Dye reduction

1 Introduction

There is growing interest in greener synthesis of metal nanoparticles. Plant extracts have been used for nanoparticles synthesis as the process involved is simple, eco-friendly and cost-effective. Moreover, this process is reproducible and easily scaled up [1]. In comparison with microbial synthesis, phytosynthesis is rapid. It does not require aseptic conditions, and it yields stable nanoparticles [2, 3].

Indian traditional systems of medicine recommend the use of medicinal and aromatic plants for curing various human illnesses. Plant extracts containing phytoconstituents are biologically and pharmacologically active. Plant metabolites are known to be excellent reducing and capping agents that can be used to synthesize nanoparticles effectively within a short time [4–6].

The tubers of *Curcuma longa* [4, 7], sweet potato [8], *Dioscorea bulbifera*, *Dioscorea batatas*, *Dioscorea oppositifolia*, etc. are rich with different reducing and capping agents that generate stable metal nanoparticles [9–11].

Silver is known for its antimicrobial and medicinal properties [12, 13]. However, the antimicrobial effect of silver ions and its salts is limited and of short duration. These limitations can be overcome by using silver nanoforms, which are inert, stable and act as antimicrobial agents effectively [9, 14, 15].

Numerous mechanisms are involved in the microbicidal effect of silver nanoparticles (AgNPs) [16]: (a) AgNPs produce structural changes in the cell membrane by deposition on it

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Research Article

HALOGEN FREE $[HNMP]^+CH_3SO_3^-$ IONIC LIQUID MEDIATED BIFUNCTIONALIZED NAPHTHOQUINONE-DIHYDROPYRIMIDIN-(1H)-ONE HYBRIDS AND EVALUATION OF ITS ANTIMICROBIAL POTENTIAL

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ABSTRACT

An efficient halogen free ionic liquid (HFIL) *N*-methyl-2-pyrrolidonium methane sulfonate $[HNMP]^+[CH_3SO_3]^-$ catalyzed Biginelli reaction is reported to synthesize naphthoquinone fused dihydropyrimidin-(1H)-ones (DHPM's). Diversifying this naphthoquinone constituent provides an access to new and interesting DHPM's for pharmacological profiling. A series of bifunctionalized naphthoquinone-dihydropyrimidin-(1H)-one conjugates (**4a-4l**) were synthesized and evaluated for their antimicrobial potential against selected bacterial and fungal pathogenic strains. The resulting naphthoquinone fused dihydropyrimidin-(1H)-one hybrids showed significant activities against all the tested Gram positive (*Staphylococcus aureus, Bacillus subtilis*) and Gram negative (*Escherichia coli, Pseudomonas aeruginosa*) bacterial pathogens and fungal strains of *Aspergillus niger* and *Aspergillus flavus*. Among the series, the DHPM conjugate **4k>4j>4e>4h** samples exhibited highest activities against all the tested strains that proved to be important candidates in the drug development against various life threatening diseases. Presently, one-pot, three-component methodology have been developed for the synthesis of bifunctionalized naphthoquinone linked dihydropyrimidin-(1H)-one are being explored for bio-active asymmetric Biginelli scaffolds.

Keywords: 3,4-dihydropyrimidin-2(1H)-ones, Naphthoquinone, Lawsone, Halogen Free Ionic Liquid (HFIL), Antimicrobial.

1. INTRODUCTION

The Italian chemist Pietro Biginelli reported, in 1893, Biginelli reaction is a multiple-component one-pot acid catalyzed cyclocondensation chemical reaction that resulted 3,4-dihydropyrimidin-2-(1H)-ones (DHPM's) from easily-accessible starting materials, namely, active methylene compound, an aryl aldehyde, and urea or Thiourea [1]. DHPM and related compounds have attracted considerable attention because of their important pharmacological and biological properties created renewal interest of the scientific community in recent year [2, 3]. It has been reported that 3,4-dihydropyrimidine-2(1H)-ones have prominent biological activities such as anti-tumour [4, 5], anti-viral [6, 7], anti-bacterial [8], anti-diabetic [9], antimalarial [10], anti-fungal [11] and anti-oxidant properties [12]. Moreover, other biological activities of the dihydropyrimidinone/thione moiety constitutes an active backbone in exciting medications, e.g., Mona-strol (anti-cancer agent) [13], SQ 32926, and SQ 32547 (anti-hypertensive drugs) [14, 15] shown in **fig. 1**.

Naphthoquinone (NQ) to a large extent have use in the synthesis of heterocyclic intermediates, medicinal and industrial applications as drugs [16, 17]. A large number

of naphthoquinone compounds occur naturally as plant constituents, and in the past many of these have found use as colorants and medicinal purposes. The two most important representatives for natural colorants with naphthoquinone structure are Lawsone (2-hydroxy-1, 4-naphthoquinone) and juglone (5-hydroxy-1,4-naphthoquinone). The naturally occurring 2-hydroxy-1, 4-naphthoquinone is a mono-hydroxyl naphthoquinone pigment extracted from henna plant [18, 19]. Lawsone is a special naphthoquinone one of the most important natural scaffold useful for many applications in various scientific and technological fields [20, 21]. For over 4000 years or more, Lawsone was used as a dye hair, skin (including body art) [22, 23], as well as in many interesting pharmacological activities such as anti-bacterial, anti-fungal [24, 25], anti-inflammatory [26], anti-viral [27], antioxidant [28], anti-tumor, anti-malarial, anti-proliferative, anti-inflammatory, anti-protozoal, anti-trypanosomiasis, and anti-topoisomerase activities, in addition to treatment of skin diseases and a coloring agent for wool and silk [29-33]. Naphthoquinone's are utilized in the synthesis of polyfunctionalized heterocyclic compounds have been noted as naturally occurring antibiotics, antibacterial, fungicidal, antimalarial, anti-parasitic and anti-tumor agents [34-37] shown in **fig. 2**.

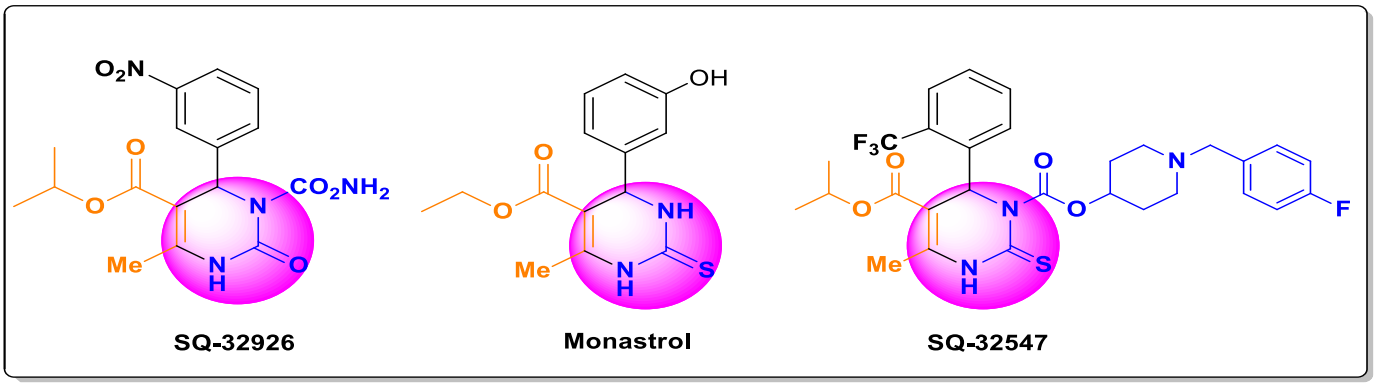


Fig. 1: Biological active DHPM scaffold of Monastrol, SQ-32926, and SQ-32547

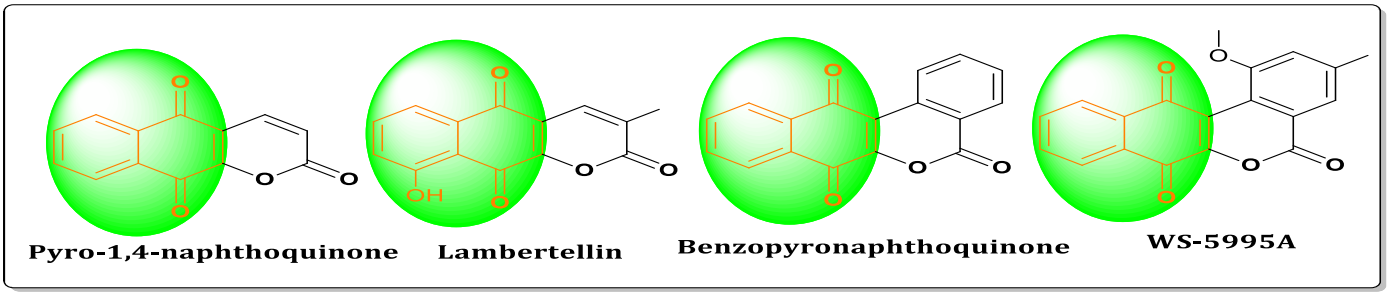
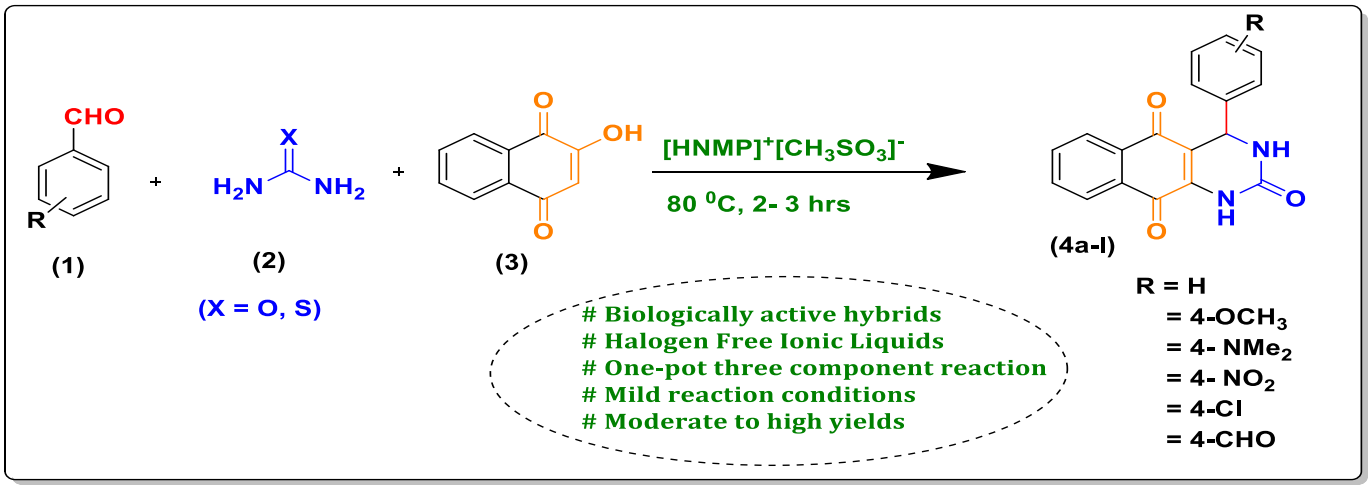


Fig. 2: Naphthoquinone fused biological active heterocycle

Keeping this point in view, in order to consideration of DHPM and naphthoquinone derivatives diverse pharmacological significance and their potentiality, we have designed and synthesized bifunctionalized naphthoquinone-dihydropyrimidin-(1H)-one hybrids. Our previous work summarizes the synthesis of Biginelli scaffolds 4-phenyl-3,4-dihydrobenzo [h] quinazoline-2,5,10(1H)-trione in presence of halogen free ionic liquid (HFIL) *N*-methyl-2-pyrrolidonium hydrogen sulfate $[HNMP]^{+}[HSO_4]^{-}$. The resulted DHPM skeleton derived from Lawsone showed good tinctorial strength and dyeing properties on the fabrics [38]. The National Cancer Institute (NIH, United State) admitted the lawsone skeleton that contain the quinone moiety as a precursor for clinically as cytotoxic activity [1]. Benzo[g]quinonline-5, 10-dione and benzo [g] quinazoline-5, 10-dione skeletons are important pharmacophoric elements for cytotoxic activity and anticancer activity [39]. In order to consideration of its diverse pharmacological profile and their capabilities, we have extended our previous research work in the synthesis of diverse biologically relevant naphtha-

quinone fused 3, 4-dihydropyrimidin-2(1H)-ones in presence of HFIL $[HNMP]^+[CH_3SO_3]^-$. The present research article accounts dealing with the pharmacological properties and uses in medicine of naphthoquinone fused 3, 4-dihydropyrimidin-2(1H)-one hybrids (**Scheme 1**). Herein, green approaches towards asymmetric Biginelli reaction are being explored for bioactive chiral bifunctionalized naphthaquinone-dihydropyrimidin-(1H)-one hybrids.



Scheme 1: Halogen Free Brønsted acid ionic liquid catalyzed Biginelli reaction for synthesis of DHMP conjugates 4a-4l

2. EXPERIMENTAL

2.1. Material and instruments

The materials and solvents used in the present work were pure and laboratory prepared. All the commercial chemical reagents and spectroscopic grade solvents were procured from S.D. Fine chemicals private limited Mumbai. The solvents and reagents were used as received without further purification. The reactions were monitored on silica gel aluminum-based plates kisel gel 60 F254 Merck, India. The melting points were determined by using standard melting-point apparatus and are uncorrected. The reaction was monitored by TLC using 0.25-mm E-Merck silica-gel 60 F254 precoated plates, which were visualized with ultraviolet light. Infrared (IR) spectra were recorded on a Perkin Elmer 100 FT-IR spectrophotometer. The ^1H NMR spectra were recorded at a Bruker 400 (400 MHz) spectrometer with TMS as the internal standard. Mass spectra were recorded on a mass spectrometer operating at 70 eV.

2.2. Antimicrobial studies

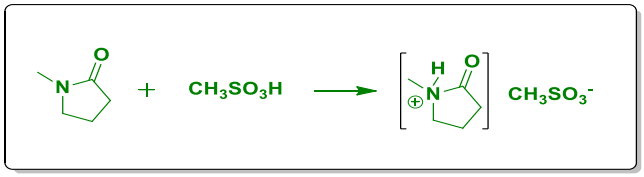
The Naphthoquinone-DHPM conjugates (**4a-4l**) synthesized above were evaluated for their antibacterial and antifungal activities against various pathogenic bacterial and fungal strains. The pure cultures of Gram positive (*Staphylococcus aureus*, *Bacillus subtilis*) and Gram negative (*Escherichia coli*, *Pseudomonas aeruginosa*) bacterial pathogens and fungal strains of *Aspergillus niger* and *Aspergillus flavus* were obtained from Department of Microbiology, R. C. Patel Arts, Commerce and Science College, Shirpur, India. The bacterial cultures were maintained on Mueller-Hinton agar slants and fungal cultures were maintained on Czapec dox agar slants at 4°C. The well diffusion method was employed for the evaluation of antimicrobial activities of test compounds (**4a-4l**) [40]. The solvent DMSO was used as the negative control. The microbial strains were rejuvenated from stock cultures by transferring into Mueller-Hinton and Czapec dox broths and incubated at 37°C for 24 h. The sterile plates of Mueller-Hinton agar and Czapec dox agar were prepared by using routine microbiological techniques. The wells of 5 mm diameter were prepared by using sterile cork borer. The bacterial and fungal strains were spread on sterile nutrient medium plates using spread plate technique [41]. Then, 50 µl of the test compounds in two different concentrations (25 and 50 µg/ml) were added into the separate wells along with negative control of DMSO. The plates of antibacterial activities were incubated at 37°C for 24 h, whereas the plates of antifungal activities were incubated at 37°C for 48 h.

Upon incubation, the plates were observed for the formation of zone of inhibition around the wells. All the experiments were performed in triplicates.

2.3. Experimental Procedure

2.3.1. *Preparation of halogen free ionic liquid N-methyl-2-pyrrolidonium methane sulfonate [HNMP]$^+$[CH$_3$SO$_3$]$^-$*

N-Methyl-2-pyrrolidone (10 mmol) was charged into a 250 ml three necked flask with magnetic stirrer. Then equimolar concentrated methane sulfonic acid was added dropwise slowly into the flask and then mixture heated at 80°C for 2 h. The mixture was washed with ether three times to remove non-ionic residues and dried in vacuum by a rotary evaporator to obtain the viscous clear [HNMP]$^+$[CH_3SO_3]$^-$ **(Scheme 2).**



Scheme 2: Synthesis of HFIL N-methyl-2-pyrrolidonium methane sulfonate

2.3.2. *Preparation of 4-phenyl-3, 4-dihydrobenzo [g] quinazoline-2,5,10(1H)-trione derivatives*

The mixture of aryl aldehyde (10 mmol), urea/thiourea (10 mmol), and 2-hydroxy-1, 4-napthaquinone (Lawsone) in presence of Brønsted acid ionic liquid [HNMP]$^+$[CH_3SO_3]$^-$ (10 ml) was stirred and heated at 80°C for 2-3 hrs. The mixture became solid at the end of reaction; product was crushed and poured into crushed ice and stir for 15-20 min. The crude product was isolated by filtration and that further purified by recrystallisation with hot aqueous ethanol to afford pure DHPM derivatives. The combined aqueous filtrate was heated at 80°C under reduced pressure (10 mmHg) to leave behind the ionic liquid in near complete recovery, pure enough to recycle. The recovered ionic liquid mixture was found to be equally effective for at least four recycles in the synthesis of DHPMs.

2.3.3. *Spectral data for the representative molecules of Naphthoquinone-DHPM conjugates*

2.3.3.1. 4-Phenyl-3, 4-dihydrobenzo[g]quinazoline-2, 5, 10 (1H)-trione (4a)

Yellow powder; yield = 95%; melting point = 202-204°C. FT-IR (KBr) cm^{-1} = 3398, 3349, 3110, 2980, 1668, 1636, 1571, 1533, 1358, 1277, 950; ^{1}H-NMR (500 MHz, $CDCl_3$) = δ/ppm 8.1 (4H, m), 8.5 (3H, m), 8.9 (2H, dd), 7.2 (1H, s), 6.2 (2H, s); ^{13}C-NMR (126 MHz, $CDCl_3$) = δ/ppm δ 54.22, 123.43, 126.71, 128.54, 129.45, 132.28, 142.49, 147.94, 178.37, 181.76; MS (ESI)m/z calcd for C18H12N2O3 = 304.29, found: 305.23 [M$^+$+H]; UV-Vis: λmax (nm) [ε (M^{-1}cm^{-1})] 490 (19456.912) in DMF.

2.3.3.2. 4-(2-Methoxyphenyl)-3, 4-dihydrobenzo [g] quinazoline-2, 5, 10(1H)-trione (4b)

Yellow powder; yield = 90%; melting point = 172-174°C. FT-IR (KBr) cm^{-1} = 3228, 3092, 2978, 1726, 1682, 1509, 1460, 1290, 868; ^{1}H-NMR (500 MHz, $CDCl_3$) = δ/ppm 8.304-7.762 (8H, m), 5.15 (2H, s), 6.10 (1H, s), 3.31 (3H, s); ^{13}C-NMR (126 MHz, $CDCl_3$) = δ/ppm 45.84, 57.03, 114.27, 120.87, 126.74, 127.76, 135.09, 149.25, 179.28, 184.15; MS (ESI)m/z calcd for C19H14N2O4: 334.07, found: 335.36 [M$^+$+H]; UV-Vis: λmax (nm) [ε (M^{-1}cm^{-1})] 472 (12418.788) in DMF.

2.3.3.3. 4, 4'-(1, 4-Phenylene)bis(3, 4-dihydrobenzo [g] quinazoline-2, 5, 10 (1H)-trione) (4f)

Yellow powder; yield = 94%; melting point = > 300°C. FT-IR (KBr) cm^{-1} =3420, 3246, 3102, 2980, 1698, 1644, 1457, 1284, 1083, 773; ^{1}H-NMR (500 MHz, $CDCl_3$) = δ/ppm 8.0-7.8 (4H, m), 7.8-7.4 (4H, m), 7.4-6.7 (4H, dd), 6.1 (4H, s), 5.2 (2H, s); ^{13}C-NMR (126 MHz, $CDCl_3$) = δ/ppm 50.04, 121.04, 126.83, 134.14, 138.38, 151.67, 178.43, 184.34; MS (ESI)m/z calcd for C30H18N4O6: 530.49, found: 531.26 [M$^+$+H]; UV-Vis: λmax (nm) [ε (M^{-1}cm^{-1})] 460 (43991.06) in DMF.

3. RESULTS AND DISCUSSION

3.1. Chemistry

We are interested in studying Biginelli reaction with the aim to develop an operationally simple method for the synthesis of a large range of DHPMs. We started our study of the one-pot three-component Biginelli reaction examined by substituted benzaldehyde **1** was subjected to Brønsted acid ionic liquid catalyzed with Lawsone **2** and urea/thiourea **3** as co-reactants (**Scheme 1**). The corresponding resulting naphtha-quinone linked dihydropyrimidin-(1H)-one hybrids (**4a-4l**) in excellent yields shown in **Chart 1**. The mechanistic path way of the reaction can be explained on the basis of recent systemic study on reaction mechanism of multi component reactions.

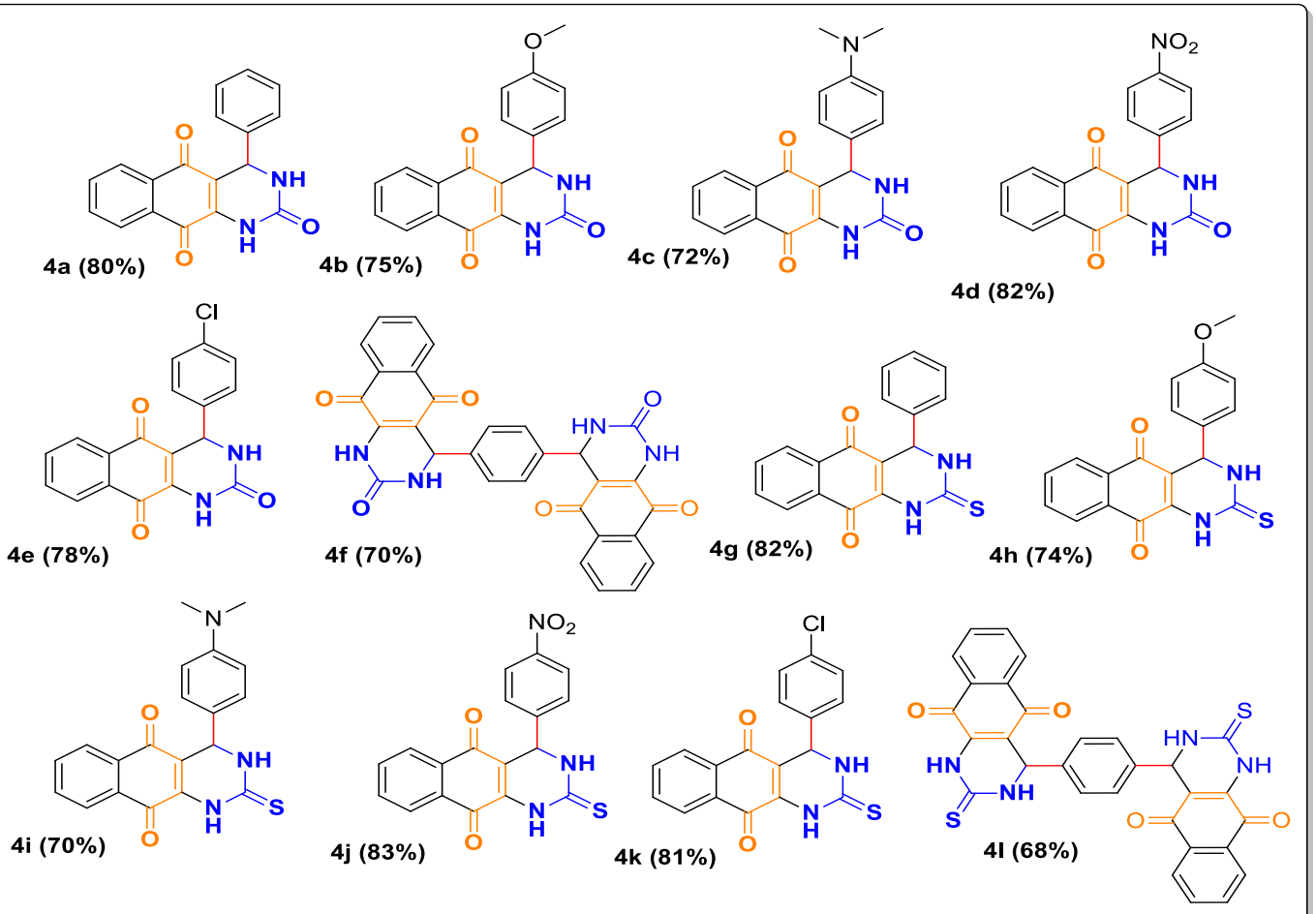


Chart 1: Bifunctionalized naphthoquinone - DHPM conjugates (**4a-l**).

3.2. Antimicrobial activity

The *in vitro* antimicrobial activities of bifunctionalized Naphthoquinone-DHPM conjugates (**4a-4l**) were studied by the well diffusion method against the Gram positive (*Staphylococcus aureus, Bacillus subtilis*) and Gram negative (*Escherichia coli*, *Pseudomonas aeruginosa*) bacterial pathogens and fungal strains of *Aspergillus niger* and *Aspergillus flavus*. The antimicrobial activities of these compounds were measured as the zone of inhibition around the well. The test compound under investigation interferes with the growth and reproduction of microbial cell that leads to the inhibition of growth of microbes around the well; hence the zone of inhibition appeared. The zones of inhibition for the test compounds (**4a-4l**) are depicted in **table 1.** These results revealed a strong antimicrobial potential of compounds under investigation against the selected strains of bacteria and fungi. The conjugate **4k** showed maximum zone of inhibition against all the selected strains of bacteria and fungi that indicated its extra potential to kill or inhibit the growth of various pathogenic microbes. The compounds **4j>4e>4h** also showed the significant antimicrobial activity against all the tested strains. These conjugates can serve as the potential candidates for the development of potent drugs against various human diseases. Other conjugates (**4a, 4b, 4c, 4d, 4f, 4g, 4i, 4l**) were also showed moderate activities against all the tested bacterial and fungal strains. The antimicrobial activities of conjugates (**4a-4l**) against bacterial pathogens (*S. aureus, B. subtilis, E. coli and P. aeruginosa*) and fungal pathogens (*A. niger and A. flavus*) at 25 µg/ml (blue) and 50 µg/ml (red) concentrations showed in **fig.3** and **fig.4** respectively. The compounds **(4k, 4j,** and **4h**) containing -Cl, -NO_2, -OMe and thione substituents, whereas compound **4e** contains -Cl and dione substituents/ chemical groups respectively that showed more potent antimicrobial activity against the bacterial and fungal strains. These results signpost towards the major role of **-Cl** and **thione** constituent in the inhibition of microbial growth around the well by leaving the clear zone of inhibition (no growth).

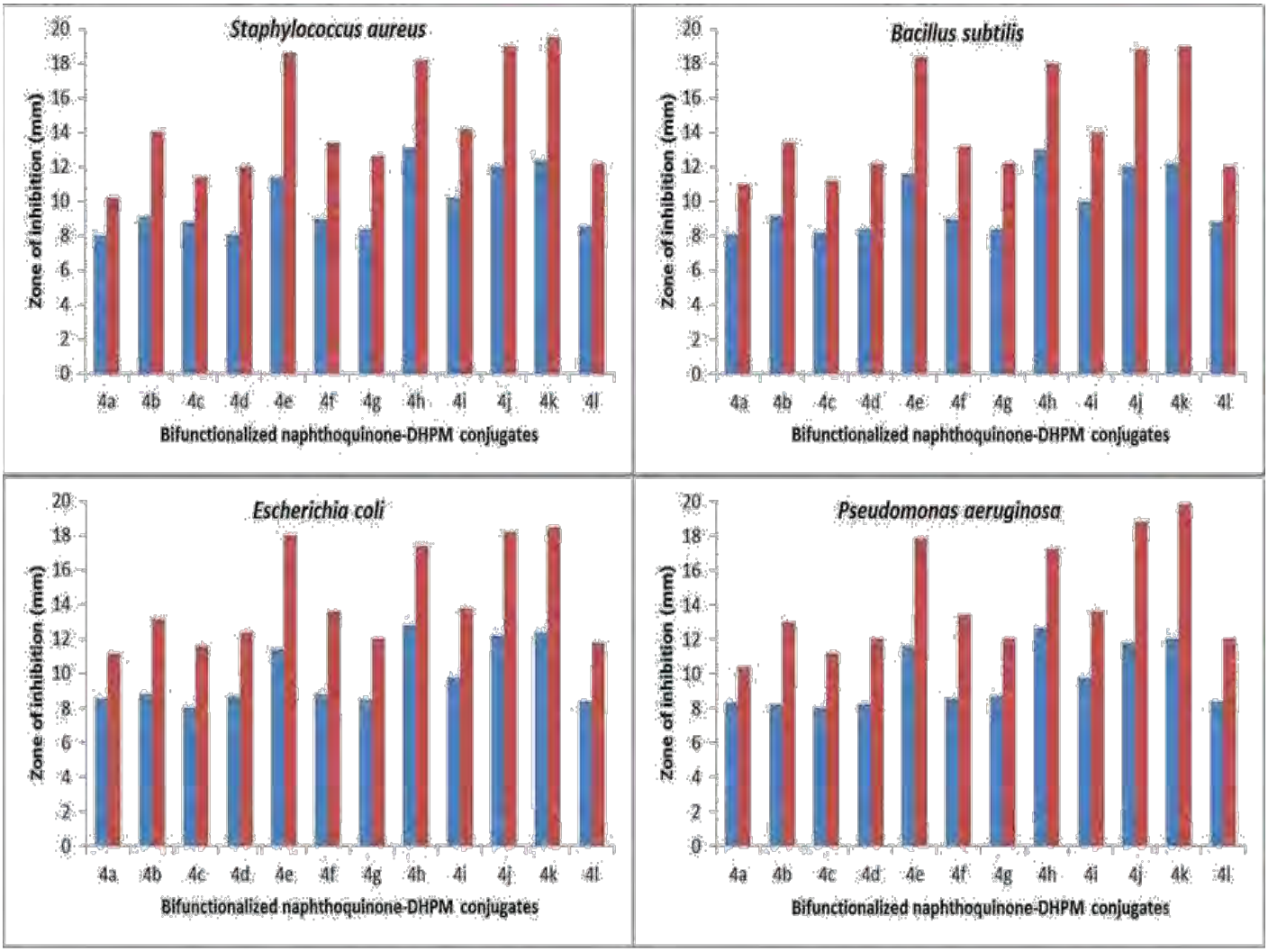


Fig. 3: Antimicrobial activities of bifunctionalized Naphthoquinone-DHPM conjugates (4a-4l) against bacterial pathogens (*S. aureus, B. subtilis, E. coli* and *P. aeruginosa*) at 25 µg/ml (blue) and 50 µg/ml (red) concentrations

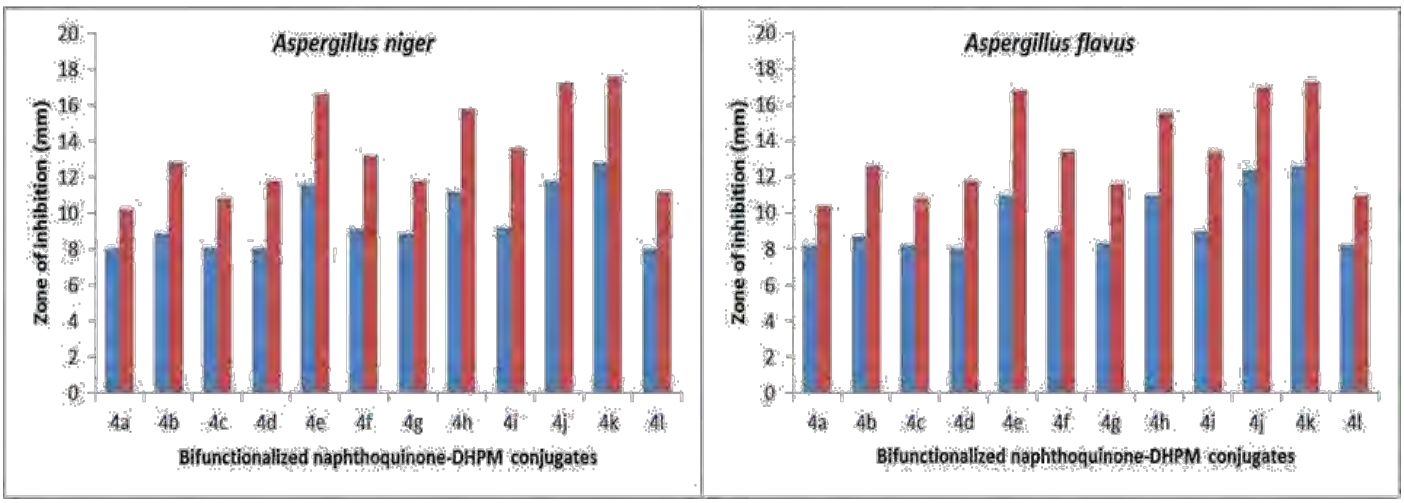


Fig. 4: Antimicrobial activities of bifunctionalized Naphthoquinone-DHPM conjugates (4a-4l) against fungal pathogens (*A. niger* and *A. flavus*) at 25 µg/ml (blue) and 50 µg/ml (red) concentrations

Table 1: Zones of inhibition of bifunctionalized naphthoquinone-DHPM conjugates (4a-4l) against selected bacterial and fungal pathogens

Compound	Conc. (µg/ml)	Zone of inhibition (mm)					
		S.aureus	*B. subtilis*	*E.coli*	*P. aeruginosa*	*A. niger*	*A. flavus*
4a	25	8.0	8.1	8.6	8.3	8.0	8.2
	50	10.2	11.0	11.2	10.4	10.2	10.4
4b	25	9.1	9.2	8.8	8.2	8.9	8.7
	50	14.0	13.4	13.2	13.0	12.8	12.6
4c	25	8.8	8.2	8.0	8.0	8.1	8.2
	50	11.4	11.2	11.6	11.2	10.8	10.8
4d	25	8.1	8.4	8.7	8.2	8.0	8.0
	50	12.0	12.2	12.4	12.0	11.8	11.8
4e	25	11.4	11.6	11.4	11.6	11.6	11.0
	50	**18.6**	**18.4**	**18.0**	**17.8**	**16.6**	**16.8**
4f	25	9.0	9.0	8.8	8.6	9.1	9.0
	50	13.4	13.2	13.6	13.4	13.2	13.4
4g	25	8.4	8.4	8.5	8.7	8.9	8.3
	50	12.6	12.2	12.0	12.0	11.8	11.6
4h	25	13.1	13.0	12.8	12.6	11.2	11.0
	50	**18.2**	**18.0**	**17.4**	**17.2**	**15.8**	**15.6**
4i	25	10.2	10.0	9.8	9.8	9.2	9.0
	50	14.2	14.0	13.8	13.6	13.6	13.4
4j	25	12.0	12.0	12.2	11.8	11.8	12.4
	50	**19.0**	**18.8**	**18.2**	**18.8**	**17.2**	**17.0**
4k	25	12.4	12.2	12.4	12.0	12.8	12.6
	50	**19.5**	**19.0**	**18.5**	**19.8**	**17.6**	**17.3**
4l	25	8.6	8.8	8.4	8.4	8.0	8.2
	50	12.2	12.0	11.8	12.0	11.2	11.0

4. CONCLUSION

The present research work involved the synthesis of naphthoquinone fused dihydropyrimidin-(1H)-one hybrids (**4a-4l**) to explore their antimicrobial activity. We have described an expedient and convergent four-component domino protocol for the regioselective synthesis of a library of naphthoquinone fused dihydropyrimidin-(1H)-one hybrids (**4a-4l**) in good yields from readily available simple starting materials. The naphthoquinone fused dihydropyrimidin-(1H)- one derivatives have been synthesized in presence of halogen free ionic liquid *viz*. *N*-methyl-2-pyrrolidonium methane sulfonate $\{[HNMP]^+ [CH_3SO_3]^-\}$as solvents-catalysts under conventional heating. Further, the synthesized derivatives have been explored for their antimicrobial activity. The synthesized compounds (**4a-4l**) displayed proficient antimicrobial properties against selected Gram positive bacteria (*S. aureus*, *B. subtilis*), Gram negative bacteria (*E. coli, P. aeruginosa*) and fungal strains of *A. niger* and *A. flavus*. The maximum antimicrobial activity was showed by **4k>4j>4e>4h** conjugates against all the selected microbial pathogens. The naphthoquinone fused DHPM having the wide range of medicinal applications. Hence, it is concluded that there is ample scope for further study in developing these conjugates as the lead compounds for the treatment of bacterial as well as fungal diseases. For the welfare of mankind further evaluation needs to be carried out in order to explore the practical clinical applications of naphthoquinone fused DHPMs.

5. ACKNOWLEDGEMENT

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Conflict of interests

The authors declare no conflict of interest.

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Several natural and skin-safe beauty products call for aloe vera gel. The clear, slimy pulp derived from the pea-green succulent plant has been used in health and beauty remedies for almost 2,000 years. Aloe-vera gel contains 99% water. The remaining 1% of its content is what makes all the difference. It contains essential vitamins like Vitamin A, C, E, B12 and folic acid that work as antioxidants against free radicals.

An enzyme called bradykinase found in aloe vera gel helps reduce excessive inflammation when applied topically on the skin. It also contains auxins and gibberellins, which are hormones that aid wound healing. The humble aloe vera gel contains a long list of minerals, namely calcium, copper, magnesium, potassium, sodium and zinc, which are essential for various bodily functions.

Development of antimicrobial textiles by using natural and ecofriendly agents

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Its fatty acid content adds to its antiseptic and analgesic properties; it can also be used to treat minor burns.

Coming to the beauty benefits, aloe vera gel stimulates fibroblast cells that produce collagen and elastin fibres, making the skin more elastic and less wrinkled. The amino acids in it also soften hardened skin cells and the zinc acts as an astringent to tighten pores.

The growing concern for global warming boosts the demand for organic products. With chemicals taking a toll on human health and environment, more and more people are becoming conscious of living life; the 'organic way'. Eco friendly clothing combining high quality clothing with socially conscious environmentalism has become a faction, and is in vogue. 'Green clothing' is made from hundred percent organic materials like soy, organic cotton and hemp. Variety of clothes like skirts, blouses, shirts, pants, socks, bathrobes, pillow cases etc. are made from organic fibres.

Antimicrobial textiles with improved functionality find a variety of applications in health and hygiene products.

Eco friendly fabrics embrace the body with a soft and supple touch. Eco friendly labels are now appearing on many products, due to the efforts of the companies to be perceived as environment friendly. Health concerns represent a potential source of benefits and demand for organic apparel. Hence, these garments are manifested as most important for children who are perceived to be more susceptible to toxins. Not only the fibres used for manufacturing the gar-

ments are organic, but the dyes used in the process of making these clothes are also environmentally friendly, or those which have a less impact on the human skin.

Manufacturers of today are considering organic garments to be ethical, and are striving to set new market trends. Apparel business is very enormous, and there is always a resistance to change. But with consumers dictating the market today; having an 'organic wardrobe' depends wholly on the consumer's choice. The bottom line of every market is 'demand', and manufacturers will only do what the consumers' desire.

Increasing global competition in textiles has created many challenges for textile researchers and industrialists. The rapid growth in technical textiles and their end-uses has generated many opportunities for the application of innovative finishes. Novel finishes of high added value for terry towel are also greatly appreciated by a more discerning and demanding consumer market. Antimicrobial textiles with improved functionality find a variety of applications such as health and hygiene products, especially the garments worn close to the skin and several medical applications, such as infection control and barrier material.

Terry towels are often very complex with yarns of different types and colors, in combination with various loop pile and flat structures. Towels are subject to changing fashions, and the market is constantly demanding new designs with improved fabric characteristics important to the consumer such as softness and absorbency. In satisfying these requirements, the content and structure of terry towels are critical decisions determining the resulting quality.

In the last few decades, with the increase in new antimicrobial fibre technologies and the growing awareness about cleaner surroundings and healthy lifestyle, a range of textile products based on synthetic antimicrobial agents such as triclosan, metal and their salts, organometallics, phenols and quaternary ammonium compounds, have been developed and quite a few are also available commercially. Although, the synthetic antimicrobial agents are very effective against a range of microbes and give a durable effect on textiles, they are a cause of concern due to the associated side effects, action on non-target and microorganisms and water pollution. Hence, there is a great demand for antimicrobial textiles based on eco-friendly agents which not only help to reduce effectively the ill effects associated due to microbial growth on textile material but also comply with statutory requirements imposed by regulating agencies.

The use of natural antimicrobial finishing of textile materials has been widely reported. Other natural herbal products, such as aloe vera, tea tree oil, and tulsi leaf (Ocimumbasilicum) neem extracts, can also be used for this purpose. There is a vast source of medicinal plants with active antimicrobial ingredients. Although, there are many natural products rich in antimicrobial agents, the study on their use in textiles is very limited and not well documented.

The relatively lower incidence of adverse reactions of herbal products as compared to modern synthetic pharmaceuticals, coupled with their reduced cost, can be exploited as an attractive ecofriendly alternative to synthetic antimicrobial agents for textile applications. Recent developments on plant based bioactive agents have opened up new avenues in this area of research. Aloe vera is one of the best anti-microbial agents which restrict the growth of microorganism on the surface of the fabric. This prevention of growth of the microbes not only deteriorates the quality of the fabric but also stop the odor of the fabric which is liberated after some time.

Materials and methods

Materials

Material used for the experiment were 100% cotton terry towel. The terry towel is for the dyeing were, desized, scoured, bleach i.e. used for dyeing.

- Cotton terry towel
- Aloe vera, neem, tulsi extracts
- Cross linking agent
- Catalyst: Natural Antimicrobial agent (concentration: 2%, 4%, 6%, 8%,) aloe-vera, neem and tulsi extract were obtained from a plants available in the college garden.

Equipments

Padding mangle, grinder, hot air oven, stirrer, and measuring cylinder. Pure cotton terry towel with plain weave (126 EPI and 70 PPI) and towel weight 15 g/m^2 was used for antimicrobial finishing. To improve the exhaustion rate of oil, acid desizing and scouring on terry towel was performed.

The antimicrobial agents can be applied to the textile substrates by exhaust, pad-dry-cure, coating, spray and foam techniques. The substances can also be applied by directly adding into the fibre spinning dope. It is claimed that the commercial agents can be applied online during the dyeing and finishing operations. Various methods for improving the durability of the finish include. Treating the fibre with resin, catalyst, cross-linking agents. Coating the fibre surface. Chemical modification of the fibre by covalent bond formation. Use of graft polymers, homo polymers and/or co-polymerization on to the fibre.

Terry towels are often very complex with yarns of different types and colors, in combination with various loop pile and flat structures.

Methods

Antimicrobial finishing methodologies

The antimicrobial agents can be applied to the textile substrates by various types of techniques like exhaust, pad-dry-cure, coating, spray and foam etc. These substances can also be applied by directly adding into the fibre spinning dope. It is claimed that the commercial agents can be applied online during the dyeing and finishing operations. There are various methods for improving the quality of durability and feel of the finishing, itinclude in chemical modification of the fibre by covalent bond formation; and use of graft

polymers, homo polymers and copolymerization on to the fibre. Treatment of the fibre with resin, condensates or cross-linking agents. New recent modification of nano-technology is used in terry towel by using the micro encapsulation of the antimicrobial agents with the fibre matrix.

There will be thin coating carried out on the fabric surface. This chemical modification of the fibre by covalent bond formation.

Parameters for padding

Terry towel was dipped in solution for 10 minutes at a temperature of 40°C,

Fig 1 : Terry towel dip in solution

Fig 2 : Padding mangle

pressure: 3.5 bar, M: L.R. = 1:30 followed by padding for other 10-20 seconds. The samples were dried at 90°C for 5 minutes. Terry towel was cold washed at 1-3 gpl concentration of soap to remove excess oil.

Experimental methods

Procedure

- 500 gm of grinded aloe-vera, neem and tulsi leaves were taken into a extractor and subjected to steam passing which helps in removal of volatile impurities such as pesticides.
- After that the desired solvent was added in the ratio of 1:30 of solvent. Aloe-vera, neem and tulsi extraction was done for 2 to 4 hrs. at temperatures of 40-45°C.
- This mixture was constantly stirred and samples of decoction were taken out at regular intervals to check the concentration of the active material in the extract. When the concentration level becomes almost constant, the mixture was drained and filtered using a centrifuge.
- This ethnologic crude extract was treated with 30 min after removal of natural impurities with ethanol which makes the extract in aqueous form. The extract was washed with water at 90°C which removes the residual trace of methanol present in the extract. Then finally the filtrate (extract) is transferred to a storage vessel for cooling.

Antimicrobial finish application

The terry towel were immersed in the 2, 4, 6, and 8 gpl concentration of methanol extracted aloe vera gel for five minutes and padded on a padding mangle individually in the presence of cross linking agent and catalyst to maintain at the 6 pH. It was immersed in the solution for five minutes and squeezing or padding process to get a wet pick up of 45 to 50% on weight of the Terry Towel. The towel was dried at 90°C for 3 min.

Antimicrobial assessment of finished terry towel

Test organisms:

- Staphylococcus aureus
- Escherichia coli

Parallel Streak Method:

Method: (ATCC Test Method 147-1988)[20]

Principle

Specimens of the test material, including corresponding untreated controls of the same material, are placed in intimate contact with nutrient agar which has been previously streaked with inoculums of a test organism. After incubation, a zone of clearance of interrupted growth underneath and along the sides of the test material indicates antibacterial activity of the specimen. A standard bacterial strain is used which is specific to the requirements of the material under test. Staphylococcus aureus was used as a representative Gram-positive organism while Escherichia coliwas used as a representative Gram-negative organism.

Procedure

Dispense sterilized nutrient (or appropriate medium) agar (cooled to 47 ± 2°C (117 ± 4°F)) by pouring 15 ± 2 ml into each standard (15 × 100 mm) Petri dish. Allow agar to gel firmly before inoculating. Prepare inoculums by transferring 1.0 ± 0.1 ml of a 24 h old broth culture into 9.0 ± 0.1 ml of sterile distilled water contained in a test tube or small flask. Using a 4 mm inoculating loop, load one loop full of the diluted inoculums and transfer to the surface of the sterile agar plate by making five streaks approximately 60 mm in length, spaced 10 mm apart covering the central area of a standard Petri dish without refilling the loop. Take care not to break the surface of the agar while making the streaks. Gently press the test specimen transversely across the five inoculums streaks to ensure intimate contact with the agar surface. This may be accomplished more easily by pressing the specimen to the agar surface with a biological section lifter or with a spatula which has been sterilized by flaming and then air cooled immediately before use. If the specimen curls, preventing intimate contact with the inoculated surface, place sterile glass slides on the ends of the specimen to hold it in place. Incubate at 37 ± 2°C (99 ± 4°F) for 18-24 h.

A standard bacterial strain is used which is specific to the requirements of the material under test.

Evaluation

Examine the incubated plates for zone of clearance along the streaks of inoculums beneath the specimen and for a clear zone of inhibition beyond its edge. The average width of a zone of inhibition along a streak on either side of the test specimen may be calculated using the following equation:

$W = (T - D)/2$

where:

W = width of clear zone of inhibition in mm

T = total diameter of test specimen and clear zone in mm

D = diameter of the test specimen in mm

The size of the zone cannot be construed as a quantitative evaluation of antibacterial activity. Treated materials should be compared to an untreated corresponding material and a material specimen with known bacteriostatic activity. Report of results will include an observation of zones of inhibition and growth under the specimen if present. The criterion for passing the test must be agreed upon by the interested parties. To constitute acceptable antibacterial activity, there must be no bacterial colonies directly under the sample in the contact area.

Results and discussion

Quantitative bacterial reduction of cotton terry towel was carried out by serial dilution method in which the percentage in reduction of the test bacteria (S aureus and E coli) was confirmed. The results were calculated and tabulated in *Table 1*. Due to the combined activities of the two antimicrobial agents in the form of finishes, the terry towel treated with herbal finishes showed an increased bacterial reduction percentage when compared to other antimicrobial agents used in the study. It is evident that the herbal finishes with 6% neem oil showed 56% reduction against S aureus and 68% reduction against E.coli whereas the terry towel finishes with 6% aloe vera gel reduced to 70% of S.aureus and, 65% of E.coli. This difference can be attributed to the terry towel finishing with antibacterial finishing inthe former, which paves the way for the better surface properties of the antimicrobial agent resulting in enhanced activity. The 100% aloe vera gel treated terry towel reduced to 65% and 70% of S.aureus and E.coli respectively. The antibacterial activities of bulk aloe barbadens is miller and aloe vera were studied respectively which proves the potent antibacterial property of the neem oil extract and aloe vera.

Table 1 : Treated sample with E coli and S aureus

Samples	E coli (10^8cfu/ml)	S aureus (10^8cfu/ml)
Untreated	600	900
Treated with 2% neem	absent	absent
Treated with 4% neem	289	379
Treated with 6% neem	106	206
Treated with 8% neem	90	136
Treated with 2% aloe vera	105	335
Treated with 4% aloe vera	69	320
Treated with 6% aloe vera	90	276
Treated with 8% aloe vera	71	290
Treated with 2% tulsi	absent	absent
Treated with 4% tulsi	280	690
Treated with 6% tulsi	331	779
Treated with 8% tulsi	259	475

Antimicrobial efficiency of the untreated and treated terry towel was performed by the quantitative method. To evaluate the effect of different concentration of antimicrobial activity varied the solution conc. 2, 4, 6 and 8 gpl on weight of terry towel. The reduction rates in the number of colonies found on finished samples at different concentrations. It can be seen from *Table 1* that the test results were clearly indicated that by increasing the solution concentration the reduction rates of bacteria colonies progressively increased. The Terry towel exhibited high antimicrobial property at 6 gpl concentration. This is due to that anti-microbial agent gets attached to the substrate through bond formation on the surface. The attached antimicrobial agent disrupts the cell membrane of the microbes through the physical and ionic phenomenon. The finishing agent inhibits growth of microorganisms by using an electrochemical mode of action to penetrate and disrupt their cell walls. When the cell walls are penetrated, leakage of metabolites occurs and other cell functions are disabled, thereby preventing the organism from function or reproducing.

After treatment growth of E coli

Here if we compare the growth of E. coli on untreated and treated sample with different concentration of the aloe vera, tulsi sample is likely more in the untreated sample and the reduction in bacterial growth on the treated sample. Both are showing excellent results, but it was concluded that the growth of E. coli on the sample is treated with the 2% neem, 4% neem, 6% neem, 8% neem, 2% aloe vera, 4% aloe vera, 6% aloe vera, 8 % aloe vera, 2% tulsi, 4% tulsi, 6% tulsi, 8% tulsi.

From the above results we conclude that the antibacterial efficiency is best or greater in the aloe vera and tulsi as compared to the neem in case of E.coli.

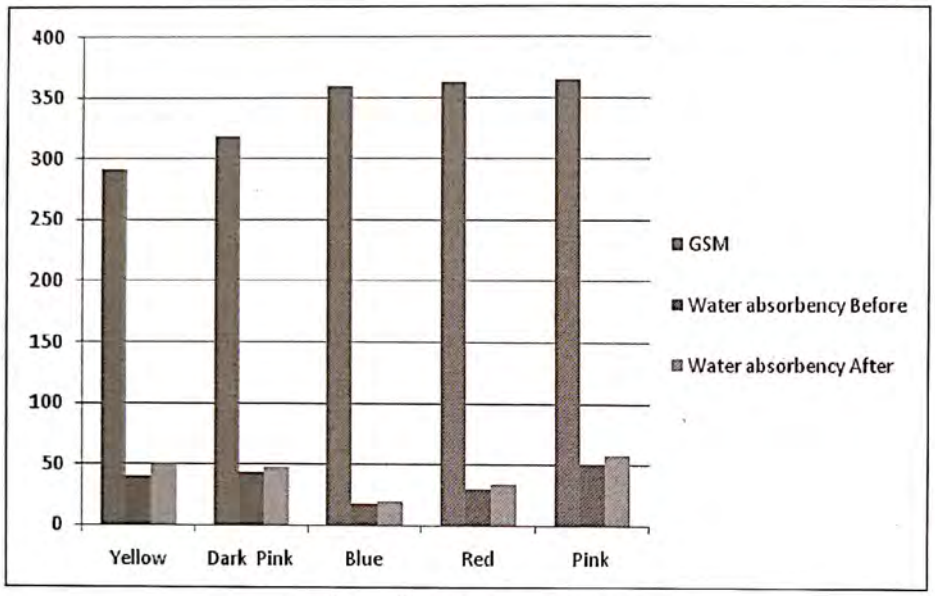
Water absorbency

Terry towel should be highly water absorbent. There are testing methods to check the water absorbency one is called as spray test method. The procedure for drop test - Specimen condition at 65 ± 2% relative humidity. Mount the specimen in the embroidery hook then place that and base loop about 25.4 mm, then adjust the flow water tester always from specimen. And pass against the base so all water goes into the pen. And pour 50 ml water by measuring cylinder in funnel attached with flow water tester and allow 25 sec. full water coming out 60^ angle. All water does not get absorbed by the specimen, some remai-

There must be no bacterial colonies directly under the sample in the contact area.

Table 2 : Effect of Water absorbency of single pile towel

Shade	GSM	Water absorbency	
		Before	After
Yellow	292	40	50
Dark pink	319	43	47
Blue	360	18	20
Red	363	30	34
Pink	365	50	58



Graph 1 : Effect of water absorbency

ning water goes into the pen.

Single pile

Table 2 shows that the absorbency of all terry towel (yellow, dark pink, blue, red, and pink shade) fabrics were increase after being treated with antimicrobial agent.

Colour fastness to rubbing dry & wet

Principle

A coloured test specimen is rubbed with white crock test cloth under controlled conditions. Colour transferred to the white test cloth is assessed by a comparison with the Gary Scale for Staining or the Chromatic Transference Scale and a grade is assigned.

Procedure

Place the test sample on track of m/c without creasing and then mount the pure cotton fabric-using holder (pin), then start the m/c & make (10 cycles) 10 strokes in back & forth motion. For wet crocking wet out the pure cotton fabric & take crocking. Then mount the samples on card and give rating.

Table 3 : Rubbing fastness property of single pile terry towel

Shade	Grey scale rating			
	Before		After	
	Dry	Wet	Dry	Wet
Yellow	4-5	4-5	4-5	4-5
Dark pink	4	4	4-5	4-5
Blue	5	5	5	5
Red	4	3-4	3-4	3-4
Pink	4-5	4-5	4-5	4-5

Rubbing fastness

Single pile

Table 3 shows that the rubbing fatness of terry towel in dark pink shade is better in before and after of dry & wet rubbing. Where in red shade gives some sort of loss in dry & wet rubbing fastness and remaining yellow, blue and pink shade was no any change in dry and wet rubbing fastness properties after being treated with antimicrobial agent.

Conclusion

Textiles have always played a central role in the evolution of human culture by being at the forefront of both technological and artistic development. The protective aspects of textile have provided the most textile ground for innovative developments. Hygiene has acquired importance in recent years. Odor has become an important factor. Unpleasant odor can arise from the acquisition of a variety of compounds produced in bodily fluids such as perspiration. 'Consumers are looking for solutions to odor and microbial problem and the unique benefits provided by antimicrobial finish'.

Microorganism growth is another factor that has resulted in development of antimicrobial finish. Microbial infestation poses danger to both living and non-living matters. Microorganisms cause problems with textile raw materials and processing chemicals, wet processes in the mills, roll or bulk goods in storage, finished goods in storage and transport, and goods as the consumer uses them. Obnoxious smell forms the inner garments such as socks, spread of diseases, staining and degradation of textiles are some of the detrimental effects of bad microbes. The consumers are now increasingly aware of the hygienic life style and there is a necessity and expectation for a wide range of textile products finished with antimicrobial properties. These antimicrobial finishes cover the full range of positive effects that antimi-

crobials bring to textile industry and provides the types and properties of antimicrobials by using the antibacterial properties of neemoil, aloe vera and tulsi.

With advent of new technologies, the growing needs of the consumer in the wake of health and hygiene can be fulfilled without compromising the issues related to safety, human health and environment. The consumers are now increasingly aware of the hygienic life style and there is a necessity and expectation for a wide range of textile products finished with antimicrobial properties.

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LANXESS India celebrates 10 successful years of operations at its Jhagadia manufacturing site

Specialty chemicals company LANXESS India celebrates the 10th anniversary of operations of three of its Business Units - Material Protection Products, Rhein Chemie and High Performance Materials at its state-of-the-art Jhagadia manufacturing site in Gujarat this month. In view of the COVID-19 pandemic, the milestone was celebrated virtually.

Jhagadia site is a key manufacturing base for LANXESS globally and one of the large production sites of the company in India. It has been built adhering to global standards and is equipped with all necessary technologies to ensure safe and environment-friendly operations. This site hosts the production facilities for four of its business units :

High Performance Materials (high tech plastics), Material Protection Products (biocides), Rhein Chemie (business line FTA and business line SRP) and Liquid Purification Technologies (ion exchange resins).

Over the past years, the site has focused on optimal use of natural resources to ensure minimum impact on the environment and promote sustainable development. It has significant features like Effluent treatment plant, Sewage treatment plant and an Occupational Health Centre among others. The organization has invested sizeable amount at the site and generated employment opportunities for the community at large. The organization continues to prioritize the topic of occupational safety and that of all its employees. Throughout these years, the site has successfully managed to observe high safety standards and ensured that potential risks are minimized from the outset and hazards are avoided in the plant.

Commenting on the occasion, Mr Neelanjan Banerjee, Vice chairman and managing director, LANXESS India said, 'We have had a remarkable decade of safe and sustainable operations at the Jhagadia site and are proud to have achieved this incredible milestone. The site has consistently delivered outstanding results over the past 10 years with a constant focus on safety, quality and customer satisfaction. The success that we have achieved so far is attributable to the hard-work and commitment of our employees as well as to the support of the local administration, the nearby communities and industry. I'm sure we will continue to work and grow together.'

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RESEARCH ARTICLE

SYNTHESIS AND CHARACTERIZATION STUDY OF HgXCr2-X S4 COMPOSITE THIN FILMS PREPARED BY CHEMICAL BATH DEPOSITION TECHNIQUE

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Abstract

The ternary thin films of composite $Hg_xCr_{2-x}S_4$ (x = 0.6) have been deposited by simple chemical bath deposition (CBD) technique on glass substrate.The thin films have been deposited at optimized conditions pH at 10 ± 0.1, bath temperature 65^0C, deposition time 120 minutes. The films were uniform and adherent to glass substrates.They were characterized by structural, optical, and electrical measurement techniques.According to their X-ray diffraction patterns $Hg_xCr_{2-x}S_4$(x = 0.6) films are crystalline with band gap of 2.4 eV.Scanning electron micrographs showed that the substrates were well covered with films; no cracks or pinholes were observed. The electrical resistivity of the films is found to be 1.3703 x 10^3 Ω-cm to 2.1243 x 10^3 Ω-cm at temperature range 303^0k to 423^0K. According to thermoelectric power measurements $Hg_xCr_{2-x}S_4$(x = 0.6) thin films are of n-type nature.

Introduction:-

The nanocrystalline $Hg_xCr_{2-x}S_4$(x = 0.6) (HGS) thin films, have been of interest due their semiconducting nature and considerable application in the field of electronics and electro-optical devices [1,2] magneto-optical devices and in magnetocapacitive as well as magnetoelectric devices [3-11]. Based on this concept, intensive research has been performed in the past to study the synthesis and characterization of these thin films. The characteristics of these films provides an overview of several capabilities based on photon, electron, and ion methods that can be effectively used to understand the structural, chemical, and electronic characteristics of a wide range of materials. The type or types of information required determines the characterization methods needed to investigate thin film. XRD is an excellent technique for studying thin films with a crystalline structure, such as those composed of inorganic/solid-state materials. XRD is a technique used to determine the crystalline structure and atomic spacing of a thin film, and the produced spectral pattern is compared against known references. XRD fires collimated X-rays at a crystalline sample, and the light becomes diffracted according to Braggs law by the crystal planes within the thin film. The X-rays are produced by a cathode source and are monochromated. Upon hitting the planes of the thin film, constructive interference is created, causing the sample to be scanned through an angle of 2θ and allowing all of the dimensions of the film to be observed is a tool used to characterize the morphology and composition of thin films. Electrons are fired from an electron gun and pass through the thin film. The energies of the electrons are concentrated and focused on using a series of lenses. The electron beam then passes through a pair of scanning coils and deflector plates in the final lens. After the electrons are focused, they are then directed towards the thin film. When the electrons interact with the sample, their energy diminishes due to scattering and absorption. The exchange of energy between the

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Adsorption of Cr(VI) on Ultrafine Al_2O_3-doped $MnFe_2O_4$ nanocomposite surface: Experimental and theoretical study using double-layer modeling

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Horizontal adsorption orientation

ABSTRACT

The synthesis of Al_2O_3-doped $MnFe_2O_4$ nanocomposite (Al_2O_3@$MnFe_2O_4$) for the adsorption of Cr(VI) ions from an aqueous solution is reported. FE-SEM, EDAX, XRD and FTIR are performed to characterize the Al_2O_3@$MnFe_2O_4$ nanocomposite. The kinetic data were analyzed using pseudo-first and pseudo-second-order kinetic models. The adsorption data is fitted well with the pseudo-second-order adsorption model for the adsorption of Cr(VI) ions. This demonstrated that the equilibrium adsorption data is better fitted with the Langmuir isotherm model when compared to the Freundlich model. The Q_{max} value was found to be 158.73 mg/g. This mathematical physics model was used to demonstrate the number of bound Cr(VI) ions and the saturated adsorption potential at various temperatures. The orientation and significance of the proposed functional groups in the nanocomposite during the adsorption of Cr(VI) ions, including their thermodynamic parameters, have been defined using statistical physics models. For the Cr(IV)-Al_2O_3@$MnFe_2O_4$ adsorption method, parameter n was calculated and found to decrease (from 0.364 to 0.358), confirming its temperature-dependence. The estimation of these parameters shows that all of the Cr(IV) ions on the adsorbent surface have a horizontal adsorption orientation.

1. Introduction

Today, water contamination due to the discharge of a wide range of toxic chemicals into water has become an ordinary practice in many countries, which has resulted in adverse effects across the globe. At very low concentrations, heavy metal ions are one of the most harmful water toxins found in bio-systems, leading to cancer and some genetic disorders in human beings and animals [1–3]. Hexavalent chromium [Cr(VI)] has extreme radioactive characteristics in natural water sources [4–6] and waste water from the mining industry [7–9]. It is also been shown that the sorption process involves heterogeneous redox reactions in which electron exchange takes place in groundwater aquifers [10]. According to the Environmental Protection Agency (EPA), an acceptable amount of Cr(VI) in drinking water is 0.05 ppm [11–13]. However, a survey conducted by the EPA in the United States of America has estimated that the Cr(VI) ion concentration varies from 50 to 100 ppm in various wastewaters, which far exceeds the acceptable limit. Therefore, a variety of traditional methods for the adsorption of Cr(VI) ions from aqueous media have been developed, including reverse osmosis, electrodialysis, ion exchange and adsorption. Moreover, adsorption is an effective, efficient and inexpensive process of treating wastewater [14–17]. Hu et al. (2004) [18] have developed a procedure combining electrostatic and ligand exchange under different pH environments for the adsorption of Cr(VI) ions using magnetite nanoparticles. Tuutijarvi et al. (2009) and Hu et al. (2005) [19–22] have studied the removal of arsenic and chromium using maghemite (g-Fe_2O_3). Several researchers

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Keratinase Enzyme Production from Bacillus Licheniformis KP9 Isolated from Chicken Feathers

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Abstract: **The aim of the present study was to isolate keratinolytic bacteria from chicken feathers, since it is rich in keratin. Microbial keratinases have become biotechnologically important since they target the hydrolysis of highly rigid, strongly cross-linked structural polypeptide "keratin" recalcitrant to the commonly known proteolytic enzymes trypsin, pepsin and papain. The isolation of keratinolytic bacteria was performed by routinely used microbiological techniques and all the 11 isolates were screened for the keratinase production. The potent strain KP9 was characterized and identified by 16S r-RNA gene sequencing as *Bacillus licheniformis* KP9. The production of enzyme keratinase was studied by submerged fermentation process. The production of enzyme was optimized at various pH, temperature, incubation period and inoculum size. The maximum keratinase enzyme production by *Bacillus licheniformis* KP9 was recorded at pH 7.0, temperature 35°C, 3% inoculum size and 48 h of incubation period.**

Index Terms: **Keratinase, Chicken feathers, Production, Optimization, *Bacillus licheniformis*.**

I. INTRODUCTION

Microbial keratinase is the type of protease enzyme capable of degrading the insoluble structural protein found in feathers, hair and wool known as keratin. Keratin is a fibrous and insoluble structural protein extensively cross linked with hydrogen, disulphide and hydrophobic bonds. It forms a major component of the epidermis and its appendages viz. hair, feathers, nails, horns, hoofs, scales and wool (Anbu et al., 2007; Kim, 2007).This protein is resistant to degradation by proteolytic enzymes such as trypsin, pepsin, papain due to the composition and molecular conformation of the amino acids found in keratin (Mukherjee et al., 2008; Rai et al., 2010). Feathers are produced in large amounts as a waste by-product at poultry processing plants, reaching millions of tons per year worldwide. Feathers contain over 90% crude protein in the form of keratin.

Keratinases (EC.3.4.99.11) belong to the group of serine proteases capable of degrading keratin. It is an extracellular enzyme produced in a medium containing keratinous substrates such as feathers and hair. Keratinases have applications in traditional industrial sectors including feed, detergent, medicine, cosmetics and leather manufacturers (Farag and Hassan, 2004), they also find application in more recent fields such as prion degradation for treatment of the dreaded mad cow disease (Langeveld et al., 2003), biodegradable plastic manufacture and feather meal production. Hence the present study focuses on the production of enzyme keratinase. Because of the numerous potential uses of keratinases, this study was undertaken to screen a bacterium that produces a highly active keratinase.

II. MATERIALS AND METHODS

A. Isolation of microorganisms

Samples of chicken feathers were collected from local poultry farms in Shirpur, India. The samples were inoculated for enrichment into the Luria-Bertani broth for 24 h at 37 °C. After the enrichment process, samples were plated on the Luria-Bertani agar plates for the isolation of individual organisms. The plates were incubated at 37 °C for 2 days until colonies appeared. Representative colonies were selected based on their morphology and colony colour. Selected colonies were isolated by transferring them on to the fresh LB agar plates (Suntomsuk and Suntomsuk, 2003).

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One Pot Synthesis and Characterization of Copolymer Poly [(Thiophene-2, 5-Diyl)-Co-4-Hydroxy Benzylidene] Using Polycondensation

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Abstract: **A one pot copolymerization technique was used to synthesize copolymer Poly [(Thiophene-2, 5-diyl)-co-4-hydroxy benzylidene]. In this technique we used catalyst phosphorous oxy chloride and 1, 4 dioxane solvent for copolymerization of 4-hydroxy benzaldehyde with thiophene. Synthesis was carried out at 70°C and took 28 hours for completion. Reaction was monitored by thin layer chromatography. Catalyst was removed using ammonia. Product was obtained using menthol. Chemical structure was confirmed by using spectral analysis like ultraviolet, infrared, nuclear magnetic resonance as well as ^{13}C nuclear magnetic spectroscopy. The amorphous phase was confirmed using structural analysis. Regular clusters with spherical shapes with approximately 0.5 µm sizes were indicated by surface morphology. Copolymer is thermally stable up to 363°C which was confirmed by thermo gravimetric analysis. Optical absorption study proved band gap value 2.50 eV and conductivity value is 5.54 x 10^{-7} S/cm measured by two probe methods. Such copolymer can be used like semiconducting material and energy storage in the field of conducting polymers.**

Index Terms: **Amorphous, Conjugated copolymer, Physical properties, Polycondensation, Surface morphology.**

I. Introduction

In recent years organic conjugated polymers have attracted more attention due to their excellent electrical and optical properties (Bura T., et al., 2016) Homopolymers like polypyrrole, poly thiophene previously prepared by electrochemical method are also now being synthesized by chemical polymerization process which is low cost and product obtained in bulk amount powdered form. All results showed the success in refining the mechanical and physical properties of polypyrrole. However, these synthetic methods contained many steps and firm condition, leading to limited application of these copolymers (Borole, D. et al.,2006). Oxidative polymerization is one of the cleanest and low-cost methods in polycondensation. Polycondensation between two different monomers offers copolymerization which modifies the properties of a homopolymer by the introduction of appropriately selected second repeating unit (Larbi B. et al.,2013). Several studies have been acceptable on conducting copolymers on their applications over homopolymer for conductivity, solubility and stability (Zerza G., et al.,2001; Pei, J., et al.,2000). The extended conjugation of the polymer chain backbone is also a major factor in creating new optical properties (Patil, A., et al., 2002). Donor–acceptor polymers with donor and acceptor moieties have extended particular attention during current years as active components of organic electronics. By submission of suitable subunits inside the conjugated backbone, these polymers can be made either electron deficient or rich. It is expected that in polymers with charge carrier motilities the ordered domains are consistent by loose polymer chains that ensure a charge transfer (Patil, A., et al., 2016; Noriega R.,2013). Synthesis of polymers for a particular application may go for selective polymerization method. Suzuki/Stile polycondensation technique is mostly chosen for optoelectronic device applications (Alessandro S.,2020; Murugesan V.,2012). Conjugated polymers have been attracting more and more attention because they acquire various electrical, magnetic and optical properties. In the balanced state, conjugated polymers are utilized in electronic devices such as photovoltaic cells, solar cells; light emitting diodes (Burroughes J.et al.,1990) field effect transistors, nonlinear optical devices, chemical, biochemical and thermal sensors (Garnier, F., 1990). Conjugated polymers are light-weight as they

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Synthesis and Photoluminescence Characteristics of $Zn_xCd_{1-x}S$ Thick Films Prepared by Flux Technique

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Abstract: **All feasible compositions of $Zn_xCd_{1-x}S$ [0≤x<1] were prepared by flux method using Na_2S as a flux. With the basic source materials, the optimum conditions for preparing good quality screen-printed thick films have been found. The optical band gap (Eg) of the films has been studied by using reflection spectra in wavelength range 350–600 nm. Increasing $[Zn^{2+}]/[Cd^{2+}]$ led to films with higher band gap (Eg). Pure CdS has the least photoluminescence intensity, whereas pure ZnS has the highest. The high transmittance, widened band gap and low resistivity obtained for ZnCdS thick films make them promising candidate for photoluminiscent applications.**

Index Terms: **Flux technique, thick films, screen printing, band gap, phosluminiscent materials.**

I. INTRODUCTION

Semiconductor nano-crystals have recently received much interest due to their unique size dependent structural, electrical, and optical characteristics. Researchers are particularly interested in II-VI chalcogenide compound semiconductors nano crystals (SNCs) because they have potential uses in solar cells, optical sensors, light emitting diodes, and biological labeling, among other things (Zia, R., et al.,2010; Jaiswal, J. et al.,2003; Jang, E. et al.,2003; Jr, M.B, et al.1998).

The study of solid-state luminescence yields information on the band structure and energy levels of impurities and defects, as well as crucial steps in the photoconductivity mechanism. In general, photoconductivity will be higher in phosphorescent luminescent materials than in non-phosphorescent luminescent materials (Gobrecht et al.,1953).

Becquerel's work in the nineteenth century marked the beginning of the scientific study of luminescence. He recognized two forms of phosphorescence decay processes: exponential and hyperbolic, which he ascribed to monomolecular and bimolecular decay mechanisms, respectively. When impurities occupy substitutional positions, the integration of either IB and VB or IIIB and VIIB elements into IIB-VIB compounds is considered as creating an activator or donor state, respectively (Bequerel E. et al.,1867) Investigators have suggested many models for the luminescence transition in ZnS type phosphors, including the Schon-Klasens model (Schon M. et al.,1942). Lambe-Klick model (Lambe J., et al.,1955) and Williams-Prener model (Williams F., et al., Prener 1956). It's crucial to remember that the properties of this sort of luminescence are highly complex, and these basic models aren't always accurate enough to grasp the nature of luminescence centers and radiative transitions.

Zinc and cadmium are two II-VI SNCs with appropriate nanocrystals for solar applications due to their straight band gap. The most widely researched substance for use as a window layer is cadmium Sulphide (CdS). By combining CdS with ZnS, the band gap of CdS may be widened. Because the band gap and lattice characteristics of the $Zn_xCd_{1-x}S$ alloy combination may be adjusted, it has a lot of potential (Olaseni I.et al.,2000). Yunchao et al. used a novel method to create tunable $Zn_xCd_{1-x}S$ alloyed SNCs with composition-dependent structural and optical characteristics at low temperatures. As a result, it's a viable option for usage in nano devices as light-emitting materials (Kumar P., et al.,2000).Vacuum evaporation (Singhal S.et al.,2009), chemical bath deposition (Khare, A., et al.,2009) spray pyrolysis (Ilican, S., et al.,2007), thermal evaporation (Sebastian, P., at al.,2004), dip-coating technique (Rafea, M.et al.,2009), molecular beam epitaxial growth (Telfer S., et al.,2000), e-beam evaporation (Kumar, P., et al., 1998) have previously been used to create $Zn_xCd_{1-x}S$ thick

films. However, there are just a few publications on the flux technique of forming $Zn_xCd_{1-x}S$ thick films.

The flux method is a straightforward approach for producing high-quality homogenous solid solutions with up scaling potential. The flux approach allows solid solutions to be synthesized much below the melting point of the material (Mughal M.,et al.,1996; Bidnaya D.,et al.,1962; Scheel H.et al.,1974; Patil L.,et al., 998; Patil L.,et al., 2001; Amalnerkar, D.,1980). The use of Na_2S_2 liquids as fluxes to manufacture metallic sulphides has been described. The existence of a common anion and little sodium incorporation into the substance to be synthesized are two benefits of Na_2S_2 solvents. The needed equipment is basic and within most laboratories economic capability.

To explore the photoluminescence characteristics of thick films for functional applications, our efforts have been undertaken to synthesize $Zn_xCd_{1-x}S$ solid solutions.

II. MATERIALS AND METHODS

Preparation of Zn_xCd_{1-x} Solid Solutions by Flux Method

Starting materials contained hydrated sodium Sulphide ($Na_2S.9H.O$), with high quality, and a suitable weight percent of coarse zinc and cadmium powders. The following is the process for preparing one of the compositions (x = 0.1).

Preparation of $Zn_{0.1}Cd_{0.9}S$

The 0.1 weight percent Zn, 0.9 weight percent Cd, and an adequate amount of sulphur and $Na_2S.9H_20$ were carefully mixed together. The solution was poured into a platinum crucible. In a kanthol wrapped muffle furnace, the crucible was put. Corundum powder was used to fill the area surrounding and above the crucible. The temperature of the furnace was raised to 600°C. After then, the temperature was kept constant for an hour. After that, the furnace was brought to normal temperature. Excess sulphur evaporated, leaving behind residual oxygen and water in the form of S02 and H2S. Double distilled water was used to wash the product in the crucible. Sodium polysulphides dissolved in water and were easily separated. The finished product has to be dried. The additional components (x = 0.2 to 0.9) were synthesized using the same technique. The same technique was used to make CDs and ZnS granules.

Preparation of $Zn_xCd_{1-x}S$ Thick Films

Screen printing was used to create thick films of each mixture. To ensure adequately fine particle size, the powder of a particular composition produced using the procedure described above was ball milled in ethanol for 24 hours. Fine solid solution powder was mixed with a solution of ethyl cellulose (a temporary binder) in a combination of organic solvents such as butyl cellulose, butyl carbitol acetate, and terpineol to make the thixotropic paste [29]. When making the paste, the ratio of inorganic to organic parts was maintained at 75:25. The paste was screen printed in a pattern appropriate for measurements on glass and alumina substrate. The films were burned in air for 10 minutes at 550°C.

Structural Analysis of the Films

X-ray diffraction patterns of the films corresponding to each composition were recorded using CuK radiations with a Ni filter on a Phillips X-ray diffractometer Model PW-1730 (A 1.5418 A). For comparison, all of the compositions' X-ray patterns were grouped in a single figure. The lattice constants of each mixture were calculated and visually displayed [30].

III. RESULTS

Photoluminescence measurement

Photoluminescence properties of thick films of $Zn_xCd_{1-x}S$ ($0 \leq x \leq 1$) were studied using Perkin-Elmers luminescence spectrometer.

Luminescence spectrometer

The model LS 50 luminescence spectrometer measures the fluorescence, phosphorescence and chemical or bioluminescence of samples either in a continuous scan over the wavelength range of the instrument (or part of the range) or at pre-selected points within the range. The excitation source is triggered at line frequency (50 or 60 Hz) to produce an intense, short duration excitation pulse of radiation. The optical system consists of two reflection grating monochromators (excitation and emission), a series of mirrors, the reference and sample, photo-multiplier detectors. The signals from the detectors are processed by the instrumental electronics, and can be displayed on a PC screen.

1. Excitation of phosphors

Phosphor under test was excited using excitation wavelengths 365nm. Excitation wavelength gave its own luminescence spectrum for a particular sample.

2. *Photoluminescence of $Zn_xCd_{1-x}S$ ($0 \leq x \leq 1$) thick films*

The photoluminescence of CdS, $Zn_xCd_{1-x}S$ ($0.1 \leq x \leq 0.9$), ZnS thick films are shown in the Fig.2.1 to Fig.2.11 respectively.

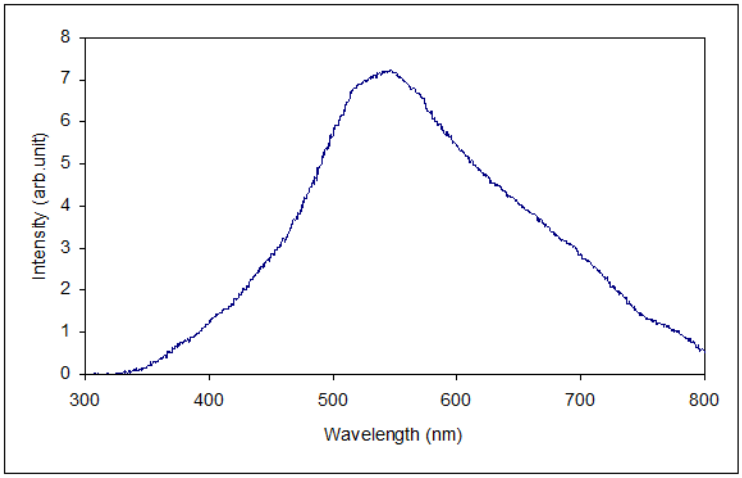

Fig. 2.1: PL of CdS

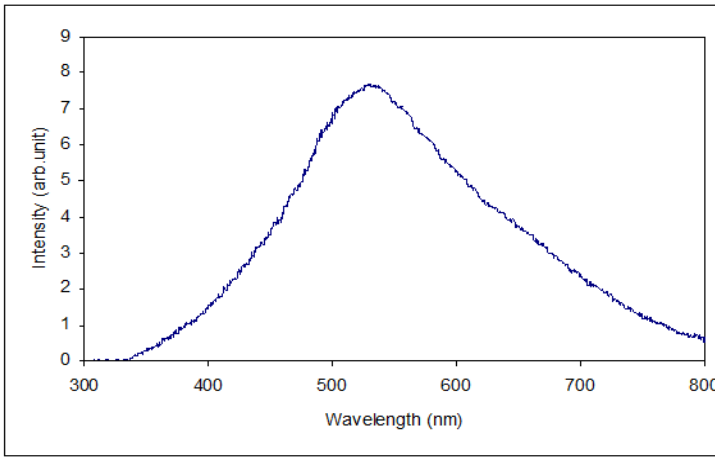

Fig. 2.2: PL of $Zn_{0.1}Cd_{0.9}S$

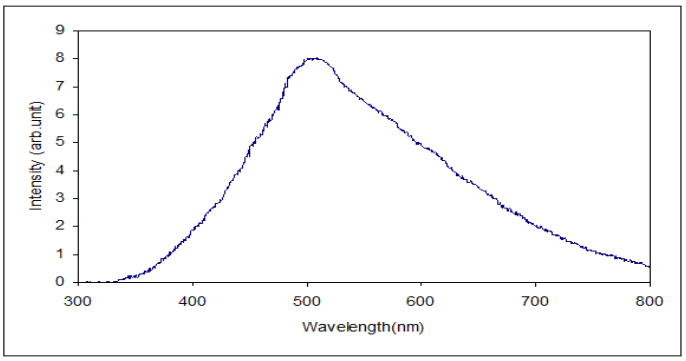

Fig. 2.3: PL of $Zn_{0.2}Cd_{0.8}S$

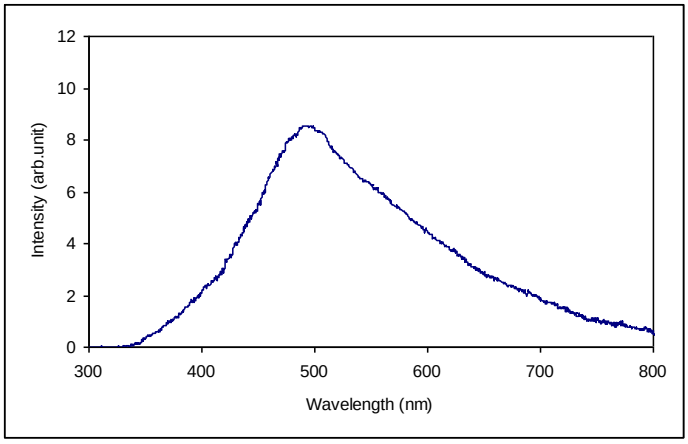

Fig. 2.4: PL of $Zn_{0.3}Cd_{0.7}S$

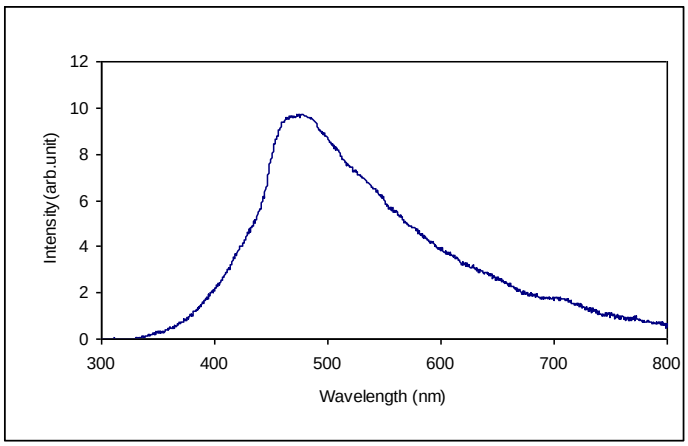

Fig. 2.5: PL of $Zn_{0.4}Cd_{0.6}S$

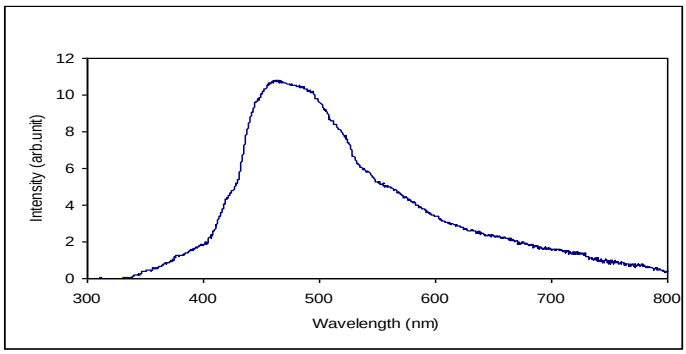

Fig. 2.6: PL of $Zn_{0.5}Cd_{0.5}S$

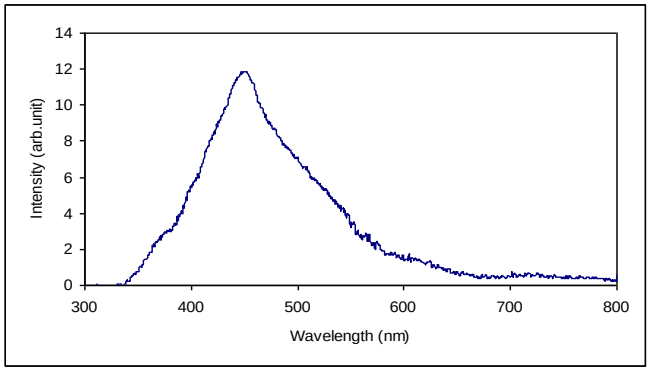

Fig. 2.7: PL of $Zn_{0.6}Cd_{0.4}S$

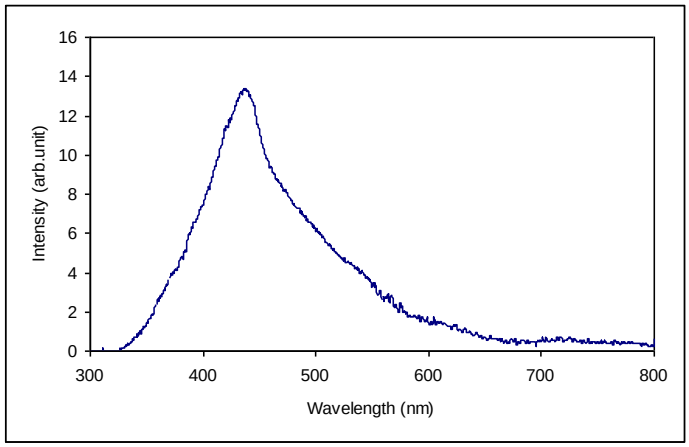

Fig. 2.8: PL of $Zn_{0.7}Cd_{0.3}S$

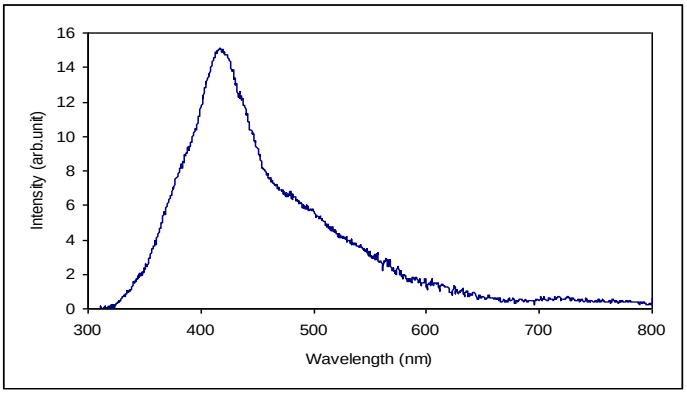

Fig. 2.9: PL of $Zn_{0.8}Cd_{0.2}S$

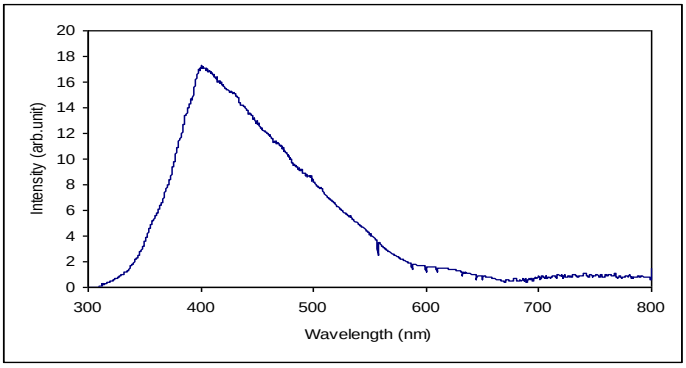

Fig. 2.10: PL of $Zn_{0.9}Cd_{0.1}S$

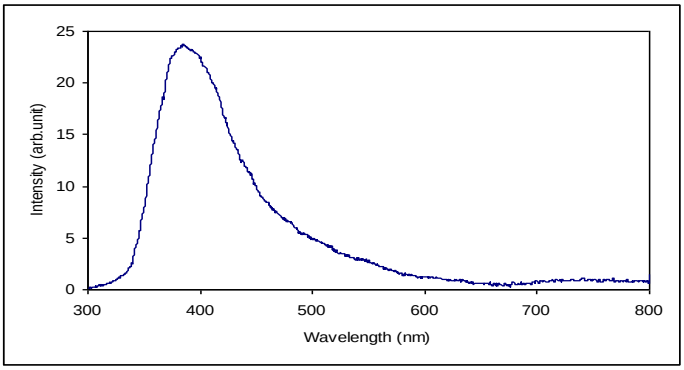

Fig. 2.11: PL of ZnS

The photoluminescence spectra of $Zn_xCd_{1-x}S$ thick films display a wide range of photoluminescence colors, ranging from blue owing to ZnS to red due to CdS. These findings also show that the energy gap between the emission center and the conduction band changes depending on the energy gap of the different $Zn_xCd_{1-x}S$ thick films. Intensity diminishes as CdS rises in ZnS.

3. Superimposition of PL of $Zn_xCd_{1-x}S$ ($0 \le x \le 0.5$)

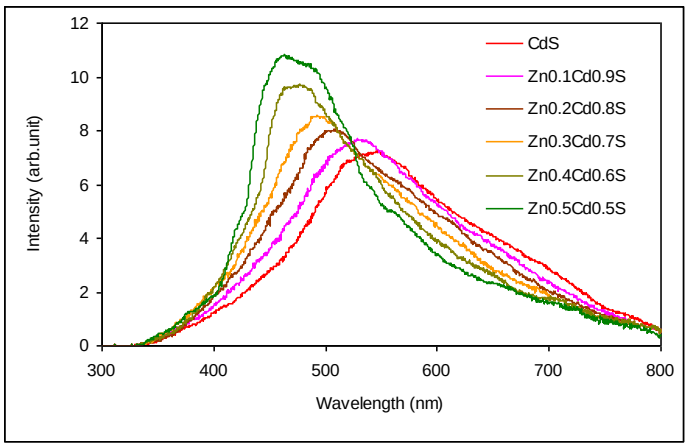

Fig. 3a: PL of $Zn_xCd_{1-x}S$ ($0 \le x \le 0.5$)

Superimposition of PL of $Zn_xCd_{1-x}S$ ($0.6 \le x \le 1$)

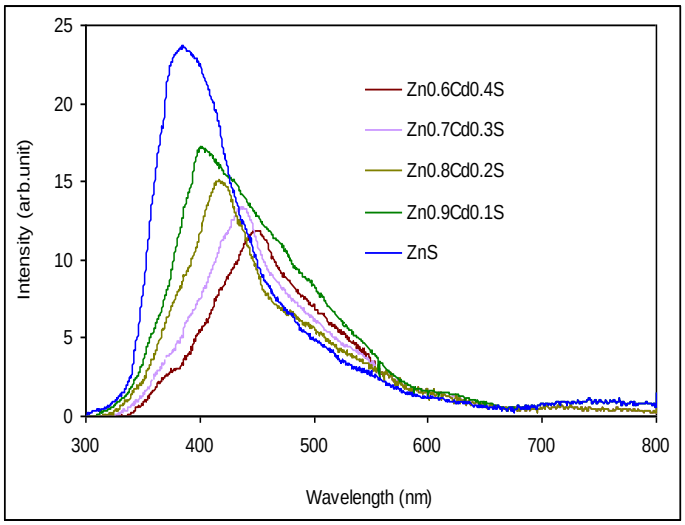

Fig. 3b: PL of $Zn_xCd_{1-x}S$ ($0.6 \le x \le 1$)

4. The variation of peak intensity with wt % of Zn in $Zn_xCd_{1-x}S$ ($0 \le x \le 1$) as shown in Fig.4. The Figure shows as wt % of Zn increases its peak intensity also increases.

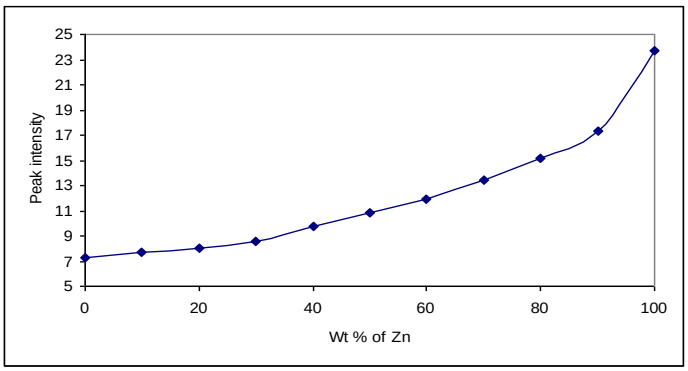

Fig.4: The variation of peak intensity with wt % of Zn

IV. DISCUSSION

Photoconductivity and photoluminescence were detected in all $Zn_xCd_{1-x}S$ ($0 \le x < 1$) compositions. Rapid recombination is required for good luminous materials, whereas delayed

recombination is required for good photoconductors. The typical material would satisfy these opposing demands if (i) both luminescence and photoconductivity are associated with the capture of the same type of carrier, either electron or hole, and (ii) luminescence is associated with one type of carrier but photoconductivity is associated with the capture of the other type of carrier. In instance (i) the existence of excellent luminescence emission indicates photoconductivity-friendly centres.

The existence of light emission might be due to a reduced density of "large-cross-section centres." As a result, free charge carriers will live for a long period before recombination. For example, in instance (ii), a suitable luminous material requires centres with a large cross section for minority carriers, which produce emission, and a small cross section for the majority carrier, which produces extended free life time for majority carriers, which produce photoconductivity. In this paper, the materials examined are n-type materials ($Zn_xCd_{1-x}S$ ($0 \leq x < 1$). These compounds should have photo sensing and photoluminescent characteristics for the reasons stated above.

V. CONCLUSION

Thick films of $Zn_xCd_{1-x}S$ having large band gap (compared to 2.42 for CdS) have been created by flux method using distinct formulations. The band gap of the film and the ratio Zn/Cd in the film initially rise when the ratio $[Zn^{2+}]/ [Cd2^{+}]$ is increased. The photoluminescence peaks of pure CdS and pure ZnS are 547 nm and 385 nm, respectively. These peaks would be ascribed to the individual materials edge emissions. The intensity of photoluminescence increases as the wt. percent of Zn in $Zn_xCd_{1-x}S$ increases. In the case of pure CdS and compositions with a higher wt. percent of CdS, the rates of rise and decay of photoluminescence intensity are nearly symmetrical.

In compositions with wt. percent CdS ranging between 50 and 70 wt. percent CdS, the rate of rise in photoluminescence intensity is considerably faster than the rate of decay. In the case of greater ZnS compositions, the rate of rise in photoluminescence intensity is quite fast compared to the rate of decay. In the case of pure ZnS, the rate of growth of photoluminescence intensity is the fastest, while the rate of decay (photoluminescence intensity) is the slowest. As the wt percent of Zn in the $Zn_xCd_{1-x}S$ compositions increases, the peaks of the spectra shift towards shorter wavelengths (blue shifts).

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Synthesis and characterization of copolymer Poly [(Thiophene-2, 5-diyl)-co-para methoxy benzylidene] doped with Cobalt acetate using Oxidative polymerization

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Abstract

A one pot oxidative polymerization technique is used to synthesize copolymer Poly [(thiophene-2, 5-diyl)-co-para methoxy benzylidene]. In this technique we used catalyst $POCl_3$ and 1, 4 dioxane solvent for copolymerization of para methoxy benzaldehyde with thiophene. One pot method takes around 24 hours. Doped copolymer was synthesized in presence of 0.2gm cobalt acetate. Catalyst is removed using ammonia. Products are obtained using menthol. UV–Vis, FTIR, ^{1}HNMR, ^{13}CNMR, XRD, FE-SEM, EDX, BET and TGA are used to analyze physical properties of undoped and doped copolymers. The polycrystalline phase is confirmed using structural analysis. Interconnected nonoporous structure is indicated by surface morphology. The nano crystalline sizes of undoped and doped forms are 44 nm and 55 nm respectively.

The surface area changed due to cobalt doping of copolymer from 3000 to 47900cm^2/g. Both copolymers are thermally stable up to 280^{o}C confirmed by thermogravimetric analysis. Optical absorption studies proved that band gap changed from 2.93 to 2.83 eV after doping and two-probe method was used to calculate conductivity values as 1.34 x 10^{-9}to 7.54 x 10^{-8} S/cm for undoped and doped copolymers. Both undoped and doped copolymers have several uses like semiconducting material and energy storage in the field of conducting polymers.

Keywords: Copolymer, Oxidative polymerization, Physical properties, Surface area, Porosity.

Introduction

Alternations of single and double bonds resulted in conjugation in the organic compounds which is useful to change the electronic and physical properties as well as applications of the organic polymers. Copolymerization of halogen containing aromatics and alkynyl arenes produced conjugated porous polymers[13]. Divinylbenzene,[24] para xylenedichloride[4] and chloromethyl ether[15] yielding high surface area polymer composites[5] were developed with linear polystyrene and hyper cross linked polymers. In various applications, conjugated polymers were used due to high porosity and excellent thermal stabilities. Certainly, these polymers have been considered for separations and gas storage,[1,28,37] encapsulation of chemicals,[6,9] heterogeneous catalysis,[3,32,29] photoredox catalysis,[12,14] light emittance,[2,16,17,31] chemo sensing[8,19,23,26,36] and energy storage[16,18,25,27].

Mostly micro or macro porous polymers have been synthesized by direct polymerization through coupling, cyclization and condensation reactions[21,34]. In polycondensation process, two monomers react to eliminate small molecule like water to form new functional group. The polycondensation process starts from condensation reaction between the two functional groups that of aldehyde and thiophene in case of typical polycondensation in presence of mild dehydrating agent phosphorous oxychloride in neutral solvent 1, 4 dioxane. There is basic need to search for new precursors which are easily available in the laboratory to form polymers with most modern physical properties using simple chemical route and to study the effect of electron withdrawing and electron donating para substituent on the electronic and optical properties of the conjugated polymers[11].

Many researchers used substituted thiophene for polymerization process. Chemical doping is an actual strategy to alter the electronic structures of semiconductors in addition to their physical properties, thus improving their practices[33]. Copolymer of thiophene and para chloro benzaldehyde showed variations in their material properties due to addition of cobalt sulphate. Thiophene with para methoxy benzaldehyde copolymerization by oxidative polymerization and characterization was studied to look at materials and their application in various fields like semiconducting material and energy storage[20].

Material and Methods

We have presented earlier the one pot synthesis of copolymerization thiophene with p-chloro benzaldehyde doped with cobalt sulphate[20]. Copolymer of p-bromobezaldehyde and thiophene was also reported in presence of cobalt sulphate but time and temperature to complete reactions were very high. Therefore, using same method of polycondensation, we used thiophene with p-methoxy benzaldehyde to synthesise conjugated copolymer.

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REFORMATION IN INDIAN FINANCIAL SYSTEM AND BANKING

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Introduction:

A financial system is a system through which money is the main financial instrument used to complete financial transactions in an economy. These three factors are important to financial traders. Transactions in the economy are carried out through households, firms, and governments. Due to financial transactions, some have excess funds in the instrument of money. Some people have a breakdown. The financial system acts as an intermediary between the two, banks and financial institutions act to mobilize excess funds in the economy. Also, the collected funds are invested through loans, borrowings, investments. If the financial system is developed in the economy, the economic development of the economy is seen to be fast. Therefore, the development of financial system is an indicator of economic development.

Objectives:

1) A study of the Indian financial system in recent times.
2) To study the knowledge of customers regarding reforms in banking sector.
3) To study the situation regarding Indian financial system and banking sector reforms.
4) To study the economic implications of changes in the Indian financial system and banking sector reforms.

Hypotheses /hypotheses:

It is decided to test the following hypotheses for the research paper.

1) Have the reforms in the Indian financial system and banking sector reached the consumers in the society?
2) Improvements in the Indian financial system and banking sector have improved the financial situation of consumers.
3) There has been awareness about reforms in the Indian financial system and banking sector.

Research Method:

The researcher has decided to adopt descriptive research method for the present research paper. This research paper is related to the present problem. Survey method in descriptive research This research method will be used.

Financial of the system Meaning -

According to Ban Horn "a financial system is a system in which savings are collected and distributed for consumption and investment." Whereas in financial market money market and capital market provide short term and long term capital.

Financial of the system work (Function of Financial System)

The functioning of the financial system is important in every country's economy to increase the rate of economic development and economic growth.

Saving _ _ Function)-

Individuals, families, industrial organizations, business organizations, government etc. in the economy. Current income wind is saving as a provision for the future. The financial system does the work of collecting and mobilizing savings.

of cash Liquidity _ _ Function)- Savings provide a financial system for capital investment and investment in real estate. When the savers need money, they prioritize making their savings available immediately or within a certain period of time. By doing so, the creditor's property and savings will not be damaged. The financial system takes care of this.

provided work (Payment Function)-

Numerous goods and services are bought and sold in the economy, such as cheques, credit cards, debit cards, demand drafts, electronic fund transfers, e-banking, tele-backing, etc. The function of providing money through the financial system is done.

risk work (Risk) -

Fire, Earthquake, Flood, Drought, Terrorism, Attacks, War etc. Disasters cause huge loss of lives and finances. Insurance companies in the financial system act as risk takers. Compensation for damages. Provides security to life and property.

of information work (Information Function)-

Demand, supply, prices of goods and services in the market, competitors in the market, availability of raw materials, capital equipment etc. The function of providing contextual information is done by the financial system.

of transfer work (Transfer Function)-

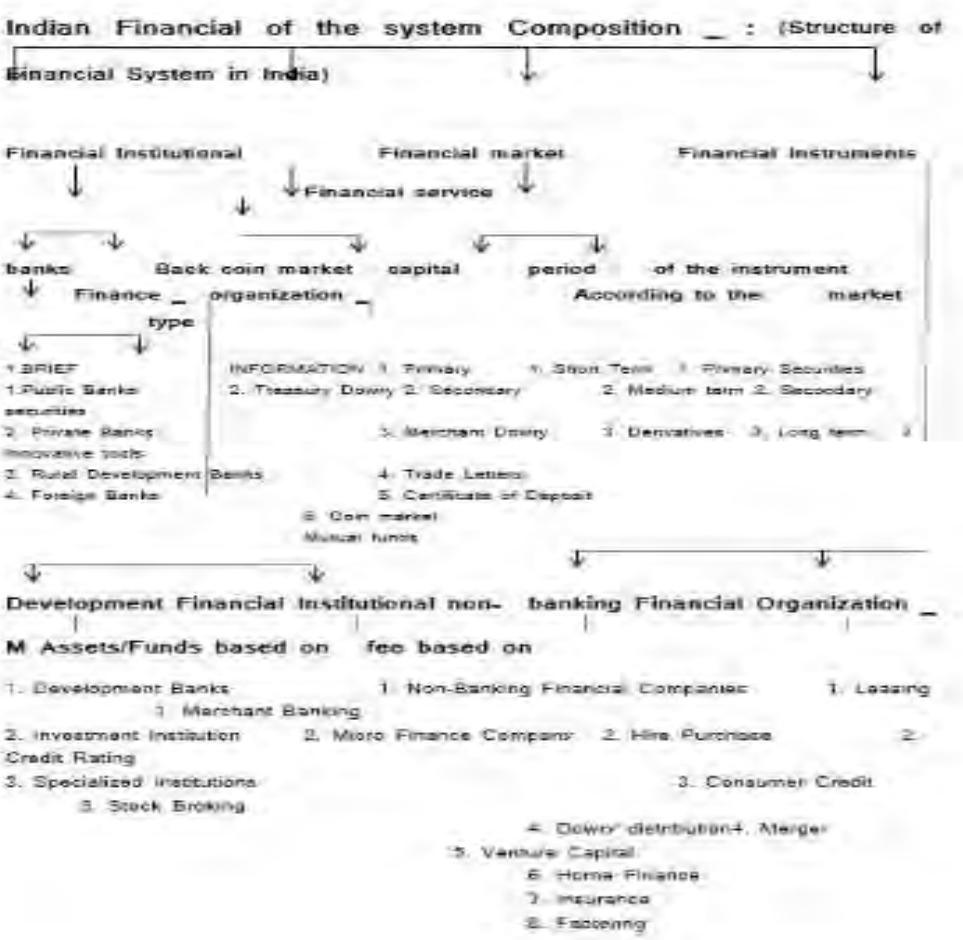
The financial system performs the function of transferring funds from one geographical area to another geographical area. This leads to balanced development in the economy.

others work (other function)-

Preparation of project reports for industries and businesses, financial credit measurement, project evaluation, capital raising etc. The work is supported through the financial system.

Financial of the system Important and : (Role & Importance of Financial System)

- Intermediaries between savers and investors
- Monitoring the performance of the company sector
- Risk taking, risk control
- Geographical transfer of financial instruments
- Guidance to Investors on Bond Collection (Portfolio).
- Maximum return from minimum cost/investment
- Encouraging entrepreneurs to raise capital
- Help to increase economic development and economic growth rate.



banking in the field amendment - (Reforms in Banking Sector)- Further reforms have been made in the banking sector by accepting all the recommendations of the report of the Narasiham Committee and 2.

Rate- The rate at which RBI lends to commercial banks is called Bank Rate. On 14 June 2014 the rate was 9%.

Repo And Reserve Repo - RBI levies repo and reserve repo on short-term loans after collateralization of securities. On 14 June 2014 the rate was 8% and 7% respectively.

principal And Aadhaar Interest Rate - In financial reforms, banks began to decide their principal interest rate themselves. From December 31, 2010, the prime interest rate has been replaced by the base interest rate. Banks are fixing this rate themselves.

Cash reserved funds quantity - (Cash Reserve Ratio- CRR) - Before financial reforms CRR was 5%. In 2002 it was as low as 5%. Therefore, credit can be extended from it.

Statutory Savings Ratio – Earlier this ratio was 38.5%. In March 2014 it came up to 22%. This leads to credit expansion.

of interest rate Shila stripes (Interest Slabs) - Before 1994-95 interest rates were different. It was brought up to 02. Interest rates on domestic fixed deposits deregulated Banks have started keeping the prime and base interest rates separate. Interest rates on loans above 2 lakhs were arbitrary. Interest rates of co-operative banks were deregulated.

somant Debt Convenience _ : This is a new tool used for short term liquidity management. First used in May 2011. The aim is to reduce intra-day fluctuations in interbank rates. In May 2011 this rate increased to 8.25%, in July 2013 to 10.25%. In June 2014 it was 9%.

of the bank Privatization - Bank privatization was started as per the recommendation of the Narasimha Committee . State banks and public sector banks are raising capital by selling shares, bonds in the market. RBI's shareholding in SBI was reduced from 99% to 67%.

Increasing number of private and foreign banks : During the period of economic reforms, many private banks were established in the country. Allowed foreign investors to have up to 74% foreign direct investment in Indian banks. Many branches of foreign banks have been opened in the country.

Discreet Accounting norms - Reserve Bank started this norm from 1992-93 . Assessing Bank Income, Non-Performing Assets (NPAs) . Non-performing assets should not adversely affect the functioning of the bank. Hence, provision of funds was made to manage NPAs.

loan Recovery - Non -recovery of loans given by banks will adversely affect the functioning of banks. For that, Recovery of Debt due to Bank and Financial Institutions Act will be prepared in 1993. Also established Debt Recovery Tribuna's to resolve disputes.

Central Board to Investigate Bank Frauds - CBBF was set up by Ministry of Finance in 1997 to take action and prevent fraud by bank employees, officers, private individuals/institutions Reserve Bank set up 'Advisory Board of Bank Frauds' in February 1997 .

Capital Sufficiency ratio - (Capital Adequacy Ratio (AR)) is a method of calculating capital. Capital Adequacy Ratio is a method of measuring bank capital. In 1992, the ratio was 8% and directed by RBI to achieve it by 1996. On January 1, 2013, RBI directed banks to implement BASER-III norms on capital adequacy, but it was directed to do so by March 31, 2018.

Original rates system - (Base Rate System)- RBI on April 9, 2010 issued guidelines regarding prime lending rate system and implemented BRS on July 1, 2010 to replace the earlier PLR. RBI changed the policy to REPO & Reserve REPO and did not change BRS much. Banks have not changed BRS much while fixing interest rates. Banks use BRS to determine interest rates.

MCLR by force Implementation – In order to enhance monetary policy, RBI adopted marginal cost of borrowing interest rate determination on 1 April 2016. It is named as Marginal Cost of Fund Based Learning Rate- MCLR. On April 1, 2016, Bankers India was forced to use MCRL while fixing interest rates .

Immediately Corrective Proceedings - (Prompt Corrective Action- PCA) Public sector banks have been suffering huge losses in the last few years. The total accumulated loss widened to Rs 92,000 crore in the quarter from 2015-16 to 2017-18. Keeping this in mind, RBI took immediate corrective action against 11 out of 21 public sector banks. Within the framework of immediate corrective action three bases of classification are made. 1) Capital Adequacy Ratio 2) Net Non-

Performing Assets (Net NPAS) 3) Return on Assets PCA does not come at bank level. A bank is thrown out of PCA after NPA does not reach 6% and returns remain negative for 2 years. The objective behind this is to improve the performance of the bank.

The rainbow Scheme - Government of India announced a seven point program in August 2015 and named it 'Indradhanushya Yojana' to improve the performance of public sector banks .

Seven point As follows - Managing Director (MD) & Non Executive Chairman (Non Executive Chairman) should be appointed separately in some big public banks .

1. Establishment of Bank Board Bureau
2. Capitalization Plan
3. A solution to reduce pressure on bank passbook accounts
4. Empowerment of banks without government intervention
5. Key performance indicators
6. Creating a new paradigm for determining responsibility on the basis of
7. Creating a similar discussion environment with the bank etc.

Conclusion _ :

It is important to emphasize the importance of consumer protection not only from an access point of view but also in terms of stakeholder trust. The charges for the services are kept reasonable. It is the trust of customers, the trust of investors that stakeholders are acting in their collective best interest, and the ordered financial statements , that are fair and reasonable evaluations of the company's operations. This is the trust of regulators, all of which make an intangible but significant contribution to national savings and financial stability. The post-Lehman affair in the financial markets in VS is a good and sobering example of what happens when investors lose confidence, and indeed all regulators and supervisors should be proactive and protect the consumer.

Much progress was made in maintaining a stable financial system. However, as we have seen the fiscal horizons are constantly changing and new challenges are emerging, the process will evolve successfully if the RBI continuously deploys the strategic and supervisory framework to accommodate such scenarios. To ensure this, IBA Members and other stakeholders should become active partners.

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शब्दब्रह्मणि निष्णातः परम् ब्रह्माधिगच्छति

यू.जी.सी. से अनुमोदित हिन्दी मासिक पत्रिका

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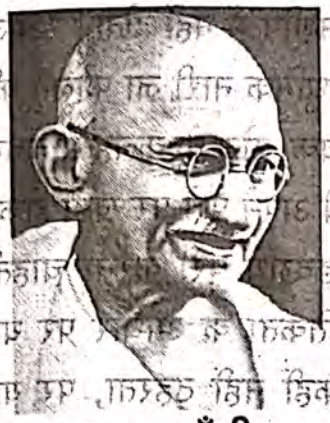
इस अंक में....

मुखचित्र - अमर शहीद जनरल विपिन लक्ष्मणसिंह रावत

गाँधी चिन्तन में नारी-विमर्श



महात्मा गाँधी

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प्रस्तावना

प्रस्तुत शोध आलेख में गाँधी चिंतन के रूप में नारी-विमर्श की संकल्पना की गयी है। महात्मा गाँधीजी के अनुसार समाज के लिए नारी-पुरुष एक ही सिक्के के दो पहलू हैं। नारी-पुरुष में भेदभाव या असमानता के कारण परिवार और समाज का अहित हो सकता है। जितना पुरुष को अधिकार है उतना ही नारी को है। नारी प्रेम, करुणा, उदारता, क्षमाशीलता, सेवा, समर्पण और सहिष्णुता जैसे सद्गुणों की मूर्ति है। नारी-स्वतंत्रता के परिप्रेक्ष्य में महात्मा गाँधीजी ने कहा है कि लिंगभेद, अशिक्षा, दहेज, भ्रूणहत्या, वेश्यावृत्ति जैसी कुप्रथायें जो नारियों की गिरी दशा या नाटकीय परिस्थिति हेतु जिम्मेदार हैं। नारी के प्रति पूज्य भाव इन दिनों कुदृष्टि के रुप में बदला है और वासना की आग में झोंककर काला कोयला बना दिया गया है।[1]

उद्देश्य :

१. स्त्री-पुरुष समानता देश के विकास में महत्वपूर्ण है, दिखाना।

२. नारी-जाति का दुरुपयोग दूर करना।

३. पुरुषवादी मानसिकता को बदलना, नारी भोग की वस्तु एवं गुलाम नहीं, स्थापित करना।

४. सीता या द्रौपदी जैसी नारी को आदर्श मानना इसलिए नहीं कि ये धार्मिक पात्र हैं, बल्कि इसलिए कि ये दोनों साहसी थीं और दोनों प्रतिरोध करना जानती थी।

५. रूढ़ी और परंपरा के दोषों पर आपत्ति उठाना।

६. नारी से अहिंसा, सत्याग्रह की प्रेरणा ग्रहण करना।

७. पुरुष-दासता का विरोध।

वर्तमान समाज में आज भी नारी की स्थिति भयावह है, भ्रूणहत्या, दहेज-प्रथा, बालविवाह, बेमेल-विवाह, अशिक्षा जैसी समस्याओं के कारण नारी की दशा दिन-प्रतिदिन बिगडती जा रही है।

इन सभी समस्याओं के संदर्भ में महात्मा गाँधीजी के चिंतन के माध्यम से हमें सोचना पड़ता है कि स्वस्थ समाज से ही स्वस्थ राष्ट्र का निर्माण

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CONTENTS

किशोरावस्थेतिल वर्तन विषयक समस्या आणि मानसिक आरोग्याचा अभ्यास

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गोषवारा

किशोरावस्थेतिलनवर्तन विषयक समस्याआणिमानसिक आरोग्यकशे संबंधित आहेत हे जाणून घेण्यासाठी दोन मानसशास्त्रीय प्रश्नावलीच्या सहाय्यानेजो निष्कर्ष आला त्यातकिशोरावस्थेतिल कौटुंबिक वातावरण पुरक असेलआणिसामाजिक संबंध अधिक असतील तरमानसिक आरोग्य उत्तम राहते

प्रस्तावना

किशोरावस्था या शब्दांची उत्पत्ती लॅटिन शब्द **Adolescere** या शब्दावरून झाली याचा अर्थ होतो वाढणेTo Grow Up किंवा To Grow To Maturityपरिपक्व होणे. पूर्वीच्या काळी पौगंडावस्था आणि किशोरावस्था असे दोन स्वतंत्र कालखंड मानले न जाता ज्यावेळी सर्वसाधारण पुनरुत्पादनाची क्षमता निर्माण होईल त्यावेळी किशोराला प्रोढ मानले जात असे.किशोरावस्था दोन भागात निभागली आहे 1. पूर्व किशोरावस्था याचा कालखंड 12 ते 16 वर्ष 2. उत्तर किशोरावस्था हा कालखंड 17 ते 22 वर्ष असा आहे.

क्रो एंड क्रो यांच्या मते- किशोरावस्था हे वर्तमानातील सामर्थ्य आणि भविष्यातील आशेचे प्रतिनिधित्व करते.

कुल्हान यांच्या मते- " किशोरावस्था म्हणजे बालपण आणि तारुण्यातील संक्रमण कालावधी."

ब्लेअर जोन्स आणि सिम्पसनच्या मते-

"किशोरावस्था म्हणजे प्रत्येक व्यक्तीच्या आयुष्याचा काळ. जे बालपण संपल्यावर घडते. आणि तारुण्याच्या सुरुवातीलाच संपते. "

स्टॅनले हॉलच्या मते- "किशोरावस्था म्हणजे तणाव, वादळ, संघर्ष आणि विरोध यांचा काळ.

1.1 किशोराचे सामाजिक वर्तनातील बदल-

सामाजिक सहभाग जेवढा अधिक वाढतो इतक्याच अधिक प्रमाणात किशोराची सामाजिक कुशलता व क्षमता वाढते. किशोरात सामाजिक समूहात जिवलग मित्र,कंपू, संघटित समूह, टोळी इत्यादींचा समावेश होतो.

1.2 कौटुंबिक संबंध-

किशोराचे कौटुंबिक संबंध विघडण्याच्या कारणात पालकच जबाबदार असतात तसेच वर्तनाचे मापदंड शिस्तीची भावना, भावंडा बरोबरील संबंध, कोंडी झाल्याची भावना, अति चिकित्सक वृत्ती, कुटुंबाचा आकार,किशोराचे अपरिपक्व वर्तन, नातेवाईकाच्या विरुद्ध प्रतिकार, वेळेबाबतचे निर्बंध इत्यादी आहेत.

II. संशोधन पद्धत

2.1 उद्देश-

- किशोरांच्या सामाजिक समस्या प्रकाराचा मानसिकआरोग्यावर काय परिणाम होतो याचा अभ्यास करणे.
- किशोरांच्या आर्थिक समस्या प्रकाराचा मानसिक आरोग्यावर काय परिणाम होतो याचा अभ्यास करणे.
- किशोरांच्या कौटुंबिक समस्या प्रकाराचा मानसिक आरोग्यावर काय परिणाम होतो याचा अभ्यास करणे.
- किशोरांच्या शैक्षणिक समस्या प्रकाराचा मानसिक आरोग्यावर काय परिणाम होतो याचा अभ्यास करणे.

2.2 गृहितके

- किशोरांच्या सामाजिक समस्या प्रकाराचा मानसिक आरोग्यावर विपरीत

परिणाम होतो

- किशोरांच्या आर्थिक समस्या प्रकाराचा मानसिक आरोग्यावर विपरीत परिणाम होतो
- किशोरांच्या कौटुंबिक समस्या प्रकाराचा मानसिकआरोग्यावर विपरीत परिणाम होतो
- किशोरांच्या शैक्षणिक समस्या प्रकाराचा मानसिक आरोग्यावर विपरीत परिणाम होतो

2.3 नमुना

शिरपूर शहरात शिक्षण घेणार घेणारे 200 विद्यार्थी

2.4 परिवतके

- **स्वतंत्र परिवर्तक**-महाविद्यालयीन विद्यार्थी
- **परतंत्र परिवर्तक**- किशोरांच्या समस्या

मानसिक आरोग्य

2.5 साधने

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III. निष्कर्ष

टेबल क्रमांक 1- किशोरावस्थेतील मानसिक आरोग्यआणि वर्तनविषयक समस्येचा सहसंबंध.

किशोरांच्या समस्याचे प्रकार	मानसिक आरोग्याचे स्तर	
	उत्तम	अस्वस्थ
सामाजिक	0.015	0.281
आर्थिक	0.019	0.005
कौटुंबिक	0.20	0.021
शैक्षणिक	0.011	0.265

टेबल क्रमांक 1 वरून लक्षात येते की किशोरांच्या समस्या प्रकारात सामाजिक समस्या मानसिक आरोग्याचा उत्तम स्तर याच्यातील सहसंबंध हा0.015आहे तो धनात्मक सहसंबंध दर्शवतो आणि अस्वस्थता त्याच्यातील सहसंबंध गुणांक 0.281असून हा ऋणात्मक सहसंबंध दर्शवतो.

किशोरांच्या समस्या प्रकारात आर्थिक स्तर आणि मानसिक उत्तम स्तर याच्यातील सहसंबंध हा 0.019आहे. हा गुणांकन धनात्मक सहसंबंध दाखवतो. तसेच अस्वस्थ आणि आर्थिक स्तर यांच्यातही धनात्मक सहसंबंध दर्शवतो त्याचेमूल्य0.005आहे .

किशोरांच्या समस्या प्रकारातील कौटुंबिक आणि मानसिक आरोग्याचा स्तर उत्तम याचा सहसंबंध गुणांकन आहे0.20 तो धनात्मक सहसंबंध प्रदर्शित करतो. याउलट अस्वास्थ्य आणि कौटुंबिक समस्येमध्ये ऋणात्मक सहसंबंध दिसून येतो त्याचे गुणांकन आहे0.021.

किशोरांच्या समस्या प्रकारातील शैक्षणिक समस्या आणि उत्तम मानसिक आरोग्ययांचा गुणांकन0.011 आहे. यावरून शैक्षणिक समस्या आणि उत्तम मानसिक आरोग्य यात ऋणात्मक सहसंबंध दिसून येतो. याचवरोवर मानसिक अस्वस्थता हा ऋणात्मक सहसंबंध प्रदर्शित करतो त्याचा गुणांकन आहे0.265.

संदर्भ

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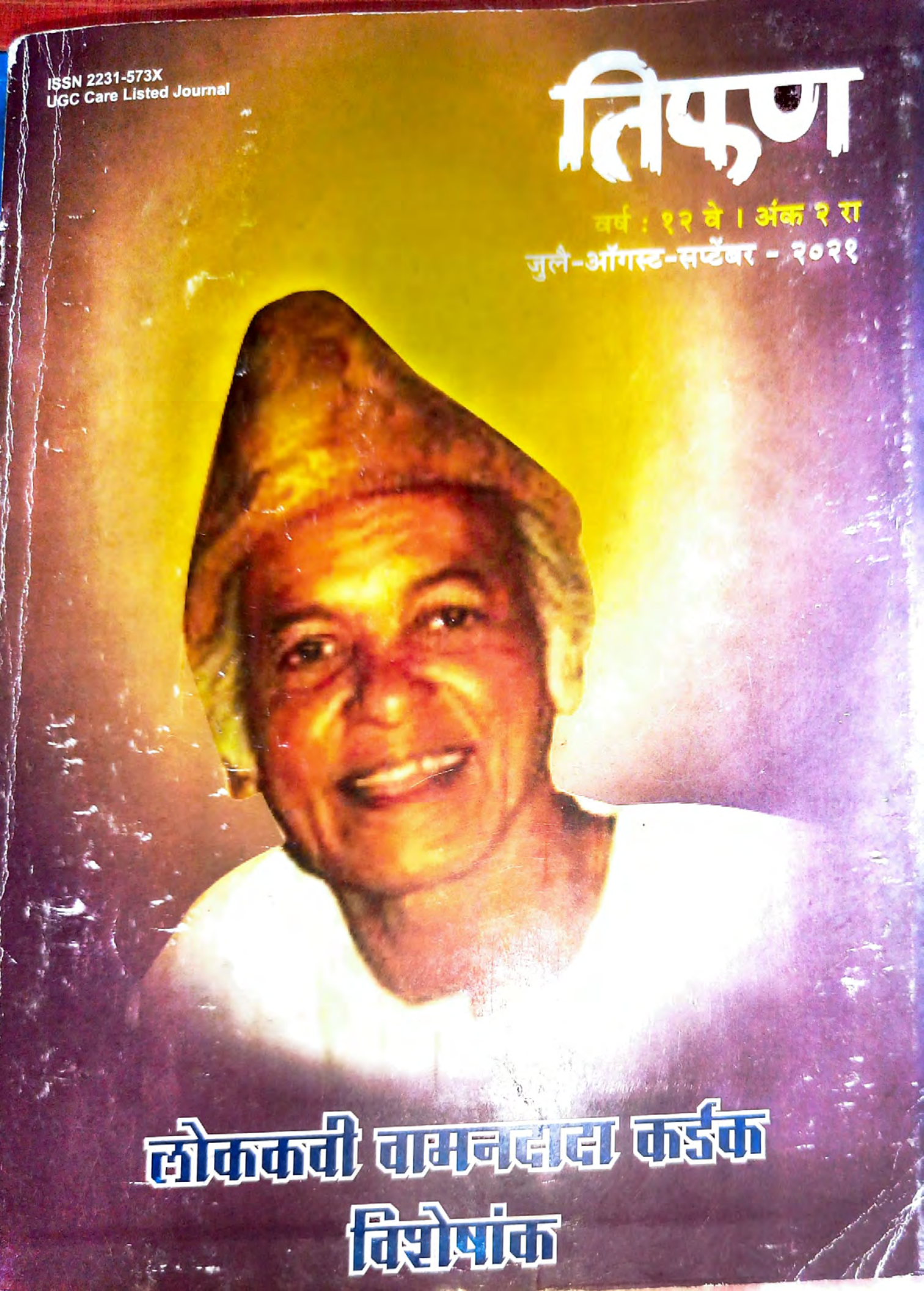

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भारतीय राजकारणातील बहुजनांचे स्थान: एक मानसशास्त्रीय चिकित्सा

डॉ. मिलिंद भगवानराव बधुटे,
आर. सी. पटेल कला, वाणिज्य आणि विज्ञान महाविद्यालय,
शिरपूर जिल्हा धुळे

सार

भारत एक महान देश आहे. भारताची समाजव्यवस्था चार वर्ण व त्यावर आधारित जातीव्यवस्था यावर दृढ झाली आहे. त्यामुळे समाजात उच्च नीचता निर्माण झाल्यामुळे, सामाजिक आर्थिक संरचना, समकालीन राजनीतिक संस्कृतिक इत्यादीशी संबंधित आहे.

बहुजनांच्या राजकारणात मानसशास्त्रीय समस्या या त्यातील स्थानिक सांस्कृतिक परिस्थितीवर प्रभाव पाडतात

बीज शब्द- भारतीय, राजकारण, बहुजन, मानसशास्त्रीय चिकित्सा

प्रस्तावना (Introduction)

भारत एक महान देश आहे. भारतात आर्या चे आगमन झाल्यानंतर वर्ण व्यवस्था अस्तित्वात आली. एक ब्राह्मण जो सर्वश्रेष्ठ आहे आणि दुसरा वर्ग शूद्र म्हणजे बहुजन समाज.(बहुजन म्हणजे शुद्र). ब्राह्मण कायम प्रथमस्थानी राहून बहुजनांमध्ये क्षत्रिय, वैश्य, शूद्र एकूण चार वर्ण व त्यावर आधारित जातीव्यवस्था दृढ झाली. त्यामुळे समाजात उच्च नीचता निर्माण झाल्यामुळे सामाजिक आर्थिक संरचना, समकालीन राजनीतिक संस्कृतिक इत्यादीशी संबंधित आहे. सहाव्या शतकाच्या अगोदर भगवान बुद्ध महावीर यांच्या परंपरेनुसार बहुजनांना सामाजिक, राजकीय अधिकार होते.

1.1. राजकारण म्हणजे काय

राजकारण मूलतः सत्ता विमर्श आहे. जीवनाच्या प्रत्येक क्षेत्रात सत्ता प्राप्ती होते ती दृश्य व अदृश्य स्वरूपात असते. तात्पर्य सत्ता राजनीतीचे केंद्रबिंदू आहे. वास्तवात राजनीति आंदोलनाचा मुख्य उद्देश सत्तेत परिवर्तन करून सामाजिक परिवर्तन घडवून आणणे. सामाजिक परिवर्तन घडवून सत्तेत परिवर्तन घडवून आणणे हे एकमेकांना पूरक आहे.

स्वातंत्र्य, समता, बंधुत्व भारतीय परिप्रेक्षच्या विशिष्टतेचे कारण भांडवलशाही आणि हिंदुत्व या दोघांसोबत संघर्ष करावा लागेल.

1.2. बहुजनाच्या राजकारणातील समस्या

- ब्राह्मणवाद व भांडवलशाही हे वरवर पाहिल्यास भिन्न वाटतात परंतु ते एकमेकांच्या पूरक आहेत
- ब्राह्मणवादाचे जनक आहेत ब्राह्मण परंतु ब्राह्मणवादाने सर्व जाती मध्ये प्रवेश केला आहे.
- ब्राह्मणवादाशी संघर्ष म्हणजे समता, स्वातंत्र्य, बंधुत्व याच्या हक्कासाठी संघर्ष.

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Gender Issues in Depression

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Abstract
Depression is a common mental illness that affects over 264 million people around the world. It's marked by recurrent depression and a lack of interest or enjoyment in previously satisfying or pleasurable behaviours. It can also affect sleep and appetite, tiredness and poor concentration are common. Depression is a leading cause of disability around the world and contributes greatly to the global burden of disease the main objective of the study to investigate the depression, anxiety and stress of man and women. Deal with depression, anxiety, and stress. A total of 64 participants were chosen, including 32 men and 32 women. Using the DASS-42 Inventory, they were evaluated. There were no associations between male and female, according to the findings of the correlational study
Keywords: Depression; Anxiety; and Stress; Gender Issue

1. Introduction

Depression is a common mental illness that affects over 264 million people around the world. It is characterized by persistent sadness and also a lack of interest or pleasure in previously rewarding or enjoyable activities It can also affect sleep and appetite, tiredness and poor concentration are common. Depression is a leading cause of disabilities around the world and contributes greatly to the global burden of disease. The effects of depression can be long-lasting or recurrent and can dramatically affect a person's ability to function and live a rewarding life

The causes of depression include complex interactions between social, psychological and biological factors. Life events such as childhood adversity, loss and unemployment contribute to and may catalyse the development of depression.

Psychological and pharmacological treatments exist for moderate and severe depression. However, in low- and middle-income countries, treatment and support services for depression are often absent or underdeveloped. An estimated 76–85% of people suffering from mental disorders in these countries lack access to the treatment they need

1.1 Differences Between Male and Female Depression

Sr.No	Women with depression	Men with depression
1	Blame themselves	Feel others are to blame
2	Feel sad, apathetic and worthless	Feel angry, irritable and ego-inflated
3	Feel anxious and scared	Feel suspicious and guarded
4	Avoid conflicts at all costs	Create conflicts
5	Feel lethargic	May act overtly or covertly hostile
6	Have trouble with self-respect	Attack when feeling hurt
7	Sleep too much	Demand respect from others
8	Feel guilty for what they do	Feel the world set them up to fail

9	Withdraw when feeling hurt	Feel restless and agitated

II. Review of Literature

- Sophie Grigoriadis, (2007) Gender Issues of Depression was the title of his research their inference is as follows Women suffer from depression at a greater rate than males, and their symptoms often vary
- Marta Elliott (2008) the title of his research Gender Differences in Causes of Depression Women are subject to stressors at a higher rate than males, but they are not more vulnerable to them
- Marco Piccinelli and Greg Wilkinson (2000) in their research on gender differences in depression concluded that "Determinants of gender differences in depressive disorders are far from being established and their combination into integrated aetiological models continues to be lacking

III. Methodology

3.1 The objective of the present study

The objectives of this research is to investigate the depression of women
The objectives of this research is to investigate the anxiety of women
The objectives of this research is to investigate the stress of women

3.2 Hypothesis

Men and women differ significantly in their Depression.
Men and women differ significantly in their Anxiety.
Men and women differ significantly in their Stress.

3.3 Participants

Participants included 64 Men and Women from Shirpur city.

Men	women	Total
32	32	64

Variable of the study

3.3.1.1 Independent variables

- Men
- Women

3.3.1.2 Dependent variables

- Depression
- Anxiety
- Stress

3.4 Assessment Measures

Depression Anxiety Stress Scale (DASS-42) item created by Lovibond (1995) and was used for assessing symptoms of depression, anxiety, and stress as outcome variables of daily stressors.

3.5 Data collection procedure

Men and women between the ages of 18 and 60 are the participants of the study. The DAS scale was distributed to the participants, and they have been requested to respond honestly and fully. Their responses would be kept confidential, they were assured. In Shirpur, a random sampling technique has been used to select the study population

IV. Result and Discussion

Table 1. Demographic characteristics of the two groups

Variable	Men		Women	
	M	SD	M	SD
Age	39.65	9.05	39.62	9.16
Gender (n)	32		32	

The sample of 64 participants are (32 males and 32 females) select in this study randomly in Shirpur city and the mean age was 39.65 (SD = 9.05; range = 30-61) for males and 39.62 (SD = 9.16; range =30-57) for females. As shown in Table 1

Table 2 shows the Mean for depression, anxiety, and stress

Cut off point and level of Depression, Anxiety and stress					
Variable	Normal	Mild	Moderate	Severe	Very Severe

Depression	0-9	10-13	14-20	21-27	28+
Anxiety	0-7	8-9	10-14	15-19	20+
Stress	0-14	18-18	19-25	26-33	34+

Variable	**Item**	**Cronbach α**	**M**	**SD**	**Severity**
Depression	14	.94	12.24	9.52	Mild
Anxiety	14	.92	11.67	8.74	Moderate
Stress	14	.93	11.86	9.38	Mild

The coefficients of reliability are found. Depression score of 0. 94. Score of anxiety of 0. 92. Score of 0. 93 for stress The result Strong internal consistency are found.

Table 3 shows the correlation coefficients for depression, anxiety, and stress.

	Depression	**Anxiety**	**Stress**
Depression	1		
Anxiety	.81**	1	
Stress	.78**	085**	1

Depression-anxiety (r=.81; p.01), anxiety-stress (r=.85; p.01), and depression-stress. (r=.78; p.01) all statistically significant correlations.

Table 3 shows the male and female correlation coefficients for depression, anxiety, and stress.

Variables	**Depression**		**Anxiety**		**Stress**	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Female	11.38	8.88	11.30	8.21	16.50	8.82
Male	14.53	10.55	13.06	9.79	10.08	10.54
t	1.97		1.86		0.96	
þ	0.052		0.067		0.326	

Gender has no statistically significant relationship to depression, anxiety and stress.

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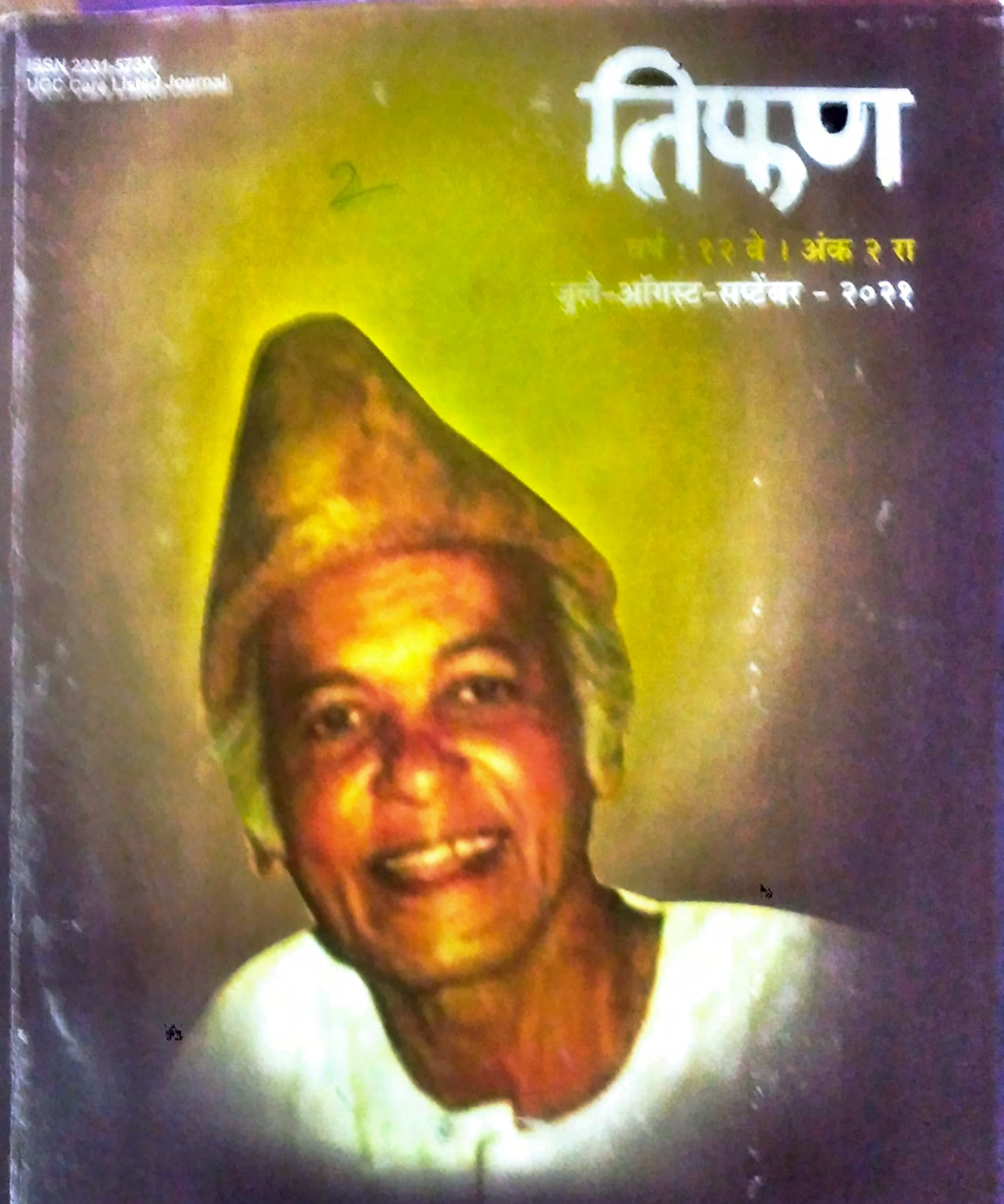

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महामानव
डॉ. बाबासाहेब आंबेडकर
अभिवादन विशेषांक

Synthesis and characterization of Cobalt doped Polymer Composite Poly [(Thiophene-2, 5-diyl)-co-para bromo benzylidene] by using Polycondensation Method

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Abstract

In this study, we present one pot synthesis and characterization of undoped copolymer and cobalt doped polymer composite, Poly [(Thiophene-2, 5-diyl)-co-p-bromo benzylidene]. Both polymers were synthesized in the laboratory at normal conditions at very low cost by polycondensation of thiophene with p-bromo aldehyde. Thiophene (0.02 mmoles) and p-bromo benzaldehyde (0.02 mmoles) were refluxed electrically in paraffin oil bath at 87°C for 24 hours in 15 ml neutral solvent 1, 4 dioxan and in presence of catalyst (0.02 mmoles) $POCl_3$ which is dehydrating agent.

The reaction was monitored by TLC. After the completion of reaction, 100 ml methanol was added in order to obtain the undoped product. Synthesis of doped polymer was carried out by similar method but after completion of reaction 0.1 gm cobalt sulphate as a dopant was added in the reaction flask and refluxed further for two hours. Cobalt sulphate (0.1gm) was used as a dopant to obtain doped polymer. After completion of the reaction, 100 ml methanol was added to obtain the doped polymer. Then undoped and doped fine dark brown powders obtained were further purified using methanol and finally dried at room temperature for 24 hours. Doping effect on the polymer was also analyzed using different characterization techniques such as: UV-Vis, FTIR, ^{1}HNMR, ^{13}CNMR, XRD, FE-SEM, EDX and BET in order to investigate the physical properties.

Keywords: Polymer composite, Polycondensation, Doping, Characterization, Physical properties.

Introduction

Polymers are the most used materials in the modern world. Their uses and applications are valid from containers to clothing. They are used to coat metal wires to prevent electric shocks. The field of conjugated polymers is a fast-developing area of research because of the extended range of their applications, due to their organic light emitting diodes[15,25] photovoltaic cells[20,24] and also unique optical, electrical and mechanical properties[29]. A wide range of porous organic polymer networks has been introduced in the past two decades such as crystalline covalent organic frameworks (COFs)[11,26] and various amorphous networks such as hypercrosslinked polymers (HCPs)[16,31], covalent triazine frameworks (CTFs),[2,12] porous aromatic frameworks (PAFs)[7,9] and conjugated microporous polymers (CMPs).[13,27]

Polythiophene and thiophene-based functional polymers have been extensively investigated and interest has been focused on low band gap materials.[19,22] An important condition for low band gap materials is the presence of quinoid contributions in the electronic ground state of the polymer backbone. In this respect, some poly thienylene methines with alternating aromatic and quinoid segments in the main polymer chain have been prepared. Several approaches have been taken to improve processability of conducting polymers.[1,17] To improve the effectiveness and excellent processability of conventional insulating polymers, a simple method is to introduce conjugated polymeric matrices into them.[5,23]

This can be achieved by combination, composite formation or copolymerization. In addition to the variation of co-monomers, the copolymer microstructure compatibly plays a large role on the properties. Copolymerization could be a necessary way because the chemical linkage between the insulating matrix and the conjugated polymer can improve the chemical stability of the polymer[4].

The resulting copolymers with new functional groups showed different properties from polythiophene homopolymer, which probably widens the applications of conducting polymer[30]. In the present work, we synthesized Poly [(Thiophene-2, 5-diyl)-co-p-bromo benzylidene] in one step namely by the oxidative polycondensation of thiophene and p-bromo benzaldehyde in 1, 4 dioxane as a solvent catalyzed under normal conditions. Doping of the same polymer composite with 0.1 cobalt sulphate was carried out which showed remarkable structural changes by increasing porosity.

Material and Methods

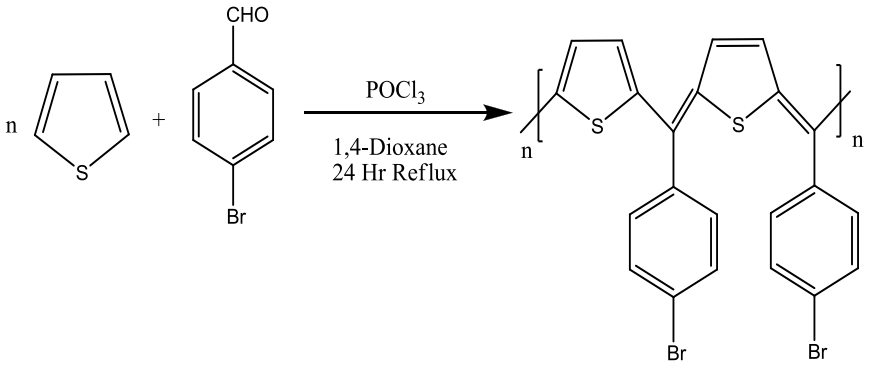
Polycondensation between p-bromo benzaldehyde and thiophene was carried out to obtained methine type conjugated polymer. Para bromo benzaldehyde reacts with phosphorous oxychloride to form carbocation which reacts with active sites (α, α'-position) of thiophene. The bromine group present at para position to benzaldehyde is an electron-withdrawing group to form stable carbocation. The lone pair of electron on sulphure of thiophene attacks the carbocation to form a complex. The alternating electron acceptor and donor arrangement will provide a pull-push

electronic structure and give rise to materials with attractive photonic properties.

Materials: Thiophene was purchased from Aldrich Chemical Co. and distilled under reduced pressure. 1, 4 dioxane and p-Bromo benzaldehyde were used as received. Phosphorous oxychloride was used as mild dehydrating agent and 1, 4 dioxan was used as solvent for the reaction.

Synthesis of Poly [(thiophene-2, 5-diyl)-co-para-bromo benzylidene]: The synthesis of conjugated polymer [Poly [(thiophene-2, 5-diyl)-co-p-bromo benzylidene] was derived from thiophene and para bromo benzaldehyde. Reaction is a single step polymerization through a simple condensation. In 100 ml round bottom flask, 0.02mmoles of thiophene and 0.02mmoles p-bromo benzaldehyde were condensed in 1, 4 dioxan solvent using catalyst phosphorous oxychloride which is mild dehydrating agent. Then reaction mixture was refluxed in oil bath using heating mantle maintained at 87°C for 24 hours.

The reaction was monitored by TLC. Reaction mixture was added in methanol and fine dark black powder obtained was washed several times by methanol and finally dried at room temperature for 24 hours. After drying, the fine product was purified using column chromatography. The scheme 1 shows the formation of methine bridge polymer.



Instrumentation

The UV-Visible spectrum of samples in CH_2Cl_2 was taken using UV-Vis Shimadzu 2450 unit in the wavelength range of 200-800 nm to investigate conjugation. The UV-Vis spectroscopy is also used to know the optical properties of the material as well as for estimation of optical band gap. The FTIR spectrum of samples was taken using FTIR, IR Affinity 1 Shimadzu unit with DRS sampling technique in the range of 4000-400 cm^{-1}. X-ray diffraction (XRD) measurements were carried out by using Bruker D8 Advance diffractometer having CuKα incident beam with λ = 1.5406 Å in 2θ range from 20 to 80 degrees. The surface morphology of the samples was characterized by using field emission scanning electron microscopy (FE-SEM, S-4800, Hitachi and 15 kV) unit. Surface area of the each sample was measured by Brunauer-Emmett-Teller (BET) method by using ASAP-2010 Micrometrics.

Results and Discussion

Optical Absorption Studies: Fig.1 shows the variation in optical absorbance of polymer composite in dichloromethane before and after doping of cobalt in bromo polymer respectively as a function of wave length. After doping of cobalt, the optical absorption spectra of polymer showed higher absorption than undoped polymer for bromo sample. It can be seen that the absorption is shifted towards shorter wavelength which confirmed increase in optical band gap value for doped bromo polymer. In the present case, both the polymers represent the direct band gap with the exponent n=1/2 and is measured by plotting $(\alpha h\upsilon)^2$ versus hυ. The extrapolation of the straight line in the graph to $(\alpha h\upsilon)^2 = 0$ gives the value of the energy band gap (inset). The value of band gap obtained was 2.10 eV for undoped and cobalt doped material 2.36 eV respectively[25].

Spectral data

FTIR: Fourier Transform Infrared (FTIR) spectroscopy of undoped and cobalt doped Poly [(Thiophene-2, 5-diyl)-co-p-bromo benzylidene] material is shown in figure (a) and (b) respectively. In both undoped and doped samples, C=O frequency is absent which confirmed the absence of the starting aldehyde carbonyl group and completion of the condensation reaction. The values for standard and observed frequencies for corresponding functional groups are given below. It is observed that the C-Co group in the range 500-550 cm^{-1} is present only in doped samples.

FTIR For undoped sample: 1597cm^{-1} (C=C),1074cm^{-1}(C-S-C),3024cm^{-1}(Aromatic C-H), 802 cm^{-1}(C-Br).

^{1}HNMR-(For undoped sample) (BRUKER ADVANCE) ($CDCl_3$): 7.74-7.76δ(dd)=(m)2H,7.61-7.63δ(dd)=(m)2H, 7.68-7.72δ(d), 1H, 7.17-7.19δ(dd)=(m), 1H,7.30-7.43δ(d) (1H), 6.35--6.37δ(d)(1H), 5.80δ(dd)=(m)(1H), 3.31δ(s,q) 1H.

^{13}CNMR (For undoped sample): 24.40, 36.51, 46.12, 76.70, 120.11, 126.01, 121.02, 124.25, 125.73, 127.76, 129.77, 130.20, 130.72, 139.11.

FTIR for doped sample: 1070 cm^{-1} (C-S-C),2924 cm^{-1} (aromatic C-H) 800 cm^{-1} (C-Br),551 cm^{-1} (C-Co).

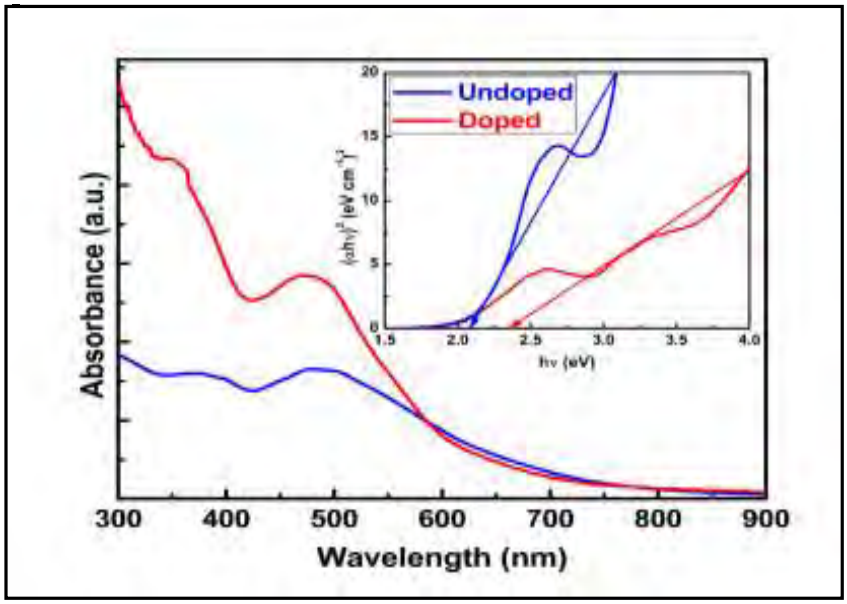


Fig. 1: Optical absorption spectra of the synthesized undoped and cobalt doped polymer in dichloromethane as a function of wavelength. Inset shows corresponding plots of $(\alpha h\nu)^2$vs photon energy (hν) for p-bromo polymer solutions

^{1}HNMR-(For doped sample): 7.48-7.50δ(dd)=(m)2H, 7.24-7.29δ(dd)=(m)2H, 7.58-7.72δ(d), 1H,7.15-7.17δ(dd)=(m), 1H, 7.34-7.36δ(d)(1H), 6.22-6.39δ(d)(1H), 5.69-5.80δ(dd)=(m)(1H), 3.30-3.36δ(s,q)1H.

^{13}CNMR-(For doped sample): 24.43, 36.58, 47.12, 76.81, 121.18, 123.09, 124.10, 126.25, 126.73, 127.86, 129.99, 130.12, 131.70, 139.38.

Structural Studies

X-Ray Diffraction: The structural properties of bromo undoped and doped polymer were studied using X-ray diffraction (XRD) patterns. Fig. 2 shows the XRD pattern of (a) undoped and (b) doped for bromo polymer. The synthesized materials showed amorphous nature for doped sample and intense peak indicating crystalline nature for undoped poly [(Thiophene-2, 5-diyl)-co-p-bromo benzylidene]. In the polymers, the value of crystallinity is about 72.5% and 48.1% for undoped and doped which indicated that the crystallinity decreased after doping of cobalt in polymer composite material[15].

A very weak cobalt peak is observed in polymer composite at 44.22° confirmed from JCPDS card number 89-4307 which changed the structural property of doped composite material. The crystallite size was found to be around 127 nm for undoped and 45 nm for doped sample calculated by using well known Scherrer's equation along peak at 28.5°.

Surface Morphological Studies, EDX, Surface Area Measurement: The FE-SEM images of powder undoped and doped polymer were taken on the carbon tap mounted on sample holder. Fig. 3 (a) and (b) showed the surface morphology for undoped and doped bromo polymer at lower magnification while (c) and (d) were at higher magnification respectively. The elemental composition of the samples was measured by EDX analysis as shown in figure (e) and (f) for undoped and doped respectively. It confirmed the insertion of cobalt in the polymer matrix.

The surface morphology of undoped polymer showed the smaller size spheres which are interconnected with each other while RBC shaped corpuscles[18] with low crystalline nature are observed in doped polymer. FE-SEM images showed that as prepared materials are uniform and interconnected with each other with porous structure[28]. Surface area is being measured by the quantity of adsorbed and de-adsorbed gas from the surface of the sample with respect to the change in the thermal conductivity of the mixture of nitrogen and helium gas. The obtained surface areas of undoped and doped polymers are 2200 cm^2/g and 8800 cm^2/g respectively[3,10].

Thermal stability

Thermogravimetric Analysis: Thermogram of Poly [(Thiophene-2, 5-diyl)-co-p-bromo benzylidene] doped polymer sample has shown interesting four step decomposition pattern as in fig. 4. The first step attributed to negligible loss of weight 10% from temperature 259 °C to 294 °C. In second step, decomposition with 27% weight loss is observed from 294 °C to358 °C. Third step decomposition starts from 358 °C to 439 °C with major weight loss 69 % due to break down of polymer backbone and finally in the fourth step, polymer matrix decomposes totally 440 °C to 492 °C with 21 % loss in weight. From TGA it is confirmed that doped sample is thermally stable up to 250 °C[5].

On the other hand undoped polymer is thermally less stable to small range of temperature. There is continuous weight loss and decomposition is observed during thermogravimetric analysis.

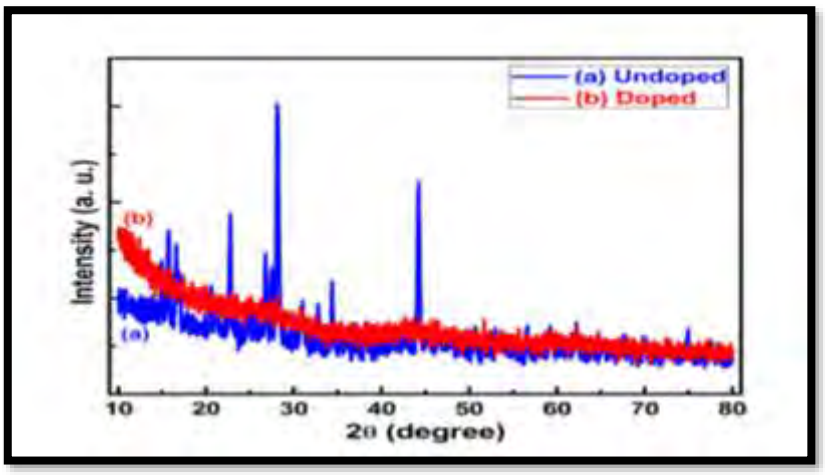


Fig. 2: XRD patterns of Poly [(Thiophene-2, 5-diyl)-co-p-bromo benzylidene] powder sample (a) undoped and (b) doped

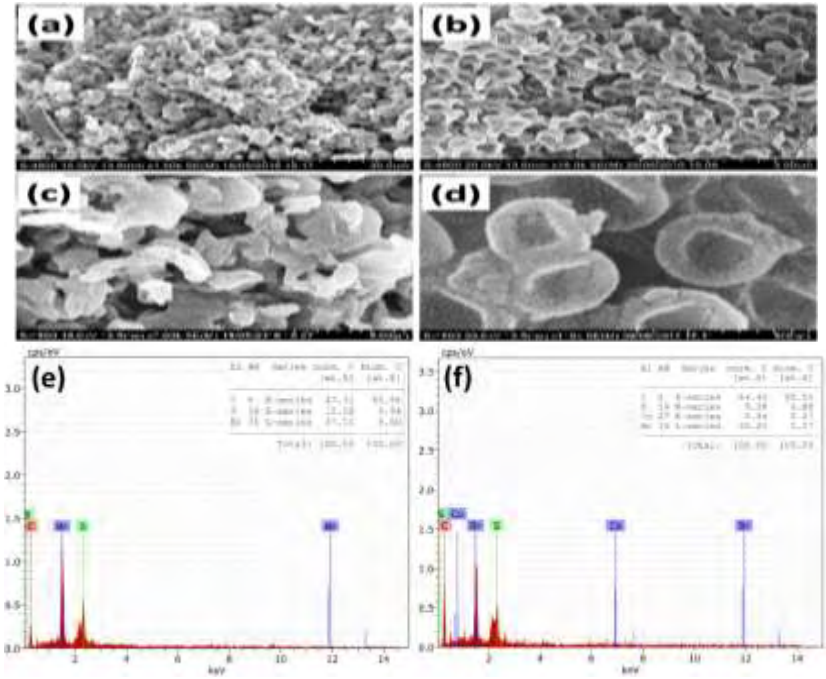


Fig. 3: Surface morphology of (a) undoped and (b) doped Poly [(Thiophene-2, 5-diyl)-co-p-bromo benzylidene] at lower magnification and (c) and (d) at higher magnification. The EDX patterns are (e) undoped and (f) doped Poly [(Thiophene-2, 5-diyl)-co-p-bromo benzylidene]

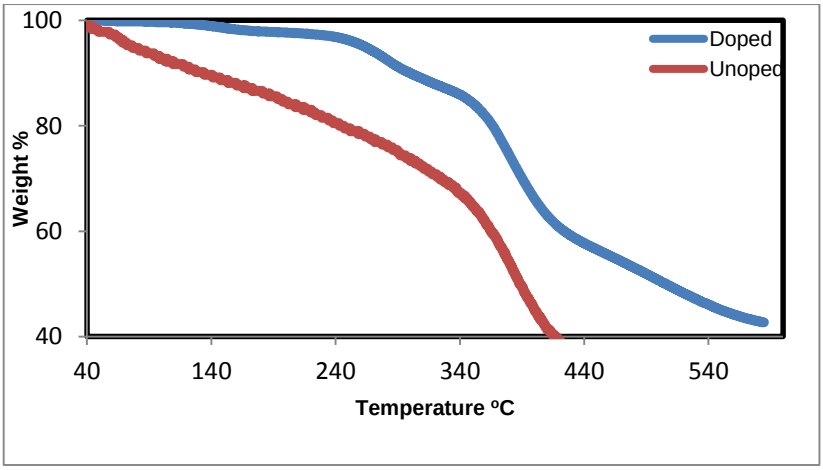


Fig. 4: Poly [(Thiophene-2, 5-diyl)-co-p-bromo benzylidene]

Conclusion

The properties of many conventional materials may change when formed from nanoparticles. This is typically because nanoparticles have a greater surface area per weight than larger particles which cause them to be more reactive to some other molecules. We have synthesized [(Thiophene-2, 5-diyl)-co-p-bromo benzylidene] by chemical oxidative method. The formation of nanocomposites was confirmed by UV-Vis spectroscopy, FTIR, XRD, SEM, EDX and surface area measurements. The XRD patterns indicated the semi crystalline phase of cobalt doped polymer. SEM analysis showed that the uniform dispersion of nanocomposites appears like RBC shaped corpuscles in the polymer composites. EDX analysis confirmed the insertion of cobalt in the polymer matrix.

In this particular polymer, thermal stability, porosity as well as the surface area increased but band gap increased after cobalt doping which resulted in decrease in conductivity of the doped polymer composite. This synthesized nanocomposite porous materials can be used or being evaluated for use in many fields such as gas storage, CO_2 capture[14] and semiconducting material.

Acknowledgement

Authors would like to thank R.C. Patel ASC College, H.R. Patel Pharmacy College,Shirpur, North Maharashtra University, Jalgaon, VNIT, Nagpur and SAIF, Chandigarh for providing UV, FTIR, XRD, FE-SEM, EDX, DSC, porosity and NMR measurement facility.

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One Pot Synthesis and Characterization of Copolymer Poly [(Thiophene-2, 5-Diyl)-Co-4-Hydroxy Benzylidene] Using Polycondensation

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Abstract: **A one pot copolymerization technique was used to synthesize copolymer Poly [(Thiophene-2, 5-diyl)-co-4-hydroxy benzylidene]. In this technique we used catalyst phosphorous oxy chloride and 1, 4 dioxane solvent for copolymerization of 4-hydroxy benzaldehyde with thiophene. Synthesis was carried out at 70°C and took 28 hours for completion. Reaction was monitored by thin layer chromatography. Catalyst was removed using ammonia. Product was obtained using menthol. Chemical structure was confirmed by using spectral analysis like ultraviolet, infrared, nuclear magnetic resonance as well as ^{13}C nuclear magnetic spectroscopy. The amorphous phase was confirmed using structural analysis. Regular clusters with spherical shapes with approximately 0.5 µm sizes were indicated by surface morphology. Copolymer is thermally stable up to 363°C which was confirmed by thermo gravimetric analysis. Optical absorption study proved band gap value 2.50 eV and conductivity value is 5.54 x 10^{-7} S/cm measured by two probe methods. Such copolymer can be used like semiconducting material and energy storage in the field of conducting polymers.**

Index Terms: **Amorphous, Conjugated copolymer, Physical properties, Polycondensation, Surface morphology.**

I. Introduction

In recent years organic conjugated polymers have attracted more attention due to their excellent electrical and optical properties (Bura T., et al., 2016) Homopolymers like polypyrrole, poly thiophene previously prepared by electrochemical method are also now being synthesized by chemical polymerization process which is low cost and product obtained in bulk amount powdered form. All results showed the success in refining the mechanical and physical properties of polypyrrole. However, these synthetic methods contained many steps and firm condition, leading to limited application of these copolymers (Borole, D. et al.,2006). Oxidative polymerization is one of the cleanest and low-cost methods in polycondensation. Polycondensation between two different monomers offers copolymerization which modifies the properties of a homopolymer by the introduction of appropriately selected second repeating unit (Larbi B. et al.,2013). Several studies have been acceptable on conducting copolymers on their applications over homopolymer for conductivity, solubility and stability (Zerza G., et al.,2001; Pei, J., et al.,2000). The extended conjugation of the polymer chain backbone is also a major factor in creating new optical properties (Patil, A., et al., 2002). Donor–acceptor polymers with donor and acceptor moieties have extended particular attention during current years as active components of organic electronics. By submission of suitable subunits inside the conjugated backbone, these polymers can be made either electron deficient or rich. It is expected that in polymers with charge carrier motilities the ordered domains are consistent by loose polymer chains that ensure a charge transfer (Patil, A., et al., 2016; Noriega R.,2013). Synthesis of polymers for a particular application may go for selective polymerization method. Suzuki/Stile polycondensation technique is mostly chosen for optoelectronic device applications (Alessandro S.,2020; Murugesan V.,2012). Conjugated polymers have been attracting more and more attention because they acquire various electrical, magnetic and optical properties. In the balanced state, conjugated polymers are utilized in electronic devices such as photovoltaic cells, solar cells; light emitting diodes (Burroughes J.et al.,1990) field effect transistors, nonlinear optical devices, chemical, biochemical and thermal sensors (Garnier, F., 1990). Conjugated polymers are light-weight as they

* Corresponding Author

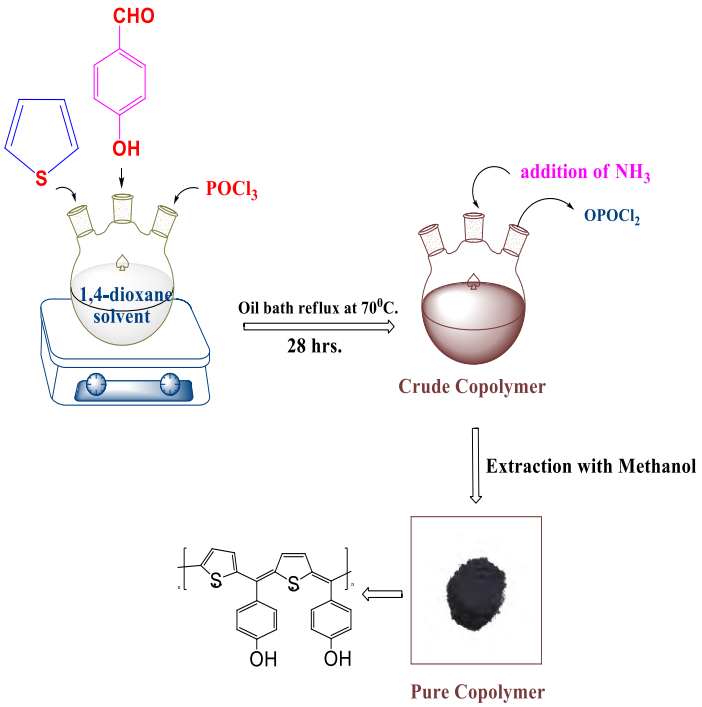
are organic in nature and can be made-up into flexible, bendable appliances. Due to the property of electrical conductivity of these polymers; they are called as conducting polymers. Conjugated polymers contain π electrons responsible for electrical conductivity (Abdelkarim R., et al.,2011; Liao L., et al., 2007). There are a lot of possibilities to modify the chemical structures of conjugated polymers to change their physical properties. The technique of copolymerization has been widely used as a way to obtain materials with properties intermediate between those of the individual homopolymers (Oliver R.., et al.,2006; Bundgaard E.,2006). Thus, physical and chemical properties of the final material can be controlled through the appropriate choice of monomers that form the polymer chain. There is basic need to search for new precursors which are easily available in the laboratory to form polymers with new physical properties using simple chemical route and to study the effect of electron withdrawing and electron donating para substituent on the electronic and optical properties of the conjugated polymers ([Innami Y., et al., 2012). Alternations of single and double bonds resulted conjugation in the organic compounds which is useful to change the electronic and physical properties as well as applications of the organic polymers. In this paper we used substituted aldehyde 4-hydroxy benzaldehyde having electron donating group. Copolymer of thiophene and para choro (Mahashabde J., et al., 2018) para methyl (Mahashabde J., et al., 2018) showed variations in their material properties due to different substituent present at para position of benzaldehyde. A similar approach was taken to synthesize copolymer of Thiophene with 4-hydroxy benzaldehyde by polycondensation and characterization studied to look at material and its application in various fields like semiconducting material and energy storage. Copolymerization could be a necessary way because the chemical linkage between the insulating matrix and the conjugated polymer can improve the chemical stability of the polymer (Baik D., et al., 1999). The resulting copolymers with new functional groups showed different properties from Polythiophene homopolymer, which probably widen the application of conducting polymer (Rajasekhar M., et al., 2009). The objective of this chemical synthesis was to study unique characteristics of copolymers synthesized by chemical polymerization having applications in the various fields of conducting polymers (Jadoun S., et al., 2019).

In this paper brief synthesis of Copolymer Poly [(Thiophene-2,5-diyl)-co-4-hydroxy benzylidene] derived from thiophene with 4-hydroxy benzaldehyde, characterization of copolymer and studied physical properties conjugated copolymer as semiconducting material.

II. MATERIALS AND METHODS

The authors have presented the one step synthesis of conjugated polymer of thiophene with 4- hydroxy benzaldehyde. The same method of polycondensation was used to synthesize conjugated copolymer of thiophene and 4-methoxy benzaldehyde. Here substituted aldehyde 4- hydroxy benzaldehyde is used for investigation which is different from previous work.

Thiophene, 4-hydroxy benzaldehyde were used as received obtained from Aldrich Chemical Co. Dehydrating agent $POCl_3$ used as catalyst and reaction was carried out in 1, 4-dioxane. Ammonia and methanol are used to obtain the product from reaction mixture.



A. Scheme for copolymer synthesis.

III. INSTRUMENTATION

The UV-Visible spectrum of samples in CH_2Cl_2 was taken using UV-Vis SHIMADZU 2450 unit in the wavelength range of 200-800 nm to investigate conjugation. The UV-Vis spectroscopy is also used to know the optical properties of the material as well as for estimation of optical band gap. The FTIR spectrum of samples was taken using FTIR, IR Affinity 1 SHIMADZU unit with DRS sampling technique in the range of 4000-400 cm^{-1}. X-ray diffraction (XRD) measurements were carried out by using BrukerD8 Advance diffractometer having CuKα incident beam with λ = 1.5406 Å in 2θ range from 20 to 80 degrees. The surface morphology of the samples was characterized by using field emission scanning electron microscopy (FE-SEM, S-4800, Hitachi, and 15 kV) unit. The thermo gravimetric analysis was carried out using thermal analyzer (TGA 50) under the stream of nitrogen gas (flow rate 50ml/min) was monitored around the sample chamber to minimize heat dissipation during measurements. The % weight loss is plotted as function of temperature to get thermogram.

IV. RESULTS AND DISCUSSION

A. Optical Absorption and Conductivity Measurement

An optical property of the copolymer prepared was investigated by using UV visible spectroscopy. From optical study, it is found that the polymer material prepared by using polycondensation method has conducting properties. Variation in optical absorbance of copolymer solutions in dichloromethane as a function of wavelength was studied and results are showed in figure 2. Optical absorption spectra showed two major absorptions bands. The band in range of 280 - 300 nm is assigned to the π - π* transition of the aromatic heterocyclic since it corresponds to the same band as its precursor, and the band in the range of 490 to 510 nm is assigned to the π - π* band gap

transition.

Band gap is calculated by equation Band gap = 1240/**λ** where **λ** is wavelength in nanometers. From optical absorption spectra maximum wavelength responsible for band gap 495 nm. Which confirmed band gap value 2.50 eV. Conductivity of copolymer was measured at room temperature using two probe method value obtained 5.54 x 10-^{7}S/cm.

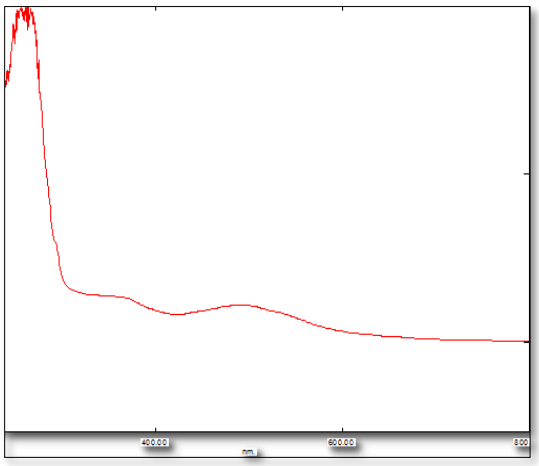


Fig. 1: Optical absorption spectra of copolymer

B. Functional Group Determination by Infrared Spectroscopy

FTIR is a powerful technique to determine changes in the functional groups that occur during synthesis. Figure 2 showed functional group changes during the synthesis. In Table 1 I R values for corresponding functional groups are observed. During polycondensation process a small molecule like water eliminated and C=C double bond is formed with disappearing C=O frequency of 4-methoxy benzaldehyde.

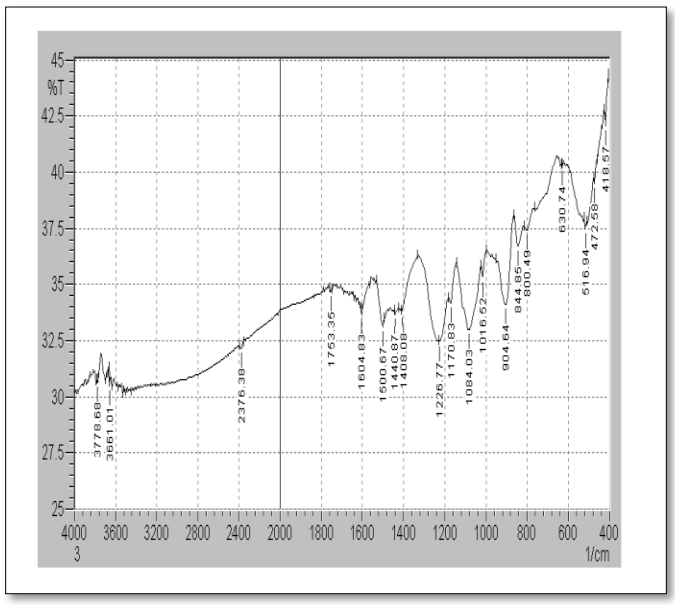


Fig. 2: FTIR spectra of copolymer

Table 1: I.R. functional groups wave numbers observed in copolymer

Functional Groups	Standard IR frequencies	Observed IR frequencies
Ar (C=C)	1500-1600 cm^{-1}	1604 cm^{-1}
C-S Thiophene	1010-1100 cm^{-1}	1084 cm^{-1}
Ar (C-H)	2900-3000 cm^{-1}	3092 cm^{-1}
C-OH	3200-3600 cm^{-1}	3500 cm^{-1}

C. *NMR data*

^{1}HNuclear Magnetic Resonance (BRUKER ADVANCE) ($CDCl_3$):

8.6δ(3H,s),6.97δ(2H,m)dd,7.29δ(2H,m)dd,7.33δ(1H,d),7.17δ (1H,m)dd,7.33δ(d,1H),6.22δ(1H,d),4.44δ(1H,m)dd,5.20δ(1H,q).

^{13}CNuclear Magnetic Resonance: (BRUKER ADVANCE) ($CDCl_3$):

24.33, 36.52, 42.74, 55.23, 113.78, 123.03, 126.50, 129.38,131.57,147.6,157.7.

D. Structural Studies

A structural property of copolymer was determined by X-ray diffraction. Figure 3 indicated the XRD pattern of the copolymer sample. The XRD specified that copolymer was amorphous.

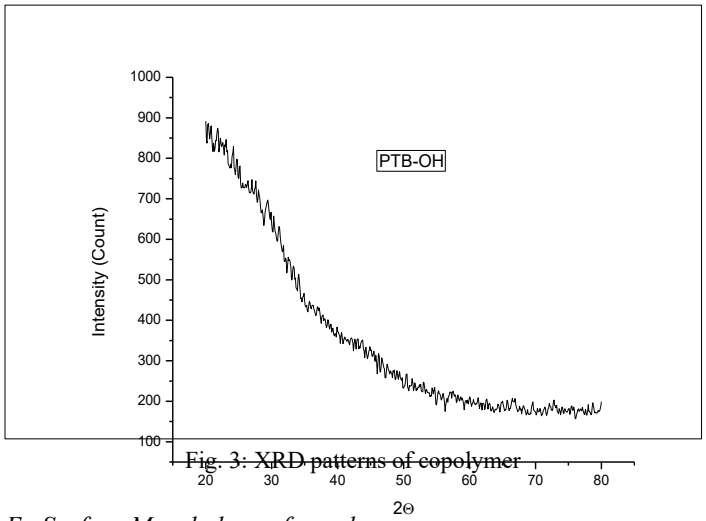


Fig. 3: XRD patterns of copolymer

E. Surface Morphology of copolymers

Figure 4 showed field emission scanning electron microscopy of copolymer. Surface morphology copolymer is shown in figure 5 at lower magnification. Surface morphology shown by the copolymer is smooth regular interconnected cluster with spherical shapes with approximately 0.5 µm sizes.

F. Thermo gravimetric Analysis

In order the check the thermal stability, copolymer sample was also characterized by thermo gravimetric analysis as shown in figure 5. The curves did not show the sharp peak in the range 90 to 100 ºC confirmed the absence of moisture. The melting started at 363.45 ºC (onset) and finished at 427.92ºC (end set). From

TGA it is confirmed that the sample is thermally stable at high temperature.

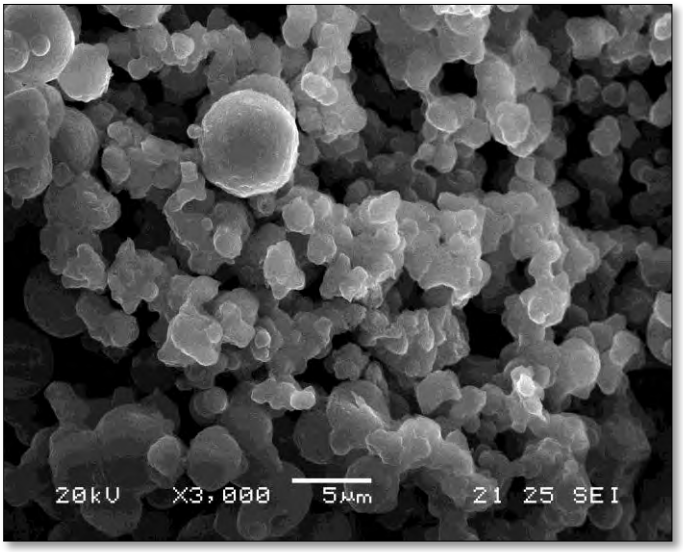


Fig. 4: Surface morphology of copolymer

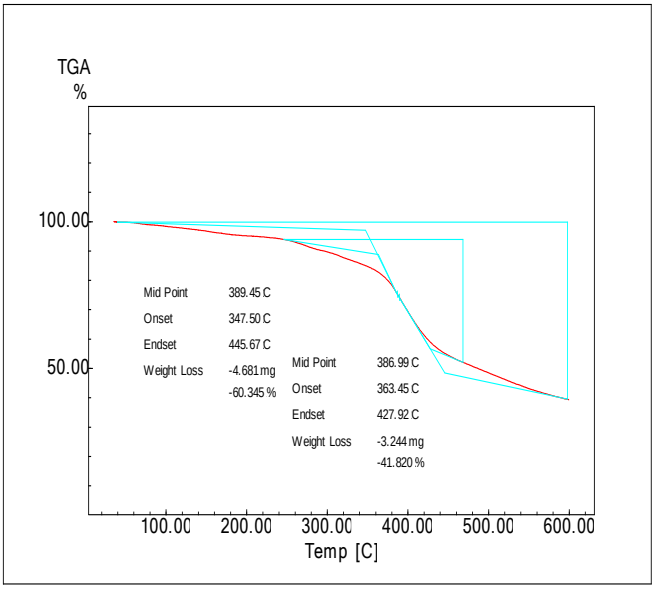


Fig. 5: TGA of copolymer

CONCLUSION

Copolymer synthesis by polycondensation of thiophene with 4-hydroxy benzaldehyde in presence of phosphorous oxychloride is cost effective and possible under normal laboratory condition. Resultant copolymer having intermediate properties between those of the individual homo polymers. Copolymer obtained is in the powder form and can allows easy processing. This conjugated copolymer is amorphous, interconnected regular clusters with spherical shapes approximately 0.5 µm sizes even more stable up to 363°C temperature having band gap 2.50 eV. In the field of conducting polymers, the surface morphology, thermal stability, and structural characteristics are notably unique and can be applied as semiconducting materials.

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Keratinase Enzyme Production from Bacillus Licheniformis KP9 Isolated from Chicken Feathers

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Abstract: **The aim of the present study was to isolate keratinolytic bacteria from chicken feathers, since it is rich in keratin. Microbial keratinases have become biotechnologically important since they target the hydrolysis of highly rigid, strongly cross-linked structural polypeptide "keratin" recalcitrant to the commonly known proteolytic enzymes trypsin, pepsin and papain. The isolation of keratinolytic bacteria was performed by routinely used microbiological techniques and all the 11 isolates were screened for the keratinase production. The potent strain KP9 was characterized and identified by 16S r-RNA gene sequencing as *Bacillus licheniformis* KP9. The production of enzyme keratinase was studied by submerged fermentation process. The production of enzyme was optimized at various pH, temperature, incubation period and inoculum size. The maximum keratinase enzyme production by *Bacillus licheniformis* KP9 was recorded at pH 7.0, temperature 35°C, 3% inoculum size and 48 h of incubation period.**

Index Terms: **Keratinase, Chicken feathers, Production, Optimization, *Bacillus licheniformis*.**

I. INTRODUCTION

Microbial keratinase is the type of protease enzyme capable of degrading the insoluble structural protein found in feathers, hair and wool known as keratin. Keratin is a fibrous and insoluble structural protein extensively cross linked with hydrogen, disulphide and hydrophobic bonds. It forms a major component of the epidermis and its appendages viz. hair, feathers, nails, horns, hoofs, scales and wool (Anbu et al., 2007; Kim, 2007).This protein is resistant to degradation by proteolytic enzymes such as trypsin, pepsin, papain due to the composition and molecular conformation of the amino acids found in keratin (Mukherjee et al., 2008; Rai et al., 2010). Feathers are produced in large amounts as a waste by-product at poultry processing plants, reaching millions of tons per year worldwide. Feathers contain over 90% crude protein in the form of keratin.

Keratinases (EC.3.4.99.11) belong to the group of serine proteases capable of degrading keratin. It is an extracellular enzyme produced in a medium containing keratinous substrates such as feathers and hair. Keratinases have applications in traditional industrial sectors including feed, detergent, medicine, cosmetics and leather manufacturers (Farag and Hassan, 2004), they also find application in more recent fields such as prion degradation for treatment of the dreaded mad cow disease (Langeveld et al., 2003), biodegradable plastic manufacture and feather meal production. Hence the present study focuses on the production of enzyme keratinase. Because of the numerous potential uses of keratinases, this study was undertaken to screen a bacterium that produces a highly active keratinase.

II. MATERIALS AND METHODS

A. Isolation of microorganisms

Samples of chicken feathers were collected from local poultry farms in Shirpur, India. The samples were inoculated for enrichment into the Luria-Bertani broth for 24 h at 37 °C. After the enrichment process, samples were plated on the Luria-Bertani agar plates for the isolation of individual organisms. The plates were incubated at 37 °C for 2 days until colonies appeared. Representative colonies were selected based on their morphology and colony colour. Selected colonies were isolated by transferring them on to the fresh LB agar plates (Suntomsuk and Suntomsuk, 2003).

[*] Corresponding Author

B. Screening for the keratinase production

The isolates were screened for the production of extracellular keratinase. Eleven morphologically different bacterial colonies were streaked onto a sterile feather meal agar plate. The plates were then incubated at 37°C for 48 h. The strain that shows highest zone of clearance was selected (KP9) and it was sub cultured. The strain was further inoculated in nutrient broth containing feather meal and kept for incubation at 37°C for 4 days on shaking incubator at 180 rpm. Then the culture supernatant was assayed for keratinolytic activity (Yamamura et al., 2002; Williams et al., 1990).

C. Characterization and identification of potent isolate

The strain (KP9), which degrade keratin effectively, was characterized. Morphological, Biochemical characterization was carried out by performing Gram Staining, spore staining, motility test, IMViC test, urease test, catalase test, starch hydrolysis test and casein hydrolysis test (Manczinger et al., 2003; Yu et al., 1968). The strain was further identified by 16S r-RNA gene amplification and nucleotide sequencing performed at the National Center for Cell Science (NCCS-NCMR), Pune, India.

D. Production of enzyme keratinase

The isolated potent strain (KP9) was transferred to 25 ml of the seed medium containing (g/L) peptone, 5; yeast extract, 1.5; beef extract, 1.5 and sodium chloride, 5; (pH 7 ± 0.2) and incubated at 37°C on rotary shaker at 180 rpm for 24 h. This was used as the inoculum for the keratinase enzyme production process. Submerged fermentation process was carried out by inoculating pure culture of potent isolate into the production medium (Suntomsuk and Suntomsuk, 2003). The production medium contains (g/L) Feather meal, 10; Yeast extract, 0.1; MgSO4, 0.1; NH4Cl, 0.5; K2HPO4, 0.3; KH2PO4, 0.3; NaCl, 0.5. Initial pH of the medium was adjusted to 7.2 ± 0.2 with Tris–HCl buffer. The medium was sterilized in an autoclave for 15 min at 121°C. The production medium was inoculated with 5% (v/v) of 24 h old inoculum culture of potent isolate containing approximately 2×106 cells/ml. The flasks were incubated on a rotary shaker at 37°C and 180 rpm for 4 days. The 10 ml fermented broth was centrifuged at 10,000 rpm for 20 min and the supernatant was used as crude enzyme.

E. Keratinase enzyme assay

The keratinase enzyme activity was assayed by taking 1.0 ml of crude enzyme properly diluted in Phosphate buffer (0.05 M of pH 7.0) was incubated with 1 ml of keratin solution at 50 °C in a water bath for 10 min, and the reaction was ceased by the addition 2.0 ml 0.4 M Trichloroacetic acid (TCA). The resulted precipitate was removed by centrifugation at 10000 rpm for 20 min. The absorbance of the supernatant was determined at 280 nm against a control. The control was prepared by incubating the enzyme solution with 2.0 ml TCA without the addition of keratin solution. One unit (U/ml) of keratinase enzyme activity was defined as an increase of corrected absorbance of 280 nm (Gradisar et al., 2005) with the control for 0.01 per minute under the conditions described above.

F. Optimization of keratinase enzyme production

1) Effect of pH

To investigate the effect of pH on enzyme production, the basal medium containing 1% feather meal was prepared. The medium was adjusted to the different pH values such as 3, 5, 7 and 9. The potent isolate KP9 was inoculated in to the medium. Production process was conducted and samples were assayed for enzyme activity (Priya et al., 2011).

2) Effect of temperature

To study the effect of temperature on enzyme production, the basal medium containing 1% feather meal was prepared. The potent isolate KP9 was inoculated in to the medium. The medium was incubated at different temperatures like 5°C, 20°C, 35°C and 50°C. Production process was conducted and samples were assayed for enzyme activity (Puri et al., 2002).

G. Effect of inoculum size

To study the effect of inoculum size on enzyme production, the basal medium containing 1% feather meal was prepared. The potent isolate KP9 was inoculated in different inoculum size such as 1%, 2%, 3% and 5% into the production medium. Production process was conducted and samples were assayed for enzyme activity (Ramnani and Gupta, 2004).

H. Effect of incubation period

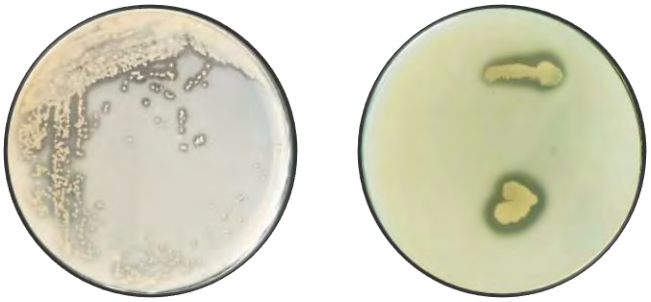
To study the effect of incubation period on enzyme production, the basal medium containing 1% feather meal was prepared. The potent isolate KP9 was inoculated in to the medium. The medium was incubated at 37°C for different incubation periods like 24h, 48h, 60h and 72h. Production process was conducted and samples were assayed for enzyme activity (Sen and Satyanarayana, 1993).

III. Results and Discussion

A. Isolation, screening and identification of potent isolate

A total of eleven different bacterial strains were isolated from chicken feather sample collected from local poultry farm at Shirpur, India. These all the 11 isolates were screened for the keratinase production on basal agar medium plates containing 1% keratin. It was found that the strain KP9 shows highest zone of clearance, indicates its ability to produce enzyme keratinase (Fig.1). The strain KP9 was selected and sub cultured for further study. The strain KP9 appeared singly and was a straight rod, Gram positive and endospore forming organism. It was aerobic, motile, and catalase positive. Additional morphological, physiological and biochemical characteristics were checked as shown in Table-1. On the basis of the results of morphological, physiological and biochemical tests the strain was belongs to *Bacillus* sp. After performing 16S r-RNA gene sequencing and phylogenetic studies by using MEGA6, it was confirmed that, the

strain KP9 was identified as *Bacillus licheniformis* KP9.



A. Isolation on LB agar plate B. Potent isolate KP9

Fig. 1. Isolation of potent isolate KP9 on Luria-Bertani agar medium

Table-1. Morphological and biochemical characteristics of *Bacillus licheniformis* KP9

Characteristics/Test	Results
Shape	Rod
Gram character	Gram positive
Acid fastness	Non-acid fast
Endospore staining	Spore forming
Motility test	Motile
Indole production	Negative
Methyl red test	Negative
Vogus-Proskauer test	Positive
Citrate utilization	Positive
Catalase activity	Positive
Oxidase activity	Negative
Starch hydrolysis	Positive
Casein hydrolysis	Positive
Urease activity	Negative
Nitrate reduction	Positive
Hydrogen sulphide	Negative

B. Production of enzyme keratinase

Production of enzyme keratinase by using *Bacillus licheniformis* KP9 isolated from chicken feathers was studied by submerged fermentation process (Fig.2). The production studies were carried out at 37ºC, for 24 h on rotary shaker at 180 rpm. The 10 ml fermented broth was centrifuged at 10,000 rpm for 20 min and the supernatant was used as crude enzyme. This crude enzyme was assayed spectrophotometrically at 280 nm. Production of enzyme keratinase was optimized at various pH, temperature, inoculum size and incubation period.

Fig. 2 Submerged production of enzyme keratinase

1) Effect of pH

pH value	Enzyme activity (U/ml)
3	43 ± 1.2
5	77 ± 2.1
7	263 ± 0.9
9	141 ± 1.3

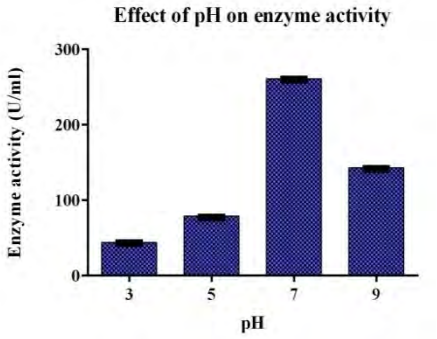


Fig. 3A. Effect of pH on enzyme activity

2) Effect of Temperature

Temperature (ºC)	Enzyme activity (U/ml)
5	13 ± 1.4
20	55 ± 1.1
35	210 ± 0.9
50	130 ± 0.8

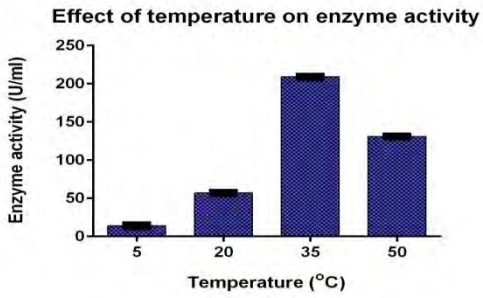


Fig. 3B. Effect of temperature on enzyme activity

4) Effect of Inoculum size

Inoculum size (%)	Enzyme activity (U/ml)
1	74 ± 1.3
2	101 ± 1.8
3	195 ± 1.6
5	150 ± 1.4

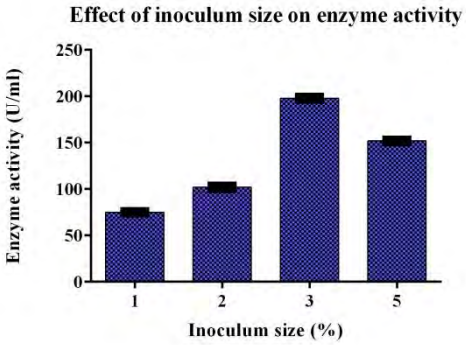


Fig. 3C. Effect of inoculum size on enzyme activity

5) Incubation period

Incubation period (h)	Enzyme activity (U/ml)
24	187 ± 1.3
48	239 ± 1.7
60	86 ± 1.2
72	47 ± 1.4

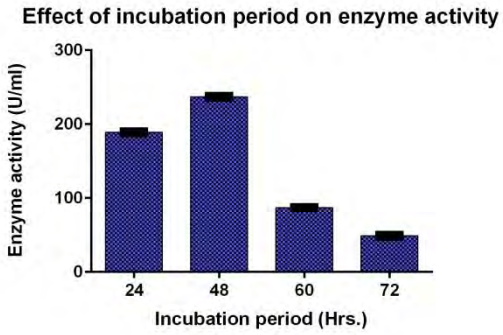


Fig. 3D. Effect of incubation period on enzyme activity

Maximum enzyme production (263 ± 0.9 U/ml) was observed at pH 7.0 i.e. at neutral pH, whereas the minimum enzyme activity (43 ± 1.2 U/ml) was seen at pH 3.0 (Fig. 3A) (Hossain et al., 2007; Najafa, 2006). In the optimization of temperature for the keratinase enzyme production, maximum activity (210 ± 0.9 U/ml) was recorded at 35ºC (Fig. 3B) (Cheng et al., 1995). Incubation period for the maximum enzyme production was recorded as 48 h. After 48 h of incubation period the keratinase enzyme production was decreased (Fig. 3D) (Lin et al., 1992). The size of inoculum at which *Bacillus licheniformis* KP9 showed maximum enzyme production is 3% (Fig. 3C) (Nilegaonkar et al., 2007).

CONCLUSION

The objective of the present study was to isolate the keratinase producing bacteria from chicken feathers, since it is rich in keratin. The production of enzyme keratinase and optimization of various parameters for the enzyme production were studied. This novel keratinolytic *Bacillus licheniformis* KP9 could be a potential candidate for the degradation of feather keratin and also in dehairing process in leather industry. This isolate could be used to produce keratinase for biotechnological applications and effectively used in the large scale production of enzyme for commercial purposes.

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Classifying Fetal Health with Cardiotocography Data Using Machine Learning Techniques

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ABSTRACT - Obstetricians commonly utilize cardiotocography (CTG) to assess the corporal state of an infant during childbirth because it offers information on the fetal heartbeat and vaginal cramps, which takes into account whether or not the fetus is malignant. Based on signal analysis and computer engineering, there are numerous approaches for interpreting conventional cardiotocography data. Machine learning is now commonly used to solve a wide range of problems in branches of science and healthcaredue to its rapid development. For fetal state classification, we apply additive logistic regression (Logiboost), k-NN and random space classifiers to analyze CTG data; Logiboost outperforms k-NN and random subspace in process of reaching accuracy in classifying specific varieties of fetuses up to 92.16 on training and testing set. Both Logiboost and random subspace performs equally and outperform K-NN in feature selection.

Keywords -cardiotocography machine learning, splitting. Accuracy,Fetal Health.

I. INTRODUCTION

In the field of medicine, novel engineering solutions have shown to be quite useful in assisting doctors in achieving their intended objectives. Without engineering technology assistance, the medical sector cannot function efficiently, live, or improve its existence, as can be seen if one goes back far enough. Clinical research aims to better comprehend the inner workings of the human body[1].

Reduced child mortality is an important indicator of human progress, and it is reflected in several of the United Nations' Development Agenda. The UN expects countries to have eliminated preventable deaths of newborns and kids under the age of five by 2030, with all countries aiming to reduce under-five mortality towards less than 25 per infant mortality rate.

Infant mortality, which accounts for million adult American deaths during and after pregnancy and childbirth, is related to child mortality (as of 2017). The vast majority of these deaths (94%) transpired in low-resource areas, and the overwhelming majority could have been prevented.

Cardiotocograms (CTGs) are a simple and inexpensive way for healthcare providers to examine fetal health and take measures to reduce infant and maternal mortality. The machine sends ultrasound pulses and reads the response, providing information on the fetal heart rate (FHR), fetal movements, uterine contractions, and more.

As per World Federation of Obstetricians and Gynecologists (FIGO) recommendations, a cardiotocograph (CTG) should be described and evaluated as a uncertain or abnormal based on fetal heart, heart rate fluctuations, accelerations and decelerations, Knowledgeable medical professionals can bring out such a perception (e.g., osteopathic physicians) or machine learning software. Because the

A Review Study of Machine translation systems for Indian languages and their issues

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Abstract

The main objective of this study is to see how far machine translation in Indian languages has advanced. The three types of machine translation methodologies examined in the survey are rule, empirical, and hybrid-based approaches. It has a set of benefits and drawbacks all of its own. The primary purpose of machine translation is to bridge the linguistic divide between two people, companies, or countries by converting one natural language into a new one using automated computing tools. Machine translation (MT) is difficult because it entails a variety of difficult subtasks, such as ambiguous language, linguistic intricacies, and differences between source and target languages. The aim of the research is to give a general overview of machine translation in Indian languages. The current condition of machine translation on a nationwide scale was investigated in this study.

Keywords

Machine Translation, National Language Machine Translation, International Machine Translation, Indian language

1. INTRODUCTION

Language is a powerful and systematic way of communication that allows people to convey their thoughts, feelings, wishes, and other emotions. According to [1] the world has around 6,800 living languages. As a result, We must create tools for translating information from one language to another in order to access information given in another. The process of changing the meaning of a text from one language to another for a new relationship is known as "translation."

Machine conversion research began in the 17th century with the purpose of using dictionaries to bridge linguistic divides across different parts of the world. Studies in India began a little later, nearly two decades ago. Due to their morphological variation and dozens of dialects, machine translation for Indian languages is a little more complex than for other languages due to machine translation. In the corporate world, the language issue is a stumbling block to the expansion of international business deals. It's difficult to get into worldwide trade since global audiences try to read and speak in their native tongues. To begin with, human translators were used, but they couldn't keep up with

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A Systematic Review of Natural Language Processing in Healthcare

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Abstract
Systematic reviews and meta-analyses to identify existing clinical natural language processing (NLP) systems that create structured information from unstructured free text have chosen a systematic strategy for reporting items. The study gathers data on the natural language processing methodologies, strategies, procedures, frameworks, and reviews utilized in healthcare applications. We used standard indices like Google Scholar, Scopus, and Web of Sciences to look for articles about NLP in healthcare. We looked for conference proceedings and journal papers published between 2005 and 2020. From the accessible sources, articles concentrating on NLP in the healthcare system were chosen. Forty research articles were evaluated based on their focus on successful activities in the research field. Nineteen publications dealt with methodology, three with frameworks, five with techniques, five with processes, and eight with review research papers. The NLP systems discussed in this paper cover a wide range of clinical and research objectives. This study looks for NLP systems that have tried to solve problems like "processing clinical free text and creating structured output." The data gathered from the highlighted studies was analyzed in order to priorities novel methods and difficulties in clinical NLP.
Keywords: Healthcare; Medical Terminology; Clinical Notes; Patient Inquiries; Natural Language Processing

I. Introduction

Natural language processing (NLP) is soaring because of its undoubted potential in interpreting complex, unstructured datasets, and in generating actionable intelligence. This data can be in any form, such as text, speech, visuals, etc. Connecting this power can unlock doors to unprecedented opportunities and maximize the organization's joint investment in terms of capital, human efforts, and time. NLP helps to process very large amounts of data presented in general linguistic form, and run superior machine learning algorithms on it to obtain important business insights.

NLP is even more valuable in the medical healthcare system, where massive amounts of facts are churned out constantly every day. A few aspects of healthcare that technology is transforming are free-text, clinical documentation improvement, data mining research, automated reporting, clinical trials, and decisions, etc. [1]. According to Dahmet et al., inappropriate usage of medical terminologies in the health care domain has raised various issues related to effective communication between patients and healthcare professionals [2]. As per Keifenheim, there is an effective relationship between the content (patient's query) and their way of communication [3]. The communication challenges confronted by healthcare professionals while interacting with patients are highly context-specific, especially when patients interact with their native language other than English (for example, Marathi). The health-related complaints of the Patients are recorded during their arrival in the emergency department (ED). The recorded information is available in an unstructured free-text format in the hospital database. This data is retrieved by healthcare professionals for categorizing and analyzing the symptoms described by patients to provide appropriate treatment [4] [5]. However, any discrepancy in this recorded data results in significant medical ignominy. According to Silverman, [6], these situations are more common when the patient's language is unfamiliar to clinicians. The symptoms of a disease can be recorded in several ways; for example, when a patient is complaining of chest pain, the symptoms can

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NONLINEAR GENERALIZED FRACTIONAL MIXED INTEGRODIFFERENTIAL EQUATION WITH NONLOCAL CONDITION

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Abstract. The aim of this paper is to study a nonlocal Cauchy problem for nonlinear generalized mixed fractional integrodifferential equations with Katugampola derivative. Some new existence results of solutions for the given equations are obtained by using the fixed point theorems. Examples are presented to demonstrate the usefulness of our main results.

1. Introduction

The differential equations of fractional order are generalizations of classical differential equations of integer order. The history of fractional calculus dates back to the 17th century. So many mathematicians define the most used fractional derivatives, Riemann-Liouville in 1832, Hadamard in 1891 and Caputo in 1997 [15, 21]. Fractional calculus plays a very important role in several fields such as physics, chemical technology, economics, biology; see [6, 7, 8, 11, 12, 18, 20] and the basic theory of fractional calculus can be found in [1, 2, 5, 16, 19] references therein.

In 2011, Katugampola introduced a derivative that is a generalization of the Riemann-Liouville fractional operators and the fractional integral of Hadamard in a single form [13, 14]. The integrals are special cases when a parameter is defined at various values; when $\rho \to 0$, the Riemann-Liouville operators are obtained; when $\rho \to 1$, the Hadamard operators are obtained.

Further, in [3], the authors studied the fractional differential equations with Stieltjes and fractional integral boundary conditions using the generalized derivatives of the form

$$ {}^{\rho}D^{\alpha_1}\mathrm{y(t)} = \mathrm{f}\left(\mathrm{t,y(t)}\right),\ t \in [0,T], $$

$$ \mathrm{y(0)=0},\ \int_0^T \mathrm{y(s)dH(s)} = \frac{\rho^{-\gamma}}{\Gamma(\gamma)} \int_0^{\zeta} \alpha_i \frac{s^{\rho_i - 10} x(s)}{\left(\zeta^{\rho} - s^{\rho}\right)^{1-\gamma}}, $$

where, ${}^{\rho}D^{\alpha_1}-$ generalized fractional derivative and $H-$continuous function.

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Key words and phrases. Fractional mixed integrodifferential equation, Existence of solution, Fixed point theorem, Katugampola fractional derivative.

RABINDRANATH TAGORE: A PIONEER OF INDIAN RENAISSANCE

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Abstract
The second of the 19th century was immensely important in the history of India since it brought the nation in the limelight of modern world. It was a kind engulfing the medieval nature of Indian culture and shaping it with the modern guise. The British rule which was rooted in India with the unsuccessful endeavor in the form of 1857 up rise, expanded Pan India soon after. Apart from the economic exploitation of natives, the British rule ushered in the prospect of self-awakening for them. Indians' encounter with the modern European world and English world helped them to shake off the centuries old lethargy. The modern education and the East- West Encounter brought the enlightenment that is called as Indian Renaissance. There were numerous stalwart personalities who emerged as the children of Indian renaissance. One of them was Rabindranath Tagore.
Keywords: Indian Renaissance, Enlightenment, Pioneer, Age, Culture, Literature and Arts.

Introduction

British rule in India initiated from Bengal. It was the first Indian province which came directly under the British rule early. Obviously, Bengal was first one which was intimated with the English language, literature and education. As a result, a numerous social, political, literary, cultural and religious activities were steered up and a kind of galvanization came in the Bengal society. Later on the galvanization turned into a kind of enlightenment of the Bengal people. These activities played a pivotal role in the historical process through which an Indian renaissance spread all over the nation. Significance of Indian renaissance was that Indian people got formed into a nation or a people.

The changes which ushered in the Bengal and later in Indian society were neither accidental nor enforced. They came out from within. Basically, Indian has its own identity as a complex where the culture and tradition have been playing the vital influencing role. Indian society had and still has a unique structure that is governed by the caste-system, religious diversity, different faiths-beliefs, traditions, and class - race distinctions. There were several social – religious practices which were not only ill but the inhuman to the great extent. First time, educated Indians started analyzing their own culture through the vision which was shaped by the modern knowledge. They became aware of the evil traditions in their own society and approaching dominance Western Culture and Christianity. Raja Rammohan Ray, Debendranath Tagore, Keshav Chandra Sen initiated the movement of awareness in Bengal through the Brahm Samaj and Tatwabodhini Sabha. Similar efforts were made by Dr. Atmaram Pandurang, M.G. Ranade through Prarthana Samaj in Maharashtra. Arya Samaj established by Dayanand Saraswati stated spreading Vedic values. Theosophical Society made the Indians to understand their glorious traditions. Ramkrishna Paramahansa and Vivekanand revitalized the Indian religious traditions while Satya Shodhak Samaj tried to eradicate the evil social practices. These activities were simply the outcome of the Indian renaissance that was resulted due to the India's encounter with the Western culture.

The Indian renaissance exemplified through the several social, political, religious and culture activities and through the contribution of various personalities. One of them was Rabindranath Tagore. He was not only a child of Indian renaissance but the pioneer of Indian renaissance. Actually he is a renaissance man.

Rabindranath Tagore: An Influencing Personality

It is historical fact that India was a colony of British Empire since 1857. Even before that the East India Company was ruling a larger geographical area of India. This was a colonial period. India had lost its dignity and the people were in a static state. But India's encounter with the Western world, knowledge, science and political philosophy brought in the new era in the country. India, though slowly, started gaining a kind of

Man's Yearning for Completeness in Girish Karnad's *Hayavadana*

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Abstract

Girish Karnad is one of the distinguished playwrights of the contemporary Indian stage. He has penned twelve plays. Each play is unique in its own way for its experimentation and techniques. The Play 'Hayavadana' is the third creative expression in the chronology of Girish Karnad, and it is one of his important plays which depicts the incompleteness of the human beings.

The playwright has taken the idea for a tale found in a collection of stories in Sanskrit, Somdeva's Katha Saristsagar from 11th century. Karnad also draws story from Thomas Mann's 'The Transposed Heads'. He borrows from both the sources but recreates the story with his extraordinary imagination. This play resolves around the episode of horse-headed Hayavadana who desires to attain completeness as a man and Padimini who is in dilemma between Devadatta and Kapila to attain completeness. This theme, finally bringing out the passion and humor of everyday life. The human being's incompleteness between body and soul is presented well with an imagination mythological story in this play.

Introduction :

The shared history of British presence has also produced a substantial body of writing in many languages, known as Commonwealth Literature. It signifies a fusion of cultures of the East, and the West for most of these countries have their own languages and where English is not their mother-tongue.

Girish Karnad is regarded as one of the great writers of contemporary Indian drama. His works are 'lasting things' in Commonwealth Literature. He is also active in the world of Indian cinema working as an actor, director and screenwriter, both in Hindi and Kannada cinema, earning numerous awards. In his plays, he makes use of ancient myths and legends to create contemporary consciousness and existentialist crisis of modern man, through his characters locked in psychological and philosophical conflicts His plays speak about the fundamental ambiguity of human existence. "Yayati", "Nagamandala" and "Hayavadana" are some of his best plays.

Karnad has been composing plays often using history and mythology to tackle contemporary issues. He has translated his major plays into English, and has received critical acclaim across India. He had got many awards like Jnanpith Award, Padma Shri and Padma Bhushan by the Government of India and so on. His plays reflect the metaphor of life is a journey in search

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ENGLISH LANGUAGE LEARNING AND BORROWING

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Borrowing is a natural process. No language can boast of its purity. In ancient times, traders went to distant places and when they returned, they carried foreign words with them. It was not that they only borrowed, they gave their own to the 'foreign' land. It usually happened that the goods they sold were not produced in the foreign soil and therefore, they referred to them in their own language. The Chinese tei and cha came to Europe and India long ago. Since tea was completely a new thing, people accepted the Chinese words. Trade and commerce have been the prime cause of borrowing.

The second important cause is the long rule of one culture over the other. The Muslims rulers of the medieval period did not know the Indian languages. They knew Arabic and Persian only. Naturally their courtiers and army officers had to speak their language to the native Indian people. This resulted in bilingualism. Khari Boli, the language of Delhi and adjacent areas could not remain uninfluenced. The bilinguals used Arabic and Persian words freely from the eleventh century to the nineteenth century. They were instrumental in the creation of Urdu, a language heavily laden with Arabic and Persian words but based on the system of Khari Boli. Modern Hindi vocabulary consists of a large number of Persian and Arabic words. Similarly, English language could not resist the influence of French after the Norman Conquest in the eleventh century.

The third factor is the cultural superiority of a foreign language. The language which is rich in literature, art, music, philosophy, science and technology will certainly influence the culturally poor language. When the French people came English people were poor in the art of cookery. They slaughtered an ox, a pig or a sheep and ate an ox, a pig or a sheep. They learnt the words beef, pork and mutton from French and began to make distinction between ox and beef, pig and pork and sheep and mutton. Indian languages have taken a large number of loan words from English, especially the technical words. Words like car, hub, axle, chassis, handle, tyre, tube, spoke, rim, pump, chain and brake can be heard from an illiterate car mechanic. A teacher of science can explain the concepts of modern physics and mathematics for better in English than he can do so in Hindi. The English people borrowed the Greek words like physics, ethics, drama, comedy, tragedy, science, catharsis, zoology, botany and many other words. Latin gave English language more words and now all botanists use Latin words to name a plant or tree.

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PROJECT –BASED LEARNING METHOD FOR ENGLISH LANGUAGE LEARNERS

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Abstract

Students in India, in spite of learning the language for over a decade in school, come to colleges to relearn or unlearn the same concepts that they have over the years. Foundation English classes in most Arts and Science colleges still follow syllabi similar to that of school where the division is genre based i.e. prose, poetry, drama etc. The students don't feel adequately challenged and those who have poor language skills don't really spend their time at college improving their skills as they continue to just write the summary of the story for any question that is asked in the exam. LSRW skills aren't given specific focus and the varying skill levels of students are ignored. Hence it is important that students at least in the tertiary level, after having learnt the language for so many years are given a chance to only focus on improving their communication skills and nothing else. PBC can be effective way of ensuring this.

Keywords: English language Teaching, ELT, PBC, Project Based learning, Problem based learning, Communication skills, Language practice.

Introduction

English Language Teaching has always evolved over the years to suit the changing learner needs and required skill sets. This century has brought in major changes in ELT methodology where the focus has shifted squarely from the teacher onto the learner and from a traditional theory backed approach to a more practically oriented approach to enable the language to be a competent user of the language. There is always a lot study that is constantly undertaken to improve the efficacy the teaching learning process. These enthusiastic studies throw new light on different approaches to ELT, newer teaching methodologies and more efficient teaching techniques. Project based learning is an emerging instructional methodology that bridges the connect between classroom learning and real world problems and solutions.

What is project based learning?

Maggie O Brien in her blog post title 'What is Project Based Learning?' defines it as an "instructional methodology that encourages students to learn and apply knowledge and skills through an engaging experience". Traditional teaching methods generally follow a method where the teaching learning process begins with the teacher delivering the content to the students. The students are then given opportunity for adequate practice to apply their learning. At the end of this, the students are tested to adjudge the level of their understanding which also provides feedback the effectiveness of the teaching learning process. But in Project Based Learning (PBC), the learning is an intrinsic part of the project. A teacher in PBL methodology elicits solutions for real world problems from students. It is part of a long-term project where the students endeavors to solve it in a creative way. In the process of finding solutions, the students employ various skills which meet the required learning standard.

Characteristics of PBC

Project Based Learning begins with an inquiry into a real world problem. The learner takes the responsibility of learning and through learning by inquiry understands the problem in its entirety and then begins to find the solution for it. A well designed PBL lesson has the following features.

1) Learner – centric

PBL is essentially learner centric, as the learner is put incharge of his own learning through the

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LANGUAGE LEARNING THROUGH CULTURE: RAISING STUDENTS' AWARENESS OF ENGLISH LANGUAGE ACQUISITION

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ABSTRACT

Today the lack of a second language doesn't isolate, it makes them less competitive. There's a Spanish proverb that says, "the person who speaks two languages is worth two" And that's why neglecting a second language instruction prevents students from realizing their full worth. The aim of this paper is to emphasize on the importance of a second language i.e. English and to highlight how to use words and expressions more skillfully and authentically, to act naturally with people of other cultures while recognizing and accepting their different reactions. There is a close relationship between language and culture. Language reflects culture and it is influenced and shaped by culture. Consequently, teaching English is inseparable from teaching its culture. The goal of this paper is to demonstrate how to foster student's cross cultural awareness in an English language classroom. Providing students in English language classroom an understanding of culture that goes beyond food and national dress can be a daunting task for any teacher. Fostering the development of cross cultural awareness can be even more challenging.

This paper focuses on how in teaching English language, a teacher needs to be sensitive to the fragility of students by using techniques that promote cultural understanding and also builds a comprehensive review in the field of culture in English language learning and teaching.

Keywords — language, culture, classroom, facilitate, techniques.

Every language is the pride of the people who use it. No doubt, English is the language of the English people. The fact is that this language is used almost in all the countries of the world. In India it occupies an important place. In every sphere of life whether social, political, academic, cultural of economic, it holds a significant value. Pt. Nehru rightly said, "English language is ours by historic necessity."

English occupies an important place in India today. Wherever we go in the country, it is used very much almost in every circle. Through the bazaar, we pass and we find that majority of the boards hanging in front of the shops are in English. Advertisement boards displayed at the focal points of different cities are in English. In the cinema halls, in the hotels and restaurants, in the offices of administration —local, regional or central-almost every record is in English. At home, in the street, in the bazaar, in business, in studies, in routine talks, English holds a good position. Even many illiterate people are heard using words of English in their day today routine of life.

It is undoubtedly, right to say that English has been playing, is playing and will continue to play a significant role in India's national life. English has its unique importance in our country. It has played and very importance role in building modem India. It has become one of the major languages of the world and Indians can neglect its study at their own peril. It is taught and learnt with affection and love. It enjoys a privileged position. The person who studies this language feels it a pride. English is not only a national language of England, but it is also an international language. It may be called the language of the world civilization. Neon should underestimate the importance of English. C.Rajgopalacharya said, "English language is the greatest gift of goddess Saraswati to India." The most common challenge that

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FEMININE NARRATIVE ACCOUNT IN SALMAN RUSHDIE'S SHAME : A CASE OF SUFIYA ZINOBIA

Dr. Kamalakar R. Patil

Salman Rushdie is a pure post-colonial voice in Indian English fiction. He is an enormously self-conscious writer whose novels, comments and analysis in interviews and essays insistently direct attention to these preoccupations and to his craft. Rushdie shows remarkably consistency when it comes to certain ideas, certain literary and philosophical preoccupations and the formal means through which to achieve them. Rushdie is also a very well-read writer. His work is sprinkled with all sorts of literacy echoes, allusions and puns. Each of these self-consciously deployed with back batting zeal which he invites the reader to share with him. He speculates about competing values of wholesale assimilation versus wholesale rejection of the dominant culture and values. A dominant theme of his work is the long, rich and often abounding story of many connections, disruptions and migrations between the East and the West. Goonetilleke describes Rushdie as a "clever writer produced by migrations inhabiting and addressing both worlds, the East and the West, the world of his mother country and that of his adopted country, belonging wholly to neither one nor the other."[1] (27)

Shame (1983) is a pungent satire on the contemporary political situations of Indian subcontinent with special emphasis on Pakistan. In *Shame,* Salman Rushdie nevertheless concentrates on the powerful nature of some restrictions, which can have devastating consequences on the persons and pose strong obstacles to them to attain wholeness. In the novel the imaginary country is presented. Though it is set in the fourteenth and fifteenth centuries, the fictitious characters of the novel bear close resemblances to Pakistan. The country described in the text exists in this way "at a slight angle to reality",[2] (157) but which needs to be called Pakistan for the sake of a smoother reading. Here, an indirect but nevertheless clear and forceful critique of Pakistan is offered. The indirectness of the approach is also useful in that it leaves the option open that the place the narrator describes could stand for many other countries or places where fundamentalism reigns. It should not certainly be reduced to represent only one specific country. In *Shame,* Salman Rushdie presents a gloomy picture of most aspects that have become characteristic of Pakistan. He obviously considers that inhuman and therefore harmful to human nature and its integrity. The corrupt regimes use violence against their people as well as the role of fundamentalist belief in Pakistan's leaders and the significance of the army's power. The novel reflects Rushdie's rejection of the idea of this separate country Pakistan in the first place and exposes consequences of in human rule, which prove to be extreme violence and destruction. A particular emphasis on the role of women in the novel is made as they are the ones that suffer most under the various governments. They have to struggle hardest in order to survive. The character of Pakistan, from the beginning, is, to a very great extent, determined by politics. The ideology of Pakistan was founded on religious intolerance and division. Therefore one can convincingly conclude that the country was doomed from the very beginning.

Salman Rushdie's *Shame* persistently signals out "the problematic imbrications of gender with nation".[3](431) Political oppression is connected with sexual suppression. The narrative explicitly states:

> I had thought before I began, that what I had on my hands was an almost excessively masculine tale..... But the women seem to have taken over; they marched in from the peripheries of the story to demand the inclusion of their own tragedies, histories and comedies.... It

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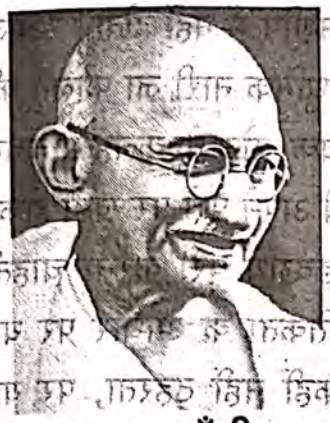
इस अंक में....

मुखचित्र - अमर शहीद जनरल विपिन लक्ष्मणसिंह रावत

गाँधी चिन्तन में नारी-विमर्श



महात्मा गाँधी

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प्रस्तावना

प्रस्तुत शोध आलेख में गाँधी चिंतन के रूप में नारी-विमर्श की संकल्पना की गयी है। महात्मा गाँधीजी के अनुसार समाज के लिए नारी-पुरुष एक ही सिक्के के दो पहलू हैं। नारी-पुरुष में भेदभाव या असमानता के कारण परिवार और समाज का अहित हो सकता है। जितना पुरुष को अधिकार है उतना ही नारी को है। नारी प्रेम, करुणा, उदारता, क्षमाशीलता, सेवा, समर्पण और सहिष्णुता जैसे सद्गुणों की मूर्ति है। नारी-स्वतंत्रता के परिप्रेक्ष्य में महात्मा गाँधीजी ने कहा है कि लिंगभेद, अशिक्षा, दहेज, भ्रूणहत्या, वेश्यावृत्ति जैसी कुप्रथायें जो नारियों की गिरी दशा या नाटकीय परिस्थिति हेतु जिम्मेदार हैं। नारी के प्रति पूज्य भाव इन दिनों कुदृष्टि के रुप में बदला है और वासना की आग में झोंककर काला कोयला बना दिया गया है।[1]

उद्देश्य :

१. स्त्री-पुरुष समानता देश के विकास में महत्वपूर्ण है, दिखाना।

२. नारी-जाति का दुरुपयोग दूर करना।

३. पुरुषवादी मानसिकता को बदलना, नारी भोग की वस्तु एवं गुलाम नहीं, स्थापित करना।

४. सीता या द्रौपदी जैसी नारी को आदर्श मानना इसलिए नहीं कि ये धार्मिक पात्र हैं, बल्कि इसलिए कि ये दोनों साहसी थीं और दोनों प्रतिरोध करना जानती थी।

५. रूढ़ी और परंपरा के दोषों पर आपत्ति उठाना।

६. नारी से अहिंसा, सत्याग्रह की प्रेरणा ग्रहण करना।

७. पुरुष-दासता का विरोध।

वर्तमान समाज में आज भी नारी की स्थिति भयावह है, भ्रूणहत्या, दहेज-प्रथा, बालविवाह, बेमेल-विवाह, अशिक्षा जैसी समस्याओं के कारण नारी की दशा दिन-प्रतिदिन बिगडती जा रही है।

इन सभी समस्याओं के संदर्भ में महात्मा गाँधीजी के चिंतन के माध्यम से हमें सोचना पड़ता है कि स्वस्थ समाज से ही स्वस्थ राष्ट्र का निर्माण

१. अखण्ड ज्योति, सं.डॉ.प्रणव पांड्या, अखंड ज्योति संस्थान, छायामण्डी, मथुरा, २०११, पृ.सं.५-६

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प्रथम अंक

इतिहास दर्पण
ITIHAS DARPAN

विक्रमाब्ध २०७९, युगांब्ध ५१२४
जानेवारी २०२२

अखिल भारतीय इतिहास संकलन योजना की शोध पत्रिका
आपटे भवन, केशव कुंज, झंडेवाला, नई दिल्ली - ११० ०५५

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खानदेशातील सतीप्रथा : एक मीमांसा

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१.१ प्रस्तावना

टोळी–टोळीने वावरणारा मानव जेव्हा एका समाजात संगठित झाला तेव्हा समाजातील जीवनपध्दतीला अनुकूल, उपयुक्त व इश्ठ ठरतील आणि समाजमान्य होत गेलेल्या एकापेक्षा अधिक समाजातील आचार–विचार, चालीरिती इत्यादी बाबी समाजातील प्रत्येक सदस्याला बंधनकारक करण्यात आले. समाजमान्य आचार–विचार रूढ झाल्यानंतर एका पिढीतून दुसऱ्या पिढीकडे संक्रमित होत गेले म्हणजेच प्रथेप्रमाणे रूढी परंपरा प्राचीन काळापासून निर्माण झालेल्या व समाजजीवनात रूढ झालेल्या असतात. समाजाचा घटक असणाऱ्या सदस्याने कोणत्या पध्दतीने आचरण करावे, कोणता मार्ग अवलंबवावा, कोणकोणते नीतिनियम पाळावे याबाबत अनेक कल्पना मानवाने समाजविकासाच्या सर्व अवस्थेमध्ये निर्माण केल्या. सतत येणाऱ्या अनुभवातून या कल्पनांनी मूर्त रूप येत गेले. त्या सामाजिक जीवनाच्या अविभाज्य घटक बनल्या त्यांनाच रूढी परंपरा असे म्हटले जाते. खानदेशात हुंडा पध्दत, बालविवाह, केशवपन, सतीप्रथा, मूर्तीपूजा, व्रतवैकल्य इत्यादी या सारख्या रूढी परंपरा विद्यमान होत्या. यातल्या काही परंपरा काळाच्या गर्भात गडप झाल्या तर काही रूढी परंपरा आजही खानदेशातील लोकांच्या मनपटलावर बिंबलेल्या दिसून येतात.

१.२ उद्देश

1. खानदेशातील सतीप्रथेवर प्रकाश टाकणे.
2. खानदेशातील सतीप्रथेची कारणे ‘ोधणे.
3. खानदेशात सती गेलेल्या स्त्रियांची माहिती मिळविणे.

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स्थापना : ९ जानेवारी १९२०

इतिहासाचार्य वि. का.राजवाडे संशोधन मंडळ, धुळे

* अनुक्रमणिका *

इतिहास व लोकसंस्कृती

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प्रस्तावना

अलीकडच्या काळात इतिहास संशोधनात महत्त्वाची होऊ पाहणारी पद्धती म्हणजे सबाल्टर्न स्टडीज ही होय. यात शोषित पददलित उपेक्षित दुर्लक्षित यांचा इतिहास मांडला जात आहे. कनिष्ठ वर्गातील शोषित उपेक्षित दुर्लक्षित इत्यादी घटकांवर विशेष लक्ष दिलेले दिसते. म्हणूनच सबाल्टर्न पद्धतीने कनिष्ठ वर्गातील पीडित उपेक्षित दुर्लक्षित आमच्या इतिहासाचा अभ्यास करण्याची स्पर्धा इतिहास संशोधकांमध्ये निर्माण झालेली दिसते. इतिहास संशोधकांनी दुर्लक्षित उपेक्षित या शब्दाचा अर्थ व्यापक स्वरूपात न घेता तो संकुचित अर्थाने घेऊन फक्त शेतकरी, कामगार, आदिवासी, दलित,स्त्री इत्यादी वर्ग म्हणजे उपेक्षित वर्ग असा घेतलेला दिसतो. त्यामुळे इतिहास संशोधन क्षेत्रात दुर्लक्षित राहिलेल्या लोकसंस्कृती खऱ्या अर्थाने उपेक्षितच राहिलेलीदिसते.

शब्द कळ

इतिहास, लोकसंस्कृती, लोकसाहित्य, गहिवर संप्रदाय, ऐतिहासिक साधन

उद्देश

१. इतिहास आणि लोकसंस्कृतीचा अभ्यास करणे.

२. लोकसंस्कृती व इतिहास या दोन भिन्न संकल्पनांवर प्रकाश टाकणे.

३. इतिहास संशोधन क्षेत्रातील दुर्लक्षित राहिलेल्या घटकांचा धांडोळा घेणे.

४. लोकसाहित्याचा अभ्यास करणे.

५. ऐतिहासिक साधन म्हणून लोकसाहित्याचे महत्व जाणणे.

संशोधन पद्धती

प्रस्तुत संशोधनासाठी इतिहासाच्या सर्वसाधारण संशोधन पद्धतीचा वापर करताना आंतरविद्याशाखीय संशोधन पद्धतीचा ही उपयोग केला आहे. प्रस्तुत विषया करता लोकसाहित्य, लोकसाहित्य संबंधी विविध ग्रंथ संदर्भ ग्रंथ व इतर ग्रंथ साधने या साधनांचे संकलन करून त्या साधनांची चिकित्सा करून त्याची उपयुक्तता प्रस्तुत विषया करता ठरवली आहे.

संशोधन पूर्व साहित्य

लोकसंस्कृती हा मानवी जीवनाचे दर्शन घडविणारा हा घटक दिसतो. समाजाचा समग्र व व्यापक स्वरूपात अभ्यास करण्यासाठी या लोकसंस्कृतीचा अभ्यास करणे अत्यावश्यक असते. या लोकसंस्कृती बाबत अनेक समाजशास्त्रज्ञांनी मानवविद्याशास्त्रज्ञांनी सखोल संशोधन केलेले दिसते. त्यात दुर्गा भागवत, इरावती कर्वे, सरोजिनी बाबर, सानेगुरुजी, रा. ची. ढेरे, तारा भवाळकर, अरुणा ढेरे, प्रभाकर मांडे, डॉ. शरद व्यवहारे, श्री गंगाधर मोरजे, डॉ. द. ता. भोसले डॉ.संभाजी खराट, डॉ. साहेबराव खंदारे, डॉ. रामचंद्र देखणे यांनी मोठे संशोधन करून खऱ्या अर्थाने मराठी लोकसंस्कृतीची चिकित्सा केलेली दिसते. प्रस्तुत संशोधनात्मक निबंधात लोकसंस्कृती व इतिहास या दोन भिन्न संकल्पनांवरप्रकाश टाकण्याचा व लोकसाहित्य इतिहासाचे साधन यासंदर्भातील संशोधनाचा यत्न केलेला आहे.

इतिहास व लोकसंस्कृती

लोकसाहित्य हा लोकसंस्कृतीचा आत्मा आहे. या अभ्यासाकडे मानव विद्याशाखा व इतिहास शाखेअंतर्गत इतिहास अभ्यासकांची

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THE ROLE OF DIWAN RAJA SIR THANJAVUR MADHAV RAO FOR THE EDUCATIONAL REFORMS IN THE DEVELOPMENT OF BARODA STATE DURING THE YEARS 1875-1882

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Dept of History, Utkal University

THE ROLE OF DIWAN RAJA SIR THANJAVUR MADHAV RAO FOR THE EDUCATIONAL REFORMS IN THE DEVELOPMENT OF BARODA STATE DURING THE YEARS 1875-1882

❑ Prof. Dattatraya Rajaram Koli[1], Dr. Ramesh Dhanraj Jadhav[2]

Abstract

Diwan Raja Sir Thanjavur Madhav Rao of the Baroda State (Sansthan) (1875-1882) in the administrative rule of Maharaja Sayaji Rao Gackwad fostered educational reforms with his great vision. During his administrative period, he has not only striven to educate the royal family members like Maharaja Sayaji Rao but also for the lower class people too. It was because of his efforts and vision the common people of the time could admit their children in government schools. He opened the school doors for girls and even started new girls' schools. He has also contributed in opening Anglo-Indian School and Vernacular schools. He also secured special funds for educational reforms and released it for the same purpose. He also started scholarships for the downtrodden, poor and needy students to bring them into flow of education. He also proposed and started 'State Library' to promote education and reading habit among people. It was because of his vision and educational reforms, 'Vadodara' is known today as 'the centre of education'.

Keywords: educational reforms, educational scholarships, vernacular schools, state library, educational funds.

Introduction

Vadodara, also known as Baroda, is one of the largest cities in the Indian state of Gujarat. Vadodara was once the capital of the Baroda State. Its name Vadodara suggests its meaning-'*vada-udara*' i.e. 'the belly of banyan tree', hence popularised as Vadodara from the time of Indian independence. It was one of the biggest states among the five other states of India, comprising of 8164 sq. mi. It was comprising of five provinces including Baroda, Amreli, Kadi, Navasari and Okha[1] In ancient records the city was popularly known as '*Vatodara*', '*Virkshetra*' and '*ViRaoati*'. Later on, the traders and merchants who visited and settled here renamed it as '*Baroda*' derived from '*Brodesh*'. [2] Pilaji Rao Gackwad was the founder of the Baroda state (1721). [3]

The British Government appointed Sir L. Peli as a representative of Governor General and commissioner with special rights against the chaos and anarchy led by Maharaja Malhar Rao Gackwad on 25th November 1874. On 14th January 1875, Maharaja Maharaja Malhar Rao Gackwad was dislodged from the throne and had to deport at Madras. Later on the spouse of Late Khande Rao Maharaja, Maharani Jamanabai Saheb and Raja Sir T. Madhava Rao had their entry in the Baroda province. The British Government appointed Raja T. Madhava Rao as the Diwan of Baroda State. He took the official charge from 16th June 1875. The Baroda throne then handled to Gopalrao on 27th May 1875, officially he came to be known as Maharaja Sayaji Rao Gaekwad III. [4]

Raja Sir T. Madhav Rao was born in the family of Ranga Rao and Radhabai on 20th November 1828 at Kumbhakonam city in Tanjawar district. He completed his primary education at Kumbhakonam in Government School. Being a Maharashtrian by linage he had his primary education in Marathi language also. Right after his *Munj*, a religious ritual tradition of the time, and demise of his parents he got married at the age of 12. After the completion of his education he served in the office of Accountant General at Thanjavur following his two years' service at Chennai. During this period he took the charge and responsibility of the education of Ayilyam Thirunal and Vishakham Thirynal of Travancore.[5]

Maharaja Sayaji Rao Gaekwad III ruled in the Baroda state from 1875 to 1939, for 64 consecutive years. He brought many reforms during his tenure in the Baroda State. The Diwan serving at Baroda had their greater contribution in the development of the Baroda state. During his tenure of 64 years he had the contribution of 15 Diwan. The third in the line of 15 Diwan was Sir T. Madhava Rao. [6] Sir T. Madhava Rao, before his appointment at Baroda state, had served at Travancore as Diwan for the period 1857 to 1872, at Indore from 1873 to 1875 and for the period from 10th May 1875 to 28th September 1882 he had served in the Baroda state as Diwan.[7]

Objective of the Research paper:

The primary objective of the present research paper is to bring forth the Educational reforms laid by Raja Sir T. Madhava Rao during his charge of seven years as the Diwan of the Baroda State.

Educational Reforms laid by Raja Sir T. Madhava Rao:

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[2]*Research Guide& Head, The Department of History, R. C. Patel ASC College, Shirpur, Dist- Dhule (MS).*

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विक्रमाब्ध २०७९, युगांब्ध ५१२४
जानेवारी २०२२

अखिल भारतीय इतिहास संकलन योजना की शोध पत्रिका
आपटे भवन, केशव कुंज, झंडेवाला, नई दिल्ली - ११० ०५५

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हरताळ, मीठाचा सत्याग्रह आणि जंगल सत्याग्रह चळवळीत पूर्व खानदेशचा सहभाग - एक दृष्टीक्षेप

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प्रस्तावना :

असहकार आंदोलन प्रभावी बनविण्यासाठी महात्मा गांधीजींनी सत्याग्रह व हरताळ या साधनांचा प्रभावीपणे उपयोग करून घेतला. केवळ राष्ट्रीय स्तरावर नव्हे तर प्रादेशिक स्तरावरही या साधनांचा प्रभावीपणे अवलंब करण्यात आला खानदेशातही सत्याग्रह व हरताळ या साधनांचा प्रभावीपणे वापर केला. महात्मा गांधीजी असे म्हणतात सत्याग्रह हा आत्मशुद्धी चा लढा आहे, पवित्र लढा आहे. आत्मशुद्धी साठी लढ्याचा प्रारंभ करणे त्यादृष्टीने योग्य होईल. त्यादिवशी सर्वांनी उपवास करावा आणि त्याच बरोबर काम धंदा ही बंद ठेवावा. सत्याग्रह व हरताळचे लोन पूर्व खानदेशातही पसरलेले आपणास दिसते. दिनांक 2 मार्च 1930 रोजी महात्मा गांधीजी यांनी व्हाईसरायला निर्वाणीचे पत्र पाठविले. आणि आपल्या 11 मागण्या मान्य न झाल्यास सविनय कायदेभंगाची चवळ सुरु करण्यात येईल परंतु मागण्यांकडे लार्ड आयर्विन यांनी दुर्लक्ष केल्यामुळे महात्मा गांधी यांनी सविनय कायदेभंगाची चळवळीची सुरवात मिठाचा सत्याग्रह करून केली .

उद्देश :

1. पूर्व खानदेशातील सत्याग्रहा आणि ,हरताळ या बद्दल महती मिळविणे.
2. मिठाच्या सत्याग्रहातील पूर्व खानदेशातील सहभागाबद्दल माहिती मिळविणे.
3. जंगल सत्याग्रहातील पूर्व खानदेशातील सहभागाबद्दल माहिती मिळविणे.
4. मिठाचा सत्याग्रहात आणि जंगल सत्याग्रह चळवळीत सहभाग घेतलेल्या व्यक्तीची आणि त्यांना

झालेल्या शिक्षेची माहीती मिळविणे .

साहित्य, कला आणि लोकसंस्कृतीला वाहिलेले त्रैमासिक

तिफण

वर्ष १२ वे, अंक – चौथा; जानेवारी-फेब्रुवारी-मार्च २०२२

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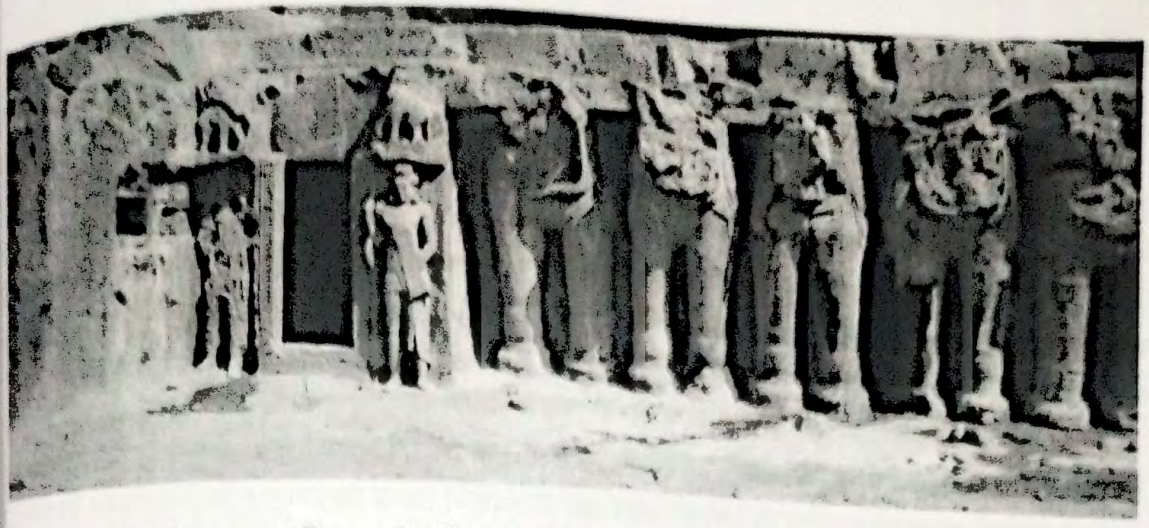
● संपादक ●
डॉ. शिवाजी हुसे
पत्ता : संपादक, तिफण, 'शिवार', श्रीराम कॉलनी,
हिवरखेडा रोड, कन्नड, जि. औरंगाबाद – ४३११०३.
मो. ९९०४००३९९८



धुळे जिल्हातील मेथी आणि बलसाणे येथील मंदिरे

- डॉ. रमेश धनराज जाधव

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भारतीय जनसामान्यांच्या जीवनाची धर्मही आधारशिला आहे. भारतात हिंदू, जैन व बौद्ध धर्माचा विस्तार झाला. या धर्माच्या प्रसारास सोबत धार्मिक अनुष्ठानासाठी धर्माच्या अनुयायांनीआपला धर्म युगानुयुगे अमर रहावा यासाठी स्थायी वास्तूंची निर्मिती केली. आणि त्यातूनच मंदिरे व स्तूप उभारण्यात आली. भारतात राज्य करणाऱ्या राजघराण्यांनी एकाहून एक अशी भव्य मंदिरे उभारली अशाच प्रकारची मंदिरे व शिल्पे धुळे जिल्ह्यातील मेथी व बळसाणे येथे पाहावयास मिळतात. भारतात मंदिर स्थापत्याच्या अनेक शैली विकसित झालेल्या आपणास दिसून येतात परंतु शिल्प शास्त्रानुसार मंदिराच्या तीन श्रेणी असून त्यात प्रामुख्याने नागर,द्रविड आणि बेसर आणि त्याच बरोबर काही प्रमाणात प्रादेशिक शैली ही विकसित होत गेल्या. या शैलीमध्ये यादव काळापासून हेमाडपंती शैली प्रसिद्ध झाली हेमाडपंती शैली यादव घराण्यातील महादेव यादव आणि रामचंद्र देवराय यांचा मंत्री हेमाडपंत किंवाहेमान्द्री याच्या नावावरून रूढ झालेली दिसून येते. धुळे जिल्ह्यातील शिंदखेडा या तालुक्यातील मेथी या गावी लक्ष्मी-नारायणचे मंदिर आहे. खानदेशातील धुळे जिल्ह्यातील बलसाणे येथे बुराई नदीच्या काठावर हेमाडपंथी मंदिरांचा समूह आहे यात प्राचीन नऊ वास्तू असून त्यापैकी आठ मंदिरे आणि एक मठ आहे या मंदिराची वैशिष्टे म्हणजे तीन मंदिरांचे मंदिर चौकोनी आकाराचे मंडप, शिव, विष्णू आणि पार्वती इत्यादी देवतांना वाहिलेले मंदिर आहे स्तंभ, अंबरनाथ येथील मंदिराच्या शिखराप्रमाणे बळसाणे परिसरातील मंदिराची शिखर रचना असलेली दिसून येते

प्रस्तावना - धुळे जिल्हा हा खानदेशचा एक भाग असून उत्तरेला नागर शैलीची मंदिरे, दक्षिणेला द्रविड शैलीची मंदिरे आणि त्याचबरोबर गुजरात आणि ओरिसा इत्यादी पश्चिमेला बासर शैलीची मंदिरे या सर्व शैलीचा खानदेशातील मंदीर रचनेवर प्रभाव पडलेला दिसून येतो. दख्खनच्या प्रदेशाप्रमाणे खानदेशातही खडक कोरून लेणी

संशोधक

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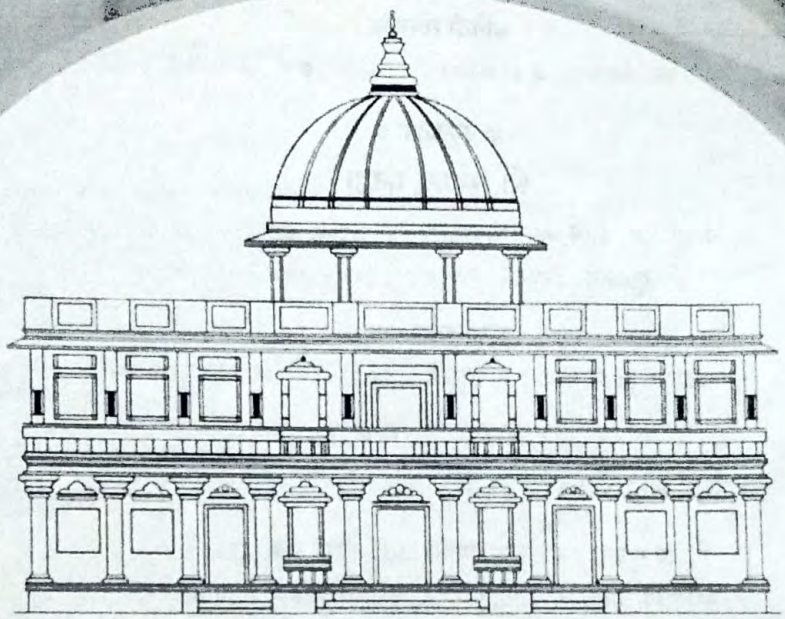

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गोषवारा :

पुणे विद्यापीठाच्या एक्झिक्युटीव्ह कौन्सिल/मॅनेजमेंट कौन्सिलचे सिनेट सदस्य, पुणे विद्यापीठाच्या स्टँडिंग कमिटीचे अध्यक्ष, महाराष्ट्र राज्य माध्यमिक आणि उच्च माध्यमिक मंडळाचे सदस्य (१९८६-१९९४), महाराष्ट्राच्या असोसिएशन ऑफ प्रायव्हेट एज्युकेशन मॅनेजमेंटचे सेक्रेटरी, भारत स्काऊट ॲण्ड गाईड असोसिएशन नाशिकचे अध्यक्ष (१९९५ पासून), '७८ च्या अखिल भारतीय मराठी साहित्य संमेलनाचे स्वागताध्यक्ष तसेच, संसद सदस्य म्हणून नाशिक लोकसभा मतदार संघातून १९९१ ते १९९६ या कालावधीत प्रतिनिधित्व केलेले व २००४ साली महाराष्ट्र विधान परिषदेवर निवडून गेलेल्या डॉ.वसंतराव पवार यांच्या नेतृत्वाखाली मराठा विद्या प्रसारक समाज, नाशिक संस्थेने दैदिप्यमान प्रगती केली आहे.

कळीचे शब्द : म. वि. प्र. समाज नाशिक, कर्मवीर डॉ. वसंतराव पवार, शैक्षणिक प्रगती

परिचय :

कर्मवीर रावसाहेब थोरात यांच्या अथक प्रयत्नांतून इ.स. १९१४ साली जुलै महिन्यात नाशिक मधील रविवार पेठेतील कृष्ण गल्लीतील वाईकरांच्या वाड्यात 'मराठा विद्यार्थी वसतिगृह' ची स्थापना केली गेली व 'नाशिक जिल्हा मराठा विद्याप्रसारक समाज' या शिक्षण संस्थेच्या कार्याचा श्रीगणेशा झाला. तेंव्हा या संस्थेची विद्यार्थी संख्या केवळ पाच होती. आज या संस्थेत जवळ-जवळ दोन लाख पन्नास हजार विद्यार्थी शिक्षण घेत आहेत.

उद्दिष्ट्ये :

१. डॉ. वसंतराव पवार यांचा शैक्षणिक क्षेत्रातील कार्याचा व योगदानाचा ऐतिहासिक दृष्टीने अभ्यास करणे.

२. डॉ. वसंतराव पवार यांनी मराठा विद्या प्रसारक समाज, नाशिक या शिक्षण संस्थेच्या विकासात दिलेल्या योगदानाचा सखोल अभ्यास करणे.

३. भावी पिढीला डॉ.वसंतराव पवार यांच्या कार्याची जाणीव करून देणे.

संशोधन पद्धती :

प्रस्तुत संशोधन लेखामध्ये ऐतिहासिक व विश्लेषण पद्धतींचा अवलंब केला असून, शोध लेखातील विवेचन द्वितीय साधन सामग्रीवर आधारलेले आहे यासाठी विविध ग्रंथांचा वापर करण्यात आलेला आहे.

संशोधन साहित्याचे पुनरावलोकन :

डॉ. वसंतराव पवार यांच्यावर पर्याप्त स्वरूपात व सर्वसमावेशक दृष्टीने संशोधन झालेले दिसून येत नाही.

१) श्रीमती पाटील कल्पना सुकदेव यांनी यशवंतराव चव्हाण महाराष्ट्र मुक्त विद्यापीठ, नाशिक येथून इतिहास विषयात एम.फिल. पदवी संपादन करण्यासाठी सादर केलेल्या 'सटाणा महाविद्यालयाचा बागलाण परिसरातील शैक्षणिक कामगिरीचा अभ्यास इ.स. १९६७ ते १९९२ अप्रकाशित लघुशोध प्रबंधातून सटाणा महाविद्यालयाच्या विकासासंदर्भात म.वि.प्र.समाज, नाशिक शिक्षण संस्थेतील डॉ.वसंतराव पवार यांच्या कार्यकाळा विषयी माहिती आली आहे.

२) बोऱ्हाडे शंकर (संपा.), 'शोध : डॉ.वसंतराव पवारांचा' या ग्रंथातून सुहृदांच्या दृष्टीतून, नियतकालिकांच्या पानांतून, कुटुंबियांच्या नजरेतून, कवितांतून आणि मान्यवरांच्या शोकसंदेशांतून डॉ.वसंतराव पवार यांची कार्यशैली, गुण-वैशिष्ट्ये, स्वभाव विशेष, कर्तृत्व आणि लोकप्रियता याविषयी माहिती आली आहे.

३) खैरनार वसंत (संपा.), 'चैतन्ययात्री डॉ.वसंतराव पवार'

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SCHOLAR PUNDITS AT THE COURT OF NAGPUR BHOSALE

Authored By

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SCHOLAR PUNDITS AT THE COURT OF NAGPUR BHOSALE

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Abstract:
Like other rulers of Maharashtra, the Bhosale's of Nagpur had given sanctuary to many learned Pundits in their court. From the reign of Raghuji Bhosale, Nagpur became famous as a center of learning. Pundit Vayakran Kesari Ghule, VeerRaghavacharya, and Krishnashastri Ramanuj, Sadhasiv Ghule, Sitramshastri Kelavkar, author Gangadharshastri Mangulkar, Pundit Ranghacharya, the scholar in all six shastras, Rekha Mathematics teacher- Bapushastri Vaidya, Theologies- Gangadhar Dev, Scholar Pundit Shrikrishnashastri Ghonge, Scholar of poetry- Dajishastri Meharkar, Kirtankar- Gopalji Hardas and Dadaji Sadhu; similarly the first *kirtankar*Laxman Buwa Dake, *kirtankar* Krishna Buwa Paturkar etc. Vitthal Pundits have been honored in his court of the Bhosale's of Nagpur by offering them lands and *Jahangir,* and giving prizes.

Keywords: Scholor Pandit, the Bhosale's of Nagpur.

Introduction:

The Bhosale family is one of the *Kshtriya* families. Many families of Bhosale stayed in Maharashtra. Among them was the clan of Chhatrapati Shivaji Maharaj, one of the branches of this Bhosale family, is the Bhosale family of Nagpur. This branch of Bhosale is known as '***Hingani***' in history.[1] Parsoji Bhosale is the ancestor of Nagpurkar Bhosale Chhatrapati [2]. After Chhatrapati Shahu came to *Swarajya,* Parsoji provided valuable assistant to Chhatrapati Shahu in the struggle with Maharani Tarabai Shahu. For his invaluable contribution, Chhatrapati Shahu conferred on him the title 'Sonsaheb Subha' in 1708 AD and gave him the charter of the province of Vardha-Gondwa. Sonsaheb Subha- Parsoji died in 1709.[3] After Parsoji's death; Chhatrapati Shahu conferred the title of Sonsaheb Subha on Kanoji Bhosale.[4] But the rift arose between Kanoji Bhosale and Chhatrapati Shahu. Consequently, Chhatrapati Shahu assigned Raghuji, the nephew of Kanoji Bhosale, against him. Raghuji captured Kanoji and sent him Satara and being rewarded Saad.[5]During the reign of Raghuji-I, Bhosale's power increased and Nagpur gained glory.

Subject deliberation:

The Bhosale king used to give royal patronage to scholar Pundits in their court; was their admirable quality. Nagpur city became a major center of learning in the first half of the nineteenth century. Nagpur came to be known as a place of learning from the reign of Raghuji Bhosale II. At Nagpur, Pundit Vayakaran Kesari Sadashiv Ghule became a Pundit, was from his native Kashi; came to Nagpur in the year 1816.

During the reigns of Raghuji Bhosale and Appasaheb Bhosale, Veerraghav Acharya and Krishnashastri Ramanuj, two Pundits were in their court and both received royal asylum. Vyankoji Bhosale had Veerraghav Acharya as a Pundit. After Vyankoji, Veerraghav Acharya came to Nagpur and Raghuji Bhosale gave him royal asylum. Veerraghav Acharya, who was a scholar in Bhosale court, has to be mentioned. He had been rewarded twenty three Acers land in Chandrapur and villages like Mahadevwadi, Nagwada and Datala to his province. During the reign of Mudhoji Bhosale, Appasaheb, Krishnashastri Ramanuj was a royal Pundit in the kingdom of his. A Mahapundit (Senior) from Kashi was invited to decide who would be the best Pundits during his time. Finally, Appasaheb invited, Sadashiv Ghule, an eminent Pundit of time, in Nagpur. Upon his arrival in Nagpur, he settled the dispute

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प्रास्ताविक :

सत्यशोधक समाजाचे महाराष्ट्राच्या राजकीय व सामाजिक परिवर्तनामध्ये फार मोठे योगदान असलेले दिसून येते. महात्मा ज्योतिराव फुले यांनी आपल्या धर्म सुधारणा चळवळीला सत्यशोधक समाज हे नाव दिले. महात्मा फुले यांच्या तोंडी सत्यशोधक समाज आणि मानव धर्म हे शब्द प्रयोग दिसून येतात. या शब्दां पैकी शोधक हा शब्द बाबा पदमजी आणि मानव धर्म हा शब्द महात्मा फुलेंनी दादोबा पांडुरंग यांच्यापासून घेतलेला दिसून येतो. इसवीसन १८३२ मध्ये मुंबईचा गव्हनर लॉर्ड कलेयर यांनी असे वक्तव्य केले होते की, भारतीय लोक सत्याची फारशी पर्वा करीत नाहीत. भारतीयांविषयीचा असा अपप्रचार होत असताना सत्यशोधक हा शब्द महात्मा ज्योतिबाना आकर्षक व प्रतिष्ठित वाटला . शूद्रातिशूद्रांना ब्राह्मणांच्या गुलामगिरीतून मुक्त करण्यासाठी आणि त्याच बरोबर बहुजन समाजाच्या सर्वांगीन उद्धारासाठी व मूलगामी परिवर्तन करण्यासाठी चळवळ करण्याचा निर्धार महात्मा फुले यांनी केला. या चळवळीला संघटनात्मक स्वरूप देणे आवश्यक होते त्यासाठी एखादे व्यासपीठ असणे गरजेचे होते. याच विचारातून पुणे येथे २४ सप्टेंबर १८७३ रोजी सत्यशोधक समाजाची स्थापना करण्यात आली. यावेळी ज्ञानगिरी बुवा , तुकाराम पिंजन, बळीराम कुंभार गयानोबा झगडे आणि रामचंद्र भालेकर इत्यादी महात्मा फुले यांचे सहकारी उपस्थित होते.१ सत्यशोधक समाजाची स्थापना केल्यानंतर समाजाचा प्रसार करण्याचे कार्य महात्मा फुले यांनी हाती घेतलेले दिसून येते. अल्पावधीतच सत्यशोधक समाजाचा प्रसार झाला आणि मोठ्या प्रमाणात सभासदांची संख्या वाढली. सत्यशोधक समाजाच्या कार्यासाठी प्रथम जमा झालेल्या सदस्यांची संख्या ३३९ पेक्षा जास्त होती. त्या सभासदांमध्ये रा. बापुजी हरी शिंदे (हेड अकाउंटंट बुलढाणा) यांचाही समावेश होता. सत्यशोधक

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प्रस्तावना

आधुनिक भारताच्या इतिहासामध्ये बंगालच्या फाळणीस महत्त्वपूर्ण स्थान प्राप्त झाले आहे. या घटनेनंतर राष्ट्रीय सभेचे नेतृत्व जहालमतवादी गटाकडे गेले आणि राष्ट्रीय सभेत या गटाचे वर्चस्व निर्माण झाले. भारतीय स्वातंत्र्य चळवळीचे नेतृत्व लाल, पाल आणि बाळ यांच्याकडे आले.

बंगाल प्रांतात त्या काळी बिहार, ओरिसा, छोटा नागपूर या प्रदेशांचा समावेश होता. त्यामुळे बंगाल प्रांत हा प्रादेशिकदृष्ट्या अत्यंत विस्तृत होता. इ. स. १८९९ मध्ये भारताचा व्हॉइसराय म्हणून लार्ड कर्झनची नियुक्ती करण्यात आली. त्याने भारतातील इंग्रजांचे साम्राज्य टिकवून ठेवण्यासाठी आणि भारतातील राष्ट्रवादी चळवळी दडपून टाकण्यासाठी; त्याचबरोबर बंगाल प्रांत म्हणजे भारतातील राष्ट्रीय चळवळीचे मुख्य केंद्र आहे आणि भारतातील हिंदू-मुस्लीम ऐक्य हे ब्रिटिश साम्राज्याला धोक्याचे आहे, असे त्यास वाटत होते. म्हणून त्याने प्रशासकीय सोयीसाठी इ. स. १९०५ मध्ये बंगालची फाळणी केली. त्यातूनच बंगालच्या फाळणीस विरोध करणारी वंगभंग चळवळ संपूर्ण देशभर सुरू झाली आणि त्यातूनच स्वदेशी चळवळीचा उदय झाला. त्याचा प्रसार आणि प्रचार महाराष्ट्रात आणि पूर्व खानदेशसाठी झालेला आपणांस दिसून येतो.

उद्देश

१. स्वदेशी चळवळीतील पूर्व खानदेशच्या सहभागाबद्दल माहिती मिळविणे.
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॥ ज्ञान, साहित्य, संस्कार संवर्धन मंडळाची निर्मिती ॥

Koregaon Education Society Koregaon's

SHANKARRAO JAGTAP ARTS AND COMMERCE COLLEGE, WAGHOLI

Department of History and IQAC

in collaboration with

Satara Itihas Sanshodhan Mandal, Satara

organized

National Seminar and 12th Annual Conference of SISMS

India after Independence and Challenges before Indian Democracy

Certificate

This is to certify that, Prof/Dr/Mr/Mrs **Dr.Ramesh Dhanraj Jadhav** of **R C.Patel ACS College, Shirpur** has actively participated as a Resource Person/Organiser/Delegate in *National Seminar and 12th Annual Conference of SISMS* organized by the Department of History and IQAC in collaboration with Satara Itihaas Sanshodhan Mandal Satara. He/She presented research paper entitled **साताऱ्याच्या छत्रपतींच्या दरबारातील धार्मिक उत्सव एक दृष्टिक्षेप** on Tuesday, 16th November, 2021.

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भारतीय इतिहास संशोधन परिषद, नवी दिल्ली

द्वारा अनुदानित

आष्टी तालुका शिक्षण प्रसारक मंडळ, संचलित

अँड. बी. डी. हंबर्डे महाविद्यालय, आष्टी

आयोजित

अखिल भारतीय इतिहास संकलन योजना, दिल्ली संलग्नीत

इतिहास संकलन संस्था, महाराष्ट्र प्रांत

०१ ले राष्ट्रीय अधिवेशन

दि. ३ व ४ जानेवारी २०२२

॥नामूलं लिख्यते किंचित्॥

आज़ादी का अमृत महोत्सव

प्रमाणपत्र

प्रमाणित करण्यात येते की, श्री./श्रीमती/प्रा./डॉ. Dr Ramesh Dhanraj Jadhav

यांनी दिनांक ०३ व ०४ जानेवारी २०२२ रोजी झालेल्या भारतीय इतिहास संशोधन परिषद नवी दिल्ली, द्वारा अनुदानित

"आधुनिक भारताच्या इतिहासाचे पुनर्लेखन विशेष संदर्भ महाराष्ट्र" या अधिवेशनास उपस्थित राहुन

हरताळ, मिठाचा सत्याग्रह आणि जंगल सत्याग्रह चळवळीत पूर्व खानदेश चा सहभाग:एक दृष्टिक्षेप शोध निबंध सादर केला/सक्रिय सहभाग नोंदविला. करीता हे प्रमाणपत्र देण्यात येत आहे.

डॉ. रवि साताप्पाई	प्रा. धनंजय जवळेकर	डॉ. राधाकृष्ण जोशी	डॉ. सोपान निंबोरे
स्थानिक सचिव	सचिव, इतिहास संकलन संस्था, महाराष्ट्र	अध्यक्ष, इतिहास संकलन संस्था, महाराष्ट्र	प्राचार्य, अँड. बी. डी. हंबर्डे महाविद्यालय, आष्टी

राजर्षी शाहू शिक्षण संस्था संचलित.....

यशवंतराव चव्हाण कला,वाणिज्य व विज्ञान महाविद्यालय

सिल्लोड जि.औरंगाबाद

आयोजित

मराठवाडा इतिहास परिषद

४१ वे (ऑनलाईन) राष्ट्रीय अधिवेशन

प्रमाणपत्र

मा./प्रा.डॉ. डॉ रमेश धनराज जाधव

यांनी दि. ७ व ८ जानेवारी २०२२ रोजी यशवंतराव चव्हाण कला,वाणिज्य व विज्ञान महाविद्यालय,सिल्लोड जि. औरंगाबाद द्वारा आयोजित केलेल्या मराठवाडा इतिहास परिषदेच्या ४१ व्या राष्ट्रीय अधिवेशनास

करवीर छत्रपती संभाजी दुसरे यांच्या काळातील इलामे- एक दृष्टिक्षेप

या विषयावर शोधनिबंधाचे वाचन केले/सक्रिय सहभाग नोंदविला.

करिता प्रमाणपत्र देण्यात येत आहे.

डॉ. झेड. ए. पठाण	प्रा. विजय पांडे	डॉ. प्रविण चव्हाण	डॉ. अशोक पंडित
अध्यक्ष	सचिव	स्थानिक सचिव	प्राचार्य
मराठवाडा इतिहास परिषद	मराठवाडा इतिहास परिषद	मराठवाडा इतिहास परिषद व इतिहास विभाग प्रमुख	यशवंतराव चव्हाण कला,वाणिज्य व विज्ञान महाविद्यालय सिल्लोड जि.औरंगाबाद

मारवाड़ी सम्मेलन संचालित

बी.एम. रुइया गर्ल्स कॉलेज

नैक प्रत्यायित बी+ (तृतीय चक्र)

एवं

सीताराम देवड़ा इंस्टीट्यूट ऑफ मैनेजमेंट स्टडीज़

एस.एन.डी.टी. महिला विश्वविद्यालय, मुंबई से संलग्न

11, कृष्ण कुंज, वाल्का गांधी रोड, गामदेवी, वांट रोड (पश्चिम) मुंबई-400007
Tel : 022 23808130, E mail : bmruia@yahoo.com, Web : bmrgirlscollege.com

सहभागिता - प्रमाणपत्र

यह प्रमाणित किया जाता है कि R.C.Patel ACS College,Shirpur से Dr.Ramesh Dhanraj Jadhav ने **बी.एम. रुइया गर्ल्स कॉलेज के हिंदी विभाग एवं आंतरिक गुणवत्ता आश्वासन प्रकोष्ठ (IQAC)** के सयुंक्त तत्वावधान में "जश्न-ए-आज़ादी:अमृत महोत्सव" राष्ट्रीय ऑनलाइन व्याख्यान-माला-06 के अंतर्गत 27 जनवरी 2022 को "आज़ादी के 75वर्ष: हिंदी साहित्य में राष्ट्रीय और सांस्कृतिक चेतना का विकास" विषय पर आयोजित राष्ट्रीय ऑनलाइन व्याख्यान में सहभागिता की है।

डॉ. सुनीता मिश्रा
(कार्यक्रम संयोजिका)

डॉ. नूरुज़िया क़ाज़ी
(IQAC संयोजिका)

डॉ. संतोष कौल काक
(प्राचार्या)

।। विद्या अमृतम् अश्नुते ।।

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In Collaboration with

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This is to certify that,

Dr./Prof./Mr./Miss. **Ramehs Dhanraj Jadhav** of **आर. सी. पटेल, कला, वाणिज्य व विज्ञान महाविद्यालय, शिरपूर (धुळे)** actively participated & presented a paper entitled **मराठा विद्या प्रसारक समाज, नाशिक संस्थेच्या प्रगतीतील डॉ.वसंतराव पवार यांचे योगदान : एक ऐतिहासिक अभ्यास** in One Day Interdisciplinary National Level E-Conference held on 15/03/2022 at Shri. Manohar Hari Khapane College of Arts & Commerce, Pachal-Raypatan.

Dr. Prakash Masaram I/c Head, Department of History, University of Mumbai	**Prof. Smita Shukla** Honorary Director, ICSSR (WRC), Mumbai	**Sanjay V. Nimbalkar** Asst. Prof. IQAC Coordinator Shri. M. H. K. College of Arts & Commerce, Pachal-Raypatan	**Dr. Pramod. S. Meshram** I/c Principal, Shri. M.H.K.College of Arts & Commerce, Pachal-Raypatan

Swami Ramanand Teerth Marathwada University Nanded And Kisan shikshan Prasarak Mandal Udgirs

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One Day Interdisciplinary International Online Conference

"Father of Indian Women's Education: Mahatma Phule and Sawitribai Phule"

E-Certificate

Date:11/04/2022

This is Certify That Shri/Smt./Dr.**Dr.Ramesh Dhanraj Jadhav**, of **R.C.Patel ACS College,Shirpur** has participated in online one day international Conference on Father of Indian Women's Education: Mahatma Phule and Sawitribai Phule.

We appreciate and acknowledge his / her contribution.

Dr.B.K.More
Editor & Convener

Dr.D.D.Choudhari
Vice-Principal

Dr.Vasant Biradar
Principal

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of

Dept. of History, R.C.Patel Arts, Commerce and Science College, Shirpur.

has successfully completed online TWO-WEEK ONLINE REFRESHER COURSE IN HISTORY

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from *25 August - 07 September 2021* and obtained

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Accredited Grade "B" By NAAC

Certificate of Participation

This is to certify that **Dr.Ramesh Dhanraj Jadhav, Associate Professor** from **R C.Patel ACS College,Shirpur** has successfully participated in the National Workshop on **"Research Methodology and Research Design"** held from 6th to 11th October, 2021, organized by the Internal Quality Assurance Cell (IQAC), J.N.S. Govt. P.G. College, Shujalpur (M.P.), sponsored by the Department of Higher Education, Govt. of M.P. under MPHEQIP – Academic Excellence.

Certificate ID:- XDZ3TA-CE000367

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महाराष्ट्र शासन

महाराष्ट्र राज्य विश्वकोश निर्मिती मंडळ, महाराष्ट्र शासन आणि

पाचोरा तालुका सहकारी शिक्षण संस्था संचलित,

श्री. शेठ मुरलीधरजी मानसिंगका साहित्य, विज्ञान व वाणिज्य महाविद्यालय, पाचोरा, मराठी विभाग,

यांच्या संयुक्त विद्यमाने

मराठी विश्वकोश नोंद लेखन कार्यशाळा

प्रमाणपत्र

प्रा.डॉ. रमेश धनराज जाधव

आर. सी. पटेल महाविद्यालय, शिरपूर, जि. धुळे यांनी

महाराष्ट्र राज्य विश्वकोश निर्मिती मंडळ, महाराष्ट्र शासन आणि मराठी विभाग, श्री. शेठ मुरलीधरजी मानसिंगका साहित्य, विज्ञान व वाणिज्य महाविद्यालय, पाचोरा, यांच्या संयुक्त विद्यमाने दि. ११ मार्च २०२२ रोजी आयोजित मराठी विश्वकोश नोंद लेखन कार्यशाळेत सहभाग घेतला. त्याबद्दल हे प्रमाणपत्र प्रदान करण्यात येत आहे.

वासो वते.

प्रो. डॉ. वासुदेव सोमाजी वते

प्रभारी प्राचार्य

श्री. शेठ मुरलीधरजी मानसिंगका साहित्य, विज्ञान व वाणिज्य महाविद्यालय, पाचोरा, जि. जळगाव

मा. डॉ. शामकांत देवरे

(सचिव, महाराष्ट्र राज्य मराठी विश्वकोश निर्मिती मंडळ, उपसंचालक, राज्य मराठी विकास संस्था)

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(अध्यक्ष, महाराष्ट्र राज्य मराठी विश्वकोश निर्मिती मंडळ)

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In Association with

K. B. C. North Maharashtra University, Jalgaon

Syllabus Restructuring E-Workshop

This is to certify that **Dr.Ramesh Dhanraj Jadhav** of **R.C.Patel ACS College,Shirpur** has participated in **"One day Syllabus Restructuring E-Workshop for F.Y.B.A. History"** organized by D.M.E.S. Arts and Science College, Amalner in association with Board of Studies in History, K.B.C. N.M.U., Jalgaon **on 20 January 2022.** This certificate is issued in appreciation of his / her active participation in the Workshop.

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in Association with

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This is to certify that, **Dr Ramesh Dhanraj Jadhav** of **R.C.Patel ACS College,Shirpur** has participated in "**One day syllabus restructuring workshop for MA History**" organized by Smt. V. U. Patil Arts & Late. B. S. Desale Science College Sakri in Association with Board of Studies in History, K.B.C.N.M.U. Jalgaon on **8 February 2022** this certificate is issued in appreciation of his /her active participation in the workshop.

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The Role of Law in Women Empowerment

Dr. Ramsing RajyaVasave
Asst.Professor Dept. of Political Science
R.C.Patel Arts Commerce and ScienceCollege Shirpur Dist. Dhule

Abstract:-

Law is tool for social change. But just making law does not change the mentality of the society. Political, social, economic, education and cultural is as need to be changed. Therefore, the rule of law should be established and women be given maximum participation in the decision making process. This right should be from family to parliament and this should be the fair share of women.

Keyword-Role, Law ,Women, Empowerment.

Introduction :-

India is know as the largest democracy in the world. The constitution of India has be drafted with the objective of revolutionary thinking. The constitution is the supreme law of the land. The constitution of independent India enshrines the principles of freedom, equality and fraternity. But the social structure of India is based on the differences of religion, rich-poor, land lord- landless, men and women. In such a heterogeneous and steep social structure, women have the lowest position. The constitution of this country , that is the supreme law has taken the fat to eliminate this inequality and establish equality.

Even though India has completed 75 years of independence, the benefits of this independence still cannot be fully enjoyed by large section of the Indian society like women. Many efforts were made at the national and state level for the protection and empowerment of women. But the incidence of women's rights violations is increasing. Gender inequality is exploited. As a result, women's issues need to be considered more sensitively women's empowerment is part of the broader.

Meaning of women Empowerment:-

- Mentioned as a concept, process movement of women empowerment.
- The concept that advocates for women's rights.
- The provides women with equal opportunities for development & progress alongside men.
- The international movement to create a new system based on gender equality by eliminating the heterogeneous society based on gender.

The main objective of women empowerment is to improve the quality of physical, mental and emotional life of women, as well as to give women equal rights and privileges in the political, economic, social and cultural spheres.

A Brief History of Women Empowerment:-

Although the process of women empowerment gained momentum in the twentieth century, it began with the American Declaration of independence and the French Declaration of individual freedom which provided for equal rights for men and women. In the 18th century, Mary wool stone Kraft, a well known British Author for women empowerment. Presented the award for women's rights in her book, 'Vindication of the Rights of Women'. In the 19th century, writers like card stanhome, will. I am Thompson, Harriet Taylor, John Stuart mill tried to inculcate the idea of feminism in the society of that time. Down in India in the late 19th century and equal 20th century, Mahatma Fule, Dr. Babasaheb Ambedkar, justice Rande, Gopal, Ganesh Agarkar, Dhondokeshav Karve and other social reformers

वर्ष 12, अंक 40, जनवरी -मार्च 2022

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8. नन्द चतुर्वेदी, डब्ल्यू. डी.आर-62 ए, ब्लाक कालोनी बैढ़न, जिला-सिंगरौली म.प्र. 486886, मो. 097529964467
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स्थापित करने का है। ऐसे में इन परीक्षाओं का 60 प्रतिशत पाठ्यक्रम सामाजिक अध्ययन विषय पर आधारित होता है, जो इस विषय की शैक्षिक स्तर पर महत्वपूर्ण स्थिति का तार्किक आधार है। ऐसे में अगर माध्यमिक स्तर पर इस विषय के पाठ्यक्रम पर समुचित ध्यान नहीं दिया जाने के कारण बहुत से योग्य एवं प्रतिभावान विद्यार्थी इस दौड़ में पिछड़ जाते हैं और कुसमायोजन का षिकार हो जाते हैं। ऐसी षैक्षिक व्यवस्थाओं के चलते प्रस्तुत शोध के प्राप्त निष्कर्ष शिक्षाव्दिों का ध्यान इस ओर आकर्षित करने में सफल हो सकेगा और अगर इस शोध के आधार पर षिक्षा विभाग, अध्यापक वर्ग, शिक्षार्थी, अभिभावकों में थोड़ी भी सजगता आती है तो शोधकर्त्री के द्वारा किए गए प्रयास की सार्थकता सिद्ध हो जाती है, क्योंकि चुप रहकर कुसमायोजन का शिकार होने से अच्छा है सोयी व्यवस्था पर उग्रता और आक्रोष प्रकट करना है, जिसमें कम से कम बुद्धिषील प्राणी इस क्षेत्र में सोचने के लिए मजबूर हो जायें।

प्रस्तुत शोध का प्रमुख उद्देश्य ये ही है कि विषय की उपयोगिता को देखते हुए विद्यालय स्तर इसकी शिक्षण व्यवस्था पर विभाग एवं समाज का ध्यान आकर्षित किया जावें एवम् सुधार की ओर व्यवहारिक कदम बढ़ाया जावें।

शिक्षा, समाज एवं राष्ट्र उत्थान के क्षेत्र में निरन्तर उर्ध्वगामी विकास हो इसके लिए आवष्यक है कि षिक्षा के क्षेत्र में अनुसंधान के माध्यम से षिक्षकों से जुड़ी विभिन्न समस्याओं का पहचान कर उनके कारणों एवं तथ्यों की खोज की जाये। शोधकर्त्री को आषा ही नहीं अपितु पूर्ण विष्वास है कि प्रस्तुत शोध कार्य से विद्यालय, समाज, घर-परिवार सभी स्तरों पर सकारात्मक दृष्टिकोण का विकास सम्भव होगा।

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6.वही

वैश्विक धरातल पर आतंकवाद : मानवता के समक्ष एक गम्भीर चुनौती

-डॉ.पवार राजू सीताराम

एसोसिएट प्रोफेसर,संरक्षणशास्त्र विभाग,
आर.सी.पटेल कला,वाणिज्य एवं विज्ञान महाविद्यालय,
शिरपुर जि.धुलिया-425405 मो.9822651742

प्रस्तावना :-

वैश्विक धरातल पर आतंकवाद सृष्टि के निर्माण के साथ अवतरीत नहीं हुआ है। वास्तविकता यह है कि व्यक्ति को बांटने की मानसिकता, आर्थिक वर्चस्व को कायम रखने में तथा उसे बनाये रखने में वर्चस्व वाद की लालच का परिणाम है। आतंकवाद बीसवीं सदीका हिंसक एवं अमानवीय कृत्य साबित हुआ भय एवं छल की राजनीती से निर्माण हुआ आतंकवाद जहाँ एक राष्ट्र का दूसरे राष्ट्र पर वर्चस्व कायम करने के लिये घुसपैठीयों को माध्यम बनाने की नियत से सुरुवात कुछ आतंकवाद को बीज खाद एवं पानी उपलब्ध कराने वाले देश को भी इसका इन हद्सो के बाद अमेरिका का आक्रोशित होना स्वाभाविक था। पुरे विश्व को सकते में डालने वाले अमेरिका पर डर का माहोल बन गया दुनिया का सबसे बडा देश जिसकी सुरक्षा को सिधी चुनौती मिली आज पुरी दुनिया आतंकवादी गतिविधीयों से त्रस्त है ओर एक सामान्य व्यक्ति से लेकर अमेरिका जैसे बाहुबली राष्ट्र इससे भयभयीत ओर अव्यवस्थित हो गया हर तरफ राष्ट्रीय अंर्तराष्ट्रीय सभा संमेलन ओर संगठ्नो में आतंकवाद के विरोध में स्वर जिस गति से बढते जा रहे है, उससे अधिक गति से उसका काला साया चारों तरफ फैलता जा राहा है। आतंकवाद का अर्थ है हिंसा के द्वारा लोगों को आतंकित करना ओर अपनी जायाज-नाजायाज मांग मनवाने के लिये चुनी हुई सरकारों के खिलाफ हिंसा का प्रयोग करना अथवा हिंसा के माध्यम से किसी काम को करना या करवाना है। वैश्विक परिदृश्य में दो महायुद्धों में तथा शीत युद्ध की समाप्ती के बाद आतंकवाद बृहद स्तर पर एक बहुआयामी परीघटना के रूप में समय-समय पर विभिन्न राष्ट्रों के सामाजिक, आर्थिक एवं राजनैतिक क्षितीज पर उदधृत हुआ जिसकी कार्य शैली में राजनीति तथा शक्ति परिधी में समय नुसार विश्व के सामने मानवता के समक्ष एक गम्भिर चूनौति है, जिसका प्रभाव पुरी मानव जाति के समक्ष खडी है।

उद्देश्य :-

१. वैश्विक धरातल में आतंकवाद का भय मानवता के समक्ष एक गम्भीर चुनौति का अध्ययन करना।

२. वैश्विक धरातल पर आतंकवाद की गतिविधियों का एवं तंत्र का अध्ययन करना।

३. वैश्विक शान्ति के लिये आतंकवाद के कारण, परिणाम, उपाय एवं विभिन्न राष्ट्र व्दारा किये प्रयासो का अध्ययन करना।

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लोक कल्याणकारी ट्रस्ट, वाराणसी

कला सरोवर

KALA SAROVAR

(भारतीय कला एवं संस्कृति की विशिष्ट शोध पत्रिका)

प्रधान सम्पादक
डॉ० प्रेमशंकर द्विवेदी

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कला सरोवर

कला एवं धर्म शोध संस्थान, वाराणसी द्वारा संचालित

कला सरोवर (त्रैमासिक)

भारतीय कला एवं संस्कृति की विशिष्ट शोध पत्रिका

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★

Naxalism –A Threat to India's Internal Security

★ Dr. Raju Sitaram Pawar

Abstract:

The aim of this research paper is to understand how the Naxalism pose threat to the internal security of the nation. Naxalism in India has shown discrimination of values by disbelieving in Indian constitution and democracy. This armed revolution within the county- now days known as Fourth Generation of Warfare. Naxalism in the last fifty years on the one hand armed struggle is going on in rural areas while in urban areas Naxalism is flourishing under various guises.According to the report of Global Terror Index, Sydney,in 2016, Maoist was ranked fourth in the world in terms of terrorists. It came only after the Taliban, ISIS, and Boko Haram. In 2016, Maoist terrorists carried out 929 attacks in India, killing 340 innocents. Out of the total number of terrorist organizations in the country, 43% were Maoist. In Gondia and Gadchiroli district, 523 police personnel have been killed so far and more than 700 innocent tribal have been killed. It is concluded that Maoists and their philosophy as well as political aims are keeping illusions in the minds of youths and are brain washed with foolish ideas to revolt against the country people and security forces.

Key Words: Naxalism, Maoists, Communism, Revolution, Armed Movement, Anti-India Sentiments.

In India. Naxalism has emerged as one of the major threats to India's internal security since independence. The communist organization came together in 1967 to oppose the exploitation of the poor agricultural labors and forest dweller the oppression of poor by rich landlords. the government's capitalist policy and to bring justice to the oppressed masses. It was form this ideology that the bloody movement began. The so called naxalite revolution that started in west Bengal is still going on today and has spread in many parts of the country. The movement which started with the noble cause of communism deviated from its original purpose as it becomes armed. The movements continue with the collection of ransoms from politicians and movement poses a great threat to Indian internal security.

Objectives:

1. To study Naxalite threats to national security
2. To understand the history and background of the Naxalite movement
3. To study the effect of Naxalism on security
4. To study the causes solutions and facts of Naxalism

Naxalist Movements:

The main aim of the Maoists is to seize power by any means. They use elements from all walks of life for their destructive purposes. It was to spread communism, but deviated in the course of time. It started poisoning the minds against national ideology and proved to be a threat to the national security.

The efforts by Federal and States governments failed to eradicate the Naxalism despite of all expenditure and the cost of lives of innocent civilians and security personnel. Unlike Shri Lanka, India could not overcome the Naxalism though having a strong para- military and police force. Moreover it spread from tribal to urban areas. Today Naxalite groups and their supporters are alive in 220 district s in 20 states of the country. This Red belt is a tribal dominated area. It

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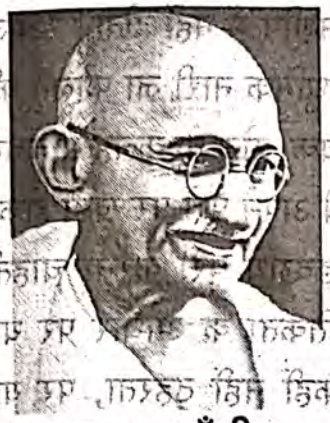
इस अंक में....

मुखचित्र - अमर शहीद जनरल विपिन लक्ष्मणसिंह रावत

गाँधी चिन्तन में नारी-विमर्श



महात्मा गाँधी

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डॉ.अनिता बी.जाधव
(हिन्दी विभाग)

प्रस्तावना

प्रस्तुत शोध आलेख में गाँधी चिंतन के रूप में नारी-विमर्श की संकल्पना की गयी है। महात्मा गाँधीजी के अनुसार समाज के लिए नारी-पुरुष एक ही सिक्के के दो पहलू हैं। नारी-पुरुष में भेदभाव या असमानता के कारण परिवार और समाज का अहित हो सकता है। जितना पुरुष को अधिकार है उतना ही नारी को है। नारी प्रेम, करुणा, उदारता, क्षमाशीलता, सेवा, समर्पण और सहिष्णुता जैसे सद्गुणों की मूर्ति है। नारी-स्वतंत्रता के परिप्रेक्ष्य में महात्मा गाँधीजी ने कहा है कि लिंगभेद, अशिक्षा, दहेज, भ्रूणहत्या, वेश्यावृत्ति जैसी कुप्रथायें जो नारियों की गिरी दशा या नाटकीय परिस्थिति हेतु जिम्मेदार हैं। नारी के प्रति पूज्य भाव इन दिनों कुदृष्टि के रुप में बदला है और वासना की आग में झोंककर काला कोयला बना दिया गया है।[1]

उद्देश्य :

१. स्त्री-पुरुष समानता देश के विकास में महत्वपूर्ण है, दिखाना।

२. नारी-जाति का दुरुपयोग दूर करना।

३. पुरुषवादी मानसिकता को बदलना, नारी भोग की वस्तु एवं गुलाम नहीं, स्थापित करना।

४. सीता या द्रौपदी जैसी नारी को आदर्श मानना इसलिए नहीं कि ये धार्मिक पात्र हैं, बल्कि इसलिए कि ये दोनों साहसी थीं और दोनों प्रतिरोध करना जानती थी।

५. रूढ़ी और परंपरा के दोषों पर आपत्ति उठाना।

६. नारी से अहिंसा, सत्याग्रह की प्रेरणा ग्रहण करना।

७. पुरुष-दासता का विरोध।

वर्तमान समाज में आज भी नारी की स्थिति भयावह है, भ्रूणहत्या, दहेज-प्रथा, बालविवाह, बेमेल-विवाह, अशिक्षा जैसी समस्याओं के कारण नारी की दशा दिन-प्रतिदिन बिगडती जा रही है।

इन सभी समस्याओं के संदर्भ में महात्मा गाँधीजी के चिंतन के माध्यम से हमें सोचना पड़ता है कि स्वस्थ समाज से ही स्वस्थ राष्ट्र का निर्माण

१. अखण्ड ज्योति, सं.डॉ.प्रणव पांड्या, अखंड ज्योति संस्थान, छायामण्डी, मथुरा, २०११, पृ.सं.५-६

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प्रथम अंक

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ITIHAS DARPAN

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जानेवारी २०२२

अखिल भारतीय इतिहास संकलन योजना की शोध पत्रिका
आपटे भवन, केशव कुंज, झंडेवाला, नई दिल्ली - ११० ०५५

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अनुक्रमणिका

कंपनी सरकारकालीन खानदेशातील भिल्ल जमातींचा उठाव

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भारतीय इतिहासलेखनात प्राच्यविद्या विचार प्रवाह, साम्राज्यवादी विचार प्रवाह, राश्ट्रवादी विचार प्रवाह आणि मार्क्सवादी विचार प्रवाह इत्यादी प्रवाह दिसून येतात. मागील काही वर्शापासून इतिहास लेखनशास्त्रात नवी विचारसरणी रूजू झालेली दिसते. इतिहास लेखनशास्त्रामध्ये संपूर्ण इतिहासावर जास्त महत्व दिसते. अखिल मानवी इतिहासाचा उहापोह करण्यात यत्न म्हणजे संपूर्ण इतिहास होय. इतिहास म्हणजे थोरांची चरित्रे ही कार्लाईलने मांडलेला विचार कालबाह्य झालेला दिसतो. अस्सल इतिहास हा फक्त काही विशिश्ठ कामगिरीवर सिमीत न राहता सामान्य लोकांच्या इतिहासावर अवलंबून असतो. समग्र इतिहास हा केवळ राजकीय, आर्थिक घटनांचे दर्शन घडवित नसून सामाजिक व सांस्कृतिक घटनांवर प्रकाश टाकण्याचा त्यातून जाणिवपूर्वक प्रयत्न केला जातो. अलिकडच्या काळात इतिहास संशोधनात महत्वाची होऊ पाहणारी पध्दती म्हणजे Subaltern Studies ही होय. यात 'गोशीत, पददलीत, उपेक्षित, दुर्लक्षितांचा इतिहास मांडला जात आहे. कनिश्ठ वर्गातील 'गोशीत, उपेक्षित, दुर्लक्षित इत्यादी घटकांवर विशेश लक्ष दिलेले दिसते. खानदेशातील 'गोशीत, उपेक्षित, दुर्लक्षित भिल्ल जमातींनी इंग्रज सत्तेविरूध्द स्वातंत्र्ययुध्द पुकारून आपला स्वतंत्र इतिहास निर्माण केला आहे. परंतु स्वातंत्र्य संग्रामाच्या इतिहास भिल्ल जमातींचा इतिहास उपेक्षित, दुर्लक्षितच राहिला.

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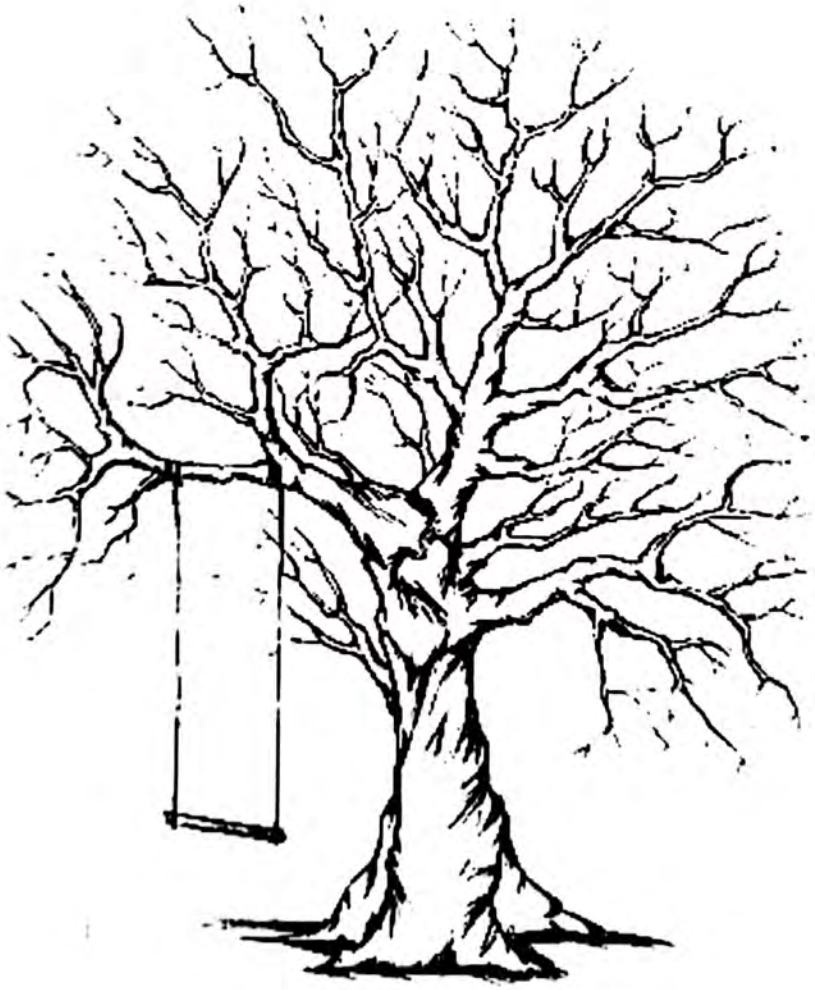

कवी आणि संपादक पुरुषोत्तम पाटील यांच्या स्मरणार्थ
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कविता-रती

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प्रकाशक

" सुजय प्रकाशन "

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आदिवासी जमातींचे भारतीय स्वातंत्र्य लढ्यातील योगदान

प्रा. डॉ. आर. एस. पवार

संरक्षणाशास्त्र विभाग प्रमुख, आर.सी.पटेल कला, वाणिज्य व विज्ञान महाविद्यालय, शिरपूर जि . धुळे, महाराट्र

प्रस्तावना

भारतीय स्वातंत्र्याचा लढा सुरू झाला आणि साराच भारत देशप्रेमाने भारून गेला. स्वातंत्र्य मिळविल्याशिवाय थांबायच नाही. भारत भूमीच्या कानाकोपऱ्यातून असंख्य आदिवासीनी आपला प्राण गमविला, लाठ्या, तुरूंगवास भोगला त्यात महिलाही मागे नव्हत्या. प्रत्येक आदिवासी भूभागातून इंग्रजांविरूध्द लढा सुरू होता. या स्वातंत्र्य लढ्याच्या प्रेरणादायी इतिहासातून बऱ्याच आदिवासींचे योगदान दिसत नाही. अशा आदिवासी महिला व बांधवांचा स्वातंत्र्य लढ्यातील योगदानावर प्रकाश टाकणे हा अध्ययनाचा मूळ वि ाय आहे. १८१८ साली पेशवाईचा ोवट होवून महारा ट्र सहित संपूर्ण भारतावर इंग्रजांची सत्ता प्रस्थापित झाली. भारतीय स्वातंत्र्य लढ्याचे पर्व तेजस्वी व प्रेरणादायी आहे. जगाच्या इतिहासातील पहिला मोठा स्वातंत्र्य चळवळीचा लढा फक्त याच देशात उभा राहू ाकला कारण भौगोलिक भिन्नता असलेल्या गौरवाशाली भूमितून आदिवासी बांधवाचे बलिदानाचे योगदान महत्वपूर्ण आहे. सारा देश महात्मा गांधीजींच्या नेतृत्वाखाली लढा देवून स्वातंत्र्य मिळविले. प्रत्येक भारतीय १५ ऑगस्टला स्वातंत्र्य दिन साजरा करतो.

उद्देश

१. भारतीय स्वातंत्र्य लढ्याचा अभ्यास करणे.
२. स्वातंत्र्य लढ्यातील आदिवासींचे इंग्रजांविरूध्द बंडाचा ोध घेणे.
३. स्वातंत्र्य लढ्यातील प्रमुख आदिवासी जातीच्या लढाऊबाणा, युध्दतंत्राचा ोध घेणे.
४. स्वातंत्र्य लढ्यातील आदिवासी जमातीच्या काही लढाईचा ोध घेणे.

गृहितके

१. स्वातंत्र्य लढ्यातील आदिवासी जमातीचे योगदान महत्वाचे मानले गेले.
२. आदिवासी जमातींचा लढाऊबाणा, त्यांची युध्दतंत्राची एक नवी ओळख इतिहासात समावि ट करावी लागेल.

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॥ श्री विश्वनाथो विजयते ॥
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।। संशोधक ।।

● मार्च विशेषांक : २०२२ ● पुरवणी मराठी विशेषांक ०२

● प्रकाशक ●

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* अनुक्रमणिका *

" भारताच्या अंतर्गत सुरक्षेतील मानसिक आरोग्य एक सामाजिक समस्या "

प्रा. डॉ. आर. एस. पवार (असोसिएट प्रोफेसर)
संरक्षणशास्त्र विभाग
आर. सी. पटेल महाविद्यालय शिरपूर जिल्हा-धुळे.
मोबा: ९८२२६५१७४२, ७६२०२२३०३५
Email : rspawar1742@gmail.com

प्रस्तावना –

भारताची अंतर्गत सुरक्षा अनेक सामाजिक समस्यांनी असुरक्षित झाली आहे विज्ञान तंत्रज्ञानाच्या प्रगती बरोबर मानवी व सामाजिक विकास आवश्यक आहे परंतु मानवी अंधश्रद्धा,अज्ञान,रूढी,परंपरा, अशाश्त्रीय कल्पना, मानसिक आरोग्य, ताण तणाव इत्यादी पासून अनेक समाजिक समस्या निर्माण झाल्या आहेत.आज भारतामध्ये अतिरिक्त लोकसंख्या, दारिद्र,भ्रष्ट्राचार,मादक पदार्थ सेवन, बेरोजगारी, भिक्षावृत्ती, मद्यपान,अस्पृशता वेश्याव्यवसाय,आणि गेल्या दोन वर्षाच्या कालावधीतील कोरोना महामारीच्या पार्श्वभूमीवर मानवाची बदललेली जीवनशैली नोकऱ्या आरोग्य यामुळे समाजात मानसिक आरोग्याचा प्रश्न मोठ्या प्रमाणावर वाढत आहे त्याकडे लक्ष देण्याची नितांत गरज असल्याचे तज्ञ डॉक्टर व मानसतज्ञ यांचे स्पष्ट मत आहे .समाजात आजचा तरुण मानसिक आजाराने त्रस्त आहे त्यामुळे भारतात सुरक्षिततेची गंभीर सामाजिक समस्या निर्माण झाली आहे. वर्ड फेडरेशन फॉर मेंटल हेल्थचे अध्यक्ष डॉ.इग्रीड डेनियल्स यांनी २०२१ च्या जागतिक मानसिक आरोग्य दिनाच्या निमित्ताने ङ्ग एक असमान जगात मानसिक आरोग्य ङ्ग घोषित केले परिणामी जगात कुणीही सुरक्षित नाही जवळ पास प्रत्येक १०० पैकी २५ मानसिक आजारांनी ग्रस्त आहेत त्यातून सामाजिक सुरक्षा पुन्हा एकदा धोक्यात आली. साधरण पणे दृष्ट्रीक्षेप, स्मृतिभ्रंश,चिंता स्वयपुर्णता अश्या मानसिक आजारांनी तरुणाईला ग्रासले आहे. देशाची अंतर्गत सुरक्षा धोक्यात आली आहे आज समाज सुरक्षित नसेल तर राष्ट्र सुरक्षित राहू शकत नाही. प्रस्तुत अध्यय नात भारताच्या अंतर्गत सुरक्षेतील मानसिक आरोग्य एक सामाजिक समस्या वर अभ्यास विवेचन केले आहे.

उद्देश–

१. भारताच्या अंतर्गत सुरक्षेतील सामजिक समस्यांचा अभ्यास करणे.

२. भारतातील मानसिक आरोग्य बाबत माहिती मिळविणे.

३. कोरोना काळातील मानसिक आरोग्याची तीव्रता तपासणे.

४. भारतीय सुरक्षेतील सामाजिक समस्या मानसिक आरोग्य यावर उपाय सुचविणे .

गृहीतके–

१. भारतात सामाजिक सुरक्षिततेतील मानसिक आरोग्य मोठी गंभीर समस्या आहे .

२. मानवी सुरक्षा सामाजिक सुरक्षेच्या समस्येचे प्रमाण भारतात जास्त आहे .

३. कोरोना काळात मानसिक आरोग्य अत्यंत प्रभावी प्रश्न निर्माण झाला

४. मानसिक आजार विषयी भारतीय समाजात अंधश्रद्धा आहेत.

मुख्य शब्द –

सदर अध्ययनात अतिविशेष मुख्य शब्द भारताची अंतर्गत सुरक्षा , मानसिक आरोग्य ,सामजिक समस्या ,कोरोना महामारीचा काळ या महत्वाच्या शब्दांचा उपयोग केला आहे जेणेकरून संपूर्ण माहितीच्या आशयाचा तात्काळ बोध होईल.

संशोधन पध्दती–

प्रस्तुत शोध अध्ययन भारताच्या अंतर्गत सुरक्षेतील मानसिक आरोग्य एक सामाजिक समस्या विषयी लेखन विस्तार करिता

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कला, मानविकी एवं वाणिज्य की मानक शोध पत्रिका

दृष्टिकोण प्रकाशन

पाकिस्तानी आण्विक क्षमता का भारतीय सुरक्षा पर प्रभाव - एक अध्ययन

डॉ० राजु सिताराम पवार

असोशिएट प्रोफेसर, रक्षा अध्ययन विभाग, आर. सी. पटेल कला, वाणिज्य व विज्ञान महाविदयालय, शिरपुर जि. धुलियॉ, महाराष्ट्र

प्रस्तावना

विश्व में शीतयुद्ध समाप्ती तथा सोवियत संघ विघटन के बाद अपने आर्थिक विकास की कीमत पर अणुबम बनाने का रहस्य के पिछे पाकिस्तान की भावना किसी से छिपी नही, क्योंकि अफगाण, चीन, इराक तो पाकिस्तान के निशाने नही हो सकते इसका एकमात्र निशाना भारत ही हो सकता है। अ राजनीति और राजनियकता को विगत 46 वर्षो में अनेक घटकों ने प्रभावित किया है, जिसमें सबसे पहले प्रभावित करनेवाला तत्व आण्विक है, 18 1974 के शांतीपुर्ण आण्विक भूगर्भीय पोखरण विस्पोट के बाद पाकिस्तान ने वास्तविक रूपसे परमाणु बम बनाने का संकल्प किया तभी तो जुल्फीकार भुटटो को कहना पडा की, भले ही पाकिस्तान को घास की रोटी खानी पडे परंतु पाकिस्तान परमाणु बम बनायगा।

उद्देश्य -

1. पाकिस्तानी आण्विक क्षमता का अध्ययन करना।
2. पाकिस्तानी आण्विक क्षमता का भारत पाक संबंधो का अध्ययन करना।
3. परमाणु अप्रसार नीति एवं सी.टी.बी.टी. संधियो को उजागर करना।
4. पाकिस्तानी आण्विक क्षमता का भारतीय सुरक्षा पर प्रभाव का अध्ययन करना।

परिकल्पना -

1. पाकिस्तानी आण्विक क्षमता का भारतीय सुरक्षा पर गहरा प्रभाव दिखाई देता है।
2. पाकिस्तानी आण्विक क्षमता का खतरा न सिर्फ युध्द के समय, बल्कि शांती के समय पर भी भारतीय सुरक्षा प्रभावित होती है।
3. पाकिस्तानी आण्विक क्षमता का संकट न केवल भारतीय सुरक्षा पर नहीं बल्कि घातक हथियारों की पहुँच खुँखार आंतकवादी संघठनों के हा को लेकर है।

पुर्ववर्ती संशोधन कार्य

डॉ. खन्ना व्ही एन इन्होंने भारत की विदेश नीति इस ग्रंथ में भारत तथा पाकिस्तान की विदेश संबंधोपर प्रकाश डाला हुआ है। प्रो. लल्लनजी सिंह आधुनिक सैनिक चिंतक इस ग्रंथ में आधुनिक विश्व के सैन्य दलो का अध्ययन किया है। मिश्र सुरेद्र एवं मिश्र आकाश इन्होंने भारत पाक संबंध एक स विश्लेषण इस ग्रंथ में पाकिस्तानी आण्विक क्षमता का अध्ययन किया है।

उपरोक्त अध्ययन से यह पता चलता है कि, पाकिस्तानी आण्विक क्षमता का भारतीय सुरक्षा पर प्रभाव यह विषय पर अधिक अध्ययन नही हुआ है। इ मेरा यह प्रयास रहा है कि पाकिस्तानी आण्विक क्षमता का भारतीय सुरक्षा पर क्या प्रभाव पडा है इस विषय पर अध्ययन किया जायेगा।

विषय विवेचन

पाकिस्तान के परमाणु कार्यक्रम से यदी विश्व का कोई राष्ट्र अधिक चिन्तित है वह भारत है, इस कार्यक्रम से जुडे भारतीय सुरक्षा को चुनौती से के भविष्य के बारे में एक सोच पैदा कर देता है, यह कार्यक्रम किस सीमा तक भारतीय सुरक्षा को प्रभावित करेगा यद्यापि पाकिस्तान एक परमाणु राष्ट्र है और चीन अमेरिका का साया रहता है तो भारत-पाकिस्तान जंग में परमाणु शक्ति का प्रयोग करेगा। पाकिस्तान का परमाणु कार्यक्रम न केवल के घेरे में घिरा हुआ है बल्कि उसके कमांड कंट्रोल, कम्युनिकेशन व्यवस्था जिस कदर कटटरता के कुचक्र में जखडती जा रही है, इससे भारत दक्षिण सहीत विश्वशांती एवं सुरक्षा को सीधे चुनौती मिलती है।

1974 के शांती पूर्ण आण्विक भूगर्भीय पोखरण विस्फोट के बाद पाकिस्तान ने वास्तविक रूपसे परमाणु बम बनाने का संकल्प किया सन्मानजनक और भारत से हुए पराजय में परमाणु बम बना रहा है, उसके मुताबिक सभी जातियों के पास परमाणु हाथियार है तो इस्लाम पीछे क्यों? लिबिया, इराण,

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Maya Angelou: A Voice for Marginalized

Rajnikant V. Sonar, Shirpur, Dhule

Abstract : Maya Angelou is an African American poetess who contributed in the numerous fields with a single purpose to voice the agony of black community in general and black womanhood in USA. Apart from the unfortunate experiences in her life, her love for life and dedication to the principles never got defeated. For her poetry became a weapon to fight against the oppression and injustice caused due to the racism.

Keywords : Black, Womanhood, Oppression, Racism, Marginalized.

Maya Angelou: An Introduction :

Maya Angelou (Born in 1928 in St. Louis, Missouri) is one of the most celebrated poet-activists in America in 20th century. She was a perfect voice of the twentieth century America that stands against the oppression, victimization, exploitation and marginalization on the basis of race, colour, gender, nationality, religion. She was a perfect companion of Martin Luther King, Jr. Maya was a voice for womanhood.

Maya Angelou was a versatile personality. She was a poet, writer and autobiographer. She was an essayist, editor and play wright. She was a dancer, actor and music composer. She was an activist at the same time. She, as an activist worked with Martin Luther king Jr. and Malcom X. She even contributed as an educator, by working as Reynolds professor of American Studies in Wake Forest University.

She was a proud recipient of several awards including National Medal of Arts and Presidential Medal For Freedom, which is the highest civilian honour in U.S.A. She had received nearly fifty honorary degrees in her life time.

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लोककवी वामनदादा कर्डक विशेषांक

वामनदादा कर्डक यांच्या काव्यगीतातील आंबेडकरी तत्वविचार

- डॉ. सुधाकर सिताराम चौधरी
(मराठी विभागप्रमुख)
आर. सी.पटेल कला, शास्त्र व
वाणिज्य महाविद्यालय शिरपूर, जि. धुळे
९९२३२२१७२०
sschadhari75@gmail.com

वामनदादा कर्डक यांच्यावर डॉ. बाबासाहेब आंबेडकरांच्याविचारांचा मोठा पगडा दिसतो. आंबेडकरी मानव मुक्तीचे परिवर्तनवादी विचार समाजामध्ये प्रसरवण्याचे कार्य आयुष्यभर वामनदादा करीत राहिले. त्यांनी आंबेडकरी विचार आपल्या एकूणच समस्त समाजाचा मानव मुक्तीचा विचार आहे आणि तो विचार घेऊन आपण पुढे गेले पाहिजे. हेच आपल्या जीवनाचे मुख्य सूत्र आहे हे त्यांनी ठरवून टाकले होते हा आंबेडकरी विचार समाजात प्रसूत करण्यासाठी त्यांनी आपल्या काव्यगीतांचा आधार घेतला. अनेक गझला त्यांनी लिहिल्या, अनेक गीते त्यांनी आंबेडकरी विचारांना वाहून लिहिले आपल्या काव्याचे प्राणभूत तत्त्व आंबेडकरी तत्वविचार आहे असे त्यांनी सांगितले आपल्या काव्यनिर्मिती प्रेरणा स्पष्ट करताना वामनदादा म्हणतात की, डॉ. बाबासाहेबांचा विचार, त्यांचे जीवन व कार्य हेच आहे असे प्रामाणिकपणे कबूल करतात. माझ्या जीवनाचे मुख्य इप्सित हे बाबासाहेबांचा विचार समाजातील तळागाळापर्यंत, शोषित लोकांपर्यंत पोहोचवणं हाच आहे. याविषयी उत्तम कांबळे म्हणतात, वामनदादांच्या बोलण्यात भीम, वागण्यात भीम, जगण्यात भीम, गाण्यात भीम, आयुष्याच्या प्रत्येक श्वासात भीम, लढण्यात भीम, प्रत्येक प्रश्नांच्या इलाजासाठी भीम असे एक भारावलेपण घेऊन वामनदादा जगले. आपला जन्मच भीम विचारांच्या प्रसारासाठी आणि समाजाला जागे करण्यासाठी आहे. या न्यायाने ते जगले शब्द भिमाचे, आवाज भिमाचा, जगण्याची प्रेरणा भिमाची, स्वाभिमानी जगाची निर्मिती भिमाची अशाप्रकारे वामनदादांच्या जीवनाचा कणनकण अवघा भिममय होऊन गेला होता." आंबेडकरी विचार हा आर्थिक सामाजिक विषमतेविरुद्ध, जातीयते विरुद्ध व जाती वर्णव्यवस्थेविरुद्ध उगारलेले एक शस्त्र होते. या व्यवस्थेविरुद्ध पुकारलेले माणुसकीचे बंड, विद्रोह म्हणजे आंबेडकरवाद होय हाच विचार वामनदादा कर्डक यांनी आयुष्यभर मांडला

आंबेडकरांचे परिवर्तनवादी विचार हा वामनदादा कर्डक यांच्या काव्यगीताचा व एकूणच जीवनाचा मुख्य आधार होता. आंबेडकरी तत्व विचारांशी त्यांची बांधिलकी होती आणि ही बांधिलकी त्यांनी आयुष्यभर संघर्ष करत आंबेडकरांचे परिवर्तनवादी विचार हे वामनदादा कर्डक यांच्या काव्य गीताच्या मुख्य जीवनाच्या आधार होता आंबेडकरीतत्व विचारांशी त्यांची बांधिलकी होती आणि ही बांधिलकी त्यांनी आयुष्यभर संघर्ष करत जपली जोपासली. स्वाभिमानी जगाची निर्मिती करायची असेल तर आंबेडकरवादी विचारा शिवाय पर्याय नाही. आंबेडकरवादी विचार हा समतेचा, बंधुत्वाचा,

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या संस्थेचे त्रैमासिक

।। संशोधक ।।

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*** प्रकाशक ***

श्री. संजय मुंदडा

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वैश्विक स्त्रीवादाचे स्वरूप, भूमिका व वाटचाल

प्रा.डॉ.सुधाकर सीताराम चौधरी
मराठी विभाग प्रमुख
आर.सी.पटेल कला, वाणिज्य व विज्ञान महाविद्यालय, शिरपूर, जि. धुळे
भ्रमणध्वनी – ९९२३२२१७२०

गोषवारा :

स्त्रीवादाचा साकल्याने विचार करीत असताना वैश्विक परिप्रेक्ष्याच्या अंगाने अभ्यास केल्याशिवाय स्त्रीवादाचा परिपूर्ण अभ्यास होत नाही. स्त्रीवादाच्या ऐतिहासिक पार्श्वभूमीचा विचार करणे त्यासाठी क्रमप्राप्त ठरते. स्त्रीवादी विचार हा मानवी भूमिकेतून विचार करायला प्रवृत्त करतो. 'स्त्री' ही वस्तू नसून ती एक व्यक्ती आहे हा विचार या ठिकाणी केंद्रस्थानी दिसतो.

शब्दकळ :

वैश्विक स्त्रीवाद, पुरूषी मूल्यव्यवस्था, पुरूषसत्ताक व्यवस्था, बालविवाह, सतीबंदी कायदा, संमतीवयाचे बील, स्त्री हक्क, प्रस्थापित व्यवस्था.

संशोधन पध्दत :

प्रस्तुत संशोधनात्मक अभ्यासासाठी वर्णनात्मक संशोधन पध्दतीचा वापर करून अंतिम निरीक्षणे नोंदविली आहेत.

संशोधनाची उद्दिष्टये :

१. स्त्रीवादाच्या निर्मिती प्रेरणांचा अभ्यास करणे.
२. स्त्रीवादाच्या वाटचालीचा परामर्श घेणे.
३. वैश्विक स्त्रीवाद व भारतातील स्त्रीवादी विचार यांचा अभ्यास करणे.

प्रस्तावना :

कोणत्याही वाद-विचार हा अगोदर बंडखोर वाटत असतो. तो नकारातून जन्माला आलेला असतो. त्यामुळे त्याची मुळे (roots) ही समाजात खोलवर रूजलेली असतात. बऱ्याच काळानंतर त्याचे रूप स्पष्ट होत असते. स्त्रीवादही त्याला अपवाद नाही. स्त्रिया या केवळ मनुष्य नाहीत तर त्यांच्यात स्त्रीत्वाची अस्मिता आहे. अखिल मानवजातीचा एक महत्वाचा अंश म्हणून स्त्रीवादाकडे बघितले जाते. स्त्रीवाद ही व्यापक संकल्पना आहे. स्त्रीवादाचे मवाळ, जहाल स्त्रीवाद, मार्क्सवादी स्त्रीवाद, कृष्णवर्णीय स्त्रीवाद, पर्यावरणवादी स्त्रीवाद, अस्तित्वादी स्त्रीवाद असे प्रकार सांगितले जातात. स्त्रीवादात विषमतेविरूध्द प्रखर संघर्ष हा मुख्य भाग दिसतो. हा संघर्ष जीवनाच्या विविध पातळ्यांवर समर्थपणे व खंबीरपणे दिला जातो. स्त्रीवादाला मुख्यत: अनुस्युत असते ते मनुष्यत्व, सम पातळीवर समाजाने मान्य करणे. स्त्रीवाद हा मुख्यत: धर्मसंस्था, कुटूंबसंस्था, विवाहसंस्था, राजकीय परिप्रेक्ष्य, शिक्षणसंस्था, यातील मतलबीपणा, स्वार्थीपणा व लबाडीवर हल्ला करून शोषणमुक्त वातावरण निर्मित करत असतो. परंपरा, रूढी, जातीव्यवस्था, तत्त्वज्ञान, रूप सौंदर्यविषयक जुने विचार वगैरेवर आसूड ओढून नवीन सुसंगत पर्याय उपलब्ध करून देत असतो. स्त्री-पुरूष विषमतेतील दरी कमी करून शोषणमुक्त समाजनिर्मिती करणे हे मुख्य ध्येय या विचारसरणीचे दिसते. त्यामुळे या स्त्रीवादाचे स्वरूप मोठी व्याप्ती कक्षा असणारे दिसते.

वैश्विक स्त्रीवादी भूमिका व वाटचाल :

स्त्रीवादी विचार हा मुख्यत: १९६० नंतर पुढे आलेला दिसत असला तरी या विचारसरणीचे मूळ अमेरिकेत १९६० च्या पूर्वी १५ ते २० वर्षे अगोदर सापडते. स्त्रीवादाला अपेक्षित असलेला स्त्री-पुरूष समभाव हा जगात गेल्या ३०० वर्षांपासून हळूहळू आकाराला येत गेलेला दिसतो. १७८९ मध्ये मानवी हक्कांचा जाहीरनामा फ्रेंच राज्यक्रांतीतून पुढे आला. पुढे १७९० मध्ये 'ऑलिच द गुंझ' या लेखिकेने स्त्रियांचा हक्कांचा जाहीरनामा प्रसिध्द करून, 'स्त्रीयांनाही पुरूषांप्रमाणे सन्मानाने जगण्याचा हक्क असून तीही एक स्वतंत्र व्यक्ती आहे, स्त्रीलाही जीवनाच्या सर्व पातळ्यांवर स्वातंत्र्य उपभोगण्याचा हक्क आहे' असा तेव्हा बंडखोर वाटणारा विचार मांडला. १७९२ मध्ये इंग्लंडमधील मेरी उलस्टोन क्राट यांनी 'The Vindication of Women' ग्रंथात स्त्रियांच्या हक्कांविषयी वैचारिक स्वरूपाचे विचार मांडले. त्या आपल्या ग्रंथात पुढे म्हणतात, ''पुरूष हा विचारप्रधान विवेकी, मर्दानी आणि स्त्री ही भावनाप्रधान, विकारी आणि नाजूक असते. ह्या पारंपारिक समजुतींना नाकारून स्त्री ही पुरूषाइतकीच विचारक्षम आणि विवेकी आहे.'' त्यातून पुढे स्त्री-पुरूषांना समान नागरी हक्क असावेत. स्त्रीयांना शिक्षण व रोजगाराची समान संधी असावी अशा राजकीय स्वरूपाच्या मागण्या पुढे आल्या. अमेरिकेत १८४८ मध्ये झालेल्या गुलामगिरीविरूध्दच्या लढ्यातही स्त्रिया सहभागी

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● वर्ष : ९० ● मार्च २०२२ ● पुरवणी मराठी विशेषांक ०२

इतिहासाचार्य वि. का.राजवाडे संशोधन मंडळ, धुळे

"डॉ. बाबासाहेब आंबेडकरांच्या विचारपृष्ठावर संपृष्ठ झालेल्या दलित नाटकांचा आशय व आकृतीबंध"

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गोषवारा (Abstract)

मराठी साहित्य हे अनेक साहित्य प्रवाहांनी मिळून समृद्ध झाले आहे. ही समृद्धी ज्या साहित्य प्रकारामुळे, प्रवाहामुळे मिळाली त्यातील एक मुख्य साहित्य प्रवाह म्हणजे दलित साहित्य हा होय. गेल्या तीस ते चाळीस वर्षापासुन दलित साहित्याचा एक मोठा प्रवाह मराठी साहित्यात येऊन आज स्थिरस्थावर झालेला दिसतो. या दलित साहित्याने मराठी साहित्याच्या व्याप्ती कक्षा अधीक समृद्ध केल्या.

शब्दकळ (Keyword)

दलित साहित्य प्रवाह,दलित कविता,कथा,नाटक,कादंबरी, आत्मकथन, आत्मचरित्र, आंबेडकरी विचार,समाज मुल्यव्यवस्था, प्रस्थापित व्यवस्था, नकार,विद्रोह

संशोधन पद्धत (Research Method)

प्रस्तुत संशोधनात्मक अभ्यासासाठी वर्णनात्मक संशोधन पद्धतीचा वापर करून अंतिम निरीक्षणे नोंदविली आहेत.

संशोधनाची उद्दिष्टे (Research Objectives)

दलित साहित्यातील नाटक या प्रकाराचे स्वरूप व आशय समजून घेऊन या साहित्य प्रकाराच्या निर्मिती प्रेरणांचा शोध घेणे.

प्रस्तावना :-

मराठी साहित्य हे अनेक साहित्य प्रवाहांनी मिळून समृद्ध झाले आहे. ही समृद्धी ज्या साहित्य प्रकारामुळे प्रवाहामुळे मिळाली त्यातील एक मुख्य साहित्य प्रवाह म्हणजे दलित साहित्य हा होय. गेल्या तीस ते चाळीस वर्षापासुन दलित साहित्याचा एक मोठा प्रवाह मराठी साहित्यात येऊन आज स्थिरस्थावर झालेला दिसतो. या दलित साहित्याने मराठी साहित्याच्या व्याप्ती कक्षा अधीक समृद्ध केल्या. दलित साहित्यामध्येही मराठी साहित्यासारखे इतर अनेक साहित्य प्रकारही आहे. त्यातील दलित कवीता हा एक मुख्य आणि समृद्ध साहित्य प्रकार होय. दलित कवीतेबरोबरच दलित कथा, दलित कादंबरी हे साहित्य प्रकारही विशेष उल्लेखनीय आहेत. दलित साहित्याचीही खरी ओळख दलित आत्मकथन व आत्मचरीत्रातूनच होते. या बरोबरच दलित नाटक, दलित एकांकीका, खऱ्या अर्थाने प्रबोधनाच्या पातळीवर जाऊन परीवर्तनाचा विचार रुजविणाऱ्या आहेत. म्हणुन दलित साहित्यात दलित नाटकाचे योगदान अधीक महत्वपूर्ण व नोंद घेण्यासारखे आहे. दलित नाटकांतून खऱ्या अर्थाने दलित समाजाचे अधीक वास्तवूपर्ण चित्रण, प्रदिर्घ अनुभव चिंतनातुन आलेले दिसते. नुसत्या नाटकांच्या शिर्षकावरून नाटकातील व एकुणच सामाजिक विभेदकतेचे चित्रण पुरेसे लक्षात येते. नाटकांच्या शिर्षकावरुन नाटकातील आशयावर पुरेसा प्रकाश पडतो.

दलित नाटकाचे स्वरुप :- दलित नाटक हा साहित्य प्रवाह दलित जीवनाचे खरेखुरे चित्रण करणारा साहित्य प्रवाहआहे. आंबेडकरी विचार धारेची प्रबोधनाची कल्पना मूर्त स्वरुपात रुजविणारा हा साहित्य प्रवाह आहे. परीवर्तनाचे वारे समाजात पसरविणारा, रुजवणारा साहित्य प्रकार म्हणुन दलित नाटकाकडे बघावे लागते. मराठी साहित्यात जसे मराठी नाटकांनी एक स्वतंत्र व्यापक व अनुभव संपन्न क्षेत्र निर्माण केले आहे. तसेच दलित नाटकांचेही आहे. दलित साहित्य हे मुळातच आंबेडकरी परीवर्तनाच्या विचारांवर उभे आहे. परीवर्तन हा दलित साहित्याचा आत्मा आहे. या संदर्भात

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या संस्थेचे त्रैमासिक

।। संशोधक ।।

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* प्रकाशक *

श्री. संजय मुंदडा

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मुखपृष्ठावरील चित्र :

महाराष्ट्र राज्य साहित्य आणि संस्कृती मंडळाने या नियतकालिकेच्या प्रकाशनार्थ अनुदान दिले आहे. या नियतकालिकेतील लेखकांच्या विचारांशी मंडळ व शासन सहमत असेलच असे नाही.

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मराठीतील ग्रामीण कादंबरीतील अस्सल ग्रामजाणीवा

– डॉ. सुधाकर चौधरी, शिरपूर

गोषवारा : मराठी साहित्य हे समृद्ध साहित्य आहे. मानवी जीवनाच्या सर्व अंगांना स्पर्श करण्याचे सामर्थ्य मराठी वाङ्मयात दिसते. मराठी वाङ्मयातील एक मुख्य साहित्यप्रवाह कादंबरी होय. मराठी साहित्य हे मानवी समष्टीला व्यापणारे आहे. मानवी जीवन-संस्कृतीचा आरसा म्हणजे साहित्य होय. मानवी समाजाच्या स्थिती गतीचे चित्रवर्णन साहित्यामध्ये उमटणे हे स्वाभाविक आहे. ज्याप्रमाणे सर्वदूर परिवर्तने होत असतात, बदल होत असतो तद्वतच साहित्यातही बदल हा स्वाभाविक असतो.

शब्दकळ : ग्रामीण मराठी साहित्य, ग्रामीण संस्कृती, ग्रामजीवन, ग्रामभाषा, ग्रामसंस्कृती.

संशोधनपद्धत : प्रस्तुत संशोधनात्मक अभ्यासासाठी वर्णनात्मक संशोधन पद्धतीचा वापर करून अंतिम निरीक्षणे नोंदवली आहेत.

प्रस्तावना : साहित्याच्या निर्मितीच्या मुळाशी मुळात एक विशिष्ट असा विचार (thought) असतो कारण साहित्य निर्माण करणारा हा एक समाजाचा घटक असतो, तो मनुष्य असतो. त्यामुळे त्याच्या स्वाभाविक गुणधर्माप्रमाणे विविध साहित्यप्रकार तो हाताळत असतो. त्यात कथा, काव्य, कादंबरी, नाटक, ललितगद्य, चरित्र, आत्मचरित्र, वैचारिक साहित्य असे अनेक स्वरूपाचे विविधांगी साहित्यप्रकार असू शकतात. त्यातील संपूर्ण जगामध्ये अत्यंत लोकप्रिय असा, वाचकप्रिय असा व प्रतिष्ठित असा साहित्यप्रकार कुठला असेल तर तो कादंबरा आहे. जागतिक पटलावर कादंबरी या साहित्यप्रकाराला मोठी प्रतिष्ठा व जगन्मान्यता प्राप्त झालेली दिसते. त्याला मराठी साहित्यही अपवाद नाही. साहित्यामध्ये विविध साहित्यप्रवाह असणे ही साहित्याची प्रगल्भता दाखवते. मराठी साहित्यामध्ये असे अनेक साहित्यप्रवाह कालौघात निर्माण झालेले दिसतात. त्यातील एक अत्यंत महत्त्वाचा आणि प्रतिष्ठित असा साहित्यप्रवाह म्हणजे ग्रामीण साहित्यप्रवाह होय. मराठी साहित्यातील ग्रामीण साहित्यप्रवाह हा अत्यंत जोमाने पुढे आलेला

संशोधक

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● वर्ष : ९० ● मार्च २०२२ ● पुरवणी मराठी विशेषांक ०२

इतिहासाचार्य वि. का.राजवाडे संशोधन मंडळ, धुळे

* अनुक्रमणिका *

भारतातील मांग/मातंग जातीची उत्पत्ती, सामाजिक आणि सांस्कृतिक स्थिती व भौगोलिक वितरणाचा अभ्यास

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सारांश:– पृथ्वीवर मानवाचे आयुष्य दोन लाख वर्षांपूर्वीचे असून तो आफ्रिका खंडावर प्रथम दिसला व तेथून जगाच्या इतर भागात पसरला, तसा भारतीय उपखंडावर हि आला. पुढे भारतात स्पृश्य, अस्पृश्य अशा वर्णआधारित जाती निर्माण झाल्या. त्यात मांग ही अस्पृश्य समजली जाणारी जात मांग शब्दाची उत्पत्ती मातंग या संस्कृत शब्दापासून झाली आहे. त्याचा अर्थ 'किरात' किंवा 'पर्वतीय' असून त्याचे मूळ स्थान कर्नाटकातील तुंगभद्रा काठी मांग हा वानर वंशीय आहे. त्याचा संबंध जांबव ऋषीशी जोडला जातो. मांग ही जात हिंदू धर्मीय राज्यकर्ती जात होती, त्याचे पुरावे पुराणात मिळतात. चंडपक, कलिंग, मघद, अवंती. कौशल्य, करू, वैशाली, मधुरा, मैथिली, किष्किंधा या राज्यांवर मांगांची सत्ता होती. मांग ही शूर व स्वातंत्र्य प्रिय जात आहे. छत्रपती शिवरायांच्या इतिहासातुन हे स्पष्ट होते. मांगांची भारतात राजस्थानापासून कर्नाटका पर्यंत मध्य व दक्षिण भारतात १२ राज्यातील अनुसूचित जातीच्या यादीत नोंद आढळते.ही जात समाजाचे तमाशा, लोकनाट्य,वाद्य वाजविणे यासरख्या कलेतून समाज प्रबोधन बरोबर करमणूक करून कष्ट दूर करण्यासाठी झिजली. छत्रपती शाहू महाराज, महात्मा ज्योतीराव फुले, डॉ.बाबासाहेब आंबेडकरांच्या उपदेशावर चालणारे व समाज उद्धारासाठी मातंग जातीतील काही कला, सामाजिक, राजकीय, शैक्षणिक क्षेत्रातील विचारवंत समाजाला पुढे नेण्याचे कार्य करत आहेत. तरी शैक्षणिक व सामाजिक दृष्ट्या मांग जातीचा फारसा विकास झालेला नाही. कारण गरिबी, दारिद्र्य अंधश्रद्धा आणि शैक्षणिक मागासलेपण या गोष्टी प्रामुख्याने मांगाच्या मागासलेपणाची कारणे आहेत.

प्रस्तावना :– भारतात अनेक धर्म व जातीचे लोक वास करून राहतात, हिंदू धर्मातील जातीव्यवस्था ही वर्णव्यवस्थे अवलंबून आहे, त्यात स्पृश्य, अस्पृश्य असे दोन गट आहे. अस्पृ गटात मांग जातीचा समावेश होतो मांग भारताच्या स्वातंत्र्य काळ पुरेसा शैक्षणिक व आर्थिक विकास झालेला दिसून येत नाही. शोधनिबंधात मांग जातीची उत्पत्ती तिचे प्राचीन धार्मिक सामाजि ऐतिहासिक व भौगोलिक अस्तित्व याचा धांडोळा घेण्याचा प्र करण्यात आलेला आहे. परंतु मांगांचा सर्वांगीण विकास व विचार करता आजही मागासलेली जात आहे.

बीज संज्ञा:–मांग, मातंग, उत्पत्ती, इतिहास, राजकीय अस्ति शैक्षणिक स्थिती, शौर्य, प्रामाणिकपणा

उद्दिष्टे:–१. मांग जातीची उत्पत्ती, मूळ व अस्पृश्यत्व याचा विचार करणे.

२.मांगाची धार्मिक ,इतिहासिक व भौगोलिक वितरणाचा अभ्य करणे.

३. मांगाची सद्यस्थिती मांडणे

माहिती व संशोधन पद्धती :– या संशोधन पत्रा साठी वापरण्य आलेली माहिती दुय्यम स्वरूपाची असून, संशोधन पद्धती स्वानुभ विवेचनावर आधारित आहे.

विवेचन:–विसेक लाख प्रकारच्या जीव जाती असलेल्या पृथ्वी वय साधारण साडेचार अब्ज वर्षे आहे. तांत्रिक भाषेत यांना प्रज म्हणतात. या प्रजातीत माणूस हा सर्वात बुद्धिमान प्राणी आहे. होमो सेपियन्स सेपियन्स गटात योतो. इतर कोणत्याही जिवांपे मानवाचे समायोजन कौशल्य जास्त असल्याचे आजपर्यंतच

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ORIGINAL ARTICLE

Effect of *Lactobacillus helveticus* CD6 on serum lipid profile and indicators of liver function in high-fat diet fed Swiss albino mice

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Abstract

In this study, we have investigated the effect of *Lactobacillus helveticus* CD6 on weight gain, lipid profile, liver function biomarkers (ALT: alanine aminotransferase; and AST: aspartate aminotransferase) and liver histopathology in high-fat diet fed Swiss albino mice. Twenty-four healthy male Swiss albino mice with an average body weight of 25.94 ± 0.33 g (35 days old) were acclimatized and equally distributed into four groups treated with different diets. The treatment groups were control (control diet), HFD (high-fat diet), HFD + LH (high-fat diet + *L. helveticus* CD6), and HFD + Gemf (high-fat diet + Gemfibrozil). After 12 weeks, *L. helveticus* CD6 treatment significantly reduced HFD-induced weight gain, the levels of serum total cholesterol (TC), triglyceride (TG), low-density lipoprotein (LDL), ALT and AST, and elevated serum high-density lipoprotein (HDL) levels. In addition, *L. helveticus* CD6 treatment maintained satiety and normal liver histology as compared to HFD group. Besides this, the results observed with *L. helveticus* CD6 treatment were comparable with lipid lowering drug gemfibrozil, except TG levels and body weight gain. In conclusion, it was found that *L. helveticus* CD6 could effectively reduce HFD-induced hyperlipidemia and weight gain and maintained normal liver histology. Moreover, the strain could be used to develop functional foods for individuals with dyslipidemia after appropriate human studies.

Keywords *Lactobacillus helveticus* CD6 · Probiotic · Lipid profile · Liver function · Weight gain · Gemfibrozil

Introduction

Cardiovascular diseases (CVDs) are the leading cause of deaths with mortality rate of 31% (17.9 million deaths per year) of all deaths worldwide (Virani et al. 2020). Dyslipidemia is one of the major contributing factors for the development and progression of CVDs (Stein et al. 2019). The elevated levels of serum total cholesterol (TC), low-density lipoprotein (LDL), triglycerides (TG), or a decreased serum high-density lipoprotein (HDL) are the indicators of dyslipidemia (Stein et al. 2019). It has been reported that dyslipidemia can be inherited and or triggered as a result of lifestyle or medical conditions (obesity, alcoholism, diabetes, hypothyroidism, hypercortisolism, metabolic syndrome, polycystic ovary syndrome, inflammatory bowel disease, severe infections and gut microbiota dysbiosis) (Karantas et al. 2020). Current drug therapies are effective in controlling dyslipidemia, but are expensive and associated with several side effects (Kreisberg and Oberman 2003). Therefore, the development of alternative management strategies using dietary constituents and supplements are necessary to control and manage dyslipidemia.

Probiotics are live microorganisms which when administered in adequate amounts confer a health benefit on the host (FAO/WHO 2002). To date, several probiotic strains were documented for their health benefits and ability to alleviate metabolic diseases (Khaleshi et al. 2019; Madempudi et al. 2019a, b; Tenorio-Jimenez et al. 2020). *Lactobacillus*

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helveticus is an industrially important starter culture for the production of fermented milk and various types of cheese (Giraffa 2014). Like other lactobacilli, some strains of *L. helveticus* possess probiotic features and are known to prevent gastrointestinal infections, stabilize gut microbiota dysbiosis and modulate the immune system (Slattery et al. 2010; Giraffa 2014; Fontana et al. 2019). Moreover, selected strains of this species have shown potential to produce therapeutically active peptides, remove allergens or undesired molecules from food, and enhance nutrient bioavailability (Jauhiainen et al. 2005; Taverniti and Guglielmetti 2012; Giraffa 2014; Fontana et al. 2019). However, the strain-specific cholesterol lowering effects of *L. helveticus* have rarely been investigated. Damodharan et al. (2016) showed that *L. helveticus* strain KII13 significantly reduced serum cholesterol and LDL levels in atherogenic diet-induced hypercholesterolemic mice. Recently, Lee et al. (2020) showed the in vivo cholesterol lowering and anti-inflammatory effects of sour milk isolate *L. helveticus*.

Currently tested strain, *Lactobacillus helveticus* CD6 (MCC 2036) was previously isolated and characterized by Ahire (2012). The experimental history demonstrated that strain CD6 possesses commonly recognized probiotic features, folate production ability, antioxidant activity, copper tolerance, and ability to lower cholesterol by assimilation and or biotransformation (Ahire 2012; Ahire et al. 2012, 2013, 2014; Paradeshi et al. 2018). Recently, Ahire et al. (2019) have shown that 14 week dietary supplementation of *L. helveticus* CD6 to Goldfish (*Carassius auratus*) improved health and reduced mortalities regardless of the composition of the diet. In this study, we report the effect of *L. helveticus* CD6 on weight gain, serum lipid profile, indicators of liver function and liver histopathology in high-fat diet fed Swiss albino mice.

Materials and methods

Bacterial strain and growth conditions

Lactobacillus helveticus CD6 (MCC 2036) was obtained from the National Centre for Microbial Resource (NCMR), Pune, India. The purity of culture was checked on De Man Rogosa Sharpe (MRS) agar plates by using routine microbiological procedures. A single colony was cultivated in 10 ml MRS broth and incubated overnight under aerobic conditions at 37 °C. The 1% (v/v) inoculum of *L. helveticus* CD6 was transferred to 100 ml MRS broth and incubated aerobically at 37 °C for 24 h. The cell pellets were harvested by centrifugation at 10,000×*g* for 5 min at 4 °C and washed twice with sterile phosphate buffer saline (PBS, pH 7.3). The cell pellets were diluted to 1×10^8 colony forming units (cfu) per ml in 0.9% (w/v) NaCl. *Lactobacillus helveticus* CD6 strain was freshly prepared daily during the 12-week experiment.

Animals, diet, and experimental design

Twenty-four healthy male Swiss albino mice with an average body weight of 25.94 ± 0.33 g (35 days old) were obtained from Central Animal House Facility, R.C. Patel Institute of Pharmaceutical Education and Research, Shirpur, India. The mice were housed in cages under controlled laboratory conditions (temperature, 23 ± 2 °C; humidity, 50 ± 10%; 12 h light/12 h dark cycle), with ad libitum feeding of standard diet and water for 7 days to acclimate before the start of the experiment. The study protocol was examined and approved by the Institutional Animal Ethics Committee (Reg. No. 651/PO/ReBi/S/02/CPCSEA) established under the guidelines of Committee for the Purpose of Control and Supervision of Experiments of Animals (CPCSEA), Government of India.

The standard diet [chow diet % (w/w): starch, 19; casein, 20; refined soybean oil, 7; vitamin mixture, 1; methionine, 0.3; cholesterol, 0.5; dextrose, 13.2; sucrose, 5; cellulose, 5; L-cysteine, 0.35; choline bitartrate, 0.25; mineral mixture, 3.5] was purchased from Nutrivet Life Sciences, Pune. The high-fat diet (HFD) was prepared as per Reeves (1997). In brief, 17.5 g lard (purchased from local pig slaughterhouse) was added in the 82.5 g standard diet and mixed uniformly. The HFD was prepared at every 4th day and stored at 4 °C.

After 7 days of acclimatization (with the standard diet), the mice were randomly divided into four groups with six individuals per group. The groups included a standard diet group (control), high-fat diet (HFD), high-fat diet + *L. helveticus* (HFD + LH), and high-fat diet + Gemfibrozil (HFD + Gemf) group. The mice in respective groups were fed with assigned diet for 12 weeks. In brief, the control group mice were fed a standard diet, the HFD group mice were fed a high-fat diet, HFD + LH group mice were fed a high-fat diet and gavaged with 0.2 ml of *L. helveticus* (1×10^8 cfu ml^{-1}) suspension, and the HFD + Gemf group mice were fed a high-fat diet and administered with aqueous solution of gemfibrozil (5 mg kg^{-1} body weight) daily for 12 weeks. The doses of bacteria and drug were transformed from the recommended human dose using the body surface area normalization method (Reagan-Shaw et al. 2008). During the trial, mice had free access to water and their group-specific diet.

Body weight and food intake

The body weight and food intake were measured weekly using a digital scale. The weight gain was reported as a change in weight from week 0 to end of the treatment (week 12) (Hoffman et al. 2002). The food intake was determined

by measuring the difference between the leftover food and the served food (Hoffman et al. 2002).

Blood sampling

At the end of the treatment (12 week), the mice were fasted overnight and blood from retro-orbital sinus was collected in heparinized microfuge tubes. The serum was obtained by centrifugation at 1500×*g* for 10 min at 4 °C and stored at − 80 °C until use.

Determination of lipid profile and liver enzymes in serum

The fasting total cholesterol (TC), triglycerides (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), alanine aminotransferase (ALT), and aspartate aminotransferase (AST) levels in serum were determined by enzymatic methods using Erba Mannheim auto analyzer XL-640 (Erba Diagnostics Mannheim, Germany). TC, TG, HDL, and LDL level were reported as millimoles per liter (mmol l^{-1}) and ALT, and AST levels were reported as micro-katal per liter (µkat l^{-1}).

Liver histopathology

The mice were euthanized at the end of the treatment by cervical dislocation. The liver was removed, washed with 0.9% (w/v) saline and fixed in 10% (v/v) neutral buffered formalin. After fixation, samples were embedded in paraffin and thin (3 µm) sections were prepared using microtome (Leica RM 2125, Germany). The sections were fixed on the glass slides, stained with hematoxylin–eosin, and examined under light microscope. The images were processed using ImageJ software (Scion Corporation, USA).

Statistical analysis

The results are expressed as the mean ± standard deviation (SD). An one-way analysis of variance (ANOVA) and Dunnett's multiple comparisons test were used to determine significant differences between HFD and other groups. Besides this, Tukey's multiple comparisons test was performed to determine significant differences between groups. GraphPad Prism (GraphPad Software Inc., USA) version 6.01 was used for all analysis. p value < 0.05 was considered statistically significant.

Results

The initial body weight of mice in assigned groups was comparable. At the end of the trial (12 weeks), the mice in HFD group had significantly higher weight gain (22.08 ± 0.87 g) as compared to control group (18.17 ± 1.52 g; $p < 0.001$), HFD + LH (19.16 ± 1.28 g; $p < 0.01$), and HFD + Gemf (1.42 ± 1.14 g; $p < 0.0001$) treatment groups. The weight gain difference recorded between HFD + LH and HFD + Gemf group differed significantly ($p < 0.001$). Besides this, no significant ($p > 0.05$) difference was recorded between HFD + LH and control (Fig. 1a) groups.

The average feed consumption of HFD group (5.46 ± 0.55 g) was significantly higher ($p < 0.0001$) as compared to control (4.10 ± 0.56 g), HFD + LH (4.81 ± 0.77 g)

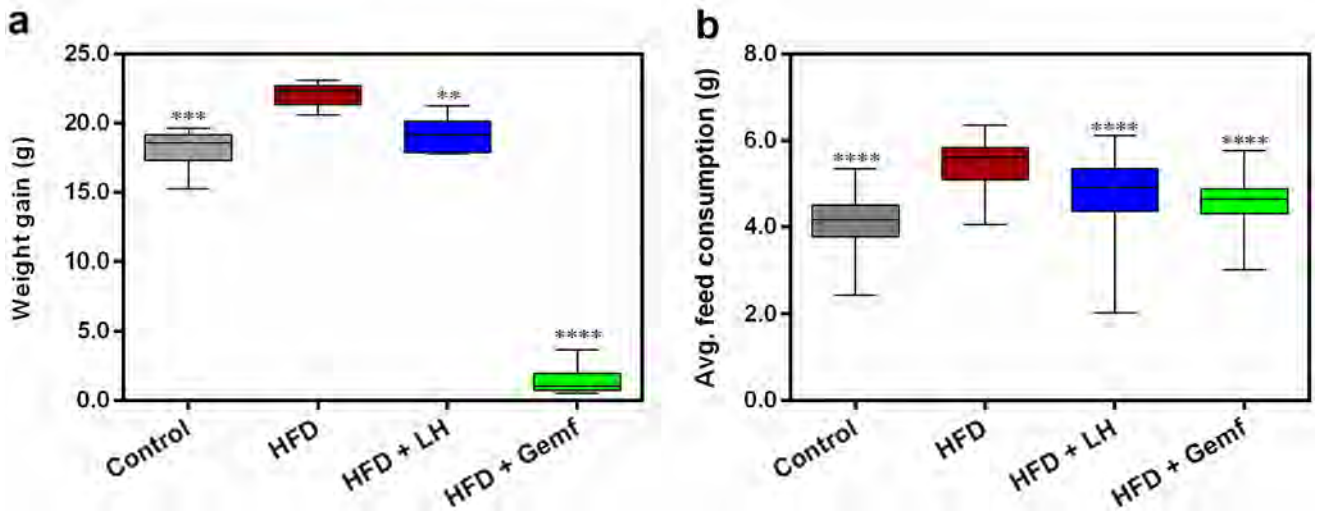

Fig. 1 Effect of *Lactobacillus helveticus* CD6 on, **a** weight gain and, **b** average feed consumption. *Control* control group, *HFD* high-fat diet group, *HFD + LH* high-fat diet + *L. helveticus* CD6 group, and *HFD + Gemf* high-fat diet + Gemfibrozil group. All data are represented as mean ± SD. $^{**}p < 0.01$, $^{***}p < 0.001$, $^{****}p < 0.0001$: significant difference compared with mice in the HFD group

and HFD + Gemf groups (4.62 ± 0.51 g). The average feed consumption difference recorded between HFD + LH and HFD + Gemf groups did not significantly differ ($p > 0.05$) (Fig. 1b).

Serum lipid analysis

The serum lipid levels of the four groups of mice are shown in Fig. 2. Mice fed a high-fat diet showed a significant ($p < 0.0001$) increase in total serum cholesterol (TC: 4.98 ± 0.24 mmol l^{-1}), triglycerides (TG: 1.99 ± 0.16 mmol l^{-1}), and LDL cholesterol (3.25 ± 0.37 mmol l^{-1}) when compared with control (TC: 1.97 ± 0.46; TG: 1.08 ± 0.18; LDL: 0.18 ± 0.61 mmol l^{-1}), HFD + LH (TC: 2.18 ± 0.33; TG: 1.35 ± 0.10; LDL: 0.27 ± 0.48 mmol l^{-1}), and HFD + Gemf (TC: 1.92 ± 0.27; TG: 1.10 ± 0.05; LDL: 0.18 ± 0.38 mmol l^{-1}) (Fig. 2a, b and d) groups. In addition, serum HDL levels were significantly decreased in HDF group (0.82 ± 0.14 mmol l^{-1}) as compared to control (1.30 ± 0.19 mmol l^{-1}), HFD + LH (1.30 ± 0.26 mmol l^{-1}), and HFD + Gemf (1.16 ± 0.21 mmol l^{-1}) (Fig. 2c) groups. The differences recorded in TC, LDL, and HDL levels between HFD + LH and HFD + Gemf group were statistically insignificant ($p > 0.05$). However, the levels of TG were significantly ($p < 0.05$) lower in HFD + Gemf as compared to HFD + LH group.

Serum liver enzyme analysis

Serum ALT and AST levels were measured as indicators for evaluating liver function. ALT levels detected in HFD group

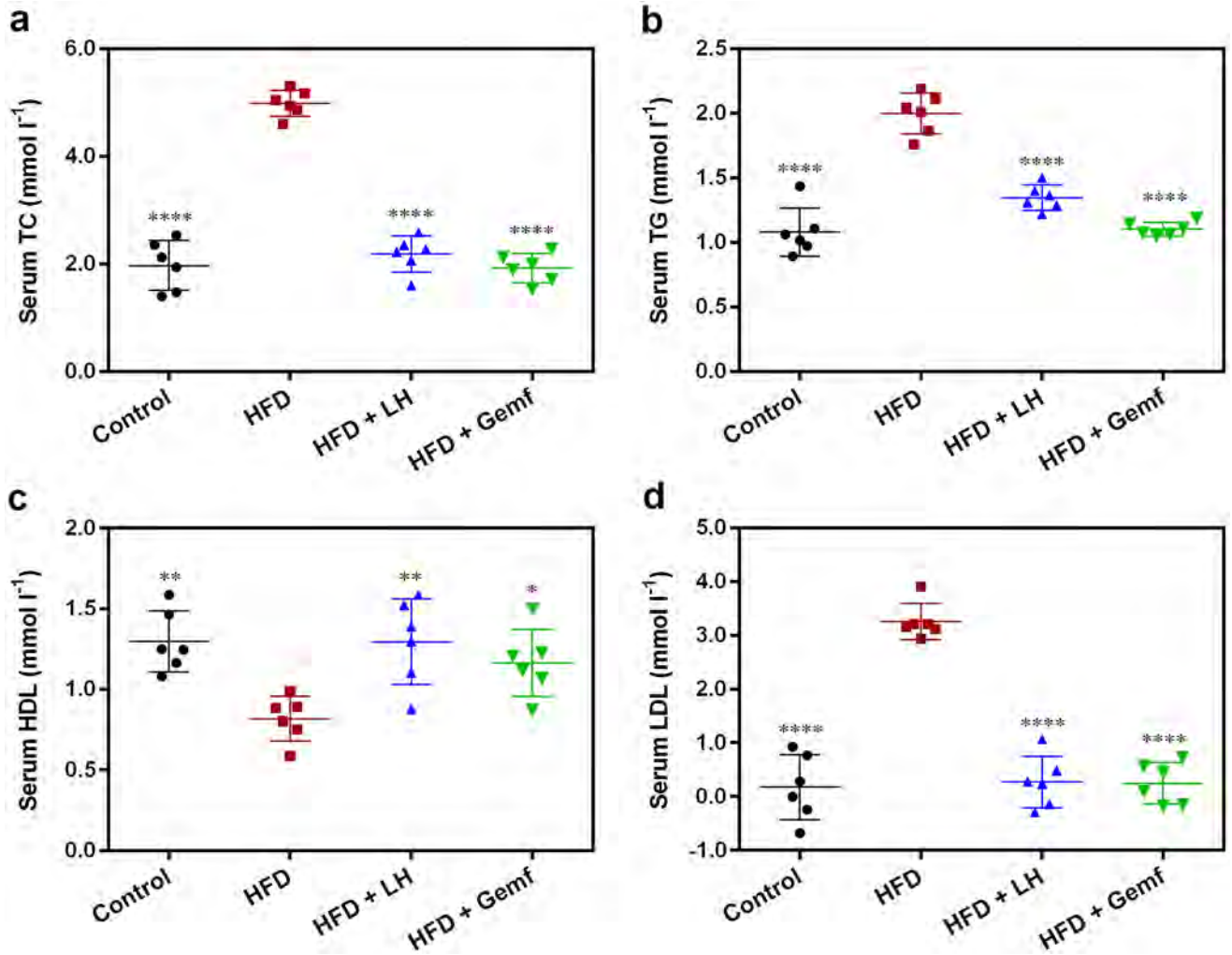

Fig. 2 Effect of *Lactobacillus helveticus* CD6 on serum lipid profile. **a** Total cholesterol (TC); **b** triglyceride (TG); **c** high-density lipoproteins (HDL); and **d** low-density lipoproteins (LDL). *Control* control group, *HFD* high-fat diet group, *HFD + LH* high-fat diet + *L. helveticus* CD6 group, and *HFD + Gemf* high-fat diet + Gemfibrozil group. All data are represented as mean ± SD. *$p < 0.05$, **$p < 0.01$, ****$p < 0.0001$: significant difference compared with mice in the HFD group

(1.17 ± 0.13 µkat l^{-1}) were higher as compared to control (0.82 ± 0.14 µkat l^{-1}; $p < 0.001$), HFD + LH (0.93 ± 0.11 µkat l^{-1}; $p < 0.01$) and HFD + Gemf (0.81 ± 0.13 µkat l^{-1}; $p < 0.001$) groups (Fig. 3a). No statistically significant ($p > 0.05$) difference was recorded between HFD + LH and HFD + Gemf groups.

Besides this, the HFD group showed significantly ($p < 0.0001$) higher levels of AST in serum (3.66 ± 0.51 µkat l^{-1}) when compared with control (2.14 ± 0.21 µkat l^{-1}), HFD + LH (2.27 ± 0.25 µkat l^{-1}) and HFD + Gemf groups (2.10 ± 0.20 µkat l^{-1}) (Fig. 3b). No statistically significant ($p > 0.05$) difference was recorded between HFD + LH and HFD + Gemf groups.

Liver histopathology

The liver sections from mice fed with standard diet (control group) showed typical morphology of sinusoids and hepatocytes with normal architecture (Fig. 4a). However, the mice fed with HFD showed signs of increased neutrophil infiltration, fibrosis, hepatocytes with peripheral nuclei or absence of nucleus, and few or invisible vascular channels (sinusoids) (Fig. 4b). Moreover, no lipid droplets were observed (Fig. 4b). The hepatocyte morphology and sinusoid architecture appeared normal in the liver sections from HFD + LH and HFD + Gemf groups mice (Fig. 4c and d).

Discussion

In this study, we demonstrated that the daily supplementation of *L. helveticus* CD6 for 12 weeks significantly reduced weight gain, improved serum TC, TG, HDL, LDL, ALT, and AST levels, and maintained normal liver histology in high-fat diet fed Swiss albino mice.

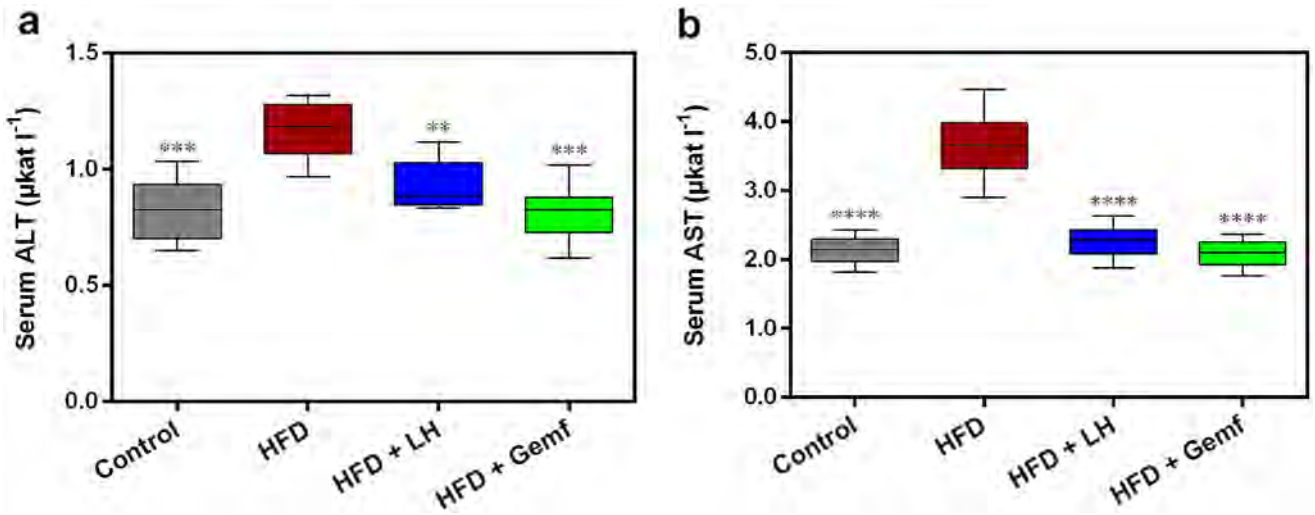

Fig. 3 Effect of *Lactobacillus helveticus* CD6 on liver function. **a** Serum alanine aminotransferase (ALT) level; and **b** serum aspartate aminotransferase (AST) level. *Control* control group, *HFD* high-fat diet group, *HFD + LH* high-fat diet + *L. helveticus* CD6 group, and *HFD + Gemf* high-fat diet + Gemfibrozil group. All data are represented as mean ± SD. $^{**}p < 0.01$, $^{***}p < 0.001$, $^{****}p < 0.0001$: significant difference when compared with mice in the HFD group

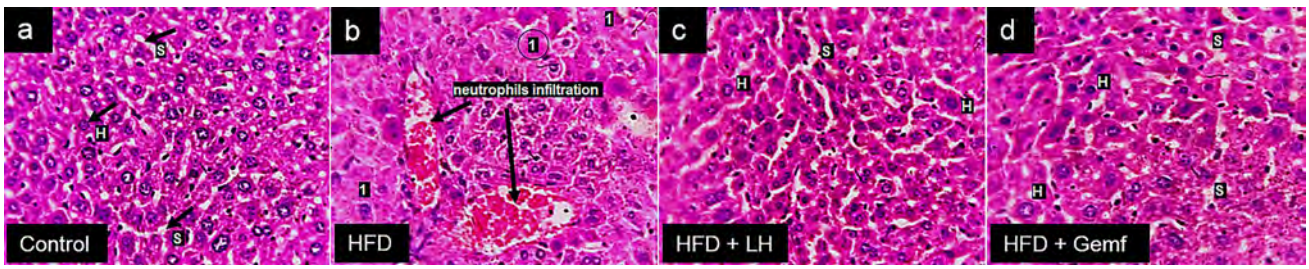

Fig. 4 Effect of *Lactobacillus helveticus* CD6 on liver histopathology. **a** Control, control group; **b** HFD, high-fat diet group; **c** HFD + LH, high-fat diet + *L. helveticus* CD6 group; and **d** HFD + Gemf, high-fat diet + Gemfibrozil group. Arrow indicates hepatocytes (H), sinusoids (S), neutrophils infiltration, and peripheral nuclei or absence of nucleus (1). Images are of ×40 magnification

The consumption of high-fat diet is one of the contributing factors for the prevalence of obesity and related metabolic disorders (Liu et al. 2020). The recent studies have suggested that probiotic administration could mitigate high-fat diet induced conditions like obesity, diabetes, dyslipidemia, and high blood pressure (Tenorio-Jimenez et al. 2020). In this study, the administration of *L. helveticus* CD6 for 12 weeks significantly reduced weight gain in HFD + LH group as compared to HFD group. Interestingly, the weight gain difference recorded between HFD + LH and control group was comparable. These results indicate that *L. helveticus* CD6 may reverse the dysbiosis induced by high-fat diet and resume the normal energy homeostasis to suppress high-fat diet induced body weight gain. *L. helveticus* strains are known to exert beneficial effects on the host by positively affecting microbiota composition (Taverniti and Guglielmetti 2012). Liang et al. (2015) have shown weight-reducing effect of *L. helveticus* NS8 in chronic restraint stress depression induced Sprague Dawley rats. However, the administration of *L. helveticus* LAT 179 along with other lactobacilli caused an increase in body weight of broiler chickens (Capcarova et al. 2011). Interestingly, the same strain CD6 has recently been reported for the induction of body weight in gold fish (Ahire et al. 2019). Hence, beyond the strain-specific actions of probiotic lactobacilli, the beneficial effects may also depend on strain–host interactions.

Gemfibrozil is a medication used to treat dyslipidemia. In this study, we observed that gemfibrozil treatment in high-fat fed mice resulted in slight weight gain from the baseline, indicative of the drug ability to prevent weight gain. These results are in agreement that gemfibrozil is associated with a progressively greater frequency of weight loss (Robins et al. 2008). In rodents, the feed consumption is controlled by their homeostatic hunger- and hedonic reward systems (Saper et al. 2002). Licholai et al. (2018) suggested that high-fat diet induced overeating and weight gain are the results of hedonic hunger in mice. In this study, the mice fed with high-fat diet showed significantly higher consumption of feed compared to the control. Besides this, the treatment of *L. helveticus* CD6 and gemfibrozil effectively controlled the high-fat diet induced overeating, thus may prevent obesity and related complications.

Elevated serum TC, TG, and LDL cholesterol levels are strongly associated with an increased risk of CVDs. The current drug therapies are effective in controlling dyslipidemia, but are expensive and associated with several side effects (Kreisberg and Oberman 2003). Thus, it is utmost crucial to control dyslipidemia by using a natural remedy. Lactic acid bacteria and their fermented products have a safe and long history to reduce serum cholesterol and have attracted much attention (Sivamaruthi et al. 2019). A recent meta-analysis showed that more than 6 weeks of probiotic intervention significantly reduce TC and LDL cholesterol levels from the baseline (Jiang et al. 2020). However, the mechanisms by which probiotic bacteria lower cholesterol is controversial and substantial evidence is lacking. Bile salt hydrolase, assimilation of cholesterol, production of short-chain fatty acids, and antioxidant activities are the proposed cholesterol lowering mechanisms in probiotic bacteria (Kumar et al. 2012). In the present investigation, the 12 weeks supplementation of *L. helveticus* CD6 to high-fat diet fed mice significantly improved the levels of TC, TG, HDL, and LDL cholesterol as compared to HFD group. These results are well comparable with the activity of gemfibrozil, except the TG levels were significantly lower in HFD + Gemf group as compared to HFD + LH group. The mechanisms by which *L. helveticus* lower cholesterol are under reported. Damodharan et al. (2016) showed that *L. helveticus* KII13 has lowered cholesterol by increasing the expression of *LDLR* and *SREBF2* genes in liver and by the production of short-chain fatty acids. In our previous in vitro study, we have shown cholesterol lowering effects of *L. helveticus* CD6 are due to the cholesterol assimilation and intracellular degradation (Ahire et al. 2012). Overall, based on the results of the present investigation, we hypothesized that *L. helveticus* CD6 lower cholesterol by assimilation and intracellular degradation or reversing the metabolic dysfunctions induced by high-fat diet.

Elevated ALT and AST levels are the indicators of hepatocellular injury or necrosis. In this study, the mice fed with high-fat diet showed elevated levels of serum ALT and AST, indicated the high-fat diet induced liver injury and or metabolic dysfunction. The signs of inflammation and necrosis observed in liver sections of HFD group further confirmed the finding. The administration of *L. helveticus* CD6 to high-fat fed mice significantly reduced the levels of ALT and AST and maintained the normal histology of liver compared to HFD group. This suggested that *L. helveticus* CD6 may attenuate the metabolic dysfunction caused by high-fat diet. These results are in agreement with Li et al. (2018), who reported *L. helveticus* KLDS1.8701 mediated reduction of ALT and AST levels in specific-pathogen-free (SPF) male BALB/c mice. Wang et al. (2019) suggested that *L. helveticus* R0052 is a promising probiotic for alleviating acute liver injury. Moreover, serum ALT and AST levels of HFD + LH, HFD + Gemf, and control groups were comparable with normal liver histology.

In conclusion, it was found that *Lactobacillus helveticus* CD6 could effectively reduce high-fat-induced hyperlipidemia and weight gain and maintained normal liver histology. Moreover, the strain could be used to develop functional foods for individuals with dyslipidemia after appropriate human studies.

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Author contributions Conceptualization: AJJ; methodology: AJJ, PMP, PUK; formal analysis and investigation: AJJ, PMP; writing—original draft preparation: AJJ; writing—AJJ, BB, CBL, PUK, PMP; resources: PUK, PMP; supervision: PUK, AJJ.

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Data availability statement The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation, to any qualified researcher.

Code availability Not applicable.

Declarations

Conflict of interest Dr. J J Ahire is employed at Unique Biotech Ltd., Hyderabad. Unique Biotech Limited had no role in the design or analysis of the study. MPP, UKP, BB, and BLC have no conflict of interest to declare.

Ethics approval The study protocol was examined and approved by the Institutional Animal Ethics Committee (Reg. No. 651/PO/ReBi/S/02/CPCSEA) established under the guidelines of Committee for the Purpose of Control and Supervision of Experiments of Animals (CPCSEA), Government of India.

Consent to participate Not applicable.

Consent for publication Not applicable.

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