Shri Shivaji Education Society Amravati's

Shri Shivaji Science & Arts College

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SHIVAJI INTERDISCIPLINARY RESEARCH JOURNAL

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(Principal)

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Executive Editors
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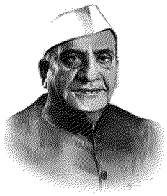

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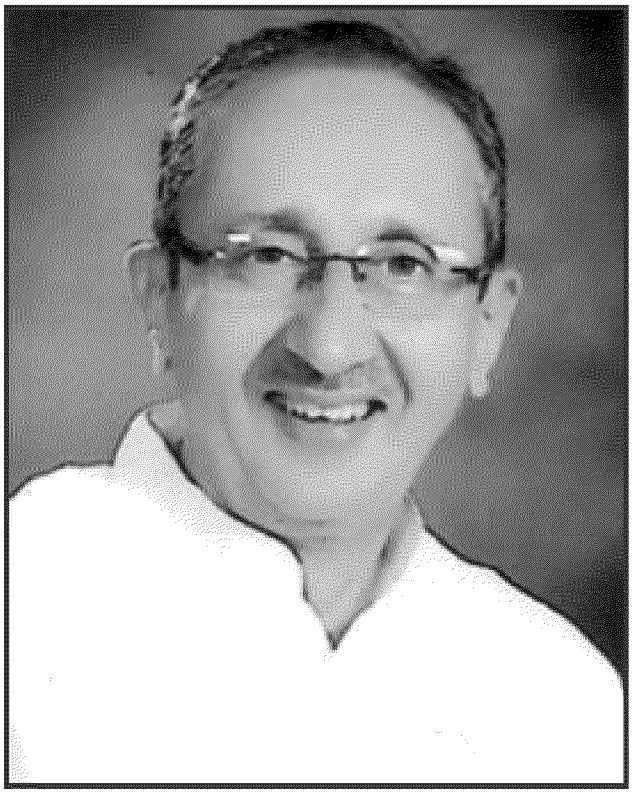

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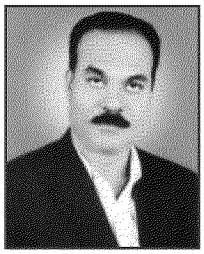

Samajbhushan Dalitmitra Late Shri Pandharinathji Patil Saheb laid a foundation stone of Shri Shivaji Science & Arts College, Chikhli in 1967. Keeping a very holy and magnificent aim for the spread of education to the common people and to huts of the downtrodden. Later on, this holy institution was affiliated with the Shri Shivaji Education Society Amravati whose foundation was laid down by the Late Dr. Panjabrao alias Bhausaheb Deshmukh, one of the greatest educationists and the first Agriculture Minister of Independent India. Under the able guidance and foresight of Dr. Punjabrao Deshmukh Saheb, the institution got its name and flourished in a very short time.

The college runs multi-faculty courses, and modern diversified courses and inspires students and teachers to research and innovative activities.The learned and well-experienced teachers and research scholars have enriched and glorified Research Journal entitled ***"Shivaji Interdisciplinary Research Journal"***. Research papers by the faculty as well as by the research students covering a wide range of research in the wings of Science, Humanities, and Commerce are published in this first issue.

The aim of this journal is to focus on highlighting economic, social, thought-provoking, and scientific aspects for solving various problems of human life and maintaining social balance. This is undoubtedly a praiseworthy and remarkable attempt by my learned and hardworking colleagues to bring forth this journal.

I take this opportunity to congratulate and appreciate the researchers who have presented their research ideas innovatively in their research papers.I thank the members editorial board who have taken efforts to give shape to this research journal. I am also thankful to the Ajanta Publication, Aurangabad.

I am sure that this journal will touch the sky and flourish in the future.

Dr. Omraj S. Deshmukh
Principal

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CONTENTS

1. Critical Data Analysis of Machine Learning-Based IoT-Enabled Smart Agriculture System

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Abstract

To increase the productivity of the farm yield several technologies are used. Beside the traditional approach of the farming use of smart technologies such as IOT, Machine Learning, Deep Learning, Cloud computing are proving beneficial. But the remote areas in India are still lacking to make use of technological farming because of poor economic conditions of farmers. Withthe use of various Machine Learning algorithms prediction and analysis of farm related data can be done very efficiently. This paper presents the survey of various research papers on IOT and Machine learning for farming. In this survey paper, challenges and outcomes of IOT and Machine Learning techniques are overviewed. Review of various Machine learning and Deep learning algorithms for crop disease detection are also presented in this paper.

Keywords : IOT, Machine learning, Deep Learning, Prediction, Cloud Computing.

1. Introduction

The Internet of Things (IoT) is the network of various physical devices in-order to exchange data and take appropriate action. In recent years the growth in technology enhances the communication between different devices are made much easier. Some of the IoT applications include automated vehicles, home automation, remote health monitoring, smart agriculture etc. In-order to make these devices work in a smarter way or to make IoT applications more intelligent there is need for analysing the huge amount of data using machine learning algorithm[1]. Machine learning refers to the set of techniques meant to deal with huge data in the most intelligent way in order to derive actionable insights.The ultimate view point of ML is to automate the data analysis process with the help of algorithms that are enabled with continuous learning skill. Hence ML refers to the set of techniques meant to deal with huge data, collected from IoT sensors in the most intelligent way in order to derive actionable insights. There are

three major types of algorithms much useful are (i) Supervised (Task driven) (ii) Unsupervised (Data Driven) (iii) Reinforcement learning(learns to react to an environment)[2]. Though still in the beginning of its journey, ML-driven farms are already evolving into artificial intelligence systems. At present, machine learning solutions tackle individual problems, but with further integration of automated data recording, data analysis, machine learning, and decision-making into an interconnected system, farming practices would change into with the so-called knowledge-based agriculture that would be able to increase production levels and products quality[3]. With the recent agriculture trends dependent on agriculture, Internet of Things and machine learning brought huge benefits like efficient use of water, optimization of inputs and many more. Farmers can implement smart farming using IoT sensors for navigation in autonomous tractors that will enable farmers to preprogram the path of their tractor in the field. These tractors can also collect crucial information on soil condition and automatically plant seeds too [4.] Automated farming trends will also give rise to farming robots that will raise the productivity in farming processes.

2. Literature Review

An IoT based advanced solution for monitoring the soil conditions and atmosphere for efficient crop growth is presented by M. S. D. Abhiram et al. (2020) [5]. The developed system is capable of monitoring temperature, humidity, soil moisture level using Node MCU and several sensors connected to it. Also, a notification in the form of SMS will be sent to farmer's phone using Wi-Fi about environmental condition of the field [5]. Data collection from crop field is done by organizing heterogeneous IoT devices in clusters and localise them for data harvesting. Clusters are formed by considering the path of UAVs, sensors heterogeneity, weather conditions, fluctuation of sensor nodes, and the communication cost of IoT devices [6]. Instead of manual checks, use of sensors networks for measurement of moisture, temperature and humidity is used. Various Sensors are deployed in various locations of farms, to control all these sensors it has been used one controller called Raspberry PI RPI and pic microcontroller [7].

The system called Agro-logger system which is capable to send and receive the data from the sensors and also get the updated and precious data from the cloud. The cloud is connected to multiple Agro-logger and get updated by the large geographical area. This data is further analyse for the best selection criteria depends on the reviews given by the farmers and Agro-logger, then cloud will update the same data to the Agro-logger and vary the threshold value as per the selection criteria to improve crop productivity and soil fertility [8]. A Machine Learning Based

Smart Irrigation System with LoRa P2P Networks, automatically and seamlessly learn the irrigation experiences from expert farmers for greenhouse organic vegetable crops. This system firstly calculate the amount of water for each irrigation based on the trained irrigation model combined with the environment data, such as air temperature/humidity, soil temperate/humidity, light intensity, etc., and then irrigate the crops automatically via the long-distance and low-power wireless LoRa P2P network[9].

Using data analytics platforms a farmer can get latest updates like weather forecast details, agriculture market for their goods. In addition, machine learning techniques offering high precision farming decisions at farmer's mobile phone [10].By applying ML to sensor data, farm management systems are evolving into real AI systems, providing optimal insights for decisions and actions to be made. The future scope may see an increased use of more advanced techniques like distributed (or edge) deep learning. AI must be used to increase the automation of tasks in agriculture and improve the yield while optimizing the use of natural resources[11]. Design and development of innovative IoT-centric applications that use technologies like machine learning and deep learning for solving specific agricultural problems as well as improve the overall outcome of the agricultural process [12].

3. Critical Analysis of Methodology

The detail survey of related papers is conducted and analysed by various key point of views. The methodology used, outcomes and limitations are thoroughly studied and summarized in table-1.

Table-1 Critical data analysis of machine learning and IoT for smart Farm

Title of the paper	Authors	Journal Year	Previous work done	Methodology	Outcomes/advantages	Limitations
The Role of Machine Learning in Internet-of-Things (IoT) Research: A Review[15]	Aneri M. Desai. Rutvij H. Jhaveri Dept. of Computer Engineering SVM Institute of technology Bharuch, India	March 2018	using WSN, RFID	IOT applications, data storage, machine learning	Reviews different research papers on IOT and ML	scalability, cost, time elapse, battery of sensors, and handling of multiple sensors data

Adoption of the Internet of Things (IoT) in Agriculture and Smart Farming towards Urban Greening: A Review[16]	A. A. Raneesha Madushanki, Malka N Halgamuge, W. A. H. Surangi Wirasagoda, Ali Syed	2019	WSN using Zigbee protoc ol	Sensors, Arduino	Decreased manpower and overheads	Connectivity issue
An Overview of Internet of Things (IoT) and Data Analytics in Agriculture: Benefits and Challenges[17]	O. Elijah, T. A. Rahman, I. Orikumhi, C. Y. Leow and M. N. Hindia,	Oct 2018	WSN	Cloud platform, sensors and camera, communicati on technology	Increase productivity of crop yield	range of communicati on distance, data rate, battery life, mobility, latency, security
ProfilIoT: A Machine Learning Approach for IoT device Identification Based on Network Traffic Analysis [18]	Y. Meidan *et al*	2017	WSN	IoT device identificati on using machine learning	IoT device classifications	Identification s of time lapse
A brief survey of machine learning methods and their sensor and IoT applications [19]	U. S. Shanthamall, A. Spanias, C. Tepedelenlio glu and M. Stanley	2017 IEEE	WSN	supervised and unsupervised methods and deep learning paradigms	Ml for IoT application	Problems to Large volume of data
Affordable Smart Farming Using IoT and Machine Learning[20]	R. Varghese and S. Sharma	2018 IEEE	WSN and RFID	machine learning based real-time analytics is performed to predict the future condition of the crops based on its past data.	affordable system which when deployed will give an insight into the real time condition of the crop	Reliability

Dynamic IoT management system using K-means machine learning for precision agriculture applications [21]	Jacqueline Stewart, Robe rt Stewart, Sean Kennedy	2017	WSN	Wireless Multimedia Sensor Networks (WMSN) , IEEE 802.15.4 Medium Access Control (MAC) and Physical (PHY) protocol	derivation and evaluation of the performance of the K-Means algorithm.	Restrictions on sensory nodes in terms of power, memory, compositiona lity
Development of IoT based smart security and monitoring devices for agriculture[22]	T. Baranwal, Nitika and P. K. Pateriya	2016		sensors and electronic devices are integrated using Python scripts	Based on attempted test cases, able to achieve success in 84.8% test cases.	Security threats
Learning IoT in Edge: Deep Learning for the Internet of Things with Edge Computing[23]	H. Li, K. Ota and M. Dong	IEEE Netwo rk 2018	Using differe nt Sensor s	deep learning for IoT into the edge computing environment	method outperforms other optimization solutions on deep learning for IoT	Extract accurate information from raw sensor data
Machine Learning Applications on Agricultural Datasets for Smart Farm Enhancement. Machines[24]	Balducci, Fabrizio & Impedovo, Donato & Pirlo	2018	WSN	Neural Network, Backprapagat ion algorithm and Linear and Polynomial Regression Techniques	provide real-time suggestions and make long-term forecasts based on user choices and preferences must be studied and tested.	to manage fault tolerance and hardware malfunction prediction
Machine learning Implementation in IoT based Intelligent System for Agriculture[25]	Bhanu K N, Jasmine H J, Mahadevasw amy H S.	2021	WSN, GPS based remote control	implementati on of machine learning in Thing Speak cloud platform	Integrating IoT into agriculture improves crop quality and productivity.	only irrigation is considered for productivity .
IoT based Smart	Kasara Sai Pratyush	2020 IEEE	WSN	Supervised Machine	farmer can decide himself to water	Limited to only water

Agriculture using Machine Learning [26]	Reddy,Y. Mohana Roopa; Kovvada Rajeev L.N.			Learning algorithms-decision tree, Raspberry pi.	the crop only when required, avoiding the wastage of water use	irrigation

4. Applications

Machine learning has been widely used in agriculture, such as classification, crop health monitoring, prediction of crop disease etc. Various Machine learning algorithms that used according to application and their performance are given in Table 2.

Table 2: Machine Learning algorithms for smart farming applications

Application	Machine Learning Models/algorithms used
Smart Management of Crop Cultivation using IOT and Machine Learning [27]	Random forest algorithm, FP tree, KNN
To predict soil moisture for Smart Irrigation System [28]	Gradient Boosting Regression Trees,Multiple Linear Regression,Random Forest Regression
To monitor paddy crop for weeds using Raspberry Pi [29]	Random forest and support vector machine
To predict maize grain yields from conventional and CA-based cropping systems under lowlands and highlands of the ESA region [30]	KNN,LDA,SVM
Crop yield prediction and nitrogen status estimation in precision agriculture [31]	Support Vector Machines, KNN,ANN
Prediction andclassification ofgeographical origin of arice sampleaccuracy [32]	Ensemble Learning /Random Forest

Crop disease detection is one of the major applications of Machine Learning algorithm. Table-3 describes traditional Machine Learning and Deep learning models used to detect various crop diseases along with their accuracies.

Table 3 [33]: Traditional machine learning (TML) and deep learning (DL) methods for plant disease detection.

Crop Name	Model	Model Type	Accuracy
Tomato	K-Nearest Neighbour	Traditional Machine learning	92.86%,

Tomato	Support Vector Machines	Traditional Machine learning	93.90%
wheat	Advanced Neural Networks	Traditional Machine learning	81%
Rice	Support Vector Machines	Traditional Machine learning	73.33 %
Barely	Support Vector Machines	Traditional Machine learning	68 %
pre-symptom disease detection task exploiting hyperspectral images	Extreme Learning Machine (ELM) classifier	Deep Learning	100%
Tobacco	Extreme Learning Machine (ELM) classifier	Deep Learning	98%
Wheat	Two-dimensional convolutional bidirectional gated recurrent unit neural network (2D-CNN-BidGRU) hybrid model.	Deep Learning	84.6%
Tomato	Extreme Learning Machine (ELM) classifier	Deep Learning	100 %

5. Conclusion & Future Scope

A review of IOT and Machine learning algorithms for farm related data analysis and prediction is presented in this paper.A Lot of research has been done in this field. This shows that to improve the productivity and efficiency of farming use of IOT and Machine Learning plays an important role[30]. To minimize the extra overheads of the farmers in order to perform the farm management this kind of prediction and analysis tools proving great benefits. This paper surveyed a usage of IOT and Machine learning in smart farming with its implementation challenges, various application areas of IOT and Machine Learning, methodology used, outcomes and limitations. It is observed global variables such as temperature, soil moisture, humidity, pH value and solar radiation have commonly used in the farming applications taken as a parameters for Literature reviewed [31]. It was also observed that data reliability and security, data connectivity and implementation cost are major challenges in this area of research.

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2. RNFL Thickness Measurement in Retinal OCT Images for Detection of Glaucoma

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Abstract

Glaucoma is one of leading cause of blindness in worldwide. Though various techniques are available for detection of glaucoma but it has certain limitations, so there is need for early diagnose the glaucoma. In this research work we developed a method for measuring the thickness of retinal nerve fiber layers. For our work we collected optical coherence tomograph images. We performed pre-processing functions on it. Used green channel histogram and grey threshold functions and extracted RNFL'S.Then we measured thickness of retinal nerve fiber layers, calculated area and its diameter. In further study we will do classification on it.

Keywords: Glaucoma, OCT, RNFL, FundusScopy, Optic Cup, Optic Disc.

Introduction

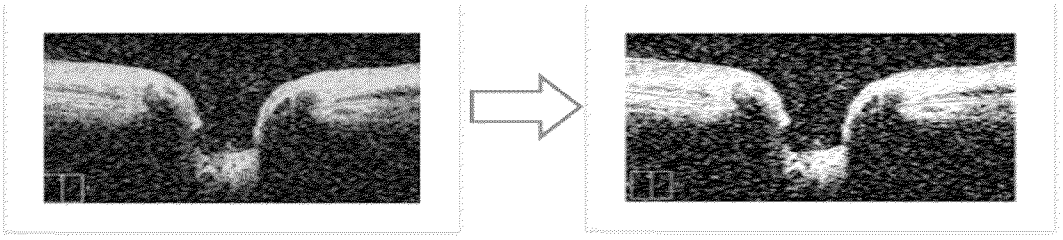
Eye is most Complex Sensitive organ in human body, which consist of various small working parts. Glaucoma is an eye disease in which either optic nerve head get damaged or the retinal nerve fiber layers are losses due to increase in intraocular pressure in eye, due to this it can cause total vision loss if it is not treated earlier, So there is need for early detection of glaucoma. For glaucoma detection ophthalmologist are using various devices fundusScopy camera,Optical Coherence tomography,heidelberg retinal tomograph through which eye images are taken. Glaucoma can be detected using fundus images but it has limitation is after progression of glaucoma it can be recognized. For early detection Optical Coherence images are useful. Among several imaging modalities optical coherence tomograph is most useful for early diagnosis of glaucoma. OCT is the non-invasive, non-contact imaging, high axial resolution and has faster scanning process [1]. For the detection of glaucoma various parameters are considered like calculating optic cup to disc ratio, neuro retinal thickness, Retinal Nerve Fiber Layer Thickness measurement, RNFL thickness map, RNFL Deviation Map. Here,in this study we worked on extraction of RNFL thickness measurement[6].

Data and Methodology

Firstly, we have performed Pre-processing on collected OCT images. We have taken input as OCT images and from color OCT image, we extracted Green channel because green channel shows high intensity as compare to red and blue respectively.

$$g = \frac{G}{(R + G + B)}$$ [5][6]

Here g is a Green channel and R, G and B are Red, Green and Blue respectively.

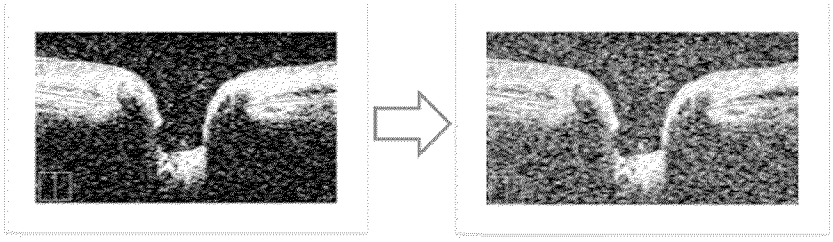


Input OCT Image Green Channel

On the green channel extracted image, we applied green channel histogram equalization function for enhance the image.

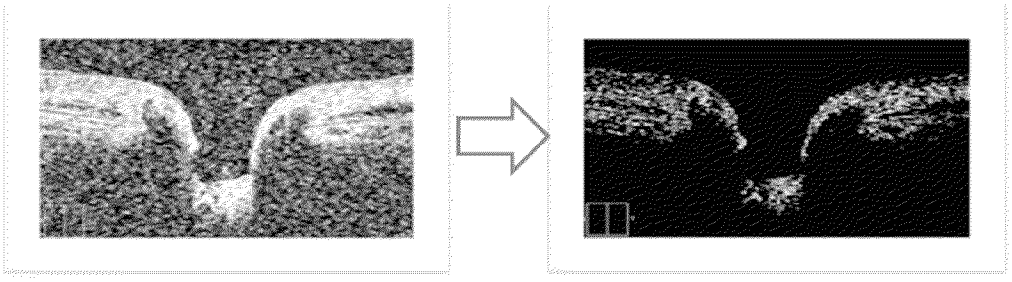
$$h(v) = \text{round}\left(\frac{cdf(v) - cdf_{min}}{(M \times N) - cdf_{min}} \times (L - 1)\right)$$ [5][6]

Here cdf_{min} is the minimum value of the cumulative distribution function, M × N gives the image's number of pixels and L is the number of grey levels.



Green Channel Green Channel Histogram Equalization

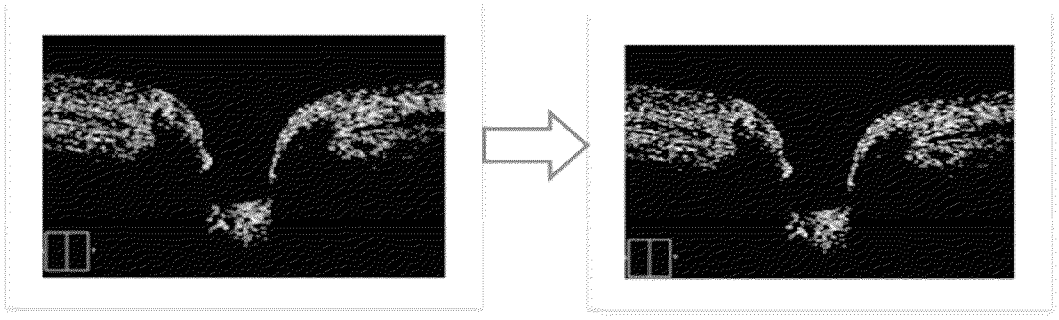
After the green channel histogram equalization, we applied intensity transformation function for adjust intensity values in OCT image.



Green Channel Histogram Equalization Intensity Transformation

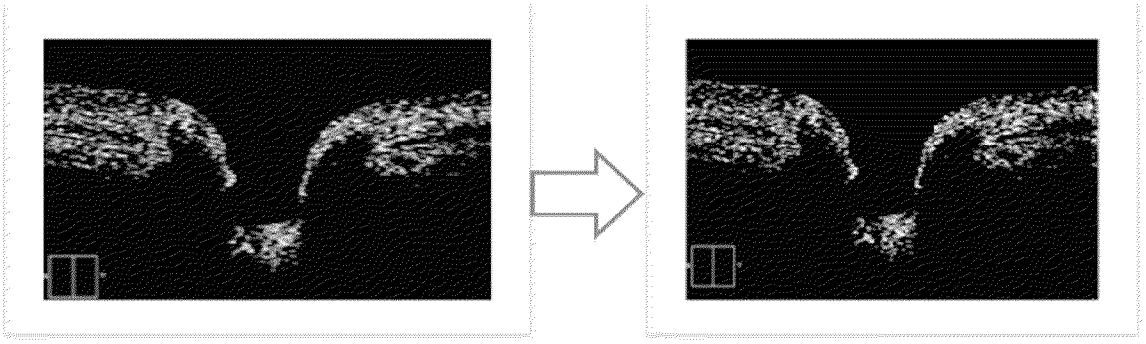
After intensity transformation, we applied gray threshold function. For converting gray scale image into binary forms for extractions of retinal nerve fiber layers.

$$T = \frac{1}{2}(m1 + m2)$$ [5][6]



Intensity Transformation Gray Threshold

From the threshold image, we extracted the Retinal Nerve Fiber Layer.



Gray Threshold Extracted RNFL

After extraction of Retinal nerve fiber layers, we calculated the area of nerve fiber layers.

Results

After extraction of retinal nerve fiber layers from the OCT images, we calculated area and diameter of RNFL. Following table shows the output results.

Table 1. RNFL Extraction Results

Images	Area	Diameter
Img1	13740	37.3305
Img2	1.17E+04	34.4617
Img3	1.17E+04	34.4617
Img4	1.44E+04	38.1545
Img5	1.34E+04	36.9089
Img6	1.28E+04	36.0589
Img7	1.35E+04	36.9396
Img8	1.34E+04	36.93
Img9	7.62E+03	27.7938
Img10	1.06E+04	32.7476
Img11	6.54E+03	25.7583
Img12	1.35E+04	36.9722
Img13	9.93E+03	31.7365
Img14	1.00E+04	31.8736
Img15	1.54E+04	39.4808
Img16	1.53E+04	39.3555
Img17	1.51E+04	39.13
Img18	399.125	6.3625
Img19	1.33E+04	36.7828
Img20	1.86E+04	43.4817
Img21	1.02E+04	32.1502
Img22	8.58E+03	29.5027
Img23	1.45E+04	38.3804
Img24	15556	39.7209
Img25	1.44E+04	38.1545
Img26	1.42E+04	37.9628

Conclusion

In this research study, we implemented a technique for measuring retinal nerve fiber thickness using optical coherence tomographic images for detection of glaucoma. For our work we collected OCT images from the eye hospital and after collection we pre-processed images, applied green channel histogram function on it, then applied gray threshold on it and extracted

retinal nerve fiber layers. We calculated area and diameter of RNFL. In further study, we will do classification on it for classifying it in normal and glaucomatous group.

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3. Electron Trajectories in the Electromagnetic Undulator and Axial Field

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Abstract

In this paper we derive the equations for the electromagnet undulator trajectories with the axial magnetic field. We analysed the trajectory theoretically. $\overrightarrow{B_z}$is the axial magnetic field which is responsible for the addition of new component in the transverse trajectory. We ignored the errors in the electromagnetic undulator period.

Keywords: Trajectory, axial field, electromagnet undulator.

1. Introduction

In recent years there exist interests in development and use of precision undulators in synchrotron radiation sources and free electron lasers Free electron laser (FEL) is source of coherent electromagnetic radiation at wavelength from microwave through terahertz radiation and infrared to visible spectrum, ultraviolet to x-rays. The physical mechanism depends upon the electron beam through a periodic magnetic field called undulator and it is the key component of the free electron laser. The undulator is field itself may be magnetostatic or electromagnetic. The main difference between the two types of the undulator is the frequency of the output radiation and this output radiation depends upon the variation in the undulator period and electron beam energy[1]. In case of magnetostatic undulator wavelength of output radiation is related by the $\lambda = \lambda_w/2\,\gamma^2$ where $\lambda_w$is the undulator period and γ is the relativistic factor for the beam. In the case of electromagnetic undulator the wavelength of the output radiation is depends in the $\lambda = \lambda_w/4\,\gamma^2$. It concludes that for the fixed undulator period and electron beam energy electromagnetic wave undulator can produce the shorter wavelength.

A longitudinal magnetic field is necessary to transport high-current beams with low electron energy. The presence of this field changes the electron path and leads to the possibilityof particle cyclotron rotation that can reduce the longitudinal relativistic factorfor electron is $\gamma$and increase the radiation wavelength[2].

Trajectory straightness is an important parameter for free electron laser in both vertical and horizontal directions. A typical requirement for straightness is order of few microns. The imperfect in the straightness of the electron trajectory or non-uniformity velocity .This leads to a phase mismatch of the radiation emitted by different periods and the quality of the radiation produced in synchrotron radiation sources is degraded [3]. A large values of the phase error associated with the undulator reduces the photon flux and the laser gain operated at higher harmonics.We shall consider the motion of a charged particle, sayan electron, in a plane electromagnetic wave. The frequency w of the electromagnetic wave is assumed low enough for the scattering and radiation reaction effects on the motion to be neglected, and the trajectory of the electron is obtained from a Newtonian equation of motion with a Lorentz force included[4]

2. Axial Field and Electron Trajectories

Let us consider the electromagnetic wave with the magnetic and electric components as,

$$\vec{B}_w = B_w\left[\hat{x}\cos\left(k_w z+\omega_w t\right)+\hat{y}\sin\left(k_w z+\omega_w t\right)\right]$$
$$\vec{E}_w = \frac{B_w\omega_w}{k_w}\left[-\hat{x}\sin\left(k_w z+\omega_w t\right)+\hat{y}\cos\left(k_w z+\omega_w t\right)\right] \quad (1)$$
$$\vec{B}_z = \vec{z}B_0$$

Where B_w is the amplitude of the electromagnetic wave undulator k_w and ω_w are the frequency and the wave number of the electromagnetic wave.$B_0$is the axial field. Using the Lorentz force equation we can write the equation (1) as,

$$\frac{d\beta_x}{dt} = \frac{-e}{m_o\gamma c}\left(\beta_y B_o-\beta_z B_y\right)-\frac{e}{m_o\gamma c}E_x$$
$$\frac{d\beta_y}{dt} = \frac{-e}{m_o\gamma c}\left(\beta_z B_x-\beta_x B_0\right)-\frac{e}{m_o\gamma c}E_y \quad (2)$$

Further we extend this equation as,

$$\frac{d\beta_x}{dt} = \frac{k\Omega}{\gamma}\sin(\Omega t)-\Omega_c\beta_y$$
$$\frac{d\beta_y}{dt} = \frac{-k\Omega}{\gamma}\cos(\Omega t)+\Omega_c\beta_x \quad (3)$$

Where,

$$k=\frac{eB_w}{m_0c^2k_w}\ ,\ \Omega_c=\frac{eB_0}{\gamma m_0c^2}\ \text{and}\ \Omega=k_w z+\omega_w t$$

Now taking the derivative of the equation (3) we can write the equation as follows

$$\frac{d^2\beta_x}{dt^2} + \Omega^2\beta_x = \frac{k\Omega}{\gamma}(\Omega + \Omega_c)\cos(\Omega t) \qquad \text{(4-a)}$$

$$\frac{d^2\beta_y}{dt^2} + \Omega^2\beta_y = \frac{k\Omega}{\gamma}(\Omega + \Omega_c)\sin(\Omega t) \qquad \text{(4-b)}$$

From equation (4-a) and (4-b) we can write

$$\frac{d\beta_x}{dt} = -\alpha\Omega\sin(\Omega t) + \beta\Omega\cos(\Omega t)$$
$$\frac{d^2\beta_x}{dt^2} = -\alpha\Omega^2\cos(\Omega t) - \beta\Omega^2\sin(\Omega t) \qquad (5)$$

We get the

$$\beta_x = \frac{-k\Omega}{\gamma(\Omega - \Omega_c)}\cos(\Omega t) - \beta_\perp\cos(\Omega_c t)$$
$$\beta_y = \frac{-k\Omega}{\gamma(\Omega - \Omega_c)}\sin(\Omega t) - \beta_\perp\sin(\Omega_c t) \qquad (6)$$
$$\beta_z = \beta^* - \frac{k\Omega\beta_\perp}{\gamma(\Omega - \Omega_c)}\cos(\Omega - \Omega_c)t$$

We get the electron trajectories as,

$$x = \frac{-kc}{\gamma(\Omega - \Omega_c)}\sin(\Omega t) - \frac{\beta_\perp c}{\Omega_c}\sin(\Omega_c t)$$
$$y = \frac{kc}{\gamma(\Omega - \Omega_c)}\cos(\Omega t) + \frac{\beta_\perp c}{\Omega_c}\cos(\Omega_c t) \qquad (7)$$
$$z = \beta^* ct - \frac{k\Omega\beta_\perp}{\gamma(\Omega - \Omega_c)^2}\sin\left[(\Omega - \Omega_c)t\right]$$

Where $\beta^* = 1 - \frac{1}{2\gamma^2} - \frac{k^2\Omega^2}{2\gamma^2(\Omega - \Omega_c)^2} - \frac{\beta_\perp^2}{2}$

3. Result and Discussion

Electron trajectories in the electromagnetic wave undulator field combined with the axial magnetic field is shown in the x-direction (figure.1) as well as in y –direction (figure 2). It shows the simple sinusoidal pattern with the relativistic speed. We consider the L is the length of the electromagnetic wave undulator $L = N\lambda_w$ where N is the number of oscillation and λ_w is the wavelength of the laser. The undulator parameter is k=1.43 [5] and γ =100 .In the figure .1and **Figure 2 trajectory starts at time zero and finished at the time 1.7 x10^{-10} second.**

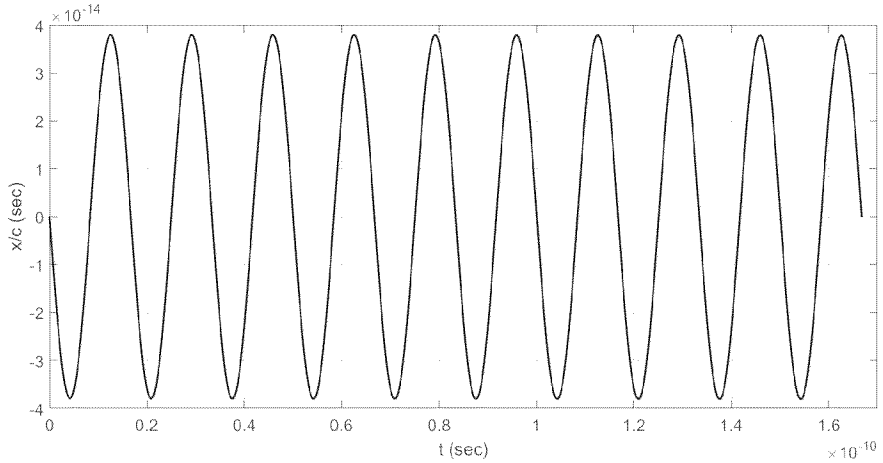

Figure 1. Electron undulator trajectory for the electromagnetic wave undulator in x direction

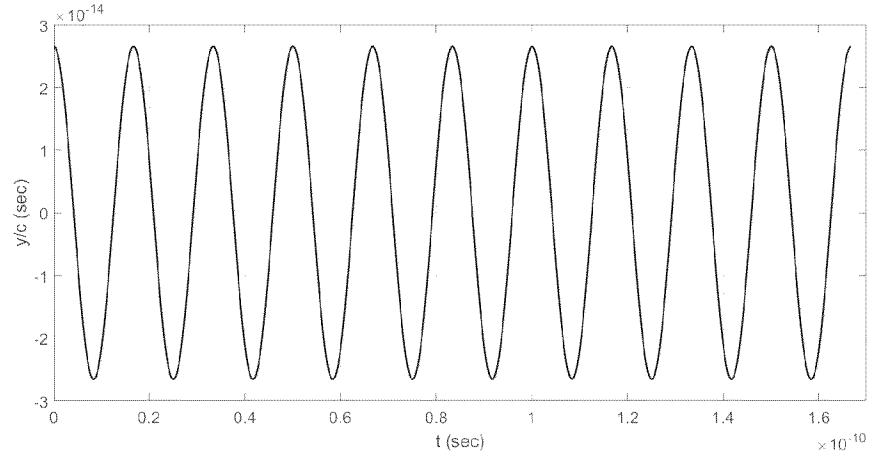

Figure 2. Electron undulator trajectory for the electromagnetic wave undulator in y-direction

In terms of the axial magnetic field we are getting very interesting result with the extra term Ωcthis is nothing but the cyclotron frequency and this term is responsible for the modification in the trajectory.This term consist of the axial magnetic field, electron charge , relativistic velocity term and mass of the electron. Another term we get (Ω-Ωc) which is comes in the denominator of the electron trajectory.

4. Conclusion

In our theoretical analysis an additional axial term is cyclotron frequency Ω_c which responsible to improvethe trajectory of the electron in an electromagnetic wave undulator.

5. Acknowledgement

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4. Impact of GST on Indian Economy

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Introduction

GST (Goods and Services Tax) is the biggest indirect tax reform of India. GST is a single tax on the supply of goods and services. It is a destination based tax. GST has subsumed taxes like Central Excise Law, Service Tax Law, VAT, Entry Tax, Octroi, etc. GST is one of the biggest indirect tax reforms in the country. GST is expected to bring together state economies and improve overall economic growth of the nation.

GST is a comprehensive indirect tax levy on manufacture, sale and consumption of goods as well as services at the national level. It will replace all indirect taxes levied on goods and services by states and Central. Businesses are required to obtain a GST Identification Number in every state they are registered.

There are around 160 countries in the world that have GST in place. GST is a destination based taxed where the tax is collected by the State where goods are consumed. GST has been implemented in India from July 1, 2017 and it has adopted the Dual GST model in which both States and Central levies tax on Goods or Services or both.

- SGST – State GST, collected by the State Govt.
- CGST – Central GST, collected by the Central Govt.
- IGST – Integrated GST, collected by the Central Govt.
- UTGST – Union territory GST, collected by union territory government

Why is GST needed in India?

Introduction of GST is considered to be a significant step in the reform of indirect taxation in India. Amalgamating of various Central and State taxes into a single tax would help mitigate the double taxation, cascading, a multiplicity of taxes, classification issues, taxable event, etc., and leading to a common national market.

VAT rates and regulations differ from state to state. On the other hand, GST brings in uniform tax system across all the states. Here, the taxes would be divided between the Central and State government.

Objective of the Research paper

Objective of the Research paper is to study the effect of GST on on Indian Economy and Different Sectors.

Research Methodology

The research pepar based on secondary data collected from various books , research pepar,newpapers,journals, and different google website.

Impact of GST on Indian Economy

GST is a game-changing reform for the Indian Economy, as it will bring the net appropriate price of the goods and services. The various factors that have impacted Indian economy are:

1. Increases competitiveness

The retail price of the manufactured goods and services in India reveals that the total tax component is around 25-30% of the cost of the product. After implementation of GST, the prices have gone down, as the burden of paying taxes has been reduced to the final consumer of such goods and services. There is a scope to increase production, hence, competition increases.

2. Simple Tax Structure

Calculation of taxes under GST is simpler. Instead of multiple taxation under different stages of supply chain, GST is a one single tax. This saves money and time.

3. Economic Union of India

There is freedom of transportation of goods and services from one state to another after GST. Goods can be easily transported all over the country, which is a benefit to all businesses. This encourages increase in production and for businesses to focus on PAN-India operations.

4. Uniform Tax Regime

GST being a single tax, it has made it easier for the taxpayer to pay taxes uniformly. Previously, there used to be multiple taxes at every stage of supply chain, where the taxpayer would get confused, which a disadvantage.

5. Greater Tax Revenues

A simpler tax structure can bring about greater compliance, this increases the number of tax payers and in turn the tax revenues collected for the government. By simplifying structures, GST would encourage compliance, which is also expected to widen the tax base.

6. Increase in Exports

There has been a fall in the cost of production in the domestic market after the introduction of GST, which is a positive influence to increase the competitiveness towards the international market.

Impact of GST on Different Sectors

1. Consumer Goods & Services

The GST rates for the FMCG industry is set at 18-20%. While most are happy with the introduction of GST, the ones who are heavily affected are opposed.

2. Transportation

The rates for cabs has been lowered to 5% and for air travel also. So, this is a welcome move for those in this sector.

3. E-Commerce

Post GST, e-commerce operators collect 1% of the net value of the taxable supplies, which is called Tax Collected at Source (TCS).

4. Entertainment & Hospitality Sector

This sector was affected as this sector falls in the 28% category. Movie tickets, hotel rates will now be costlier.

5. Financial Products and Services

The, financial services such as funds and insurances, (Non-Banking Financial Company) are most impacted.

6. Start-Ups

GST has a positive influence towards start-ups. It had got both advantages and disadvantages for start-ups. However, as a start-up, already facing the stress of a new business, the question of how the new GST will impact your business, must be difficult for you.

7. Inflation and Economic Activity

GST is a Inflationary measure. However, the rise in the tax rate on services to 18% is expected to raise inflation.

8. Stock Transfer

Post the introduction of GST, tax is levied on branch transfers and input tax can be claimed later.

9. Export of Goods & Services

At all stages of the supply chain there is no tax, post GST. Moreover, the availability of input credits is welcomed.

10. Gold and Gold Jewellery Prices

Post GST the tax rate was set to 18% initially then brought down to 5% tax rate

11. Rent

Since the implementation of GST the exemption limit for renting out commercial property is Rs. 20 lakhs and there is not GST on house rent.

12. SEZ

Under GST regime , SEZ's have benefitted from a zero-tax rate.

13. Affordable Housing

Purchase of houses is non-taxable, however under construction house will carry a GST tax rate. The GST rates for homes purchased under CLSS, EWS, LIG, MIG1/11 will be 8%, after deducting cost of land. However, those doesn't qualify CLSS, etc, will have to pay 12% GST on constructed houses.

14. Real Estate Sector

This sector has mostly benefitted from the introduction of GST, as much of this sector is becoming more transparent.

15. Logistics

The rate pre-GST was above 26% and post the implementation of GST there was reduction to 18-21%, which was good news for the sector.

16. Manufacturing Industry

GST, demands businesses to set-up mechanism for meeting the requirements of GST. Therefore, once the companies adapt the requirements, the compliance costs will go down drastically.

17. Automobile Industry

GST absorbed indirect tax regime, which attracted several duties and taxes on the sale of vehicles and spares and accessories.

18. Chemical Industry

Implementation of GST is believed to be positive to the chemical industry, especially in the long term.

Conclusion

Change is definitely never easy. The government is trying to smooth road to GST. It is the important to take a leaf from global economices that have implemented GST before us, and who overcance the teething troubles to experience the adventage of having a unified tax system and easy input credites. GST with end to end IT enabled tax machanisam is likely to bring buoyancy to gonerment revenue. It is expected that the malicious activity of tax that will go away under GST regime in order to benifite both governments as well as consumer. In reality that extra revenue that the government is expending to generate won't come from the consumers pocket but from the reuction tax theft.

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5. महिला सक्षमीकरणाचा मंत्र : स्वयंसहायता बचतगट

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सार (Abstract)

महिलांच्या सर्वधारी बचत गटाच्या माध्यमातुन महिलांचे सक्षमीकरण केल्याबद्दल महम्मद युसुफ यांना नोबल पारितोषिकांनी सन्मानीत करण्यात आले. यासोबतच स्वयंसहायता बचत गटाची संकल्पना, आर्थिक घटक, शिक्षणासाठी खर्च, मार्केटिंग तंत्राच ज्ञान, आरोग्याकडे बघण्याचा दृष्टिकोन बदलला, त्यासोबत महिलांचा विकास होवुन आंतरराष्ट्रीय व्यापारातील भारताचा वाटा कसा मोठया प्रमाणात वाढेल. इत्यादी बाबत प्रस्तूत पेपर मध्ये चर्चा करण्यात आली आहे.

बारामती तालूक्यातील सोनगावची निरक्षर, कमलताई परदेशी यांनी बचत गटाच्या माध्यमातून कोटी रुपयाचा मसाल्याचा उद्योग करीत आहेत, यामुळे शेकडो महिलांच जिवन बदलून टाकले त्याची एबीपी माझा या वाहिनीवर २२ व २३ ऑगस्ट २०२१ ला माझा कट्टावर मुलाखत प्रसारीत झाली. त्यांची मुलाखत म्हणजे महिला सक्षमीकरणाचा मंत्र : स्वयंसहायता बचतगट होय.

कीवर्ड Key Words: Self help group, micro finance, Women Empowerment

१. प्रस्तावना

गरीबीत ज्या महिला शैक्षणिक, सामाजिक आणि आर्थिक दृष्टिने खितपत पडल्या होत्या. अशा महिलांच्या सर्वधारी बचत गटाच्या माध्यमातुन महिलांचे सक्षमीकरण केल्याबद्दल महम्मद युसुफ यांना २००६ साली नोबल पारितोषिकांनी सन्मानीत करण्यात आले. महिला सक्षमीकरणाकरीता बचत गट कसे कार्ये करतात याचे हे उदाहरण म्हणजे एक पावतीच आहे. जे बांग्लादेशात झाले तेच अमेरिकेत, भारतात व्हावे या दृष्टिने बचत गटाची सुरुवात जगभराच्या विविध देशात झाली म्हणजे जग या सिध्दांतापर्यत पोहचलेलं आहे. महिला सक्षमीकरणातून महिला आर्थिकदृष्टयासुध्दा सक्षम व्हायला हव्या. यासाठी बचत गटांची गरज आहे. बनारस हिंदू विद्यापीठातील डॉ. ए.एस.आडतेकर यांनी लिहीलेल्या 'प्राचीन भारताची शिक्षण पध्दती' या ग्रंथामध्ये भारतातील महिलांची स्थिती दर्शविली आहे. इस. २००१ ला भारतात महिला साक्षरतेचे प्रमाण ७५ टक्के एवढे होते आणि महिलांच्या सांस्कृतिक, सामाजिक, शैक्षणिक, राजकीय दर्जा उच्च होता. जगातील आंतरराष्ट्रीय व्यापारात भारताचा वाटा ३६.६५ टक्के एवढा होता. आपण १९९१ ला जागतिकीकरणाचे धोरण स्विकारले त्यावेळी आंतरराष्ट्रीय व्यापारातील भारताचा वाटा २.२ एवढा होता. याचे कारण म्हणजे भारतातील एकूण लोकसंख्येपैकी जवळपास निम्मी लोकसंख्या असलेला महिला वर्गाचे मागासलेपण हे म्हणता येइल. त्यातील बहुसंख्य महिला वर्ग हा चूल आणि मूल ऐवढयापुरतेच कार्य करतांना दिसुन येते. ग्रामीण भागातील महिलांच्या विकासासाठी बचत गटाच्या चळवळीतुन इस. पूर्वेला ज्याप्रमाणे महिलांचा आर्थिक, सामाजिक, राजकीय, शैक्षणिक विकासाकडे विचार करण्याची सुरुवात झाली आहे. बचत गटातुन सर्वांगींण विकासाचे उदाहरण पाहिले असता दुग्ध उत्पादनाचे घेता येइल. महिला दुग्धजन्य पदार्थातुन पैसा आणि जनावरांच्या शेणामुळे शेतीतील उत्पादनात मोठया प्रमाणात वाढ झाल्याचे चित्र दिसत आहे. समाजाचा आर्थिक स्थर उंचावला तर राहणीमानाचा दर्जा आपोआपच उंचावतो आणि राहणीमानाचा दर उंचावला तर शिक्षण, आरोग्याकडे पुरेसे लक्ष दिल्या जाते. ग्रामीण भगीणींच दारिद्रियात खितपत पडल्या आहे याचे कारण उत्पन्नाचे शेतमजुरी शिवाय दुसरे साधन नसणे हे आहे मात्र बचत गटांमुळे विविध प्रकाराचे रोजगाार स्त्रियांना मिळत आहेत किंवा

येणाऱ्या काळात ही चळवळ अधिक सक्षमतेने राबवल्यास महिलांचा उत्पादकतेमधील सहभाग वाढून महिला सक्षमीकरण होईल. यासाठी बचत गट परवलीचा शब्द, जादुची कांडी, कल्पतरुची सावली आणि चिंतामणी होईल.

२. स्वयंसहायता बचत गटाची संकल्पना

'' स्वंयसहाय्यता गट म्हणजे समान आर्थिक व सामाजिक स्तरातील आणि ग्रामीण भागातील लोकांनी स्वयंस्फूर्तीने एकत्रीत येउन तयार केलेला गट कि ज्याच्या माध्यमातून गटाच्या सदस्यांना गटाच्या निर्णयानुसार गटाने उभारलेल्या बचत निधीतून कर्ज वाटप केले जाते.''

''समान समस्या असलेल्या लोकानी त्या समस्या वैयक्तिकरित्या सोडविता येत नाहीत हे लक्षात आल्यावर त्या समस्यांचे निराकरण करण्यासाठी एकत्रीत येउन स्थापन केलेला गट म्हणजे स्वंयसहाय्यता बचत गट होय.''

रिर्झव बॅक ऑफं इंडियाच्या मते, "A Self help group is a registered or unregistered group of micro entrepreneurs having homogenous social and economic background voluntarily, coming together to save small amount regularly, to mutually agree to contribute to acommon fund and to meet their emergency needs on mutual help basis. The group members use collective wisdom and peer pressure to ensure proper end use of credit and timely repayment thereof. In fact, peer pressure has been recognized as an effective substitute for collaterals.''

वरील व्याख्याच्या अध्यायांनावरून असे म्हणता येईल ''कमीत कमी सात जास्तीत जास्त कितीही लोक एकत्र येउन एक गट स्थापन करने. सर्व मिळुन ठराविक रक्कम बॅकेत बचत करणे व ज्या सदस्याला भांडवलाची गरज आहे त्याला कर्ज देणे. आणि त्याच्या व आपल्या जीवनमानाचा विकास करण्याच्या ध्येयाने एकत्र आलेल्या गटाला स्वंयसहाय्यता बचत गट म्हणता येईल.''

३. आर्थिक घटक

स्त्रियांचा समाजातील दर्जा स्त्रीकडे केवळ उपभोगाची वस्तु म्हणून बघण्यात आल्यामुळे घरातील निर्णयामध्ये स्त्रियांना कुठलेही स्थान नव्हते परंतु स्त्रियांच्या बचत गटातील सहभागामुळे ती स्वत:च्या बचत गटासाठी सामुहीकपणे निर्णय घेउ लागल्यामुळे तिचा निर्णयशक्तीचा परिचय समाजाला होउ लागला आहे. त्यामुळे अलीकडे बचत गटात काम करणाऱ्या महिलांचा अभ्यास केल्यास त्यांच्या मतांचा घरातसुध्दा आदार होउ लागला आहे. हे महिला सक्षमीकरणाकडे एक पाउलच आहे.

३.१ शिक्षणासाठी खर्च

बचत गटामुळे महिलांच्या हाताला मोठया प्रमाणात रोजगार मिळाल्यामुळे त्यांच्या हातात पैसा येत आहे. परंतु या पैशातुन कर्जाची परतफेड करुनही ती काही पैसा बचत करत आहे. हा बचतीचा पैसा ती आपल्या मुला मुलींवर शिक्षणासाठी खर्च करु शकत असल्यामुळे मुलांचा शैक्षणिक विकासही होत आहे.

३.२ मार्केटिंग तंत्राच ज्ञान

बचत गटांच्या माध्यमातुन उत्पादित होणाऱ्या वस्तु विविध प्रर्दशनीमध्ये विकत असल्यामुळे मार्केटिंग तंत्राबददल तिला माहिती होवु लागली आहे. त्यामुळे तिच्या ज्ञानात भर पडून ती आर्थिक पिळवणूकीपासुन वाचत आहे. उदा. बचत गटाच्या चळवळी अगोदर स्त्रिया जंगलातील लाख, डिंक, चारोळी गोळा करीत होत्या आणि त्यांच्या कडून व्यापारी अल्पदरात विकत घेत होते. त्यामुळे स्त्रियांची आर्थिक पिळवणुक होत होती परंतु मार्केटिंग तंत्रांमुळे तिच्या मालाला योग्य भाव मिळाला आहे.

४. सामाजिक घटक

शिक्षणाची जागरुकता बचत गटामुळे झाली. ग्रामीण स्त्रियांना बॅंकेमध्ये, सरकारी कार्योलयामध्ये, शहरात भरणाऱ्या प्रदर्शन आणि विक्रीसाठी जावे लागत असल्यामुळे शिक्षणाचे महत्व तिला समजले. त्यामुळे आपली मुलगी शिकली पाहिजे असे तिला वाटले. स्त्रिया जर शिकल्या तर महिला सक्षमीकरण होईल.

४.१. आरोग्याकडे बघण्याचा दृष्टिकोन बदलला

एका वैद्यकीय पाहणीमध्ये ८० टक्के स्त्रियांचे हिमोग्लोबिंनच प्रमाण कमी आहे असे आढळले याचे कारण ती स्वत:च्या आहाराबददल जागरुक नाही हे आहे. बचत गटामुळे ती जागरुक होत आहे त्यामुळे राहणीमानाचा दर्जा उंचावण्याचा प्रयत्न ती करीत आहे आणि बचत गटामुळे महिला सक्षमीकरण होईल असे वाटते.

बचत गटामुळे ग्रामीण स्त्रियांना शहरी सोयी सुविधांबददल माहिती होत आहे. दरवर्षी दर लाख १३० महिलांचा मृत्यु हा प्रसूती घरी केल्यामुळे होत आहे ही गोष्ट लाजीरवाणी आहे. परंतु स्त्री बचत गटांच्या चळवळीमुळे घराबाहेर पडत असल्यामुळे तिला शासनाच्या रुग्णालयाची माहिती होत आहे त्यामुळे अलीकडे सरकारी दवाखान्यातील सुविधा घेण्याची ग्रामीण महिलांची संख्या वाढत आहे.

४.२. स्त्रियांच्या सामाजिक दर्जात वाढ

९९.०६ टक्के महिला हया सरकारी नौकरीमध्ये दिसत नाही आणि महाराष्ट्रातील प्रमाण बघितले तर ८७ टक्के महिला हया केवळ ग़हिणी आहे. हया ८७ टक्के महिलामधील काही महिला हया बचत गटाच्या चळवळीत काम करत असल्यामुळे महिलांचा दर्जा वाढलेला आहे.

४.३. दारिद्रय रेषेखालील महिलांच्या विकासात चालना

भारतामध्ये २२ कोटी लोक दारिद्रय रेषेखाली राहत असुन या गटामधील बऱ्याच स्त्रियांना रोजगाराच्या संधी मीळुन आहे. म्हणुन त्यांचा दर्जो वाढत आहे

४.४. बचत गटामुळे स्त्रियांना संपत्तीमध्ये वाटा

भारतामध्ये शेती आणि स्थावर मालमत्ता ९९.०५ टक्के पुरुषांच्या नावे आहे. फक्त ०५ टक्के मालमत्ता स्त्रियांच्या नावे दिसत आहे. घरांच्या मालकीचे प्रमाण जर घेतले तर ९३ टक्के घर हे पुरुषांच्या नांवे आहे मात्र बचत गटामध्ये देण्यात येणारे कर्ज आणि येणारी रक्कम स्त्रियांच्या नांवे होत असल्यामुळे स्त्रियांच्या नांवे असलेल्या संपत्तीत वाढ होत आहे.

५. राजकीय घटक

बचत गटांमुळे महिलांचा राजकारणातील सहभागही वाढला आहे. गेल्या ६० वर्षात 'तुला काही समजत नाही' 'तु घरातच बैस' असे म्हणून स्त्रियांचा राजकीय सहभाग नाकारला जायचा गेल्या ६० वर्षात फक्त ४८ महिला आमदार आपल्या विधानसभा आणि विधान परिषदेमध्ये निवडुन गेल्या आहे. त्यापैकी ४५ महिला हया राजकीय वारसा म्हणून किंवा सदन कुटुंबातील महिला होत्या. बचत गटासारख्या चळवळीमुळे महिला आरक्षणाला पाढबळ मिळेल आणि राज्यसभेत महिला आरक्षण पास झालेलं बिल लाकसभेतसुध्दा पास होईल आणि येणाऱ्या काळात ३३ टक्के महिला दिसायला लागतील हे केवळ महिलांच्या जागरुकतेमुळे होईल आणि महिलांची जागरुती बचत गटामुळे होत आहे म्हणुन महिलांच्या सक्षमीकरणाकरीता बचत गटासारख्या चळवळी मोठया प्रमाणात राबावायला हव्या.

६. समारोप

बचत गटातील महिलांना योग्य प्रशिक्षण, उत्पादित मालांना वेगळी बाजारपेठ आणि आता आहे त्यापेक्षा जास्त कर्जपुरवठा आणि बचत गटासाठी वेगवेगळे प्रशिक्षण केंद्रांची आवश्यकता आहे. बचत गटामधुन निष्क्रीय गटांवर लक्ष ठेवुन त्यांना प्रेरीत करण्यारसाठी

आणि ज्या महिला बचत गटामध्ये सक्रीय नाही किंवा बचत गट ज्या महिलांना माहितच त्या महिलांना मोठया प्रमाणात बचत गटांच्या योजनेत सामाहुन घेण्याचे कार्ये करणारी यंत्रणा विकसीत व्हायला हवी. यामुळे बचत गट अधिक कार्यक्षम होतील आणि महिलांचा विकास होवुन आंतरराष्ट्रीय व्यापारातील भारताचा वाटा मोठया प्रमाणात वाढेल.

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6. Water Pollution: Causes, Consequences, Prevention Method

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Abstact

Water is life for all but this water is polluting day by day in severe condition. So it can be said that our life (water) is not safe now. We are in crisis period. Water pollution is a major serious problem for all over the world. It affects drinking water, rivers, lakes and oceans all over the world. It consequently harms the health and wellbeing of human life and the natural environment. The present study is tried to discuss basically what water pollution is and focused on different causes of water pollution, effects of this pollution on Earth and finding possible solutions and preventive methods of this problem. This study is based on secondary sources of data from different government reports, research articles, journals and books, internet sources. Researches proved that water pollution affects not only morbidity and mortality of human life but also the whole ecosystem. In the study area water pollution is mainly caused due to overpopulation, agricultural practices, soil erosion, industrialization and urbanization.

Keywords- severe condition, drinking water, ecosystem, soil erosion

1. Introduction

Water pollution is a serious problem in India as almost70 per cent of its surface water resources and a growing percentage of its groundwater reserves are contaminated by biological, toxic, organic, and inorganic pollutants. In many cases, these sources have been rendered unsafe for human consumption as well as for other activities,such as irrigation and industrial needs. This shows that degraded water quality can contribute to water scarcityas it limits its availability for both human use and future ecosystem.In 1995, the Central Pollution Control Board(CPCB) identified severely polluted stretches on 18major rivers in India. Not surprisingly, a majority ofthese stretches were found in and around large urban areas. The high incidence of severe contamination nearurban areas indicates that the industrial and domestic sectors'contribution to water pollution is much higher than their relative importance implied in theIndian economy. Agricultural activities also contributein terms of overall impact on water quality. Besides

arapidly depleting groundwater table in different parts,the country faces another major problem on the water front—groundwater contamination—a problem which

has affected as many as 19 states, including Delhi. Geogenic contaminants, including salinity, iron, fluoride, and arsenic have affected groundwater in over 200 districts spread across 19 states.Water as an environmental resource is regenerative in the sense that it could absorb pollution loads up to certain levels without affecting its quality. In fact therecould be a problem of water pollution only if the pollutionloads exceed the natural regenerative capacity

of a water resource. The control of water pollution is therefore to reduce the pollution loads from anthropogenic activities to the natural regenerative capacity of the resource. The benefits of the preservation of water quality are manifold. Not only can abatement of water pollution provide marketable benefits, such as reduced water borne diseases, savings in the cost of supplying water for household, industrial and agricultural uses,control of land degradation, and development of fisheries, it can also generate non-marketable benefits like improved environmental amenities, aquatic life, and biodiversity.Using available data and case studies, this chapter aims to provide an overview of the extent, impacts, and control of water pollution in India. It also tries to identify the theoretical and policy issues involved in the abatement and avoidance of water pollution in India.

2. Water Pollution

2.1 What is water pollution?

Water is good solvent .Therefore it is rarely found, except in chemical laboratory, freefrom ‘impurities’. Even rain water has dissolved some gases in it. The practical and rational definition of water can thus be following-

“The presence of deleterious matter in such quantities tomake the water unsuitable for its designated use.”

In Scientific sense, “water pollution is a distortion of the aquatic ecosystem .Hence,water pollution is such a change which ‘adversely affect the aquatic ecosystem interms of the living organism, Oxygen content, the presence of toxins and so on.

In legal sense,Strictly Speaking ,pollution of water means a departure from normalstate (rather than a pure water,for ideally unpolluted water is misconception) of waterby human activities in such a manner to prevent it from being used for the purposesthought as normal. Normal areas of use include domestic, agricultural, Industrial, Fish,and other aquatic life and wild life including recreation and aesthetics.

The water (Prevention and control of pollution) act 1974 makes a legal definitionof water pollution as –

"Such contamination of water or such alteration of the physical, chemical, orbiological properties of water or such discharge of any sewage or trade effluent orany other liquid ,gaseous or solid substance into water as may ,or is likely to create anuisance or render such water harmful or injurious to public health or safety or todomestic ,commercial ,industrial ,agricultural or other legitimateuses or to the life and health of animals or aquatic organism."

2.2 Types of Water Pollution and Consequences of Water Pollution

There are many types of water pollution because water comes from many sources. Here are a few types of water pollution and their consequences on human beings.

1. Nutrients Pollution : Some wastewater, fertilizers and sewage contain high levels of nutrients. If they end up in water bodies, they encourage algae and weed growth in the water. This will make the water undrinkable, and even clog filters. Too much algae will also use up all the oxygen in the water, and other water organisms in the water will die out of oxygen starvation.

2. Surface water pollution : Surface water includes natural water found on the earth's surface, like rivers, lakes, lagoons and oceans. Hazardous substances coming into contact with this surface water, dissolving or mixing physically with the water can be called surface water pollution.

3. Oxygen Depleting : Water bodies have micro-organisms. These include aerobic and anaerobic organisms. When too much biodegradable matter (things that easily decay) end up in water, it encourages more microorganism growth, and they use up more oxygen in the water. If oxygen is depleted, aerobic organisms die, and anaerobic organisms grow more to produce harmful toxins such as ammonia and sulfides.

4. Ground water pollution : When humans apply pesticides and chemicals to soils, they are washed deep into the ground by rainwater. This gets to underground water, causing pollution underground. This means when we dig wells and bore holes to get water from underground, it needs to be checked for ground water pollution.

5. Microbiological : In many communities in the world, people drink untreated water (straight from a river or stream). Sometimes there is natural pollution caused by microorganisms like viruses, bacteria and protozoa. This natural pollution can cause fishes and other water life to die. They can also cause serious illness to humans who drink from such waters.

6. Suspended Matter : Some pollutants (substances, particles and chemicals) do not easily dissolve in water. This kind of material is called particulate matter. Some suspended pollutants later settle under the water body. This can harm and even kill aquatic organisms that live at the bottom of water bodies.

7. Chemical Water Pollution : Many industries and farmers work with chemicals that end up in water. This is common with Point-source Pollution. These include chemicals that are used to control weeds, insects and pests. Metals and solvents from industries can pollute water bodies. These are poisonous to many forms of aquatic life and may slow their development, make them infertile and kill them.

8. Oil Spillage : Oil spills usually have only a localized effect on wildlife but can spread for miles. The oil can cause the death to many fish and get stuck to the feathers of seabirds causing them to lose their ability to fly.

3. Prevention Measures

Water pollution is a serious problem in India as almost 70 per cent of its surface water resources and a growing percentage of its groundwater reserves are contaminated bybiological, toxic, organic, and inorganic pollutants.

In many cases, these sources have been rendered unsafe for human consumption aswell as for other activities, such as irrigation and industrial needs. This shows thatdegraded water quality can contribute to water scarcity as it limits its availability forboth human use and for the ecosystem.Extensive studies have been undertaken to find economically feasible alternativesfor water and wastewater treatment. A number of methods such as coagulation,membrane process, adsorption, dialysis, foam flotation, osmosis, photo catalyticdegradation and biological methods have been used for the removal of toxic pollutantsfrom water and wastewaterxvi. However, their applications have been restricted bymany factors, such as processing efficiency, energy requirement, engineeringexpertise, economic benefit and infrastructure, all of which precludes their use in muchof the world.

The waste water should be treated at the source itself, but even if it is let out intothe river after treatment, it will not have any effect on the pollutant already present inthe river. To exterminate the pollutants in river, it is necessary to treat the river wateras well and here AFI (Artificial Floating Islands) can help us. One can simultaneouslystart treating the water at various places with the help of Artificial Floating Islands, sothat the ecology of the MulaMutha River can be restored. Climate of India is suitablefor use of AFI, the temperature and atmosphere can

accelerate the process ofconversion of complex matter in simpler form. According to various studies, withproper selection of Plants and site, AFI can reduce BOD and COD by 80 and 60percent respectively. The root system converts the complex molecules in simplernutrient form; this simple form of nutrient is consumed by other aquatic organisms,thereby it improves water quality in an eco-friendly way. AFI can prove to be a greatsupport system to save our rivers and life depending on them

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7. Visible light induced Photocatalytic Degradation of Methylene Blue using Undoped Ag2CrO4

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Abstract

The photocatalytic degradation of methylene blue has been investigated in aqueous suspension of silver chromate of prepared by these different methods under variety of conditions which is essential from an application point of view. The degradation was monitored by measuring the change in substrate concentration as a function of irradiation time employing UV spectroscopic analysis. The degradation methylene blue was studied using different parameters such as type of photocatalyst, catalyst concentration and substrate concentration. The degradation rate was found to be strongly influenced by all above parameters. The photocatalyst AgC-US prepared by ultrasonic method was found to be more efficient as compared with AgC-SS and AgC-RF.

Keywords: Photocatalysis, methylene blue, silver chromate, dye, kinetics.

1. Introduction

Water is a basic requirement for all living organisms. Population increase and industrialization led to water pollution. One of the pollutants of water is the dye effluents from various textile industries. A substantial amount of dyestuff is lost during the dyeing process in the textile industry, which possess a major problem for the industry as well as a threat to the environment [1, 2]. Decoulourization of dye effluents has therefore acquired increasing attention. During the past decades, photocatalytic processes involving TiO_2 semiconductor particles under UV light illumination have been shown to be potentially advantageous and useful in the treatment of wastewater pollutants.

There are several studies related to the use of semiconductors in the photo mineralization of photo stable dyes [3-11]. The mechanism constituting heterogeneous photocatalytic oxidation processes has been discussed [12, 13] extensively in the literature Briefly, when a semiconductor such as TiO_2 absorbs a photon of energy equal to or greater than its band gap width, an electron may be promoted from the valence band to the conduction band (e_{cb}^-) leaving behind an electron

vacancy or "hole" in the valence band (h_{vb}^{+}). If charge separation is maintained, the electron and hole may migrate to the catalyst surface where they participate in redox reactions with sorbed species. Specially, h_{vb} hole may react with surface-bound H_2O or OH to produce the hydroxyl radical ($OH^{\cdot}$) and e_{cb}^{-} picked up by oxygen to generate superoxide radical anion ($O_2^{-\cdot}$) as indicated in eqs. 1 - 3. It has been suggested that the hydroxyl radicals ($OH^{\cdot}$) and superoxide radical anions ($O_2^{-\cdot}$) are the primary oxidizing species in the photocatalytic oxidation processes. These oxidative reactions would result in the bleaching of the methylene blue.

$$TiO_2 + hV \longrightarrow e_{cb}^{-} + h_{vb}^{+}$$

$$O_2 + e_{cb}^{-} \longrightarrow O_2^{-\cdot}$$

$$H_2O + h_{vb}^{+} \longrightarrow OH^{\cdot} + H^{+}$$

Earlier studies have shown heterogeneous photocatalytic oxidation processes can be used for removing coloring material from dye effluent in the presence of light. But for the activation of TiO_2 UV light is required which hinder practical application. Ag2CrOhave orthorhombic structure with 1.75 eV band gap and have a good photocatalytic activity than P25 Degussa. Ag_2CrO_4 is non toxic, quite stable in aqueous medium and activate under visible light are the advantages over TiO_2 Hence in the present study we use Ag_2CrO_4 prepared by different methods to understand more about photocatalytic processes. Methylene blue has been selected a refractory model compound in this oxidation process. Methylene blue is a basic dye extensively used for dying and printing cotton, silk etc. It is also used as a medicinal dye because of its antiseptic properties.

2. Experimental details

The photochemical degradation of methylene blue (s d fine-chem) was studied in presence of Ag_2CrO_4 prepared by different methods viz. ultrasonic, Reflux, Solid State reaction methods by using stoichiometric amount of $AgNO_3$ (sd fine-chem)and K_2CrO_4 (sd fine-chem). The water employed in all the studies was double distilled water. The samples prepared by ultrasonic, Reflux, Solid State reaction method was denoted as AgC-US, AgC-RF, and AgC-SS here after. The detail about its photophysical properties are described elsewhere. The pH of the resultant mixture was measured by using digital pH meter (systronics Model 335) and was found to be 5.6.The Photolysis of aqueous solution of methylene blue for 2, 4, 6 ppm and 100, 200,300 mg of Ag_2CrO_4 prepared by different methods was carried out in a circular glass reactor (designed and fabricated in our laboratory). Tungsten lamp (40W/230V/36D, Phillips, Essential) was used as a visible light source. During the photolysis experiment air was bubbled in a solution

continuously as a source of oxygen. Aliquots of the reaction mixture were withdrawn and suspensions were filtered through 0.2 um millipore discs prior blue to determination of methylene quantitative a using UV-Visible spectrophotometrically spectrophotometer (ShimadzuUV-1800).

The mineralization of methylene blue was monitored by measuring the absorption intensity as a function of irradiation time whereas the degradation was monitored by measuring the absorbance on UV-Visible spectrophotometer (ShimadzuUV-1800). The absorption maxima of the methylene blue have been found to be 663 nm. Therefore, the degradation of the methylene blue was followed at the wavelength as a function of irradiation time with appropriate dilution. For each rate experiment, the degradation for the mineralization and decomposition of the model pollutants was calculated from the initial slope obtained by linear regression from a plot of the natural logarithm of absorbance of the methylene blue as a function of irradiation time, i.e. first order degradation kinetics. It was calculated in terms of mol L^{-1} min^{-1}.

3. Results & Discussion

Photocatalysis is a powerful advanced oxidation process having many advantages over the other oxidation methods. Fig. 1 shows the change in absorption intensity on irradiation of an aqueous solution of methylene blue in the presence of Ag_2CrO_4 prepared by different methods.

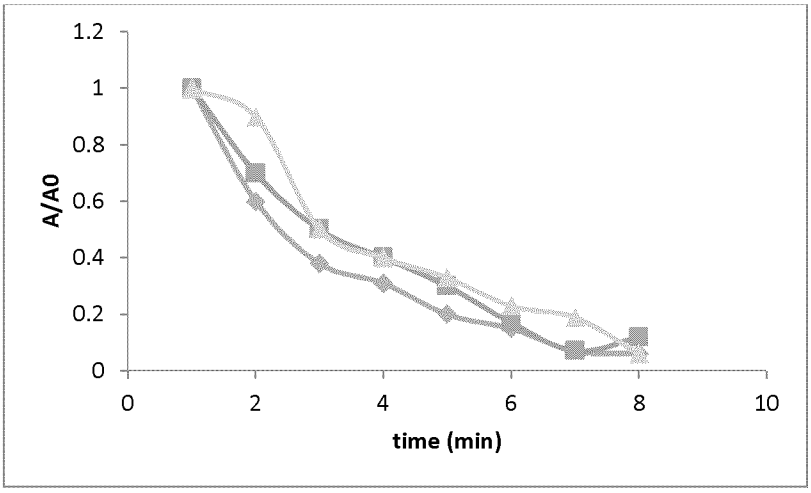

Figure 1: Change in absoption intensity as a fuction of iradaition time for aqueous solution of methylene blue in present of different silver chromate. Experimental Conditions: Concentration of Methylene blue (2ppm), Volume 100ml, pH=5.6, Catalyst (200mg)

It was observed that the degradation of methylene blue is more for AgC-US, AgC-RF as compared with AgC-SS. The degradation curves can be fitted reasonably well by an exponential

decay curve suggesting first order kinetics. For each experiment, the rate constant was calculated from the plot of natural logarithm of absorption intensity and dye concentration as a function of irradiation time. The degradation rate for the mineralization and decomposition was calculated using the formula given below,

$$-dk[A]/dt = kc^n$$

Where A=Absorbance, k= rate constant, c= concentration of MB, n=Order of reaction. Blank experiments were carried out by irradiating aqueous solution of methylene blue in absence of photocatalyst, where no observable loss of methylene blue.

Silver chromate is known to be the semiconductor photocatalytic activity is non-toxic, relatively inexpensive and stable in aqueous solution. Certain reviews have been written, regarding the mechanistic and kinetic details as well as the influence of experimental parameters. It has been demonstrated that degradation by photocatalysis can be more efficient than by other wet-oxidation techniques. We have tested the photocatalytic activity of three different photocatalysts prepared by different methods on the degradation kinetics of methylene blue. Figure 2 shows the degradation rate for the decomposition of methylene blue in the presence of different types of photocatalysts viz AgC-US, AGC-RF, and AgC-SS.

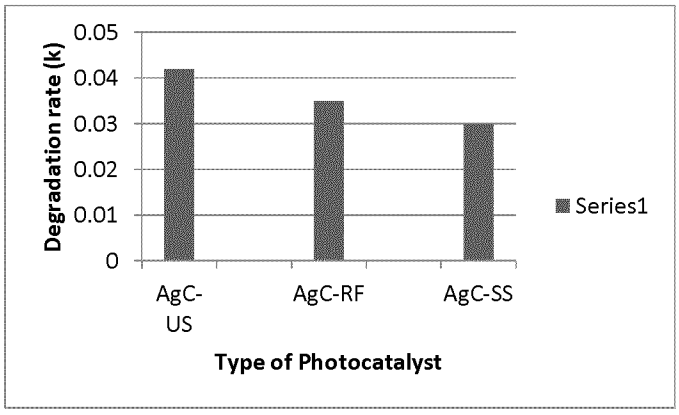

Figure 2: Comparison of degradation rate for the mineralisation and decomposition of methylene blue in present of different silver chromate. Experimental Conditions: Concentration of Methylene blue (2ppm), Volume 100ml, pH=5.6, Catalyst (200mg).

It has been observed that the degradation of methylene blue proceeds much more rapidly in the presence of AgC-US, AgC-RF as compared with AgC-SS. This inferred that the catalyst prepared by ultrasonic method is more active than the other two catalysts. The differences in the photocatalytic activity of AgC-RF, AgC-SS and AgCUS are likely to be due to differences in the BET-surface, impurities, lattice mismatches or density of hydroxyl groups on the catalyst's

surface since they will affect the adsorption behavior of a pollutant or intermediate molecule and recombination rate of electron-hole pairs.

In all the following experiments, AgC-US was used as a photocatalyst since this material exhibited the highest overall activity for the degradation of methylene blue.

It is important from a mechanistic and application point of view to study the dependence of photocatalytic reaction rate on the substrate concentration. Hence the effect of substrate concentration on the degradation of methylene blue was studied at different concentrations such as 2, 4 and 6 ppm. Figure 3 shows the degradation rate and decomposition of methylene blue as a function of substrate concentration employing Ag_2CrO_4 as photocatalyst prepared by different methods.

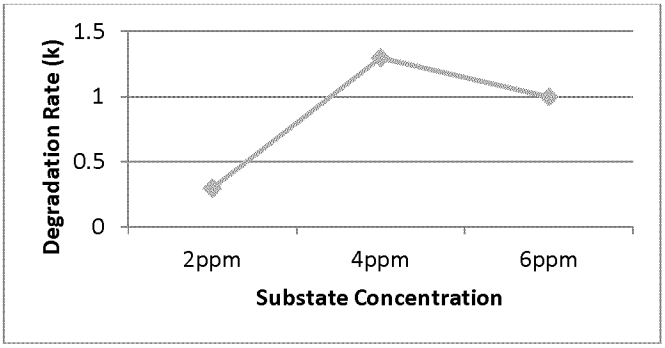

Figure 3: Influence of sustrate concentration on the degradation rate for the mineralisation and decomposition of methylene blue in present of AgC-US Experimental Conditions: Volume 100ml, pH=5.6, Catalyst (200mg)

It is interesting to note that for methylene blue, the degradation rate increases with the increase in substrate concentration from 2 to 4 ppm and further increase in substrate concentration led to decrease in degradation rate.

The effect of substrate concentration on the degradation rate for the decomposition and mineralization of methylene blue was studied, as it is important from both the mechanistic and application point of view. As oxidation proceeds, less and less of the surface of the Ag_2CrO_4 particle is covered as the pollutant is decomposed. Our results on the effect of the initial concentration on the degradation rate of methylene blue indicate that the degradation rate decreases with the increase in substrate concentration from 4 to 6ppm. This may be due to the fact that as the initial concentrations of the dye increases, the colour of the irradiating mixture becomes more and more intense which prevents the penetration of light to the surface of the catalyst. Hence, the generations of relative amount of OH and O_2 on the surface of the catalyst

do not increase as the intensity of light; illumination time and concentration of the catalyst are constant. Conversely, their concentrations will decrease with increase in concentration of the dye as the light photons are largely absorbed and prevented from reaching the catalyst surface by the dye molecules. Consequently, the degradation efficiency of the dye decreases as the dye concentration increases.

The effect of catalyst concentration on the degradation of methylene blue was investigated by employing different concentrations of Ag2Cros varying from 100, 200 and 300 mg L'shown in figure 4.

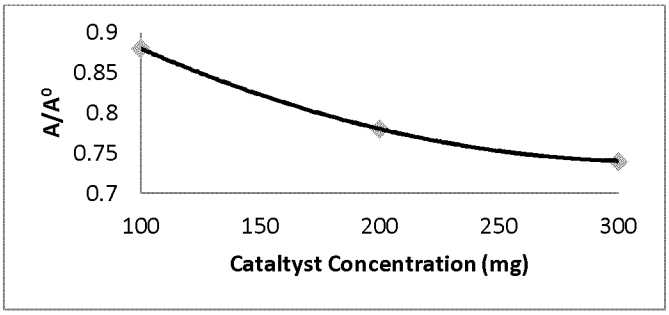

Figure 4: Influence of catalyst concentration on the degradation rate for the mineralisation and decomposition of methylene blue in present of AgC-US as a photocatalyst. Experimental Conditions: Concentration of Methylene blue (2ppm), Volume 100ml, pH=5.6.

The degradation rate for the mineralization and decomposition of methylene blue under investigation was found to decrease with the increase in catalyst concentration and remain almost constant above certain level. This can be explaining as fallows, as amount of catalyst is increased, the substrate molecules available are not sufficient. As the number of Ag_2CrO_4 particles increases, i.e. although more area is available, for constant initial concentration of dye, the number of substrate molecules present in the solution is the same. Hence additional catalyst powder is not involved in catalyst activity and the rate does not increase with an increase in the amount of catalyst beyond certain limit. The results are in agreement with a number of studies reported earlier [14]

Conclusion

Ag_2CrO_4 as photocatalyst can efficiently catalyze the photomineralization of textile dye like methylene blue in the presence of visible light and oxygen. The degradation rate decreases with the increase in substrate concentration from 2 to 4ppm for AgC-US. The photocatalyst AgC-RF and AgC-US showed superior photocatalytic activity as compared with AgC-SS for the degradation of methylene blue under investigation. The observations of these investigations

clearly demonstrate the importance of choosing the optimum degradation parameters to obtain a high degradation rate, which is essential for any practical application of photocatalytic oxidation processes. The best degradation condition depends strongly on the nature of pollutant. The investigations were conducted at the laboratory scale in order to determine the optimal degradation condition and further studies are required.

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8. Yogic Practices: Sukshma Vyayam

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Introduction of Sukshma Vyayama

The basic meaning of the word vyayama (Skt. Vyayama) - this exercise. Vyayama divided into two groups: sukshma (Skt sukshma - thin.) And sthula (sthula - dense, rough), i.e. "Exercises a subtle effect," operating in one area of the body or at several nearby, and "exercise a powerful influence" that affect the entire body. If necessary vyayama may be a warm-up to the practice of asanas or other training, and can be self-practice for 1.5-2 hours, a fully worked through the whole body. Yogic Sukshma Vyayama is among the oldest element in Yoga which is unknown to many modern Yoga schools. This was developed, designed and propagated originally by Maharishi Karthikeyaji Maharaj of the Himalaya. Sukshma means the 'Subtle body' or the internal body which is not visible to the naked eyes; it covers the breath, mind, intellect, and soul and as the name suggests, Sukshma Vyayam is a set of Yogic exercises to nourish the internal body (breath, mind, intellect, and soul). It is a very powerful, deep, scientific and yet very simple to learn.

Sukshma Vyayam is a workout for each internal organ, joint, muscle, opening and appendage. It handles the prevention and cure of many ailments and increases the strength, vigor and functioning of all the different organs and systems in the body. This group of Asanas is concerned with loosening up the joints of the body. It eliminates energy blockages in the joints and outer extremities of the physical body and works on the Pranic and the mental level as well. It is a set of exercises that doesn't just work your muscles, but stimulates the entire body, from top to toe. It targets the subtle body, so if you're expecting a hardcore, purely physical workout, you're on the wrong page. Sukshma Vyayama Yoga requires little time and preparation. These short exercises open up subtle energy channels and in a session as short as 15 minutes stiffness in your joints will release and your body will become flexible, awake, strong and ready for the day's activities. You will, undoubtedly, feel a tangible difference. It is so sensitive, so powerful, so scientific, so deep and yet so simple.

Historical background of Sukshma Vyayam

The founder of the Yoga Brahmachari considered Maharishi Kartikeya, but this style of yoga gained fame thanks to his student Dhirendra Brahmachari. Today, the tradition

Brahmachari keeps his successor - Bal Mukund Singh. Another well-known disciple Brahmachari - Swiss Reinhard Gamelthaller teaches approximately to the tradition, but calls his style" Kundalini - yogoy". Sukshma Vyayama is a specific ancient technique of yogic postures and dynamic movements which was introduced by Swami Dhirendra Brahmachari (1925-1994). Swami Dhirendra was a student of Maharishi Kartikeya and was an influential yoga teacher. In fact, the Morarji Desai National Institute of Yoga was originally founded by him and was known as Vishwayatan Yogashram. His complete book on Sukshma Vyayama is available for public access on Archive.org. Yogic sukshma vyayama techniques are supposed to be extremely powerful as they activate the subtle panic body. Today it is taught only at National Institute of Yoga, New Delhi.

The Importance of Sukshma Vyayama

Human body has various joints which require movement and lubrication. In our day to day life, some of the joins are rarely used and some are overused - which creates problems at later phase of life. Therefore basic movement of joints is essential in order to maintain them in healthy & proper condition. Sukshma Vyayama is a system of physical and breathing exercises which help to sequentially work out all joints of a body from the crown of head to the tip of toes, and warm it up. This system has a strong purifying effect on the energy of the body.

It was designed, developed and propagated initially by Maharshi Karthikeya Maharaj of Himalayas. Who in turn propagated it across the modern world?

There are 3 important components to be noted while performing Sukshma Vyayama -

1. Breathing pattern
2. Concentration point / area in your body &
3. The actual exercise

Benefits of doing Sukshma Vyayama are immense, direct & immediate -

- It helps work out all joints of a body from the crown of head to the tip of toes, and warms it up.
- Removes block & tightness of the muscles & strengthens them.
- Increases flexibility of ligaments.
- Increases body mobility and makes it flexible.
- Develops coordination & equilibrium.
- Improves blood circulation & metabolism.
- Strengthens immunity.
- Increases vital lung capacity.
- Increases endurance i.e. capacity to withstand wear & tear.

- Facilitates cleaning of nadis <nadis are subtle channels in our body through which the vital energy called prana flows, a detail blog on what is prana is to come up soon.
- Prepares the body for the practice of more complex asanas and pranayama.

Sukshma vyayama puts your concentration and focus on breathing to the highest level of spiritual experiences. Once we can learn how to focus on breathing then we can master our inner core. In addition to this DElotus sukshma vyayama reduces anxiety and worry. sukshma vyayama also increases attentiveness and clarity of thoughts.

All in One

The other beautiful and more important aspect of Yogic Sukshma Vyayama is that it is the only system of exercises in the world where each and every part of the body including each organ, each joint and each muscle is taken into consideration. A particular exercise or set of exercises associated with a specific type of breathing. And a specific point of mental concentration. As the name suggest Sukshama meaning micro or subtle, Sukshama Vyayama which consists of 48 exercises is meant for micro body parts and subtle body not the gross body. This Sukshama Vyayama is followed by Sthula (gorss) Vyayama which works on the gross body. Learn all these 48 exercises in our Hatha Yoga Teacher Training Course.

Aim & Objectives of Sukshma Vyayama

Sukshma - Vyayama - Sanskrit word Sukshma means fine, delicate. Sanskrit word Vyayama means exercise and also can be translated as to exercise, stretch and to warm up. System of the physical and breathing exercises which helps to sequentially work out all joints of a body, to warm it up. This system has a strong purifying effect on energy body of a human. To understand what Sukshma Vyayama is how to perform it correctly and what kind of results it can bring, at the beginning we will translate this mysterious word combination. Sukshma Vyayaym are light exercises which can be practised between pranayams and can also be practised independentally for providing energy, vitality and maintaining a healthy body. Sukshma Vyayayam is basically subtle yogic warm ups with gentle stretching and coordinated breathing that results in deep relaxation. This readies you for a more dynamic sequence of pranayama, asanas and other physical exercises.

Sukshma Vyayama is a workout for each internal organ, joint, muscle, opening and appendage. It handles the prevention and cure of many ailments and increases the strength, vigour and functioning of all the different organs and systems in the body. Aims & Objectives:The primary objective of this project is to provide detailed knowledge of Suksham and Sthula Vyayam. Sessions will be mainly focused on practical aspects and correct procedure. This group of 48 Asanas is concerned with loosening up the joints of the body. It eliminates

energy blockages in the joints and outer extremities of the physical body and works on the Pranic and the mental level as well. Each part of the body including all organs, joints and muscles are benefited. So the Yogic Sukshma Vyayama, as is implied by its name, is meant for the subtle body or Sukshma Sarira.

Yogic Sukshma Vyayama (Micro circulation practices)

- Neck Movement - Griva Shakti Vikasaka (I,II,III,IV)
- Shoulder Movement - Bhuja Valli Shakti Vikasaka Purna Bhuja Shakti Vikasaka
- Trunk Movement - Kati Shakti Vikasaka (I, II, III, IV, V)
- Knee Movement - Jangha Shakti Vikasaka (II-A&B) Janu Shakti Vikasaka
- Ankle movement - Pada-mula shakti Vikasaka – A&B - Gulpha-pada-pristha-pada-tala shakti Vikasaka

Principles/ Characteristics/Method of Sukshma Vyayama

Sukshma Vyayam is nothing but minor exercise from toes to head. Below I have pasted the whole series of joint movements. Hope that will help.

Minor exercise from head to toe

Initial Stage before starting asana, you should practice joints movements to make your body flexible and fit for asana.

The joint movements are classified as

- Leg joints movements
- Hand joints movements
- Neck and Head movements

Position/Posture

While doing all the joints movements you should sit straight having the angle of 90 degree between your legs and upper portion of your body. Keep hands on either sides of your back. Join your legs. Your back, neck and head should be straight.

Relaxation

While doing joints movements, if you feel tired; you must relax for few seconds. Relaxation in the sitting posture: Make little gap between your legs. Lie down your feet, bend your back little backward and tilt your neck in any one direction. Feel relaxed and do normal abdominal breathing.

Leg joints movements

1. Move your toes up and down for 10 times.
2. Move your feet up and down for 10 times.

3. Rotate your feet in both clockwise and anticlockwise direction for 5 times. With the practice, you can gradually increase rotations till 10 times.
4. Keep left leg over your right knee such that your left foot should remain completely out.
5. Rotate your left foot in both clockwise and anticlockwise direction for 5 times. While rotation, you can hold left toes with your right hand and put left hand on the left ankle. Now lift your left leg till it reaches your right thy. Put left hand on the left knee and move it up and down for 10 times. After moving it up and down, in the same position rotate your left leg in both clockwise and anticlockwise direction for 5 times. Again lift your left leg and try to touch heel to your navel. Repeat all these steps with your right leg as well.
6. Bend your left leg vertically. Cross your fingers and put them on your left leg. Press your chest with your left leg and then stretch it (left leg). Do this for 10 times. Leave your left leg in middle and put crossed fingers below the knee over your left thy. Now rotate your left leg in both clockwise and anticlockwise direction for 5 times. After doing this touch left ankle to your forehead (don't bend your neck while doing this). Repeat all these steps with your right leg.
7. Join your legs. Contract and relax your knees for 20 times.
8. Butterfly flapping – Join the bottoms of your feet, cross your fingers and put them below the feet. Bring your feet closer to you as far as possible and flip your legs up and down for 10 times. Initially you may feel pain in your thigh muscles.
9. Take your legs apart from each other as far as possible. Lift your hands on either side. Turn to your left and try to touch the left toes with your right hand. See towards left. Similarly turn to your right and try to touch the right toes with your left hand. See towards right. Do it for 10 times.

Hand Joints Movements

1. Make fists. While making fist thumb should go inside. Open and close your fists for 10 times. Stretch the fingers when you open the fist.
2. Lift your hands up parallel to your legs. Move your palms up and down for 10 times. While bringing your palms up, feel that you are pushing some heavy object.
3. Rotate fists in both clockwise and anticlockwise direction for 5 times. If you feel pain in your hands, bring them down. Press and rub them till you feel comfortable.
4. Stretch your hands on either sides and then bend them to touch the shoulders. Again stretch your hands and touch your shoulders. Do it for 10 times.

5. Bend your hands horizontally and bring both the palms pointing towards each other. Now move your hands to the back side as far as possible. In this case your chest will expand. Do it for
6. 10 times. This exercise is good for releasing neck and upper back pain.
7. Stretch your hands to front side and invert your palms. Slowly-slowly move your hands inward and outward for 10 times.
8. Turn the fingers of both the hands and lock them. Take this loop to the back of your neck and stretch it in the left and right directions for 5 times.
9. Rotate your shoulders in both clockwise and anticlockwise direction for 5 times. For this put your palms on respective shoulders and bring them up (elbows will touch while doing this) then back and then to the front side.
10. Join both the palms as if you are doing 'Namaskara'. All the fingers should be over each other. Now clap them for 10 times.

Neck and Head movements Neck

1. Cross your fingers. Put them on the back of your neck and push the neck in forward direction. Do it for 5 times.
2. Sit straight. Slowly-slowly move your neck down. Now Slowly-slowly lift your neck up. Do it for 5 times. Similarly Slowly-slowly move your neck to left side and then to the right side for 5 times. Also do side bending that is bend your neck to left side (left ear will touch the left shoulder) and then to the right side (right ear will touch the right shoulder). Do it for 5 times.
3. Rotate your neck in both clockwise and anticlockwise direction for 5 times. While doing this, it is preferred to close your eyes to avoid giddiness.

Head

Put one hand on your forehead and other on its back. Push them inward for 5 times.

Eyes

1. Sit straight. Your back, neck and head should be straight. Look down. While looking down, only move your eyeball, your neck should be straight. Slowly-slowly look up i.e. move your eyeball upward. Similarly move your eyeball to left and right directions. Repeat it for 5 times. After doing this close your eyes for 10 seconds.
2. Rotate your eyeball in both clockwise and anticlockwise direction for 5 times. After doing this close your eyes for 10 seconds.
3. Close your eyes. Put 1st finger (pointer/index) of both the hands on respective eyelids and move them gently in both clockwise and anticlockwise direction for 5 times.

Ears

With the help of your palms open and close your ears for 10 times.

Cheeks

widely open your mouth. Stretch your cheeks and then relax. Repeat it for 10 times.

Teeth

Put the upper series of teeth over the lower series and press it. Repeat it for 10 times.

To each concrete movement of a complex a breath or an exhalation corresponds. There are a lot of breath-holdings combined with movements what strengthens training effect. Bhastrika Pranayama uses often. This kind of breathing is very useful on a physical level, and also as energy component. To some exercises a certain orientation of attention concentration (dristi) corresponds that draws energy to a place in a body where consciousness is directed.

Sukshma Vyayama exercises should be performed in smoothly and consciously way. Complexity of exercises could be regulated by quantity of one movement repetitions, and also by changing time of pose fixing.

The whole body is worked out consistently during the succession of exercises.

The basic scheme of movement to work with body is from top to bottom (it is described in the book) - from a head to foots. Other methods could be applied such as from periphery to the centre.

Beside Sukshma Vyayama exercises also Sthula Vyayama is separately allocated. Sanskrit word Sthula means - dense, rough, it is system of strong influence which can be used as an addition to Sukshma Vyayama exercises. Sthula Vyayama has powerful influence on our body. These Vyayamas are recommended to advanced yogis.

This group of Asanas is concerned with loosening up the joints of the body. It eliminates energy blockages in the joints and outer extremities of the physical body and works on the Pranic and the mental level as well.

It is beneficial for those suffering from rheumatism, arthritis, high blood pressure, heart problems or other ailments where vigorous exercise is not advised.

Conclusions

Summarizing the above information, we will point following things – yoga practice allows us to work out physical and energy bodies, gives us way to live more effective and conscious life, to move forward (instead of marking time or slide downwards). There is a considerable quantity of various techniques of self-improvement, it is necessary to choose one that suits you best and practice regularly. Probably you will choose Sukshma Vyayama. To motivate ourselves for regular Sukshma Vyayama practice, we will summarize positive effects of

this system: removes blocks and clips in muscles, strengthens them, increases of flexibility ligaments; enlarges body mobility and makes it flexible and plastic; develops coordination and equilibrium; improves blood circulation and metabolism; strengthens immunity; harmonizes organism; Increases vital lung volume; increases endurance; favors cleaning of Nadi; Activates energy points (chakras); prepares for practice of more complex asanas and pranayamas.

Suggestions for Sukshama Vyayama

1. Stiff muscles that are subjected to sudden elongation during exercise or sports can more easily become torn or strained.
2. Tightness in muscles can cause pain elsewhere in the body. Tight calves, for example, can cause knee pain, shin splints and foot pain. Tense muscles at various points in the lower back can cause pain to radiate throughout the entire torso.
3. Lack of flexibility can cause muscular imbalances. A tight hamstring, for example, can make the thighs work harder at keeping the body properly aligned, which may cause knee pain. Beyond that, feeling stiff makes you slow down, move more carefully, act more tentatively—it's the first way a young man starts to feel like an old one.

Awareness

- The practice can be performed with awareness of the actual physical movements.
- Peace, balance and one wontedness is induced by this method which in turn brings about harmony in the physical body.
- The practice is to be performed in synchronization with breath.
- The movements, in this case, become slower which in turn slows down the brain waves, further enhancing relaxation and awareness. This method of practice has a greater influence at the physical and Panics levels and is especially useful for harmonizing and revitalizing the body and improving the function of the internal organs.

Periodic rest

- After every two or three movements, sit quietly in leg stretch position with the eyes closed.
- Be aware of your breath and of the parts of the body that have been moved.
- Also be aware of the thoughts and the feelings that come into the mind.
- After a minute or so continue the practice.
- Shavasana can be practiced, if rest is required.

Note

- Only those muscles associated with any particular practice should be used while the rest of the body should be completely relaxed.

- Close your eyes.

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9. Graphene Reinforced Polymer Nanocomposites : Critical Analysis

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Abstract

In modern era, graphene polymer nanocomposites have attracted the attentiveness of researches for broad range of applications due to their tunable properties, improved processability, stability, surface area and cost effectiveness. These days wide arrays of physico-chemical methods are being used for nanocomposites synthesis. Nevertheless, biofabrications of nanocomposites using plants extract, microbes, enzymes, vitamins etc are most captivating owing to use of non- toxic reducing agent and eco-friendly process. This report summarizes critical overview of state of art of graphene polymer nanocomposites and finally conclusion is discussed.

Keywords: Graphene polymer nanocomposites, Green synthesis, photocatalysis.

Abbreviations

Graphene polymer nanocomposites- GPNCs, Nanoparticals- NPs, Nanocomposites- NCs, Graphene oxide- GO, Reduced GO- rGO.

Introduction

Graphene reinforced polymer nanocomposites (GPNCs) acquiring crucial significance in today's date due to its commercial application. GPNCs are a promising tool immerges from interface of graphene and polymer material. Review on synthesis, properties and probable application of GPNCs validates that this area is still in an early stage of development and yet many challenges to be inscribe to outreach their full potential. Even though we are familiar with advances, promises and applications of GPNCs, the considerable research is still obligatory to provide basic understanding of these materials to study their nanoengineerd applications [1].

Nanoparticals

Nanocomposites (NCs) are materials that incorporate nanosized particles (nanoparticals) into matrix of standard material. This nanoparticals (NPs) have improved chemical, physical, mechanical, biological, optical, electrical and thermal properties due to its small size and large surface to volume ratio [2]. NPs have been synthesized using different chemical (chemical reduction, photochemical method, electrochemical method, pyrolysis, sol gel, and CVD) and

physical methods (physical vapour condensation, spray pyrolysis, pulsed laser desorption, layer by layer growth, lithographic technique and arc- discharge method) for longer period of time [3]. These conventional methods for the synthesis of NPs have various limitations like using high radiation, high cost and use of highly concentrated chemical reducing agents, stabilizing agent and generation of hazardous byproducts. To overcome this problem, the researchers are focusing on development of safe, environment friendly, and green approach for synthesis of nanoparticals [4]. The synthesis of NPs using plant extracts, biological extracts, green techniques which are compatible with green chemistry are called as green synthesis. The concept of green synthesis is introduced to define synthesis method which is favored over solvent medium because it utilizes non toxic stabilizers along with reducing agent that are benign to environment and consume less energy [5]. The green synthesis carried out using biological routes such as use of different plants parts (root, stem, leaf, flower, fruit etc) , microbes (bacteria, fungi, yeast) and enzymes [3], [6].

Graphene Derivatives

Graphene based nanomaterial are found in three common forms herein pure graphene, graphene oxide (GO) and reduced graphene oxide (rGO) [7]. Mainly GO and rGO is use to incorporate graphene into polymers because pristine graphene have limited yield. GO is synthesized from graphite flex using two step Hummers or one step modified Hummers method creates graphene sheet covered with large number of oxygen containing functional group like epoxy, carbonyl, carboxyl, diols and hydroxyl which make graphene sheet hydrophilic enabling easy dispersion in polar solvent and form stable colloid. This GO on simple reduction using variety of methods (electrochemical reduction, thermal reduction, photocatalytic reduction and chemical reduction) produces rGO [8][9]. Several conventional routes such as dip coating, casting, spray deposition, solution and melt mixing, in-situ polymerization, epectrospining, electropolymerization, electrodeposition have been put forward for synthesis of graphene reinforced polymer NCs [8]. Nevertheless, the dispersion behavior and interfacial bonding between graphene and polymer matrix limits better performance and application of GPNCs. Owing to this, effective synthesis route and surface modification of graphene with polymer NCs have been adopted[10].

Review literature and Development

The research on polymer NCs has attracted significant scientific interest making them one of the prime classes in the area of material science. This is because new materials dispense better properties when compared with pure polymer. Within past decades, it has been proved that graphene in low filler fraction also improve the properties of wide range of polymers e. g. epoxy,

polystyrene, nylon, polypropylene, polyethylene terephthalate, polyaniline and polymethylmethacrylate [11]. To the date several review material has made attempt for the synthesis of graphene to address the need of composite industries along with methods for dispersion of graphene for various polymer matrices. Abdulazeez T. Lawal (2020) in his review article presented literature survey of various graphene polymer nanocomposites with their espoused properties. He also reviews about characterization techniques for polymer NCs and their potential application.

Chee W. K. et al. (2015) summarizes various polymer types, nanofillers and preparation method for polymeric- based graphene NCs. The dispersion of nanofillers into polymer matrix is one of the most crucial parameter because overall performance of newly synthesized GPNCs depends upon interfacial interaction between graphene and host polymer. They also reviewed that; GO easily achieve molecular dispersion in hydrophilic polymer than hydrophobic polymer due to polarity. Unlike GO, naturally hydrophobic graphene due to lack of functionalities on its surface limits its dispersion. To enhance graphene compatibility with various solvent, grafting of specific functionality on graphene has been reported in plenty of literature.

Out of all the polymers which we are going to, research work for some polymers are explained here. Addition of graphene nanofiller in polymer improves properties of NCs has been reviewed in several literatures. Liao et al. synthesized polyurethane (PU) NCs with aqueous reduced graphene using solvent process. This process improves the mechanical and electrical properties of NCs. Yadav and Cho incorporated functionalized graphene nanoplatelets in PU NCs by in situ. With 2 wt.% filler, tensile strength of composites increases more than ten times of pure polymer. Cai et al. reported PU/GO NCs. With only 4wt.% GO content Young's modulus enhanced seven times and thermal decomposition temperature increased by 50^{o}C compared to pure polymer[12]. Poly (ethylene terephthalate) (PET) polymer used graphene nanoplatletes at 2%, 5%, 7.5% and 10% (wt. %) to fabricate the NCs. At 10 wt. % filler the elastic modulus of NCs increased by 58%. Thermal analysis by differential scanning calorimeter reported that crystallinity of NCs increased by 50% compared to pure PET polymer with 10% filler[13]. PET nanocomposites with changing weight fraction of thermally exfoliated GO (TEGO) tailored thermo-mechanical properties, chain conformation, crystallinity of PET. Incorporation of TEGO in PET improves its softening and short term heat resistance properties which lead to diminish the failures of PET in applications[14].

GO is use as precursor for reduced graphene oxide and graphene nanosheet synthesis. In recent time several routes have been proposed for GO reduction like electrochemical reduction, thermal reduction, photocatalytic reduction and chemical reduction. Among all this, scientists

consider chemical method as best because easy, scalable and inexpensive. But it involves use of toxic reducers like hydrazine, sodium borohydried and hydroquinone. As alternative, different kind of enzymes, organic acid, amino acids, microbes, plant extract and cellulosic materials are used for GO reduction. Aunkor (2016) present overview and discussed green reduction of GO into graphene, selection of pristine graphite and synthesis of GO precursor [9]. Kavitha K. S. et al. (2013) in their review paper reported many plants resources for synthesis of different NPs.

Merits of GPNCs

Polymers are reinforced by various nanoscale fillers to alleviate the limitations of polymers, also to improve the mechanical, electrical, thermal and optical properties of polymers than conventional polymer composites. The superior properties of polymer NCs over host polymer partially due to large interfacial area between polymer matrix and nanoscale fillers [15]**.** Fillers like carbon based nanofillers, metal nanofillers, clay, silica, reinforced fibers and other anisotropic reinforcement are added to polymer. Recently carbon based nanofillers have found to improve the properties of NCs. Among these carbon nanofillers, the thinnest, sp^2 hybridized, 2D material graphene [16] show promising extraordinary phenomenon such as high potential, proper mechanical strength, good electron mobility, thermal conductivity, Young's modulus is 1 TPa with huge surface area, excellent optical transparency, and high chemical stability. Also, it is zero band gap semiconductors. These extraordinary properties of graphene made it explore in wide range of applications like energy storage device [17], drug delivery [18], as electrode in electrical and optical device [19], lithium ion batteries [20], antibacterial application[21], potential adsorbent of heavy metal ion and toxic dyes [22], biological and medical application [23], catalyst, biosensor, super capacitor, energy storage, and sensor [24]. Owing to these promising applications, widespread efforts have been made to explore graphene in all fields of technologies. Therefore polymer NCs with graphene as reinforcing material has attracted considerable attention over long period of time.

Hence newly synthesized polymer NCs show excellent mechanical, optical, electrical, and thermal properties. The global population is increasing continuously which triggered several health related problems. The use of graphene and its derivative as biomedical material has become engrossing in research field due their great biocompability, selectivity, permeability. They shown great potential as biosensing and bio-imaging materials, also in the field of tissue engineering, cell culture, drug delivery, cancer therapy etc [25]. Hence the construction of hierarchically nanostructure polymer NCs using graphene offer great edge of creating functional material of advanced features for biomedical application [26].

Another worldwide environmental concern is polluted water body. Release of agricultural, industrial, domestic and municipal waste into water bodies result in increased flux of toxic pollutant. Among all water pollutants, dyes, heavy metal ions and pesticides have serious concern non-biodegradable, carcinogenic, mutagenic and accumulate in both human and aquatic body. A wide array of techniques for waste water remediation has been put forward such as adsorption, coagulation, membrane filtration flocculation, chemical precipitation, biodegradation and reverse osmosis. All these methods are expensive and required extra efforts for their byproduct removal. Alternatively, photocatalytic degradation technique is globally acclaimed due to its versatility, economic feasibility and most desirable method to mitigate their environmental impact. Carbon based material (GO/rGO) show strong binding with these pollutant and help to remove these pollutant by photocatalysis[22][27]. Polymer NCs show fast decontamination power and high selectivity to remove pollutant due to its surface area, stability, tunable properties, improved processability and cost effectiveness [28]. For development of highly efficient and improved photocatalytic activity of GPNCs, modification have been done by doping, surface sensitization, coupling, fabricating, improving electrocatalytic active sites etc[29]. Another promising application of GPNCs is in the field of antibacterial agent. GO and other graphene derivatives exhibit antibacterial activity against dental pathogene due to its high surface area, reactive functionalized surface, water solubility and extraordinary properties[21].

Demerits of GPNCs

While discussing different aspects of GPNCs, the health and welfare effects of nanomaterials must be considered. The toxicity effect of graphene and its derivatives has not yet fully explored. Emerging data evidences recommended that, graphene after inhalation can cause fibrosis, lung inflammation and give rise skin irritation. However, additional information is needed to duly understand the damage caused by exposure of nanomaterials [30]. From past several decades, reinforcement of graphene in variety of host polymer matrices come up with many challenges include: (i) Poor dispersion of graphene nanofillers within host polymer, (ii) weak interfacial interaction between graphene and polymer, (iii) distinct interfacial contact resistance such as edge-to-edge, plane-to-plane and plane-to-edge among graphene nanosheets and polymer matrices [31]. Another drawback lies in synthesis techniques. It has been reported that, the fabrication of graphene and its derivatives using conventional methods involve the use of chemical reducing agent such as borohydride, hydrazine or other noxious agent as well as this methods gives hazardous and non-biocompatible byproduct and also expensive.

Conclusion

This critical analysis report explores that, from past many years several researchers have been synthesized GPNCs successfully for various applications. Graphene shows noteworthy improvement in electrical, thermal, mechanical and optical properties of added host polymer matrix even at lower nanofiller loading. Synthesis of graphene derivatives using eco-friendly green reducing agent attracted remarkable attentiveness owing to its substantial antimicrobial activity towards microbes also because of its major band gap and large surface area it shows efficient photocatalytic degradation applications. Despite all these GPNCs do persist some challenges. The synthesis of expensive graphene on larger scale and production of graphene with same characteristics is major challenge. However, toxicity profile of graphene and its derivatives have also been not established till date.

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10. Studies on Diversity Related to Architectural Biology of the Vertebral Coloumn in Channa Orientalis (SCH)

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Abstract

Axial skeleton develops primarily to support the central nervous system, which also lies along axis of the body. Morphology and osteology of different genera have also been studied by many authors. This article shows that the vertebral column of Channa orientalis is formed of 42 vertebrae. Besides 2 vertebrae, 14 vertebrae are trunk vertebrae. There are 28 caudal vertebrae. Each caudal vertebra has a pair of single pleural rib. This modification of vertebral column might be due to accommodation of swim bladder in the posterior region of the tail.

Keywords: Diversity, Channa Orientalis, Vertebral Coloumn, Trunk Vertebrae, Caudal Vertebrae**,** etc.

Introduction

Many authors have contributed good accounts on the skull of genera Channa (opiocephalus). Bhimachar (1932) has described the cranial osteology of Ophiocephalus striatus Bloch. Boeseman (1949) has given an account of bones from the skull of an extinct species of Ophiocephalus paloeostriatus. Srinivaschar (1955) has dealt with chondrocranium of Ophiocephalus punctatus and has given an account of the morphology of the skull and modification of the bones in relation to the supra-brachial organ in Ophiocephalus punctatus. Very few authors have described the complex endoskeleton or skeletal parts other than skull. Channa Day (1914) has published a paper on the complete osseous system of Ophocephalus striates; Hussain (1956) described the tail fins in family Ophiocephalidae; Khanna (1960), the hypobranchial skeleton of Ophiocephalus marulius along with some other fishes.

Important osteological character in different fishes have been discussed by Saxena and Chandy (1966); Sorescu (1975); Bahadur et al; (1977); Howes (1978); Mehta and Tondon (1984); Mehta et al (1987); Mehta and Mehta (1988). Miles, R.S. (1970) studied the vertebral column and caudal fin of acanthodian fishes. Fabio Galbusera & Titto Bassani (2019) Studied the shape of the spine throughout the whole evolution of vertebrates and vertebrate embryos, from primordial jawless fish to extant animals such as birds and humans.

The above cited references clearly indicated that except Day (1914), who has worked out the complete osseous system of the Ophiocephalus striates, no other worker has worked out the full details of the whole endoskeleton in channidae. Hence, in this article an attempt has been made to workout this in the fish Channa orientalis.

Materials and Methods

Information of the Fish

The species, which has been selected for the present study, is of economic value and readily available throughout the year and it stands captivity well. The fish is most sensitive. It represents the natural population in the river or water bodies of Amravati (latitude $20^0$56'N, longitude 77045'E) and is resistant to handling and transportation. Identification and taxonomical position of the fish (berg. 1940) is as:

Kingdom	-	Animalia
Sub-kingdom	-	Metazoa
Phylum	-	Chordata
Sub-phylum	-	vertebrata
Super class	-	Gnathostomata
Series	-	Piseces
Class	-	Teleostomi
Sub-Class	-	Actinopterygii
Order	-	Channiformes
Family	-	Channidae
Genus	-	Channa
Species	-	Orientalis

Locally the fish is known as "DOK" and is a common edible fish in the region and fetches high price.

Collection, Maintenance and Acclimatization Methods of Fish

The fishes were collected from localities around the Amravati region. The fishes were first brought into the laboratory and transferred to the glass aquarium and were inspected for any possible injury or infection. Only the healthy fishes were selected and washed with dilute solution of Potassium Permanganate ($KMnO_4$ 10mg/l) to remove dermal infection if any. Fishes were used for studying different parameters.

Results

The vertebral column of Channa orientalis is formed of 42 vertebrae of which anterior 14 vertebrae along to the trunk region and except the first 2, each carries a pair of double pleural

ribs. The posterior 28 vertebrae belong to the caudal region, each carrying a pair of single pleural rib, except the modified last 5 vertebrae. The vertebrae are amphicoelous. The intervertebral space between the adjoining biconcave centra is filed by the remanat of notochordal tissue and is continued through the tunnel core of the vertebral center.

Typical Trunk Vertebra

A typical trunk vertebra has a cylindrical centrum slightly compressed laterally. The centrum at both the ends is concave and is perforated by narrow notochordal canal. From the dorso-lateral ridges of the centrum arise neural arches, which are rather thin and pierced by two foramens for spinal nerves. Dorsally, these neural arches unite together to form a backwardly directed long and neural spine. The anterior walls of the neural arches are produced obliquely into a pair of prezygapophyses while their posterior walls form a pair of postzygapophyses. The centrum gives out anteroventrolaterally a pair of socket like processes, the basa-pophyses, which sub terminally carry the elongated double pleural ribs. Some of the trunk vertebrae of the column show slight individual variations from the structure of the typical trunk vertebrae.

First Vertebra

The Centrum of first vertebra is rather compressed in the long axis. The neural arches are vertical in position laterally flattened and unite to produce a long perpendicular neural spine. Laterally the neural arches carry a single pair of foramen for spinal nerves. The anterodorsal margin of the Centrum is modified into a pair of oval articulatory facets, which are fitted into the exoccipital condyles. The vertebra carries a pair of single pleural ribs, which are inserted dorsolaterally on the marginal grooves of neural arches. Ventro laterally at the posterior end, the Centrum gives off a pair of short processes

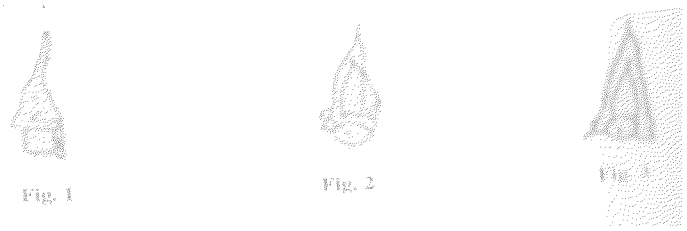

Fig. 1 Fig. 2

Second Vertebra

The Centrum of this vertebra is also compressed into its long axis. The neural arches are well developed, flattened laterally and rise vertically up. The pre- and post zygaphphyes are not well developed. Postero-ventro laterally, the Centrum has a pair of processes. There is only one pair of foramens in the walls of neural arches for spinal nerves. A pair of single pleural ribs rises from the anterior groove of each neural arch.

Third Vertebra

The neural arches are distinctly inclined to the posterior side. They are laterally flattened and equal in the breadth of the Centrum. Prezygapophyses are well developed. There are two pairs of ribs arises from the well-developed socket like processes present on the lateral side of the Centrum. Postero-ventro-laterally the Centrum has a pair of prominent processes directed posteriorly.

The first and second vertebrae thus show major variations from the typical trunk vertebra. Other remaining trunk vertebrae have very minor variations in their structures. The postero-ventro lateral processes of the trunk vertebrae decrease gradually in their size in the succeeding vertebrae, being completely absent in the tenth vertebra. From the eleventh vertebrae again these processes appear but they are directed ventrally instead of posteriorly.

Typical Caudal Vertebrae

In the caudal vertebrae the neural arches are well developed. Neural spine is also well developed and posteriorly directed. Centrum is cylindrically and deeply concave at both the ends. A narrow notochordal canal perforates it. The pre and post zygapophyses are well developed antero ventro-laterally. There are well developed ventrally directed basapophyses or socket like processes while the antero-ventro laterally are the equally developed lateral processes. The basapophyses bear a pair of single ribs (fig 4, 5 and 6) and the last five caudal vertebrae are modified in structure to support the tail fin. All other remaining caudal vertebrae are similar in structure to that of the typical vertebrae

Fig. 4

Fig. 5

Fig. 6

These ertebrae resemble the typical caudal vertebrae in the structure of the neural arches, neural spine, prezygaphophyes and post zygapophyses except that they do not bear any pleural ribs. The antero-ventro-lateral processes grow further backwards and meet each other to form backwards and meet each other to form a haemal spine. The postero ventral processes are small and posterior directed.

Last Two Vertebrae

The last two vertebrae are the main vertebrae, which form the support for the caudal fin. A typical urostyle is absent in the last vertebrae. Neural arches of the last vertebrae form a cup-

like depression in combination with the prezygapophysis on the dorsal side of the Centrum. The last but one vertebrae consists of neural arches and prezygapophyses on the dorsal side of the centrum. The neural arches from both the sides grow further in the backward direction to meet each other to form epural and parallel to the first hypural. This is the only radial seen on the ventral side. The proximal end is free. In the cup like concavity of the last vertebrae lie the 1st and 2nd dorsal radials. The proximal ends of the radials are free and lie close together. The 5th and 6th hypural arise from the dorsoposterior part of the last vertebrae, the 4th and 3rd hypural arise from the posterior part of the same vertebrae and the 2nd hypural arises from the ventral part of the last vertebrae. All the hypurals are laterally flattened and spread out fanwise.

Pleural Ribs

Each of the first two vertebrae carries a pair of single pleural ribs form 3rd to 14th vertebrae. Each has a pair of double pleural ribs, which form the trunk region. From 15th vertebra onwards, each has a pair of single pleural ribs, except the last 5 vertebrae. The attachement of these ribs to the vertebrae shows variations in the trunk region. The point of attachement has been found to shift from its dorso-lateral position in the 1st vertebra to an almost ventral position in the 14th vertebra and onwards.

Discussion

In Channa orientalis there are 42 vertebrae of which 14 belong to the trunk region. Day (1914) did not mention the total number of vertebrae. According to him there are 17 trunk vertebrae in Ophicephalus striates, first 2 of which have only 1 pair of single ribs. Typical trunk vertebrae bears a biconcave Centrum, a pair of prezzygapophyses and a pair of posizygapophyses in Pantius Sophore (Bahadur et.al 1977). Similar structure present in Channa orentalis. In Channa orientalis the 3rd vertebrae has prominent lateral process and receives double pleural rib, but in orientalis the 3rd vertebrae has a prominent lateral process and receives double pleural rib, but in Ophicephalus striates the transverse process in 3rd vertebrae are absent (Day, 1914).

The last five vertebrae are modified for the support to the caudal fin. Day (1914) also found similar conditions in Ophicephalus striatus. It is not possible to compare the vertebral column of the other species of the genus Channa as no work haseen done except that an Ophicephalus striatus by Day (1914). The last three caudal vertebrae have become modified to support caudal fin in P. Sophore (Bahadur et. al. 1977).

A peculiar and rather unusual character is seen in case of the caudal vertebrae. (Figs 4, 5 and 6). The caudal vertebrae except the last five bear a pair of single pleural ribs. This condition may be explained as follows. The swim bladder in this species and even in all species of the

genus Channa extends right into the posterior region of the tail below the vertebral column. To accommodate the swim bladder in this species of the tail below the vertebral column. To accommodate the swim bladder the vertebral column might have undergone this modification. This structure is of the last but 4th vertebra just in front of which the swim bladder ends. This vertebrae has no pleural rib but instead a haemal spine is present.

Urostyle is reported in P. Sophore (Bahadur et al. 1977). No urostyle in any form is seen in Channa orientalis as it has been noted by Hussain (1956). In his study of the morphology of tail fins he states, 'in all fishes the tail fin is found one lobed and continuous with the dorsal fin'. This condition is not observed in Channa orientalis as there is a distinct gap between dorsal fin and caudal fin over the caudal fin peduncle. Regarding the position of the last two hypurals, he states, "the posterior dorsal end of the last vertebrae because slightly prolonged upwards and backwards forming a cup like cavity in Ophicephalus gachua and Ophicephalus punctuates, the proximal tips of the last two hypurals are lodged in it".

The present observation on Channa orientalis reveals that the 1st and 2nd dorsal radials lie in the concavity instead of the last two hypurals, the 6th and 5th.

Conclusion

A peculiar and rather unusual character is seen in case of the caudal vertebrae. The caudal vertebrae except the last five bear a pair of single pleural ribs. The swim bladder in this species extends right into the posterior region of the tail below the vertebral column. To accommodate the swim bladder the vertebral column might have undergone this modification. These last vertebrae has no pleural rib but instead a haemal spine is present.

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11. Comparative in Silico Study of Phospholipase - A2 from Venom of Four Major Indian Snakes Species

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Abstract

The dense and dark forest of India are best habitat for the reptiles too, these forest offers a wide range of home for giant snakes and abundant pray. There are 270 species of snakes in India out of which about 60 are highly venomous. The big four dangerous snakes of India includes Naja naja, the spectacled cobra Bungarus caeruleus, the common krait. Daboia russelii, Russell's viper Echis carinatus, the saw-scaled viper. Venom of snakes is neurotoxic or haemotoxic. Venom of snakes contains different peptide chains. PLA2 is one of the important enzyme. Here we study it in silico for its antigenic determinants. As our knowledge of the immune responses to a protein antigen progressed, it became clear that the whole protein is not necessary for raising the immune response, but small segments (NACAASVCDCDRLAAICFAG" 83-102 aa of Naja naja) of protein called the antigenic determinants or the epitopes are sufficient for eliciting the desired immune response.

Keywords: Venom, In Silico prediction, PLA2, Antigenic Determinants, Naja naja

Introduction

Venom is a form of toxin secreted by an animal for the purpose of causing harm to another.[1] Venom is injected into victims by means of a bite, sting or other sharp body feature[2] which differentiates it from poison (that is absorbed, consumed or inhaled). The potency of different venoms varies; lethal venoms are often characterised by the median lethal dose (LD_{50}, LD50, or LD-50), expressed in terms of mass fraction (e.g., milligrams of toxin per kilogram of body mass), that will kill 50% of the target of a specified type (e.g., laboratory mice).

Utilization of venom across a large amount species demonstrates an example of convergent evolution and a homoplastic trait. It is difficult to conclude exactly how this trait came to be so intensely widespread and diversified. The multigene families that encode the toxins of venomous animals are actively selected on, creating more diverse toxins with specific functions. Venoms adapt to their environment and victims and accordingly evolve to become

maximally efficient on a predator's particular prey (particularly the precise ion channels within the prey). Consequently, venoms become specialized to an animal's standard diet.[3]

The reptiles most known to use venom are snakes, some species of which inject venom into their prey via fangs. Snake venom is produced by glands below the eye **Venom**, the venom secretion of an animal, produced by specialized glands that are often associated with spines, teeth, stings, or other piercing devices. Venomous snake bites may cause a different symptoms, like respiratory paralysis, pain, swelling, tissue necrosis, low BP, convulsions, haemorrhage, kidney failure, coma and death.

The composition of snake venom can vary within a species due to diet variation, which is caused by differences in geological location

1. Naja naja, the cobra
2. Bungarus caeruleus, the krait.
3. Daboia russelii, Russell's viper
4. Echis carinatus, the saw-scaled viper

These are the major four venomous snakes species responsible for causing the most human snake bite cases in South Asia (mostly in India). They are known as the **big four**. Snake venom is highly modified saliva containing zootoxins that facilitates the immobilization and digestion of prey, and defends against a threat. Snake venoms are mixture of enzymes and non-enzymatic proteins used for paralysing and digestion of prey. The most common snake venom enzymes include acetylcholinesterases, and Phospholipases A(2) (4). Phospholipase A2 is one of the major enzymatic content of snake venom.

Phospholipase A2 is a common neurotoxic content present in snake venom. PLA2 breaks biological membranes and can lead to damage and lysis of cells. The binding of PLA2 to acetylcholine receptors block the binding of acetylcholine, which causes paralysis. Respiratory failure often accompanies the paralysis because there is likely a high affinity for PLA2 in phrenic nerve-diaphragm endplate receptors.(5). Antigenic epitopes on PLA2 protein (Naja naja, Bungarus caeruleus, Daboia russelii, Echis carinatus,) are important antigenic determinants.

Materials and Method

Database Searching and retrivation

Proteomic and Genomic databases are used to store the vast amount of information issuing from the different proteomic and genom projects. There are many databases available, but for regular and routine protein sequence analysis, Genbank (6), Uniport (7) databases are initially the most important(8). We searched and retrieved genome protein sequence of PLA2 protein (Naja naja, Bungarus caeruleus, Daboia russelii, Echis carinatus,) sequences are

downloaded directly in FASTA format (9). For ease of use sequences was retrieved from web sites are as- www.ncbi.nlm.nih.gov.

Prediction of epitopes

This method predicts those segments of sequence within a PLA2 protein (Naja naja, Bungarus caeruleus, Daboia russelii, Echis carinatus) sequence that are antigenic by eliciting an antibody response. These antigenic epitopes are determined using method of Kolaskar and Tongaonkar (10) Prediction are based on a table that reflects the occurrence of amino acid residues in experimentally Known segmental epitopes. Segments are only if they have a minimum size of residues (http.//www.mifoundation.org)

Method Specification	-	Method- Prediction antigenic peptides.
Method	-	Antigenic Prediction.
Protein Sequence	-	PLA2 Protein (Naja naja, Bungarus, Daboia, Echis carinatus).
Format	-	Raw sequence
Website	-	http.www.bio.dfci.harvard.edu/tools/antigenic.org/.

Result

FASTA format of PLA2 protein (Naja naja, Bungarus caeruleus,Daboia russelii, Echis carinatus) is as follows

- Nlyqfknmikctvpsrswwdfadygcycgrggsgtpvddldrccqvhdncyneaekisgcwpyfktysyecsqgtlt ckgdnnacaasvcdcdrlaaicfagapyndnnynidlkarcq
- Nlqqfknmiqcagtrtwtayinygcycgkggsgtpvdkldrccythdhcynqadsipgcnpniktysytctqpnitctrt adacakflcdcdrtaaicfasapyninnimisasnscq
- Sllefgkmileetgklaipsyssygcycgwggkgtpkdatdrccfvhdcc
- Mktlwivavwliavegnlyqfgrmiwnrtgklpilsygsygcycgwggqgppkdatdrcclvhdccytrvgdcspk mtlysyrfengdiicdnkdpckravcecdreaaiclgenvntydkkyksyedcteevqec

Direction for prediction of Antigenic Peptides

Antibodies find multiple applications in a variety of areas including biotechnology, Pharmaceuticals Molecular Biology for diagnosis and indeed they are one of the most powerful tools for life science research. In analysis of PLA2 protein, we found two antigenic determinants sites it is highest at start position, the highest peak sequence of antigenic determinants plot indicate antigenic site for the host cell attachments.

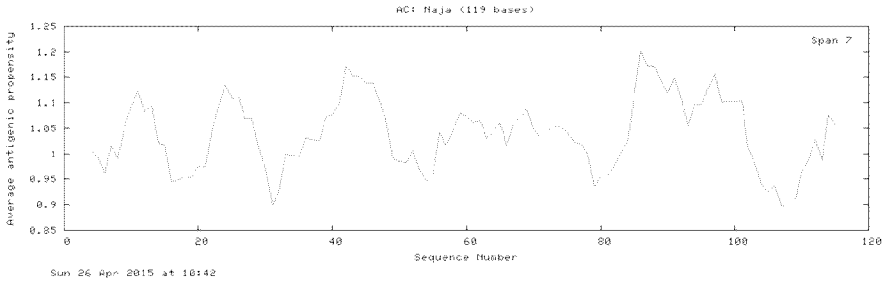
Antigenic Specificity

- The ability of individual antibody combing site to react with only one antigenic determinant.

- The ability of a population of antibody molecules to react only one antigen.

Naja naja

Naja sequence is 119 residues long.
Average antigenic propensity for this protein is 1.0405
Antigenic plot for sequence Naja (http://imed.med.ucm.es/Tools/antigenic.pl**)**

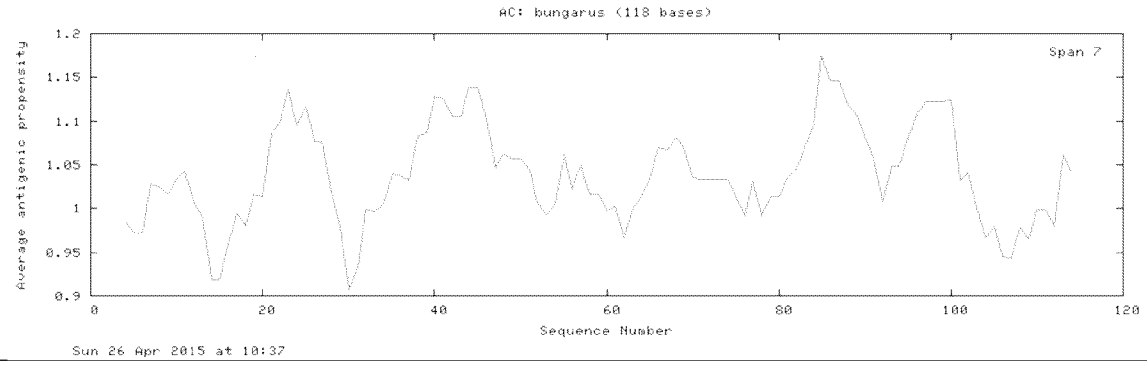


There are 5 antigenic determinants in this sequence

n	Start Position	Sequence	End Position
1	9	IKCTVPS	15
2	22	ADYGCYCG	29
3	36	PVDDLDRCCQVHD	48
4	56	KISGCWPYFKTYSYECSQGTLTC	78
5	83	NACAASVCDCDRLAAICFAG	102

Bungarus caeruleus

***Bungarus* sequence is 118 residues long**
Average antigenic propensity for this protein is 1.0386
Antigenic plot for sequence *bungarus* (http://imed.med.ucm.es/Tools/antigenic.pl)



There are 4 antigenic determinants in this sequence:

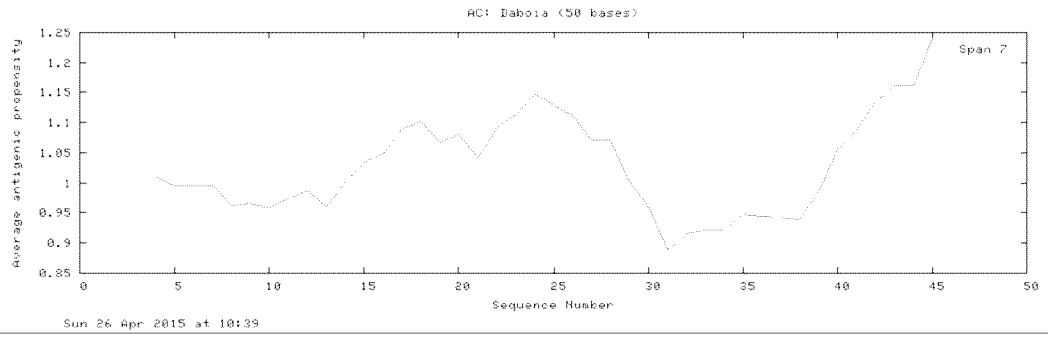
n	Start Position	Sequence	End Position
1	19	AYINYGCYCG	28
2	34	TPVDKLDRCCYTHDHCYNQ	52

	3	63	IKTYSYTCTQPNI	75
	4	79	RTADACAKFLCDCDRTAAICFASAP	103

Daboia russelii ***Daboia*** **sequence is 50 residues long**

Average antigenic propensity for this protein is 1.0508

Antigenic plot for sequence *Daboia(*http://imed.med.ucm.es/Tools/antigenic.pl)



There are 2 antigenic determinants in this sequence:

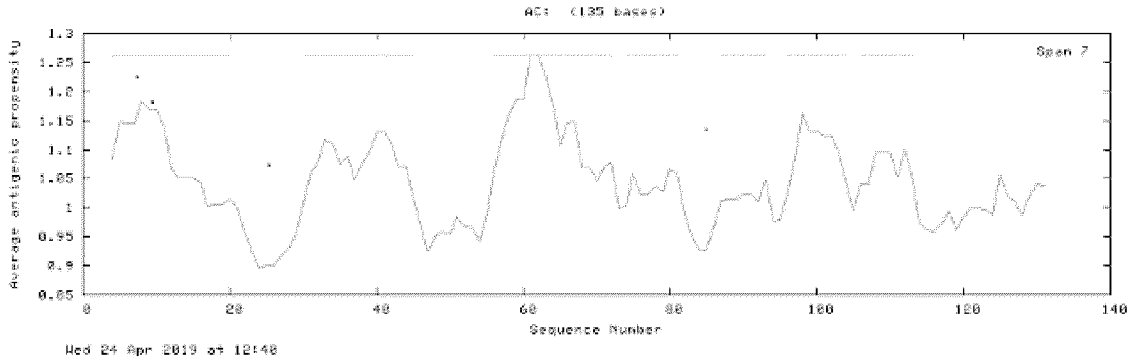
n	Start Position	Sequence	End Position
1	14	GKLAIPSYSSYGCYCG	29
2	40	TDRCCFV	46

Echis carinatus,

Echis carinatus *PLA2 sequence is 136 residues long*

Average antigenic propensity for this protein is 1.0438

***Antigenic plot for sequence* Echis carinatus *PLA2 (*http://imed.med.ucm.es/Tools/antigenic.pl)**



There are 7 antigenic determinants in your sequence:

n	Start Position	Sequence	End Position		
1	4	LWIVAVWLIAVEGNLYQ	20		
2	30	GKLPILSYGSYGCYCG	45		
3	56	TDRCCLVHDCCYTRVGD	72		
4	74	SPKMTLYS	81		
5	87	GDIICDN	93		

6	96	PCKRAVCEC	104		
7	106	REAAICLG	113		

Discussion

When any foreign material (here raw snake venom) enter in the animal body, it is picked up by macrophages and are processed to form antigenic determinants [11,12].

Prediction of antigenic epitopes (determinants) of PLA2

The FASTA format sequence for Phospholipase A2 of big four venom was pasted in the window provided on the antigenic epitope search engine page [10] and was then submitted for getting the predicted antigenic determinants. The results are shown in figure 1,2,3,4.

1. PLA2 Protein of Naja naja shows 5 antigenic determinant sites in the sequence. The highest peak is recorded seen between amino acid 83 to 102 and amino acid 36 to amino acid 48. The sequence of amino acid in this region is "NACAASVCDCDRLAAICFAG" and PVDDLDRCCQVHD. The average propensity for the PLA2 protein is found to be 1.0405.
2. From PLA2 Protein of Bungarus caeruleus, we got 4 antigenic determinant sites in the sequence. The highest peak is recorded seen between amino acid 79 to 103. The sequence of aa in this region is RTADACAKFLCDCDRTAAICFASAP Average antigenic propensity for this protein is 1.0386.
3. From PLA2 protein of Daboia russellii we got 2 antigenic determinant sites in the sequence. The highest peak is recorded seen between amino acid 40 to amino acid 46. The sequence of amino acid in this region is "TDRCCFV". The average propensity for the Phospolipase A2 protein is found to be 1.0508.
4. PLA2 protein of Echis carinatus shows 7 antigenic determinant sites in the sequence. The highest peak is recorded seen between amino acid 56 to 72. The sequence of amino acid in this region is "TDRCCLVHDCCYTRVGD". The average propensity for the PLA2 protein is found to be 1.0438.
5. All residues having above 1.0 propensity are always potentially antigenic. (http;// ncbi .nlm.nih.gov).

Conclusion

PLA2 is the most important content for neurotoxicity. Antigenic epitope of PLA2 proteins are important determinants of to raise immune response. The knowledge of the immune responses to a protein antigen progressed, it became clear that the whole protein is not necessary

for raising the immune response, but small segments of Protein called the Antigenic Determines or the epitopes are sufficient for eliciting the desired immune response.

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12. GC-MS Analysis of Stem Bark Benzene Extracts of Wrightia Tinctoria - A High Medicinal Value Plant

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Abstract

Wrightia tinctoria, a medicinally important plant belongs to the family Apocynaceae. Traditionally stem bark are used in the treatment of diarrhoea and dysentery diseases. In the present study, the bioactive compounds of Wrightia tinctoria stem bark have been evaluated using GC-MS. The chemical compositions of the benzene extract of W. tinctoria were investigated using Perkin-Elmer Gas Chromatography - Mass Spectroscopy. GC-MS analysis of W. tinctoria benzene extract revealed the existence of the GC-MS chromatogram of the ten peaks presented. The major chemical constituents are 2-Nonadecanone, Eicosane, 9-Octyl,Sulfurous acid, 2-Propyl Tetradecyl 1 ester, Trimethyl (4-(1,1,3,3,- Tetramethyl 1 butyl) Phenoxy) Silane, Cyclotrisiloxane, Hexamethyl and 1,2-Bis(Trimethylbutyl) Benzene.

Keywords : GC-MS analysis, Bioactive compounds, Wrightia tinctoria, Benzene extract.

Introduction

Wrightia tinctoria Roxb. is a small to medium-size deciduous tree belongs to the family Apocynaceae which is distributed throughout India up to 1200m. The plant grows up to 18 m tall and to 20 cm DBH (Diameter at Breast Height) with green marks on the stem and producing milky-white resin. The bark is smooth, somewhat corky and pale greyamenable for carving. Traditionally W. tinctoriais commonly called as “Jaundice curative tree” in south India 1. Different parts of this plant possesses very high medicinal value and used in Ayurveda, Siddha and other traditional systems of medicine for curing various ailments 2. The plant has been assigned to have antidiarrhoeal 3, antihaemorrhagic 4, antipyretic 5, anthelmintic and diuretic 6,7, antinociceptive 8,stomachic 2, analgesic and antidiabetic 9,10, antiviral and cytotoxic 11, anti-inflammatory 12, hypolipidemic 13, antioxidant 14 and antiulcer 15 activities. It is also used in febrifuge and dog bite 1,3,16, toothache 4,skin diseases 4,17,18,19,20,21, psoriasis 7, seminal weakness and flatulence 1,leprosy, burns, enlargement of spleen, boils and piles 21. Moreover, a few drops of its sap in milk prevent curdling and enhance its shelf life, without the need to refrigerate owing to its preservative nature 10.The reported constituents in bark are alkaloids, terpenes, wrightial 22, Tryptanthrin 23, Indole and flavonoids 2.Active compounds present in the

W. tinctoria flower extract by GC-MS analysis was reported 24. Past studies revealed that so far there is no study pertaining phytochemical constituents of the stem bark of W. tinctoria. Therefore the present study was carried out to determine the phytochemical constituents from W. tinctoria stem bark by GC-MS using benzene extract.

Materials and Methods

Plant material

Wrightia tinctoria was collected from Uttamsagar forest of Betul district, Madhya Pradesh, India. The plant specimen was identified and confirmed by Flora of Kolhapur District, Shivaji University,Kolhapur, Maharashtra, India.

Preparation of leaf powder

The leaves were collected and washed in running tap water in order to remove the surface adhered dust particles. Then they were shade dried and pulverized to powder in a mechanical grinder. The powdered obtained were sieved in a cotton muslin cloth (hole size of 0.2mm) to get a fine powder. The fine powder of leaf was stored in a plastic container at 4oC until further use.

Preparation of leaf extract

1gm of the leaf powder of Wrightia tinctoria was weighted, transferred to flask, treated with the absolute ethanol until the powder was fully immersed and incubated overnight. The extracts were then filtered through Whatmann filter paper No.41 along with 2gm sodium sulfate to remove the sediments and traces of water in the filtrate. Before filtering, the filter paper along with sodium sulphate was wetted 95% ethanol. The filtrate is then concentrated to 1ml by bubbling nitrogen gas in to the solution. The extract contains both polar and non-polar components of the material.

GC –MS analysis

2 ml of the benzene extract of W. tinctoria was employed for GC-MS for analysis of different compounds.

Instruments and chromatographic conditions

GC-MS analysis was carried out on a GC clarus 500 Perkin Elmer system comprising a AOC-20i auto sampler and gas chromatograph interfaced to a mass spectrometer (GC-MS) instrument employing the following conditions: columnElite-1 fused silica capillary column (30 ×0. 25 mm × ID x 1 µm of capillary column, composed of 100% Dimethyl poly siloxane), operating in electron impact mode at 70 eV; helium (99.999%) was used as carrier gas at a constant flow of 1ml/min and an injection volume of 0.5 EI was employed (split ratio of 10:1) inject or temperature 250°C; ion-source temperature280°C. The oven temperature was programmed from 110°C (isothermal for 2mi n), with an increase of 10°C/min, to200°C/min,

then 5°C /min to 280°C/min, ending with a 9 min isothermal a t 280°C.Mass spectra were taken at 70 eV; a scan interval of 0.5 s and fragments from 45 to 450Da.

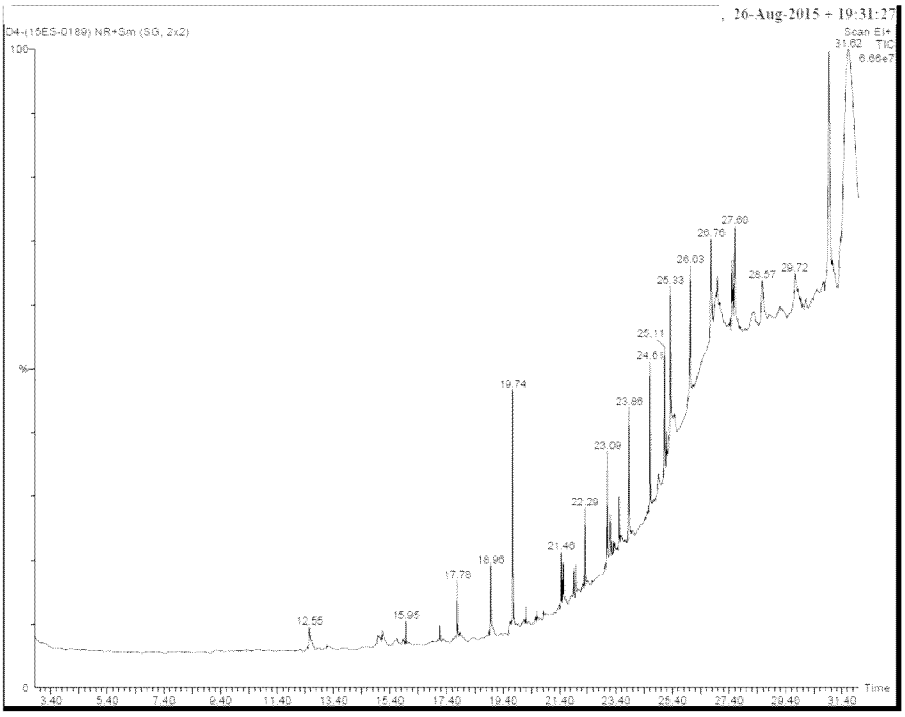
Identification of phytocompounds

Identification of phytocompounds and interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components using computer searches on a NIST Ver.2.1 MS data library. The name, molecular weight and structure of the components of the test materials were ascertained.

Results and Discussion

The studies to determine the possible chemical components from the leaf of W. tinctoria was carried out by GC-MS. The ethanol extract analysis clearly revealed ten peaks indicating the presence of ten phytochemical compounds. The GC-MS chromatogram of the ten peak of the compounds detected was shown in Figure-1.

Fig 1 GC - MS analysis of Wrightia tinctoria



The ten phytoconstituents were characterized and identified on comparison of the mass spectra of the constituents with the NIST library. The active principles with their retention time (RT), molecular formula, molecular weight (MW), concentration (peak area%) and activity reported are presented in Table-1.

Table 1: GC-MS analysis of Wrightia tinctoria

Sr. No.	Retention Time	Peak area (%)	Compound analyzed	Molecular formula	Molecular weight	Activity reported
1	19.735	3.357	2-Nonadecanone	$C_{19}H_{38}O$	282	Anti-bacterial, Anti-tumor, cytotoxic
2	23.862	2.312	Eicosane,9-Octyl	$C_{28}H_{58}$	394	Anti-oxidant, Anti-microbial
3	25.327	3.116	Sulfurous acid,2-Propyl Tetradecyl ester	$C_{17}H_{36}O_3S$	320	Anti-inflammatory, Antioxidant, Antimicrobial
4	26.028	2.662	Eicosane,9-Octyl-	$C_{28}H_{58}$	394	Anti-oxidant, Anti-microbial
5	26.763	2.972	Trimethyl Silane	$C_{17}H_{30}OSi$	278	Anti-oxidant, Anti-microbial, Anti-diabetic
6	26.998	2.512	Cyclotrisiloxane, Hexamethyl-	$C_6H_{18}O_3Si_3$	222	Anti-oxidant, Anti-microbial
7	27.593	3.108	Cyclotrisiloxane, Hexamethyl-	$C_6H_{18}O_3Si_3$	222	Anti-oxidant, Anti-microbial
8	29.719	2.286	Cyclotrisiloxane, Hexamethyl-	$C_6H_{18}O_3Si_3$	222	Anti-oxidant, Anti-microbial
9	30.945	7.773	Cyclotrisiloxane, Hexamethyl-	$C_6H_{18}O_3Si_3$	222	Anti-oxidant, Anti-microbial
10	31.640	34.834	1,2-Bis(Trimethylsilyl) Benzene	$C_{12}H_{22}Si_2$	222	Anti-oxidant, Anti-Listeria

The results showed out of ten compounds one and nine were major and minor constituents respectively. The one major compounds include1,2-Bis (Trimethylsilyl) Benzene (34.834%) and other minor compounds include 2-Nonadecanone (3.357%) , Eicosane,9-Octyl (4.934%), Sulfurous acid,2-Propyl Tetradecyl ester (3.116%), Trimethyl Silane (2.972%), Cyclotrisiloxane, Hexamethyl (15.679%).

GC-MS study of the benzene stem bark extract of W. tinctoria revealed the presence of ten peaks 24. The major chemical constituents include1,2-Bis (Trimethylsilyl) Benzene (34.834%) and other minor compounds include 2-Nonadecanone (3.357%) , Eicosane,9-Octyl (4.934%), Sulfurous acid,2-Propyl Tetradecyl ester (3.116%), Trimethyl Silane (2.972%), Cyclotrisiloxane, Hexamethyl (15.679%). The stem bark extract also shows presence of many dimethyl siloxane and ethyl esters such as acetate, alkane, ethyl acetate, phenol and ketone at retention time of 30.945, 19.735,23.862, 25.327, 26.763 and 31.640 respectively and activity

reported such as anti-bacterial, anti-tumor, cytotoxic, anti-oxidant, anti-microbial, anti-inflammatory, anti-diabetic and anti-listeria.

GC-MS analysis stem bark shows ten peaks. The presence of several constituents in the benzene stem bark extract of W. tinctoria justifies the use of the stem bark for various ailments by veterinary practitioners.

Conclusion

It was concluded that benzene extract of stem bark of Wrightia tinctoria possess various potent bioactive compounds and is recommended as a plant of phytopharmaceutical importance. Further studies are needed to explore the potential compounds responsible for the biological activity from W. tinctoria for application in drug delivery, nutritional or pharmaceutical and veterinary fields.

Acknowledgement

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13. Design and Development of Emotional Speech Database in Hindi

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Abstract

Research in the area of speech recognition is reached to a critical level to be used for real communication tool. The research in speech recognition in Indian languages is carried out in different institutes and research labs. The research is mostly concentrated on the development of applications in Tamil, Telgu and Hindi. Hindi is the most precisely used and official language of India.

A review of the research papers of the speech recognition was found that the research was done on Emotion Recognition System from artificial Marathi Speech using MFCC & LDA techniques, Marathi speech, Swahili Text, English speech, etc.

The present project is about the design and development of Emotional Speech Database in Hindi. The project contributes the database for the future research work for Emotional speech database. The database was created with the help of 50 speakers in which 25 speakers were male and 25 speakers were female. These speakers produced emotional Hindi utterances.

The speech samples were taken on 3 types of emotion i.e. Happy, Sad and Angry. The words that was taken for these 3 emotions was taken by seeing movies and daily soaps.

Keywords : Emotion, Recognition, Happy, Sad and Angry.

1. Introduction

1.1 Speech

Speech is a medium of communication of Humans with each other. It is vocalized form or one can say verbal form of human communication. Speech is based upon a syntactic combination of Lexical and names that are drawn from very large vocabularies. A set of vowel and consonant forms a speech sound for each of the spoken word. In short, we can say that speech is produced when air is forced from the lungs through the vocal cords and along the vocal tract.

Motivation for enabling a computer system to understand a speech and talk like humans has been done from long time. And keeping this mind the researchers are trying to develop a system which can analyze, classify and recognize signals. One of the major influencing factors for the low recognition accuracy is the 'emotion' which have been found while developing the system.

1.2 Speech Signal

The signals are usually processed in a digital representation, so speech processing can be recorded as a special case of digital signal processing, applied to speech signal.

1.3 Introduction to Emotion

It is the non-verbal aspect of speech which is the effect of moods & stress. A person's state of mind and instinctive responses

1.4 Emotional Speech

So emotional speech is the combination i.e., the verbal conversation i.e., affected by the non-verbal aspect of speech or it can also be described as vocal expression.

Emotional prosody is characterized as an individual's tone of voice in speech that is conveyed through changes in pitch, loudness, timbre, speech rate & pauses which is different from linguistics and interacts with verbal content.

1.5 Research in speech Recognition

Researchers all around the world are now trying for detection of emotions in Speech. Many researchers are exploring the depth in the area of emotion detection from speech in Human Computer Interaction (HCI). The emotional speech differs from the normal speech by pitch, loudness, timbre, speech rate and pauses.

The major challenge for the researchers who are working in the area of emotion recognition and studying the effect of emotions on speech recognition or speech synthesis system is the designing and development of the emotional speech database.

The emotional speech database can be helpful in many ways such as: -

1. In the development of robust automatic speech recognition (ASR) and for robotics.

2. To overcome the challenge of development of various robust applications whether it is speech recognition system or speech synthesis.
3. Development of new interfaces using speech.

The research work has not yet reached to the level where it can be used as communication tool in Indian languages. In developed countries a lot of work has been done in other languages. The same research work has been done in English and Marathi languages; hence the focus of this work is on Hindi language.

The present work describes the design and development of emotional Hindi speech database. After studying many emotional speech databases in different languages, the database of the current project was developed.

1.6 Speech Analysis

Analysis of speech sounds taking into consideration their method of production is the level of processing between the digitized acoustic waveform and the acoustic feature vectors.

1.7 Speech Enhancement

It aims to enhance the quality of speech by using different algorithms.

1.8 Motivation

Speech emotion recognition's research work has been carried out in many languages that has been described in the point of Research in all other language.

Hindi being the official language of India and most preciously used for any conversation was selected out for the emotion speech recognition.

2. Hindi Language

Hindi is most precisely known as Modern Standard Hindi. A standard and Sanskrit oriented language of Hindustani.[1] Hindi is considered to be Native language of most people living in Delhi, Uttar Pradesh, Uttarakhand and Chhattisgarh, Himachal Pradesh, Chandigarh, Bihar, Jharkhand, Madhya Pradesh, Haryana & Rajasthan

3. Text and Speech Corpus Development

In the present study, a Text Corpus is developed. The Text Corpus consisted of 30 emotional words. 3 emotions of Hindi Language were taken into consideration that are Happy, Sad and Angry. These 30 words were 10 from each described Emotion.

The speech data was then collected from different speakers using the developed Text Corpus.

The Method applied for the Present study is shown in Figure 1.

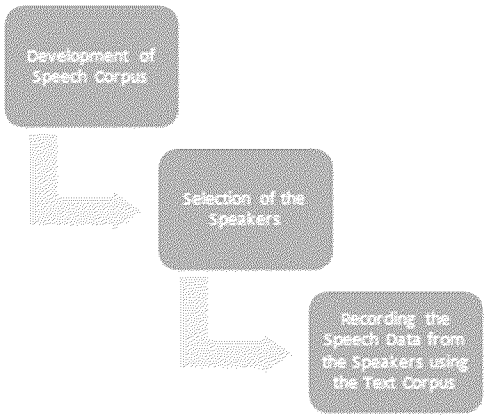

Fig.1: Method applied for the present study

Step 1

Text corpus was developed by watching different Hindi Movies and Daily Soaps. The selected words were checked for the typographic error. The words were distributed in 3 different categories of emotion i.e., Happy, Sad and Angry.

Step 2

50 speakers were selected of different age. Some speakers were students and some belonging to different professions. 25 speakers were female and 25 speakers were male. 2 speakers were taken whose mother tongue was Hindi i.e., 1 male speaker and 1 female speaker.

Step 3

The speech samples were recorded from total 50 speakers in normal environment.

Step 4

The speech samples having noise were enhanced using spectral subtraction.

Step 5

Features were extracted using Mel Frequency Cepstral Coefficient (MFCC).

Step 6

The analysis of the extracted features was carried out.

The Text Corpus should be correct in terms of typography and grammar.

The Text Corpus for the present study was generated by watching different Hindi Movies and Daily Soaps. These words were generated depending whether it was Happy, Sad or Angry. Total 30 words were finalized from which 10 words was from Happy emotion, 10 from Sad and 10 from Angry. Total 30 words were finalized from which 10 words was from Happy emotion, 10 words from Sad and 10 words from Angry emotion.

One word was selected same for 2 different categories i.e., for Happy and Sad so as to show difference in the emotions with same word. As Hindi is a language in which same words are used for different emotions which differ in pitch and toning.

4. Ldc Standard

There is various recording standard that are being followed worldwide. The researchers all over world follow the standards set by the linguistic data consortium.

Linguistic Data Consortium (LDC) is hosted by the University of Pennsylvania, USA. It is an open consortium of universities, companies and government research laboratories that creates, collects and distributes speech and text databases, lexicons, and other resources for research and development purpose. This initiative, known as 'LDC' was established in 1992 with an initial US government grant to provide a new mechanism for research in linguistic technologies. It now includes more than 100 companies, universities, and government agencies as its active users and members.

5. Sampling Frequency

The sampling frequency needs to be 16,000 Hz (As per standard the sampling frequency should be multiple of 8 kHz) and it should 16 bits.

6. File Format

The file format used for saving the recorded speech file is .wav format. The sound should be recorded in mono not in stereo.

7. Procedure of Speech Data Collection

7.1 Selection of Speakers

50 speakers in all were selected from which 25 speakers were male and 25 speakers were female. The selected speakers were in age groups ranging from 18-25, 26-32, 33-40 and 41-55. Maximum speakers were taken whose native language was not Hindi. Only 2 speakers were taken whose native language was Hindi. Literacy was also taken as a criterion for variation. But the main criteria that was found was native language after the selection of speaker.

7.2 Recording Procedure

For recording the speech samples PRAAT software was used with Sennheiser PC8 USB headset. This headset has Mac & PC USB Sound Card with noise cancellation feature.

8. Steps for Recording the Speech Samples Are

Step 1

Speakers who were selected were asked regarding any problem with reading or speaking the Hindi words.

Step 2

Speakers were given basic information about the headset used and when to speak the word.

Step 3

The sampling frequency was set to 16 kHz with 16 bits in Mono sound type.

Step 4

The speaker was asked to read each word and the recorded sample was saved as .wav file.

Step 5

Step 4 was repeated for all 150 utterances that were recorded from the speaker.

All the steps were repeated for all the 50 speakers.

8. Data Collection Statistics

Emotions selected for the present project were 3 i.e., Happy, Sad and Angry. 10 words each for these 3 emotions were finalized. Means in to total 30 words were shortlisted. The speech samples were taken from 50 speakers. Of which 25 speakers were male and 25 speakers were female. These speakers were also selected according to the age group as mentioned in section 4.8.1. Each speaker was told to utter 1 word 5 times. So, from each speaker we got 150 speech samples. In total 7500 utterances were collected of 30 words and 50 speakers.

9. Conclusion

The main purpose of this project was to make an emotional speech database A database of 7500 utterances from 50 speakers from which 25 male speakers and 25 female speakers was developed.

10. Limitations

1. The speech database developed is of limited vocabulary.
2. The variations captured are less.
3. The difference in the time required for uttering the word hampers the recognition which is not handled efficiently.

11. Future Scope

To the collected speech database different speech signal enhancement technique and feature extraction technique can be applied. A robust automatic speech recognition system using the developed speech database.

12. Applications

The developed speech database can be useful in many applications like Criminal Investigation, forensic, lie detection, Medical Applications, Analyze the mood of the patient, Mental changes of human.

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14. Role of Information Technology in Insurance Industry

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Abstract

The present research essay has highlighted the challenges faced by the insurance industry in India due to rapid innovation in the field of information technology. The use and application of information technology in various types of insurance company operations has become imperative now that it has a direct impact on the productivity of resources. It has a sweet effect on reducing cases of various activities. With the advent of private insurance players, competition has become more intense and the insurance sector has a significant role to play. Although the use of information technology is not new to the insurance sector, we can find a sharp division in the use of information technology in various departments of insurance companies, including the major players for the last 50 years. The most visible of these departments are Accounting, Policy Issue and Servicing, Claims Processing, Sales Management. Innovations in information technology can be used effectively for the following areas. This paper has tried to shed light on information technology in the insurance sector in India. This research essay shed light on the use of information technology in the insurance industry.

Keywords: Insurance Industry, Productivity, Claim processing, Sales Management.

Introduction

There is an evolutionary change in the technology that has revolutionized the entire insurance sector. Insurance industry is a data-rich industry, and thus, thee is a need to use the data for trend analysis and personalization. With increased competition among insurers, service has become a key issue. Moreover, customers are getting increasingly sophisticated and tech-savvy. People today don't want to accept the current value propositions, they want personalized interactions and they look for more and more features and add ones and better service. The insurance companies today must meet the need of the hour for more and more personalized approach for handling the customer. Today managing the customer intelligently is very critical for the insurer especially in the very competitive environment. Companies need to apply

different set of rules and treatment strategies to different customer segments. Personalization helps organizations to reach their customers with more impact and to generate new revenue through cross selling and up selling activities. To ensure that the customers are receiving personalized information, many organizations are incorporating knowledge database-repositories of content that typically include a search engine and let the customers locate the all document and information related to their queries of request for services.

Technologies and Insurance in India

Businesses are using information technology to improve quality, to lower costs and to design new products and services. It is a powerful tool for competitive advantage in increasingly competitive, global markets. The insurance business is being changed by information technology too. Exactly where the change is leading is unforeseeable, but change is inevitable, and intelligent participants in the insurance business will want to take advantage of it. Insurance has been no stranger to technological change. Over the years, the business has lowered expenses by embracing new technologies in communications and automation. Insurance has brought to the public the economic benefits of declining loss costs as other technologies brought better health, longer lives, fewer fires and safer factories and highways. In recent years, information technology has lowered the capital costs of insurance through the unbundling of insurance products and through the risk management movement. Over and over again, consumers benefited. Competitors who rode the changes gained over those who resisted or ignored them. Regulation will play an important role in determining how quickly and under whose auspices the latest round of advances in information technology gets to the public through the marketplace. For the main way technology gets to market is by giving one competitor a significant edge over another. With technology moving so quickly forward, the competitive advantages and the shifts in the competitive pecking order will naturally tend to come quickly too. But even where their long-term effect on the public is beneficial, rapid competitive shifts are difficult, disruptive and upsetting to those in any business that is subjected to them. That is where regulation comes in.

Regulation can affect the pace or rate of change, not its direction but the time it takes to get there. Where regulation finds itself already athwart the path that change is taking, regulation is in a natural position to slow change down. And it may be disposed to do so. That is not necessarily bad where the regulated field is alone, left to its own devices and in control of its destiny. But in financial services, insurance is not alone. In the real world of applying public policy to insurance, the state insurance commissioners are not alone. State regulation of

insurance, like all regulation, has not always dealt easily with rapid change that was upsetting to the regulated business. Regulation has a tendency to guard its jurisdiction over the regulated activity and to side with constituents who feel threatened by change. Sometimes regulation has resisted innovations made possible by information technology. But where a technological advance lowered costs or otherwise served both sellers and buyers, it was not held back for long. The forces of regulation and information technology are about to collide in the distribution of insurance.

Information technology is making it possible to distribute financial services at low cost and in convenient and attractive forms. Those possibilities will not naturally respect the borders among nations, let alone states. They will not naturally submit to our inherited distinctions among the various financial services. It is in the nature of advances in information technology to leap over borders of geography and boundaries of profession. It is in the nature of regulation to respect and enforce those borders and boundaries and to try to make them permanent. So the changes based on recent advances in information technology will inevitably run up against regulation of many kinds. The most exposed aspect of insurance regulation – the one likely first to be seen as standing in the way of the competitive use of the technological gains – is the licensing of insurance agents.

Benefits of Information Technology

Information Technology provides multiple benefits to the insurer and the existing and prospective insured:

- Information collected is better and cheaper
- Provides new ways of doing business in competitive market
- Flexible pricing and customized services
- Global accessibility i.e. lapse of physical boundaries
- Increased sales without additional sales force
- Immediate premium collection and funds transfer
- Reduced cost per transaction
- Real time knowledge base building

Conclusion

The technology in insurance has grown through their performance, restructuring policy and their efficiency in providing the large amount of insurance services with the help of

technology as their technology as their tool. Insurance companies that are enabling to react to their customer's demands will lose market share to their competitors that can. The question now facing insurance companies is no longer if they should take advantage of the internet, but now should they do it. The insurance services without technology will be like tea without sugar. The IT revolution has set the stage for unprecedented increase in financial activity across the globe. The progress of technology and the development of worldwide networks have significantly reduced the cost of global funds transfer. It is information technology which enables banks in meeting such high expectations of the customers who are more demanding and are also more techno-savvy compared to their counterparts of the yester years. They demand instant, anytime and anywhere banking facilities.

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15. Role of Commercial Bank in India

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Abstract

Commercial banks as their name suggest are profit seeking institutions .they do banking business to earn profit .They give short term loans and advances. They occupy a dominate place in the money market. The commercial banks in India are governed by the Indian Banking Regulation Act,1949. Under this law commercial banks are not supposed to do any other business , except banking.

Commercial banks play a very important role in our economy; in fact, it is difficult to imagine how our economic system could function efficiently without many of their services.
They are the heart of our financial structure, since they have the ability, in corporation with the Reserve Bank Of India, to add to the money supply of the nation and thus create additional purchasing power.

Commercial bank are all-purpose banks that perform a wider range of functions such as accepting demand deposits, issuing cheques against saving and fixed deposits, making short term business and consumer loans, providing brokerage services, buying and selling foreign exchange and so on. Primarily, commercial banks can be classified into (a) Public sector banks (b) Private sector banks (c) Foreign Banks and (d) Regional rural banks.

Keywords - Commercial bank, Public Sector Bank, Private sector Bank.

Introduction

Commercial bank is a financial institution which performs the function of accepting deposit from the A general public and giving loans for investment with the aim of earning profit. They are also known as joint stock companies dealing in money and credit. in fact, commercial banks as their name suggest are profit seeking institutions .they do banking business to earn profit .They give short term loans and advances. They occupy a dominate place in the money market. The commercial banks in India are governed by the Indian Banking Regulation Act, 1949.Under this law commercial banks are not supposed to do any other business ,except banking.

According to section (b) of the Indian Banking Regulation Act, 1949 " A Bank is one which transacts the business of banking which means the accepting for the purpose lending or investment ,of deposits of money from the public, repayable on demand or otherwise and withdrew able by cheque , draft, order or otherwise."

According to Crowther," The Bankers business is to take the debt of other people to offer his own in exchange and thereby create money."

According to R.S. Sayers "A Bank is an institutions whose whole debts are accepted in settlement of other people's debt."

Types of Commercial Bank

1. Public Sector Bank
2. Private sector Bank
3. Foreign Bank
4. Regional Rural Bank

Commercial Banks are classified in above four catenaries

1. Public Sector Bank

These are banks owned by the government .It refers to a type of commercial banks that are nationalized by the government of a country. In the public sector banks, the major stake is held by the government .In India Public sector banks operate under the guidelines of Reserve Bank of India.

Some of the Indian Public sector banks are , Andhra Bank , Allahabad Bank , Bank of Maharashtra , Bank of India , Bank of Baroda , Central Bank , Dena Bank , Indian Bank, IDBI Bank, UCO Bank , Union Bank of India etc.

2. Private Sector Banks

These Banks are owned by private entities .It refers to a kind of commercial banks in which major part of share capital is held by private business and Individual . These banks are registered as companies with limited liability.

Some of the Private sector banks are, Axis Bank ,HDFC Banks ICICI Banks, Kotat Mahindra Bank, Indus land Bank etc.

3. Foreign Banks

These are Banks That have headquarters in a foreign country but operate some branches in India. Some of the Foreign banks are , Citibank ,HSBC , Standard Chartered Bank, American Express Bank etc.

4. Regional Rural Banks (RRB)

These Banks are jointly owned by the central Government, state Government and sponsoring commercial bank .RR Bank established under the provision of the ordinance promulgated on the 26th September 1975 and RRB Act,1976 with an objective to ensure sufficient institutional credit for agriculture and other rural sectors . NABARD holds the apex position in the agriculture and rural development.

Function of Commercial Bank

Commercial bank is the most important deposit mobilization and disbursers of finance. Indian commercial banks are the oldest, biggest and fastest growing financial institutions . The activities of commercial banks are almost redefined after economic liberalization in 1991. The activities of commercial banks now are not confined into accepting deposits and granting loans.

The Main Function of the Commercial Banks can be Classified under Two Types

1. Primary Functions
2. Secondary Functions

1. Primary Functions

Commercial Banks performs varies primary functions some of them are given below "-

1. Accepting Deposits: A popular and primary function of the commercial banks is to accept deposit from the people. An individual or a group of individual or organizations can open account with the bank where they can keep their money deposited from time to time. Deposits can be of several types:- a) Demand deposits b) Current deposits c) Saving deposit d)Term deposits . e) Fixed deposit f) Recurring deposit.

2. Advancing Loans : The commercial banks provide loans to individual and organizations for varies purposes. The loans are advanced from the deposits that the bank receives from the public .The bank charges interest on the loans based on the amount and the term for which the loan is taken.

Loans can be granted in various ways: - a) Overdraft facilities b) cash credit c) Discounting bills of exchange.

3. Credit Creations : The central bank in an economy has the sole authority to issue currency .Thus money supply as under the control of the central bank. The cash deposit it receives is advanced as loans, which are used by the borrowers for further financial transaction .Thus the deposit is circulated in the economy in the form of credit and gets multiplied.

2. Secondary Functions

The commercial banks often act as agents of different individual and organizations to performs some financial operations on their behalf. These functions include agency & utility functions:- a) collection b) purchase & sale of securities c) payment d) provision of safe deposit vaults e) Investment advisory f) source of data on trade and industry g) Acts as a trustee. h) Transfer of government benefits i) Transaction of foreign exchange.etc.

Role of Commercial Bank in India

Besides performing the usual commercial banking functions banks in developing countries play an effective role in their economic development. The majority of people in such countries are poor, unemployed and engaged in traditional agriculture. There is acute shortage of capital .people lack imitative and enterprise. Means of transport are undeveloped. Industry is depressed. The commercial banks help in overcoming these obstacles and promoting economic development. The role of a commercial bank ion; a developing country is discussed as under:-

1. Mobilizing Saving for Capital Formation

The commercial banks help in mobilizing saving through network of Brach banking people in developing countries have low income but the banks induce them to save by introducing variety of deposit schemes to suit the needs of individual depositors . They also mobilize idle saving of the few rich. By mobilizing saving, the banks channelize them into productive investmen . Thus they help in the capital formation of a developing country.

2. Financing Trade

The commercial banks finance the industrial sector in a number of ways. They provide short-term, medium short term and long term loans to industry. In India the commercial banks undertake short term and medium term financing of small scale industries and also provide hire purchase finance.

3. Financing Trade

The commercial banks help in financing both internal and external trade . The banks provide loans to retailers and wholesalers to stock goods in which they deal .they also help in the movement of goods from one place to another place to another by providing all types of facilities such as discounting and accepting bills of exchange , providing overdraft facilities , issuing drafts etc.

4. Financing Agriculture

The commercial banks help the large agriculture sector in developing countries in a number of ways. They provide loans to traders in agriculture commodities. They open a network of branches in rural areas to provide agriculture credit. They provide finance directly to agriculture credit. They provide financial assistance for animal husbandry ,Dairy farming , Sheep Breeding , Poultry farming the small and marginal farmers and landless agriculture workers artisans and petty shopkeepers in rural banks in India.

5. Financing Consumer Activitie

People in underdeveloped countries beings poor and having low income do not possess sufficient financial resources to buy durable consumer goods .The commercial banks advance loans to consumers for the purchase of such items as houses, scooters, fans, refrigerators etc.

6. Financing Employment Generating Activities

The commercial banks Finance employment generating activities in developing studying in engineering, medical and other vocational institutes of higher learning . They advance loans to young entrepreneurs, medical and engineering graduate and other technically trained persons in establishing their own business. Such loans facilities are being provided by a number of commercial banks in India.

7. Finance to Government

Government is acting as the promoters of industries in under developed countries for which finance is needed for it . Banks provide long term credit to Government by investing their funds in Government securities and short term finance by purchasing Treasury Bills.

8. Help in Monetary Policy

The commercial banks help the economic development of a country by faithfully following the monetary policy of the central bank .In fact; the central bank depends upon the commercial banks for the success of its policy of monetary management in keeping with requirement of a developing economy.

Thus the commercial banks contribute much to the growth of a developing economy by granting loans to agriculture, trade and industry by helping in physical and human capital formations.

Conclusion

As to the role of commercial banking in the economic development of a country, economic discourse is rather reticent. The question may be asked as to whether the banking

system has at all any important part in the economic growth .practically, no conspicuous effort has yet been made in the hitherto published works to assess the role of commercial banking in Indians developmental planning. The most impelling reasons therefore for undertaking this study is to bring out a critical analysis regarding the contribution of the commercial banks to the economic growth of India.

It is therefore ,evident that the potentialities for increasing deposits in growth oriented economy especially in rural sector are great and that bank deposits could be increased if more untapped centers are brought within the orbit of banking operations We, can therefore emphasis that commercial banking must move away from behind the counter to the field . Banks should concentric of their servicing aspects and take them to a higher stage of perfection.

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16. History of the Nation and the Community in the Select Novels of Bapsi Sidhwa

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Abstract

Bapsi Sidhwa's works have aroused a variety of reactions. Her interests are vast and she cannot be easily categorized just as a comic writer or a Parsi novelist. In her novels viz. *The Crow Eaters, (1978), The Pakistani Bride (1983), Ice-Candy-Man (1988)* her historical consciousness is dominant. Her aim of dealing with history is twofold. One is to narrate the history of the Indian subcontinent and to bring out the atrocities committed during partition and creation of Pakistan. Secondly, she wants to preserve and bring it to the knowledge of the people around the world the history of her community. History is an important aspect of postcolonial Indian writings. Bapsi Sidhwa narrates the history of the nation and her community from feminist angle.

Key words: Historical Consciousness, Postcolonial, Feminist etc.

Introduction

There are many female writers who producing literature from Indian subcontinent. Bapsi Sidhwa's writings are unique in many ways. She is aware about her community's decreasing population. As a postcolonial writer she wants to preserve history of her own community. The culture and ethos of Parsi community is not known to many in the world. Literature is a powerful medium which preserves culture, tradition, ethos, aspirations of communities all over the world. Bapsi Sidhwa through her flawless writing skill made the history of her community open to all. As she is the product of Indian subcontinent, her writings reflect the history of India and Pakistan. She brings out the horrors of partition from Parsi point of view. My endeavour in this paper is to bring to light the history of the nation and Parsi community portrayed in the early three novels of Bapsi Sidhwa viz. *The Crow Eaters, (1978), The Pakistani Bride (1983), 'Ice-Candy-Man' (1988)*

Discussion

A detailed study of the earlier novels of Bapsi Sidhwa reveals that she is aware about the ethnicity of her community. In this respect the novel *The Crow Eaters* becomes a document on ethnicity of Parsis. In this novel Sidhwa discusses elaborately the migration and settlement of Parsis in India, the religious rituals, the problems of Parsis as a minority group. Her third novel *Ice-Candy-Man* is a kind of sequel to *The Crow Eaters.*

The Parsi people are said to be the descendant of the Aryan tribes which migrated from the Pamirs of Central Turkistan to West Asia, particularly Iran. The word 'Parsi' is an ethinic term, which means a native of Fars, the ancient Persian province, now in Southern Iran. The religion they follow is known as Zoroastrianism which was founded around 2000 B. C. Their religion is based on the teachings of Zoroaster. Their religious texts are collectively known as the *Avesta.* Their religion is quintessentially preserved in five *gathas* or divine songs, which are basically the dialogues of Zarathushtra, the Prophet, with God and reveal the essentially ethical nature of his gospel. The Parsis were forced to leave their homeland about 1,200 years ago to save their religion from being Islamized by the invading Arabs. Hunted out of their homeland in eighth century A. D. the Parsis first arrived at the port of Diu. After their stay here for about 19 years, they set sail towards the South and landed at the port of Sanjan, in Gujarat around 785 A. D. which was then ruled by king Jadhao Rana, a liberal monarch. Col. Bharucha, one of the Parsi character in *Ice-Candy-Man* reminds the gathering of Parsis at Lahore, that when their forefathers were denied entry into the land of India, they had suggested by the symbolic gesture of stirring a teaspoon of sugar into milk, that they would harmoniously mingle with the people of India and sweeten their lives with their decency and industry. (Sing, Arun, 14-41)

Ironically these very conditions which encouraged resilience and adaptability in the Parsi community, also generated a sense of alienation and ambivalence in the Parsi youth in the beginning of the twentieth century. The Parsis had prudently decided to follow the rules and customs of the ruling classes of the country in order to avoid the possibility of any controversy. They were the first people to encourage English language and English ways under the British Raj and became the most westernized Indian community. They were baffled and flabbergasted when the Raj started to disintegrate. In India and Pakistan they had to cope with the hegemonic forces of the dominant community and feared that as a community they may lose significance after independence. Such fears, coupled with the difficult choice between retaining loyalty to the British and pragmatic demands of aligning with the freedom movement, created a feeling of deep

rooted insecurity among them. As Parsis are loyal to the rulers, they decide to stay where they are and they will be loyal to the government. As Freddy suggests his sons and daughters:

"We will stay where we are… let Hindus, Muslims, Sikhs,
or whoever, rule. What does it matter ? (TCE, 283)

The same thing echoes in Col. Bharucha's suggestion in Ice-Candy-Man:

"We are to run with the hounds and hunt with the hare." (ICM, 37)

Parsis take safe side and decide not to struggle for power. They don't take any ones side, it may be Hindus, Muslims or Sikhs. They remain neutral.

Bapsi Sidhwa is essentially a feminist novelist. "Feminism is concerned with the marginalization of all women: that is, with their being relegated to a secondary position." (Guerin, Wilfred L, at el, 196) Sidhwa examines in her earlier three novels the experiences of women in the Indian sub-continent. In the novel *The Crow Eaters* the female characters are just puppets in the hands of the dominating males. 'Putli', an Urdu word, meaning 'puppet' is a female character in *The Crow Eaters*. The patriarchal set up of Parsi culture is so strong that Putli considers, walking one step ahead of her husband is just like "marching naked in public." (TCE, 188) In *The Pakistani Bride* female exploitation becomes central. The novel describes the lives of tribals in Kohistan. The tribals consider women as commodities. Women are beaten and treated as slaves. The punishment of running away from the house of husband is death. The story of exploitation of females continues in the novel *Ice-Candy-Man.* In this retelling of the partition story, the role of women emerges first as victims, then as saviours. "Historical reports show that during the rage of partition violence, women were paraded naked, their children were thrown into the air and caught on swords, and their bodies were mutilated." (Ross, Robert L, 12) At the same time, women like those portrayed in Ice-Candy-Man performed heroic deeds and brought some order to the chaos. Thus the novel *Ice-Candy-Man* becomes a feminist text.

Bapsi Sidhwa's novles deal with both the pre and postcolonial period of the Indian subcontinent. Her novels not only bring to life the horrors of partition but also vividly portray the complexities of life in the subcontinent. What makes her work interesting from the postcolonial point of view is the way in which she rewrites the history of the subcontinent. The most remarkable quality of her work is her dual perspective, which is based on both the Pakistani and the Parsi point of view. She speaks for both - the Pakistanis and the marginalized Parsi community. While narrating the history of the nation, she narrates the history of her community in her novels viz. *The Crow Eaters* and *Ice-Candy-Man.*

Sidhwa, in her novels, as mentioned earlier, rewrites history from the Pakistani point of view also. "To counter the British and Indian versions of the partition, Sidhwa in the *Ice-Candy-Man* not only tries to resurrect the image of Jinnah but also demystifies the image of Gandhi and Nehru."(Sapra, Rahul, 12) Jinnah in the novel is highlighted as an ambassador of Hindu - Muslim unity: "Today forty years later, in films of Gandhi's and Mountbatten's times, in books by British and Indian scholars, Jinnah who for a decade was known as an ambassador of Hindu - Muslim unity, is caricatured and portrayed as monster."(ICM, 160) The sublime image of Gandhi constructed by British and Indian historians is totally undercut when he is seen through the eyes of the seven-year-old narrator, Lenny:

"He (Gandhi) is small , dark, shrivelled, old.

He looks just like Hari, our gardner, except he has a disgruntled, disgusted and irritable look; and no one'd dare to pull off his dhothi! He wears only the loincloth and his black and thin torso is naked."(ICM, 86)

Unlike most of the Indian historians who credit Gandhi for single-handedly ousting the British from India, in *Ice-Candy-Man* Sidhwa reduces him to the role of an eccentric dietician, who advises every woman to 'flush' their systems with enemas. Similarly Nehru is a shrewd politician who in spite of all the efforts of Jinnah "will walk off with the lion's share." (ICM, 131) Nehru, according to the Ice-candy-man is "a sly one … He's got Mountbatten eating out of his one hand and the English's wife out of his other what not… He's the one to watch!" (ibid)

Even though Sidhwa tries to depict the atrocities committed by Hindus, Muslims, and Sikhs without partiality, being a Pakistani writer she makes it obvious that her sympathies are with the Muslim victims. The attacks on Muslim villages in Punjab described vividly, in *The Pakistani Bride* and *Ice-Candy-Man.*

Conclusion

Literature is a powerful tool in the hands of creative writers to modulate and change the societal framework, and Sidhwa through her extremely absorbing and interesting work seeks to contribute to the process of change that has already started all over the world, involving a reconsideration of women's rights and status, and a radical restructuring of social thought. She is aware of being a Parsi. She has immortalized the Parsi culture, temperament and psyche by creating fictional stories based on Parsi lives.

At the time she is influenced by the political change occurred in the Indian subcontinent in the modern times. She tried successfully to record the history of her nation from a female and Parsi point of view.

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17. Phyto-Diversity of Campus, Shri Shivaji Science and Arts College, Chikhli, Dist., Buldana (M. S.) India

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Abstract

A field appraisal on plant diversity of Shri Shivaji Science And Arts College, Chikhli was conducted during 1st July to 15th August 2021 study was performed in all parts of the study area on the basis of field survey of plants it is resulted that 99 species under 42 families showed their presence in the campus which were collected, identified and listed. Out of 99species 45 are trees 13 are shrubs and 42 are herbs plant community is a dynamic biological system consisting of different plant species. Vegetation at a particular site is the result of interaction of various climatic and bio edaphic factors. The composition of annual herbaceous flora may vary in different seasons. Therefore these species can be utilized keeping in view the idea of sustainable development and utilization (Surender Kumar; 2016).

The name of the plants with family and local name were enumerated. The major resource of traditional medicines is from the nature. The total plant species recorded, indicated the heterogeneous floristic composition in the college campus. So, these plant species superficially depict the composition of flora of Shri Shivaji Science and Arts College, Chikhli

Keyword - field survey, Diversity college campus.

Introduction

Plant community is a dynamic biological system consisting of different plant species. Vegetation at a site is the result of interaction of various climatic and bio edaphic factors. Knowledge of species composition is essential for many Ecological studies Natural communities

are mixture of species which are unequally successful Distribution of plants depends on their genetic makeup, various environmental factors like temperature, walks and others edaphic factors (Curtis, J.T., Cottom, G. 1956,philips 1959, misra 1968) Plant diversity is a is the most important feature, which plays a vital role in complexity. The present work has been carried out in college campus to explore the diversity plants and for sustainable utilization of available plant resources. The findings will rave the key towards sustainable development in the era of indiscriminate collection of plants. Total area of the campus is 18 acres. In the main entrance there was anoldest tree of *Polyalthialongifolia* gives additional prettiness to the campus. All buildings are surrounded by different types of trees and ornamental plants.

Material and Method

The survey was conducted to collect information about the plant SPP like their identification and documentation in the form of Botanical name and family the field survey was carried all during 1st July to 15 August 2021. The identification was also done based on literature study (Benthom, G., Hooker, J.D. 1876).the whole campus visited many times for the collection of plants information.

Results and Discussion

Sr. No.	BOTANICAL NAME	FAMILY	HABIT	COMMON NAME
1.	*Abutilon indicum*Linn.	Acanthaceae	Herb	Pethari
2.	*Accacianilotica* Linn.	Fabaceae	Tree	Babhul
3.	*Accacialeucophloea*Linn.	Fabaceae	Tree	Hivar
4.	*Achyranthusaspera*Linn.	Amaranthaceae	Herb	Aparmaga
5.	*Adhatodavasica*Linn.	Acanthaceae	Shrub	Adulsa
6.	*Aegle marmelos* Linn.	Rutaceae	Tree	Bael
7.	*Ageratum conyzoides* Linn.	Asteraceae	Herb	Ghaneraosaadi
8.	*Ailantus excels*Roxb.	Simaroubaceae	Tree	Marukh
9.	*Aloe barbadensis*Linn.	Liliaceae	Herb	Vilayatikorphad
10.	*Aloe vera*	Liliaceae	Herb	Korphad
11.	*Amarantuscaudtus* Linn.	Amaranthaceae	Herb	Fox tail
12.	*Annona squamosal* Linn.	Annonaceae	Tree	Sitafal
13.	*Argemonemaxicana* Linn.	Papaveraceae	Herb	Pivla-dhotra
14.	*Araucaria heterophylla*	Araucariaceae	Tree	Christmas Tree
15.	*Azadirachtaindica*A. Juss.	Meliaceae	Tree	Neem
16.	*Bambusa vulgaris*	Poaceae	Tree	Bamboo
17.	*Barleriaprionitis* Linn.	Acanthaceae	Herb	Pivalikoranti
18.	*Bauhinia racemosa*Linn.	Fabaceae	Tree	Aapta
19.	*Bauhinia variegate* Linn.	Fabaceae	Tree	Kanchan

20.	*Bignonia capreolata*Linn.	Bignoniaceae	Shrub	*Crossvine*
21.	*Boerhaaviadiffusa* Linn.	Nyctaginaceae	Herb	Punarnava
22.	*Bougainvillaeaspectabilis*.	Nyctaginaceae	Tree	Kagdiful
23.	*Butea monosperma*(Lamk.) Taub.	Fabaceae	Tree	Palas
24.	*Caesalpiniaferrea*	Fabaceae	Trees	Leopard Tree
25.	*Caesalpiniapulcherrima*	Fabaceae	Tree	Shankasur
26.	*Callistemon citrinus*Stapf.	Myrtaceae	Tree	Bottle brush
27.	*Calotropisprocera*Ait.	Asclepidaceae	Shrub	Rui
28.	*Canna indica*Linn.	Zinziberaceae	Herb	Kardali
29.	*Caryotaurens*	Arecaceae	Tree	Fishtail palm
30.	*Cassia fistula* Linn.	Fabaceae	Tree	Bahava
31.	*Cassia tora*Linn.	Fabaceae	Herb	Tankala
32.	*Ceibapentandra*	Malvaceae	Tree	Kapok
33.	*Chenopodium album* Linn.	Chenopodiaceae	Herb	Chakvat
34.	*Clitoriaternatea*	Fabaceae	Herb	Gokuna
35.	*Coleus forskohlii*Auct.	Lamiaceae	Herb	Karmelo
36.	*Croton bonplandianum*Baill.	Euphorbiaceae	Herb	Kala Bhangra
37.	*Cynodondactylon*Linn.	Poaceae	Herb	Haryali
38.	*Cyperusrotundus*Linn.	Cyperaceae	Herb	Laval
39.	*Citrus lemon*	Rutaceae	Tree	Limbu, Lemon
40.	*Dalbergiasissoo*(Roxb.) DC.	Fabaceae	Tree	Shisham
41.	*Datura innoxia*Linn.	Solanaceae	Herb	Dhotra
42.	*Delonixregia*	Fabaceae	Tree	Gulmohar
43.	*Dicanthiumannulatum*	Poaceae	Herb	Marvel Grass
44.	*Durantaerecta*	Verbenaceae	Shrub	Nilkanta
45.	*Eclipta alba* (Linn.)	Asteraceae	Herb	Bhringaraj
46.	*Emblica officinalis* Gaertn.	Euphorbiaceae	Tree	Avla
47.	*Erythrina variegate*	Fabaceae	Tree	Pangara
48.	*Eucalyptus citriodora*Hook.	Myrtaceae	Tree	Nilgiri
49.	*Euphorbia hirta*Linn.	Euphorbiaceae	Herb	Dudhi
50.	*Ficusbenghalensis*Linn.	Moraceae	Tree	Vad
51.	*Ficusbenjamina*Linn.	Moraceae	Tree	Naandaruk
52.	*Ficuscarica*Linn.	Moraceae	Tree	Anjeer
53.	*Ficusreligiosa*Linn.	Moraceae	Tree	Pimpal
54.	*Heteropogoncontortus*Linn	Poaceae	Herb	Black Speargrass
55.	*Hibiscus rosa -sinensis*Linn.	Malvaceae	Shrub	Jasvand
56.	*Ixora coccinea* Linn.	Rubiaceae	Shrub	Rugmini
57.	*Kigeliapinnata*(Jack.) DC.	Bignoniaceae	Tree	BalamKhira
58.	*Lantana camara*	Verbenaceae	Shrub	Ghaneri
59.	*Lathyrusodoratus*Linn.	Fabaceae	Herb	Sweet Pea
60.	*Launaeaasplenifolia*Hook. F.	Asteraceae	Herb	Pathari
61.	*Malvastrumcoromandelianum*Linn.	Malvaceae	Herb	Chandiri
62.	*Mangiferaindica*Linn.	Anacardiaceae	Tree	Amba
63.	*Melia azedarach* Linn.	Meliaceae	Tree	Bakan-nimb
64.	*Mimusopselengi*	Sapotaceae	Tree	Bakul
65.	*Musa ensetesuperber*	Musaceae	Tree	Keli

66.	*Nelumbonucifera*	Nymphaeaceae	Shrub	Lotus
67.	*Neriumindicum*Mill.	Apocynaceae	Shrub	Kanher
68.	*Nyctanthes arbor-tristis*Linn.	Oleaceae	Tree	Parijatak
69.	*Ocimum sanctum*	Lamiaceae	Herb	Tulsi
70.	*Oreodoxaregia*Kunth Syn. *Roystonearegia*	Arecaceae	Tree	Royal Palm
71.	*Oxalis corniculata*Linn.	Oxalidaceae	Herb	Amrul
72.	*Partheniumhysterophorus*Linn.	Asteraceae	Herb	Gajargavat
73.	*Phoenix sylvestris*Linn.	Arecaceae	Tree	Kharik
74.	*Phyllanthusniruri*Hook. f.	Euphorbiaceae	Herb	Bhuiavali
75.	*Plumeriapudica*	Apocynaceae	Tree	White frangipani
76.	*Polyalthialongifolia*Sonn.	Annonaceae	Tree	Ashok
77.	*Prosopis cineraria* Linn.	Fabaceae	Tree	Shemi
78.	*Psidiumguajava*Linn.	Myrtaceae	Tree	Jamba, Peru
79.	*Prunusamygdalus*, Sny. *Prunusdulcis*	Rosaceae	Tree	Badam
80.	*Ranunculus sceleratus*Linn.	Ranunculaceae	Herb	Kulagi
81.	*Rosa indica*Linn.	Rosaceae	Shrub	Gulab
82.	*Scirpuslitoralis*Schrad Syn.	Cyperaceae	Herb	Bulrush
83.	*Setariaglauca*Linn.	Poaceae	Herb	Bhadli
84.	*Sidaacuta*Linn.	Malvaceae	Herb	Chikana
85.	*Sisymbriumirio*Linn.	Brassicaceae	Herb	London Rocket
86.	*Solanum nigrum* Linn.	Solanaceae	Herb	Laghukavali
87.	*Solanum Xanthocarpum*Linn.	Solanaceae	Herb	Kateringani
88.	*Syzginumcumini*	Myrtaceae	Tree	Jabhul
89.	*Tageteserecta*Linn.	Asteraceae	Herb	Jhenduphool
90.	*Tectonagrandis*	Lamiaceae	Tree	Sagwan
91.	*Thespesiapopulnea*	Malvaceae	Tree	Bhend
92.	*Thujaorientalis*Linn.	Cupressaceae	Tree	Morpankhi
93.	*Tribulusterrestris*Linn.	Zygophyllaceae	Herb	Saranta
94.	*Tridaxprocumbens*Linn.	Asteraceae	Herb	Kambarmodi
95.	*Vincarosea*Linn.	Apocynaceae	Herb	Sadaphuli
96.	*Vitex negundo*	Lamiaceae	Shrub	Nirgudi
97.	*Withaniasomnifera*Linn.	Solanaceae	Herb	Ashwagandha
98.	*Xanthium strumarium*Linn.	Asteraceae	Herb	Ghagara
99.	*Zizyphusjujuba*Mill.	Rhamnaceae	Tree	Bor

On the basis of survey of plants, it is resulted that 99 species under 42 families showed their presence in the campus which were collected, indentified and listed out of 99 species 45 are trees 13 are shrubs and 42 are herbs. The name of the plants with family andcommon name are enumerated in table 1.1.The dominance of plants from Fabaceae family indicated the tough environmental conditions and the ability of these plants to develop nitrogen fixation capacity to make legumes in their roots (Manhas et al., 2010).These results were positively correlated with (Parani K.; 2006).

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18. Analysis of Attenuation or Material Losses in Fibre Optic Technology

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Introduction

Fiber attenuation is one of the most important limitations in optical fiber communication links. It limits the maximum distance that information can be sent without use of repeaters. Although fiber losses do not distort optical pulses, they can reduce the amplitude of a pulse to the extent that the initial information cannot be recovered in presence of noise. The basic attenuation mechanisms in optical fibers are absorption, scattering and bending losses. In addition to these losses, there is the splice loss that occurs when two fibers are linked. Splice loss occurs due to fiber misalignments, differences in the numerical apertures, etc. Three mechanisms contribute to absorption[2] viz absorption by atomic defects in the glass composition, extrinsic absorption by impurity atoms in the glass material and intrinsic absorption by the basic constituents of fiber materials. Every material has defects in its atomic structure. These defects cause absorption of the optical radiation incident on it. In optical fibers, the losses caused by these defects are in general negligible compared with other sources of absorption. They are only important when the fiber is exposed to intense nuclear radiation levels[12]. The extrinsic absorption by impurity atoms occurs when these atoms causing energy transitions or charge transitions between their ions absorb light. They are present in the range of 0.6-1.6 μ□m and are generated by metal impurities and water vapors[3]. The dominant absorption factor in fibers prepared by the direct-melt method is the presence of impurities in the fiber material. Impurity absorption results predominantly from transition metal ions, such as iron, chromium, cobalt, and copper and from OH (water) ions[10]. The intrinsic absorption is related to the electronic resonance (in the ultraviolet region) and the vibrational resonance (in the infrared region) of silica glass. The electronic resonance's occur when a photon interact with an electron in the valence band and excites it to a higher energy level; whereas the vibrational resonance are associated to the chemical bonds of the silica glass[2]. Light is scattered when it encounters variations of the material caused by density fluctuations, defects, etc. When scattering occurs, part of the light leaves the fiber and is

absorbed by the jacket. The scattering losses due to density fluctuations, known as Rayleigh scattering losses, are proportional to λ^{-4}. These scattering losses are more important at shorter wavelengths. The Rayleigh scattering and, ultraviolet and infrared absorption losses are intrinsic to the fiber materials. The combination of these losses has a global minimum in the region around 1.55 μ□m and that is why most long distance systems are operated at this wavelength[6].

Simulation Material Losses

Fiber Propagation Loss Definition

The total fiber loss can be divided into material losses and fiber induced losses. Material losses include Rayleigh scattering, ultraviolet (UV), infrared (IR) absorption, and hydroxyl (OH) absorption losses. Material losses are the limiting losses in fibers. Fiber loss is defined as the ratio of the optical output power P_{out} from a fiber of length L to the optical input power P_{in}. The symbol α is commonly used to express loss in decibels per kilometer[4]:

$$\alpha = \frac{10}{L}\log\left(\frac{P_{in}}{P_{out}}\right) \quad \ldots\ldots\ldots\ldots \quad (3.8)$$

1. Rayleigh Scattering Model

Because of the granular appearance of atoms or molecules of the glass fiber, light transmitted through the fiber suffers scattering loss. This is known as Rayleigh scattering loss. Rayleigh Scattering in glass is the same phenomenon that scatters light from the sun in the atmosphere, there by giving rise to a blue sky. Rayleigh scattering losses in a fiber are typically determined through experimental measurement. The loss is expressed in decibels per kilometer by[3]:

$$\alpha_s = A/\lambda^4 \quad \ldots\ldots\ldots\ldots (3.9)$$

For a single-component glass such as SiO_2,

$$A = 8\pi 3 n_0^8 p^2 \beta k T/3$$

The Rayleigh scattering loss is given by[3]

$$\alpha_s = 8\pi 3 n_0^8 p^2 \beta k \mathrm{T}/3\ \lambda^4 \quad \ldots\ldots\ldots\ldots (3.10)$$

Where, n_0 is the refractive index, p is the photoelastic coefficient, β is the thermal compressibility, k is the Boltzmann coefficient, and T is the absolute temperature of the sample and A is termed as Scattering amplitude.

2. Ultraviolet Absorption Model

Ultraviolet or UV absorption results from electronic absorption bands in the ultraviolet region. The electronic absorption bands are associated with the band gaps of amorphous glass materials. Absorption occurs when a photon interacts with an electron in the valence band and excites it to a higher energy level. The UV absorption at any wavelength can be expressed as a function of the mole fraction 'x' of GeO_2[3]:

$$\alpha_{UV} = 10^{-2} \frac{154.2x}{46.6x + 60} \exp\left(\frac{4.63}{\lambda}\right) \quad \ldots\ldots\ldots\ldots \quad (3.11)$$

Where,

x is the mole fraction of the impurity (GeO_2) and λ is wavelength UV loss is small compared to scattering loss in the near infrared region.

3. OH-radical absorption model

The dominant absorption factor in fibers prepared by the direct-melt method is the presence of impurities in the fiber material. Impurity absorption results predominantly from transition metal ions, such as iron, chromium, cobalt, and copper and from OH (water) ions. The OH radical of H_2O molecule vibrates at a fundamental frequency corresponding to IR light wavelength of λ =2.8μm. Since the OH radical is slightly a harmonic, "overtones" can occur. These cause OH absorption lines to occur at λ=1.39, 0.95, and 0.725μm, the second, third, and fourth harmonics of fundamental frequencies, respectively. Broad peaks can appear[11].

OH absorption can be characterized by fitting the absorption lines by Lorentzian or Gaussian method[10, 11].

Lorentzian Fit Method

$$\alpha_{OH}(\lambda) = \sum_{i=1}^{7} \frac{A_i}{1 + \left(\frac{\lambda - \lambda_i}{\sigma_i}\right)^2} \quad \ldots\ldots\ldots\ldots \quad (3.12)$$

Gaussian Fit Method

$$\alpha_{OH}(\lambda) = \sum_{i=1}^{7} A_i \exp\left[-\left(\frac{\lambda - \lambda_i}{\sigma_i}\right)^2\right] \quad \ldots\ldots\ldots\ldots \quad (3.13)$$

In the above two equations, A_i is amplitude, λ_i is absorption peak position, and σ_i is the width of the i-th absorption line. Using up to seven absorption lines fits the OH absorption

spectrum here. In contemporary state-of-the-art fibers the hydroxyl-group absorption is greatly reduced, and only the peak at λ=1.38-1.39 μm still retains some practical importance.

4. Infrared Absorption Model

Infrared or IR absorption is associated with the characteristic vibration frequency of the particular chemical bond between the atoms of which the fiber is composed. An interaction between the vibrating bond and the electromagnetic field of the optical signal results in a transfer of energy from the field to bond, thereby causing absorption. This absorption is quite strong because of the many bonds present in the fiber. An empirical expression for the infrared absorption in dB/Km is[3]

$$\alpha_{IR} = A \exp(-B/\lambda)$$

Where A is Amplitude of the exponential fit curve, B is exponential 1/ wavelength decay coefficient. For $GeO_2 - SiO_2$ glass ($A = 7.81 \times 10^{11}$ and $B = 48.48$) is,

$$\alpha_{IR} = 7.81 \times 10^{11} \exp\left(\frac{-48.48}{\lambda}\right) \quad \ldots\ldots\ldots\ldots \quad (3.14)$$

4.2.3: Analysis of Material Losses

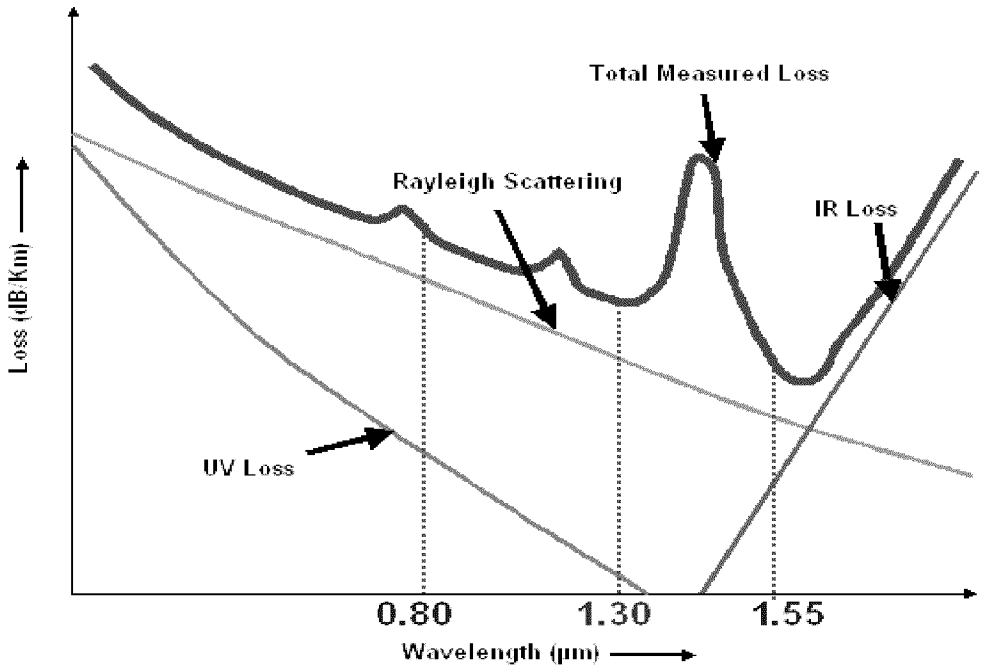

Figure3.9: A typical variation of total attenuation with wavelength in silica based optical fibers. The figure also shows the attenuation curves due to Rayleigh scattering, Infra-Red absorption and Ultra Violet absorption in SiO_2 (From T.Miya et al[6])

The fiber samples used for analysis are the silicon fibers with composition of doped silica. The preform consists of GeO_2 doped silica core and either Sio_2 or Fluorine doped silica cladding. The pure silica material is known as host material and by adding the doping material when the refractive index of material get increased is known as 'dopant+' and when it decreased is known as 'dopant-' The properties of the material used are defined by the Sellmeier theory and Sellmeier formula[9].

Sellmeier Formula

The Sellmeier formula is as[72]:

$$n^2(\lambda) - 1 = \frac{A_1 \cdot \lambda^2}{\lambda^2 - \lambda_1^2} + \frac{A_2 \cdot \lambda^2}{\lambda^2 - \lambda_2^2} + \frac{A_3 \cdot \lambda^2}{\lambda^2 - \lambda_3^2} \quad \ldots\ldots\ldots (3.15)$$

Where, n is the wavelength-dependent or non-linear refractive index, A_1, A_2, and A_3 are the Sellmeier amplitudes, and λ_1, λ_2, and λ_3 are the Sellmeier resonance wavelengths. The elements of "Parameters of Material" are described below. The Sellmeier coefficients and non-linear refractive index of different materials are given by S. Kobayashi et al[13] as shown in the Table 4.4

Table 3.4: Sellmeier coefficients and non-linear RI

Coefficients	Pure Silica	Germania-doped Silica	Fluorine-doped Silica
A_1	0.6961663	0.7028554	0.693200
A_2	0.4079426	0.4146307	0.397200
A_3	0.8974760	0.8974541	0.860080
λ_1	0.0684043 μm	0.0727723 μm	0.672398 μm
λ_2	0.1162414 μm	0.1143085 μm	0.117140 μm
λ_3	9.8961612 μm	9.8961609 μm	9.776098 μm
NRI	4e-016 cm^2/w	5e-016 cm^2/w	2e-016 cm^2/w

A typical variation of total attenuation with wavelength in silica-based optical fiber is as shown in figure 3.9 and it shows that the loss curve has minima at around λ = 1.310 μm and λ = 1.55 μm. These low loss regions generally referred to as the second and third low loss windows (Sec 1.1.11). The ultraviolet absorption loss[5] is obtained for GeO_2-doped silica glass data and it is very small as far as window II and III. The infrared absorption curve is obtained from loss characteristics of GeO_2-doped silica core fiber at higher wavelengths and it shows the steep rise on the long wavelength side of λ = 1.55 μm. The Rayleigh scattering loss component is

determined by the slope of curve proportional to λ^{-4}. The addition of all these losses produces the total Attenuation or Material loss[7].

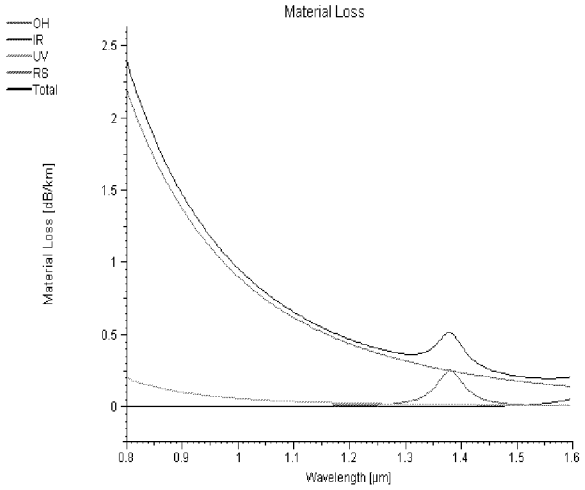

Figure 3.10: Material Loss Vs Wavelength for GeO_2 doped silica core (3.1%) and Fluorine doped silica cladding (1.0%) with pure silica as host material

Table 3.5: Experimental Material losses of fiber at different windows

Material Loss dB/Km	λ = 0.80 µm	λ = 1.310 µm	λ = 1.55 µm
RS	2.1973	0.3074	0.1551
UV	0.1984	0.0173	0.0096
OH	0.0002	0.0082	0.0015
IR	0.7361e-14	0.8524e-4	0.023022
Total	2.3959	0.3293	0.1892

The fiber used for analysis is having host material of pure silicon and 3.1% GeO_2 doped silica core and 1.0% fluorine doped silica cladding[8]. Thus GeO_2 is used as Dopant+ whereas fluorine used as Dopant-. The analysis of this fiber for absorption and scattering losses is as shown in figure 3.10 and Table 3.5.

Table 3.6: Experimental Material losses of all fibers

Total Loss					
	Fiber 1	Fiber 2	Fiber 3	Fiber 4	Fiber 5
1.2	4.6006054861E-01	4.6006054861E-01	4.6006054861E-01	4.6006054861E-01	4.6006054861E-01
1.24	3.9879681699E-01	3.9879681699E-01	3.9879681699E-01	3.9879681699E-01	3.9879681699E-01
1.28	3.4940747705E-01	3.4940747705E-01	3.4940747705E-01	3.4940747705E-01	3.4940747705E-01
1.33	3.1766861000E-01	3.1766861000E-01	3.1766861000E-01	3.1766861000E-01	3.1766861000E-01
1.37	4.5986504062E-01	4.5986504062E-01	4.5986504062E-01	4.5986504062E-01	4.5986504062E-01
1.42	2.5401194714E-01	2.5401194714E-01	2.5401194714E-01	2.5401194714E-01	2.5401194714E-01

1.46	2.1517153176E-01	2.1517153176E-01	2.1517153176E-01	2.1517153176E-01	2.1517153176E-01
1.51	1.9556237041E-01	1.9556237041E-01	1.9556237041E-01	1.9556237041E-01	1.9556237041E-01
1.55	1.8936549018E-01	1.8936549018E-01	1.8936549018E-01	1.8936549018E-01	1.8936549018E-01
1.6	2.0465054144E-01	2.0465054144E-01	2.0465054144E-01	2.0465054144E-01	2.0465054144E-01

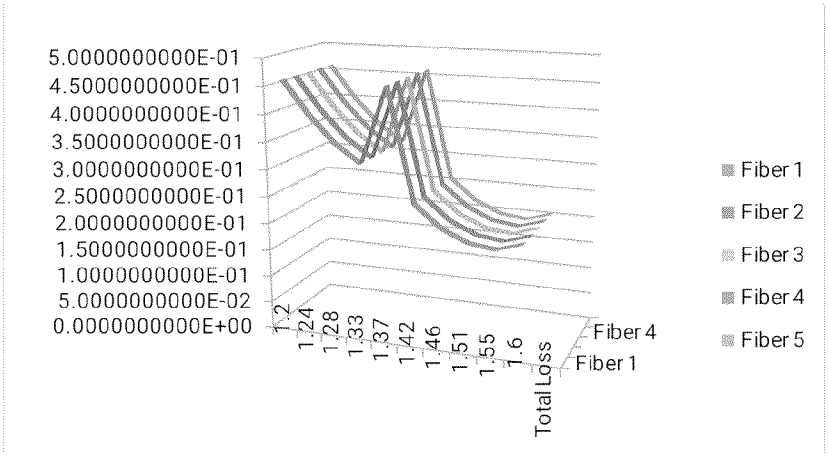

Figure 3.11: Material Loss Vs Wavelength of All fibers

The infrared absorption curve is obtained from loss characteristics of GeO_2-doped silica core fiber at higher wavelengths and it shows the steep rise on the long wavelength side of λ = 1.55 μm. Thus infrared absorption is not a major problem at lower wavelengths but dominated at higher operating wavelengths and can be minimized by controlling the concentration of GeO_2-doped silica core. The analysis shows that the total loss of the germania-doped silica-core fibers can be separated into the inherent ultraviolet absorption loss, the scattering loss and the inherent infrared absorption loss. It is also seen that the ultraviolet absorption loss and the scattering loss are dominated at the short wavelengths below 1.2 μm and the infrared absorption loss is dominated at longer wavelengths above 1.5 μm. To summarize the above results, dopants have a great effect on the transmission loss of high-silica glass optical fibers at long wavelengths. When an optimum dopant is selected for making a doped-silica optical fibers and OH content is greatly reduced, a phenomenally broad window where the loss is below 1 dB/Km can be achieved.

Conclusion

In conclusion, an ultimate lower loss SMF has been fabricated by reducing the excess loss due to imperfections of attenuation as much as possible. The loss mechanism in the optical fiber discussed has been also analyzed. Transmission losses have been reduced almost down to the intrinsic material loss and the minimum loss is 0.20 dB/Km at 1.55 μm. The atunation characteristics also analyzed at long wavelength the attenuation is minimized, thus it is

confirmed that the single mode fibers are most applicable for long distance and large capacity transmission.

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19. पाश्चात्य विचारधारा व सामाजिक सुधारणा

प्रा.डॉ. विष्णू रा. पडवाल
इतिहास विभाग प्रमुख, श्री शिवाजी विज्ञान व कला महाविद्यालय, चिखली, जि. बुलडाणा.

जगाचा मध्यमयुगीन कालखंड हा अंधकाराचे युग म्हणून ओळखला जातो. कारण की, या कालखंडात धर्मसत्तेचे वर्चस्व सामाजिक क्षेत्रावर प्रस्थापित झाले होते. धर्मसत्तेच्या प्रभावामुळे समाजात मोठया प्रमाणावर अनिष्ठ रूढी व परंपरा निर्माण झाल्या होत्या. यामध्ये विशेषत: समाजातील स्त्रीया, मागास व उपेक्षीत वर्ग मोठया प्रमाणात पिळल्या गेला. त्यांचे मोठया प्रमाणात मानसिक, शारिरीक, आर्थिक व सामाजिक शोषण झाले. हे सर्व बदलण्यासाठी संवेदशील विचार मनाच्या काही समाजसुधारकांनी सामाजिक सुधारणावादी चळवळीचा प्रारंभ केला.

भारताच्या दृष्टीने विचार करता १९ व्या शतका अगोदर व नंतर राजाराम मोहनरॉय, म. ज्योतीबा फुले, ईश्वरचंद विद्यासागर, डॉ. बाबासाहेब आंबेडकर, स्वामी विवेकानंद यांच्या सारख्या अनेक समाज सुधारकांचे कार्य भारतातील सामाजिक, परिवर्तनाच्यादृष्टीने मुलगामी व दिशादर्शक ठरले. वरील सर्व समाजसुधारकांनी सामाजिक रूढी, परंपरांच्या विरोधात आवाज उठवून प्रत्यक्ष कृतीला प्रारंभ केला. परिणामी सामाजिक गुलामगीरीत खितपत पडलेला उपेक्षीत मानव समुह, स्त्री वर्ग जागृत व्हायला प्रारंभ झाला. या सामाजिक चळवळींना ब्रिटिश सरकाराच्या आधुनिक शिक्षण व विचारांचे बळ मिळाले. ब्रिटिशांमुळेच आपल्या मधील अनिष्ट रूढी व परंपरांची जाणीव संवेदशील भारतीय मानवी समुहाला झाली असे या ठिकाणी स्पष्टपणे मांडतांना संकोच होणार नाही. या सामाजिक चळवळींमुळेच २० व्या शतकात या सामाजिक परिवर्तनाची फळे मानव जातीला मिळायला लागली. भारतीय स्वातंत्र्यानंतर निर्माण झालेल्या भारतीय संविधानातही समता, स्वातंत्र्य, न्याय, बंधुता व विशेषाधिकार या स्वरूपात त्याचे प्रतिबिंब उमटलेले दिसते. हया मधूनच सांप्रदायिक सद्भावना, सहिष्णुता व मानवतावादी मुल्य विकसित झाले. हा सर्व सामाजिक सुधारणा चळवळींचाच परिणाम आहे.

उददेश

प्रस्तुत शोध निबंधामध्ये तत्कालीन समाजसुधारकांनी पाश्चात्य विचार व विज्ञानाचे निष्पक्षपातीपणे निरीक्षण करण्याचे कार्य केले. सामाजिक सुधारणा चळवळीत मागील त्यांची भूमिका काय होती ? सर्वच सामाजिक चळवळींचा उददेश काय होता ? समाज सुधारकांना अपेक्षित असलेले सामाजिक परिवर्तन झाले का? अशा सर्वच प्रश्नांची उत्तरे शोधण्याचा प्रमुख उददेश आहे.

गृहितके

१. पाश्चात्यांच्या प्रभावामुळेच भारतात सामाजिक सुधारणा चळवळींना प्रारंभ झाला.

२. सामाजिक सुधारणा चळवळींमुळेच समाजातील अनिष्ठ—रूढी परंपरा कायदयाने बंद झाल्या.

३. सर्वच सामाजिक सुधारणा चळवळींचा उददेश समाज सुधारणा करण्याचा होता.

४. सामाजिक सुधारणा चळवळींमुळेच स्त्री वर्ग, अस्पृश्य समाज व उपेक्षित वर्गाना न्याय मिळाला.

सामाजिक सुधारणा चळवळींची पार्श्वभूमी

१८ व्या शतकात पाश्चात्य राष्ट्रात सुरू झालेल्या वैचारिक जागृतीमुळे युरोपियन समाजाला तर्कवाद, संशोधन, विज्ञान व वैज्ञानिक दृष्टीकोन प्राप्त झाला. या नविन विचाराने युरोपमधील राजकीय, लष्करी, आर्थिक, धार्मिक व सामाजिक या सर्वच क्षेत्रांना प्रभावित केले. या उलट स्थिती भारताची होती. भारतीय समाज जातीहिन, निर्माल्यवत व सुस्त झालेला होता. अशा स्थितीत भारताला अशा एका आक्रमणाला तोंड द्यावे लागले जो केवळ श्वेतवर्णीयच नव्हता तर सामाजिक व सांस्कृतिक दृष्टीने स्वत:ला श्रेष्ठ मानीत होता. यामुळेच भारतात एकवेळ अशी निर्माण झाली की, भारत हया पाश्चात्य विचारांना शरण जाणार असे वाटू लागले. भारतीय संस्कृती जागतिक स्पर्धेत मागे पडल्याचे दृश्य निर्माण झाले. पाश्चात्य विचार व शिक्षणाने प्रभावित झालेल्या बंगाली तरूणांनी हिंदू धर्म व संस्कृती बद्ल तिरस्कार दर्शवून हिंदूंच्या धार्मिक सामाजिक प्रथांचा त्यागच केला नसून मदिरापान सोबत गोमास भक्षण करून हिंदूंची मने दुखविल्या पर्यत त्यांनी मजल मारली. परंतु अशाही परिस्थितीत राजा रायमोहन रॉय यासारख्या पाश्चात्य समर्थक व बुध्दीवादी मंडळींना भारतीय समाज आणि धर्माशी आपले नातेगोते कायम ठेवून होते. हयाच नवशिक्षित मंडळींची भूमिका अशी होती की, हिंदू धर्मात आणि समाजात सुधारणा व्हावी आणि पाश्चात्य पौर्वात्य चांगलया गोष्टी स्विकारल्या जाव्या. म्हणून त्यांनी भारताच्या प्राचीन परंपरांपासून प्रेरणा घेऊन आधुनिक राष्ट्रवादाच्या संदर्भात त्याचे नवे स्पष्टीकरण करण्याचा त्यांचा प्रयत्न होता. याच बुध्दीवादी मंडळींनी देशाचा भूतकाळ तपासून असा निष्कर्ष काढला की, हिंदू धर्म — समाजात अनेक प्रथा, परंपरा व श्रध्दा अनिष्ठ आहेत आणि त्यांचा काळानुसार पुनरूज्जीवन घडवून आणण्यासाठी त्या महत्वाच्या आहेत. वरील सर्व विचारांचा एकत्रित परिणाम म्हणजे, भारतीय समाजात धार्मिक व सामाजिक सुधारणा चळवळी सुरू झाल्या आणि हयामुळे भारतीय समाजाचा चेहरा—मोहरा बदलवित असतानाच देशाच्या आधुनिकीकरणात महत्वाचे योगदान दिले. ब्रिटिश सत्तेने भारताच्या सर्वच क्षेत्रांना प्रभावित केले. विशेषत: सामाजिक व धार्मिक सुधारणा करण्याची आवश्यकता भारतीय बुध्दीवादी मंडळीला वाटू लागली, आणि त्यामुळे तत्कालीन भारतात सामाजिक चळवळींचा आरंभ झाला. याच सामाजिक चळवळींचा आढावा खालील प्रमाणे.

राजाराय मोहन रॉय

ब्रिटिश राज्यव्यवस्थेचा प्रारंभ बंगालपासून झाल्यामुळे पाश्चात्य आधुनिक संस्कृतीशी तेथील लोकांचा संपर्क आला आणि त्यामुळे आधुनिक उदारमतवाद व सामाजिक विचाराची पेरणी करण्यास आरंभ सुध्दा बंगालमधुनच झाल्याचे दिसून येते. यामध्ये प्रामुख्याने राजाराम मोहन रॉय यांचे योगदान महत्वाचे होते. त्यांनी तत्कालीन भारतीय समाजातील अनिष्ठ रूढी, परंपरा करण्याकरीता विशेषता सामाजिक सुधारणा करण्याकरीता 'ब्राम्हो समाजांची' स्थापना केली. या संस्थेचा उद्देशच व्यक्ती स्वातंत्र्यांच्या मूल्यांचा प्रसार करणे, समाजामध्ये स्त्री—पुरूष समानता निर्माण करणे, प्रत्येक व्यक्तीला त्याच्या गुणवत्तेनुसार सामाजिक दर्जा मिळाला पाहिजे व जाती संस्थेमुळे व्यक्ती स्वातंत्र्य व सामाजिक ऐक्याला बाधा येत असल्यामुळे ती मोडून काढण्याकरिता ब्राम्हो

समाजाने विशेष प्रयत्न केल्याचे दिसून येते. म्हणूनच राजाराम मोहन रॉय यांनी स्त्रीयांचे रूढीग्रस्त कल्पनांमुळे होणारे शोषण थांबविण्यासाठी जनजागृती घडवून आणली.

पुरूषप्रधान संस्कृतीमध्ये स्त्रीला दुय्यम स्थान देण्यात आले आहे. याचे ज्वलंत उदाहरण म्हणजे पती निधनानंतर स्त्रीला जीवंत राहण्याचा हक्क नाकारण्यात आला. यालाच सतीप्रथा असे म्हणतात. पतीच्या निधनानंतर धगधगत्या ज्वालात पती डोके आपल्या मांडीवर घेऊन शांतपणे मृत्युला सामोरे जावो म्हणजे सती जाणे होय. अशा प्रकारच्या प्रथेला बंद करण्याचा प्रयत्न अकबरने यापूर्वी केला होता. परंतु त्यांच्या प्रयत्नांना फारसे यश प्राप्त झाल्याचे दिसत नाही. ब्रिटिश कालखंडात ही अमानुष प्रथा बंद करण्याकरीता रॉय यांनी अथक प्रयत्न केले. यासाठी त्यांनी कलकत्ता याठिकाणी स्वतंत्र समिती स्थापन करून सती जाण्यास प्रवृत्त केले जाते की, काय यावर लक्ष ठेवण्याचे काम त्यांनी केले. लोकांमध्ये जागृती घडवून आणण्या करीता रॉय यांनी प्रयत्न केले. त्यांच्या जनजागृतीच्या परिणाम म्हणून सन १८२९ साली गव्हर्नर जनरल लॉर्ड विल्यम बेंटिग यांनी कायदयाने सती प्रथा सदोष मानवहत्येला समान दंडनिय मानण्यात आले. या संतीबंदी कायदयाविरूध्द भारतातील सनातनी प्रवृत्तीचे लोक इंग्लडला गेले. परंतु रॉय यांनी इंग्लंडला जाऊन हा कायदा कसा आवश्यक आहे याचे महत्व समजावून सांगितले. यामुळेच भारतासारख्या सनातनी संस्कृतीची जोपासना करणाऱ्या देशात सतीबंदी सारखा क्रांतीकारी कायदा अस्तित्वात येऊ शकला. म्हणूनच राजाराम मोहन रॉय यांना बंगालमधील सामाजिक सुधारणा चळवळीचे जनक म्हटले जाते.

महात्मा ज्योतीबा फुले

भारत या पवित्र मातृभुमीत थोर समाज सुधारक अखिल मानव जातीच्या कल्याणाकरीता सर्व स्तरावर सुधारनांचे कार्य करणाऱ्या महात्मा ज्योतीराव फुले यांच्या शिवाय समाज सुधारणेचा इतिहास लिहिता येणार नाही. तत्कालीन अज्ञान, अंधकार, अस्पृश्यता, भेदाभेद, जातीयतेच्या बेडया तोडून प्रवाहाच्या विरूध्द दिशेने जाण्याचे धाडस म. फुलेनी दाखविले. येथील दलित, पिडीत, अस्पृश्य मुला मुलींसाठी शाळा काढून यशस्वीपणे चालविल्या. जन्मत:च सर्व माणसे समान आहेत. म्हणून त्यांना समान हक्क व अधिकार मिळावे म्हणून स्वत:च्या पाण्याचा हौद अस्पृश्य बांधवांकरीता खुला करून देणारे कृतीशील सुधारक होते. स्वत: व पत्नीला सोबत घेऊन महार, मांग सारख्या अस्पृश्य मुला मुलींकरीता विद्यादानाचे कार्य करून त्यांना अज्ञानाच्या खाईतून बाहेर काढले. म. ज्योतिबा फुले यांच्या सामाजिक कार्यचे कौतुक विचार केशवराव यांनी पुढील प्रमाणे मांडले ''सन १८६३ मध्ये त्यांनी विधवांच्या गुप्त बाळंतपणाची व तेथे मुले ठेवून जाण्याची सोय महाराष्ट्रात प्रथमत: त्यांनी केली. त्याच प्रमाणे सन १८६४ साली पुर्नविवाहाची प्रथा सुरू करून सारस्वत ब्राम्हण शेगवी जातीतील रघुनाथ जनार्धन व नर्मदाबाई यांचा विवाह झाला हा महाराष्ट्रातील पहिला विवाह होय''. या बरोबरच फुले दापत्य यांनी १८७७ च्या महाभयानक दुष्काळात रोज सकाळ–संध्याकाळ हजारो लोकांना भाकऱ्या वाटून त्यांची भूक भागविले आणि हे कार्य दुष्काळ संपेपर्यत चालू होते. सन १८८३ साली मुंबई येथील देवदासीच्या लग्नांची तयारी फुलेंनी पाहिली व पोलीसांच्या मदतीने लग्न सोहळा होऊ दिला नाही. याबददल तालचेकर एच. ए. म्हणतात की, ''देवदासी प्रथेचे विरोधक जोतीराव फार धाडसी, निश्चयी व करारी वृत्तीचे होते. हाती घेतलेले कार्य तडीस नेणे हा त्यांचा बाणा होता. यश मिळो वा न मिळो पण

शिकस्तीने प्रयत्न करीन. सामाजिक प्रश्नाबददल एकदा त्यांनी ठरविले की, तो सुटेपर्यंत ते स्वस्त बसत नव्हते. तत्कालीन गतीहीन भारतीय समाजाला आपल्या प्रत्यक्ष कृतीतून गतीशील बनविण्याचे कार्य केले असे याठिकाणी म्हणता येईल.

स्वामी विवेकानंद

स्वामी विवेकानंद समाज सुधारणा करण्यासाठी रामकृष्ण मिशन या संस्थेची स्थापना केली. प्रारंभी पासूनच त्यांनी जाती पध्दती व अस्पृश्यतेवर कठोर प्रहार केले. त्यांच्यामते उपाशी माणसाला धर्माचे ज्ञान शिकविणे हा देवाचा आणि मानवतेचा अपमान आहे. त्यापुढे ते म्हणतात की,''मी त्याला महात्मा समजेन ज्याचे हृदय गरीबांसाठी द्रवते, इतर दुरात्मा आहेत''. या मिशनच्या माध्यमातून त्यांनी धर्मार्थ औषधालय, दवाखाने, विद्यालये सुरू केले. आजही रामकृष्ण मिशन राष्ट्रीय संकटात उदा. दुष्काळ, पुर, भुकंप इत्यादी जनतेला मदत करण्याचे महान मानवतावादी कार्य रामकृष्ण मिशन करते.

गुलामगीरी प्रथा

भारतात असलेली गुलामगीरी प्रथा पाश्चात्य राष्ट्रांसारखी नव्हती. भारतीय गुलामगीरी प्रथेबददल बोलतांना इतिहासकार म्हणतात की, भारतीय गुलामांना आपल्या घरातील मुलां समान वागविले जाते आणि ते गुलाम स्वातंत्र्याऐवजी गुलामगीरीत अधिक चांगले जीवन व्यतीत करतात. प्रामुख्याने या ठिकाणी असे म्हणता येईल की, भारतीय गुलामांशी युरोपियनांचा व्यवहार निर्दयपणाचा होता. सन १८३३ साली ब्रिटिश साम्राज्यात गुलामप्रथा समाप्त करण्यात आली आणि १८३३ च्या चार्टर ॲक्टमध्ये भारतीय गुलामगीरी बंद करण्यासंबंधी तरतुद करण्यात आली. जेणेकरून भारतीय गव्हर्नर जनरला ही प्रथा लवकरात लवकर समाप्त करता यावी. या मुळैच सन १८४३ साली संपूर्ण भारतात गुलामगिरी प्रथा बेकायदेशीर घोषीत करण्यात आली आणि मालकांना दंड नुकसान भरपाई न देता पिनल कोड नुसार गुलामांचा व्यापार अवैध घोषीत करण्यात आला.

२० व्या शतकातील सामाजिक सुधारणा

या शतकातील सामाजिक सुधारणा चळवळीचे वैशिष्टये म्हणजे भारतीय व प्रादेशिक स्तरावर कार्य करण्याच्या उद्देशाने प्रेरित झालेल्या अनेक संस्था सुरू झाल्या. त्यामध्ये रानडे यांनी १८८७ साली भारतीय राष्ट्रीय सामाजिक परिषद १९०३ साली मुंबई सामाजिक सुधारणा, बेंझट व्दारा हिंदू असोसिएशन, १९३२ मध्ये अखिल भारतीय अस्पृश्यता समिती, हरिजन सेवा संघ इत्यादी संस्थांनी भारतीय समाज जागृती करण्याचे कार्यच केले नसुन त्यांचे कार्य आजही सुरूच आहे.

वरील सर्वच सामाजिक सुधारणा चळवळींना भारतीय समाजात जागृती घडवून आणण्यासाठी ब्रिटिश कायदे व विचारधारा यांच्यामुळे सहकार्यच झाले असे या ठिकाणी सांगता येईल. विशेषत: भारतीय समाज व्यवस्थेत रूढ झालेल्या वाईट प्रथा बंद करण्यास मदत झाली आणि आधुनिक भारतीय समाज उदयास आला. या सर्वच सुधारणा चळवळी म्हणजे ब्रिटिश साम्राज्याचे फलित आहे असे याठिकाणी म्हणणे चुकीचे होणार नाही.

निष्कर्ष

भारतीय समाजावर पाश्चात्य विचारधारेचा प्रभाव पडल्यामुळेच आम्हाला आमच्यातील दोष उमगले आणि त्यामध्ये आम्ही सुधारणाच्या माध्यमातून बदल केले. हया सामाजिक सुधारणा चळवळींमुळे आधुनिक भारतीय समाजाची निर्मिती झाली. तत्कालीन भारतात सुरू झालेल्या सर्वच सुधारणा चळवळींनी आपल्यामधील चांगल्या गोष्टीचा स्विकार व वाईट प्रथांचा त्याग करण्यास भारतीय समाजाला प्रवृत्त केले. स्वातंत्र्यानंतर अस्तित्वात आलेल्या संविधानातही याच सामाजिक सुधारणावादी चळवळींच्या मुल्यांचा प्रभाव पडल्याचे दिसते. ज्यामध्ये स्वतंत्र, समता, बंधुता स्त्री–पुरूष समानता, धर्मनिरपेक्षता, सहिष्णुता व अस्पृश्यता निवारण या मानवतावादी मुल्यांचा समावेश आहे.

संदर्भ

१. आधुनिक भारताचा इतिहास – प्रा. डॉ. विभा आठल्ये.

२. आझादी के बाद का भारत – बिपीनचंद्र, मृदुला मुखर्जी, आदित्य मुखर्जी.

३. आधुनिक भारताचा इतिहास – डॉ. बी. एन. ग्रोवर, डॉ. एन. के. वेल्हेकर.

४. भारताचा इतिहास – डॉ. संतोष बनसोड, डॉ. सिध्दार्थ जाधव.

५. आधुनिक जग – नि. सी. दिक्षीत.

20. समाजसुधारक अण्णा हजारे यांचे भ्रष्टाचाराविरोधी जनआंदोलन : एक विश्लेषणात्मक अभ्यास

डॉ. जे. जे. जाधव
मार्गदर्शक व विभागप्रमुख, राज्यशास्त्र विभाग, श्री. शिवाजी कला व विज्ञान महाविद्यालय, चिखली
उद्धव रामभाऊ वायभासे
संशोधक विद्यार्थी, राज्यशास्त्र विभाग, श्री. शिवाजी कला व विज्ञान महाविद्यालय, चिखली.

अॅबस्ट्रॅक

"महाराष्ट्रातील गांधीवादी विचारांचे समाज सेवक अण्णा हजारे यांनी शासन व प्रशासन क्षेत्रातील भ्रष्टाचाराच्या विरोधात चालवलेल्या भ्रष्टाचार विरोधी आंदोलनांची फलनिष्पती ही भ्रष्टाचार विरोधी कायदा, दप्तर दिरंगाईचा कायदा, माहिती अधिकार कायदा, जनलोकपाल काय दाबदल्याच्यां संदर्भातील महाराष्ट्र अधिनियम क्रमांक २१. हे कायदे पास होण्यात झाली. हे कायदे व अण्णांची आंदोलने यामुळे समाज जागृती निर्माण होऊन शासनावरील दबाव वाढला, जनता बऱ्याच प्रमाणात जागृत झाली. भ्रष्टाचार विरोधात आवाज उठऊ लागली त्यामुळे भ्रष्ठाचार विरोधात जरब बसुन विकासा लागती मिळाली."

प्रस्तावना

आज समाजाच्या सर्वच अंगाना भ्रष्टाचार नावाच्या समस्येने ग्रासलेले आहे. ही समस्या केवळ भारतापुरतीच मर्यादीत नसुन सर्वव्यापी आहे. भारतातील सामाजिक, आर्थिक, राजकीय परिस्थितीनुसार तसेच ऐतिहासिक टप्प्यांनुसार या समस्येचे वेगळे आकलन करणे सर्व जगालाच गरजेचे आहे. भ्रष्टाचारांने संपुर्ण समाज पोखरून टाकला आहे. आज भ्रष्टाचारावीना कोणतेही क्षेत्र अलिप्त असल्याचे दिसुन येत नाही. सर्वच क्षेत्रात प्रत्यक्ष व अप्रत्यक्ष पणे भ्रष्टाचार सुरू आहे. राजकीय क्षेत्र निवडणुका, बांधकाम व्यवसाय, शेअर व बॅंकिंग क्षेत्र, विविध हवाला उद्योग, रस्ते व बांधकाम.इत्यादी क्षेत्र भ्रष्टाचाराची ज्वलंत क्षेत्रे म्हणुन दिसुन येतात. राजकीय क्षेत्र, प्रशासकीय क्षेत्र, आर्थिक क्षेत्र, धार्मिक क्षेत्र, सामाजिक क्षेत्र, अशा सर्वच क्षेत्राात भ्रष्टाचार वाढलेला दिसुन येतो. तसेच स्पीड मनी, गिफट् मनी, फंड मणी व खंडणी इत्यादी भ्रष्टाचाराचे प्रकार अस्तित्वात आलेले दिसतात.

जगातील सर्वच भांडवलशाही व्यवस्था कमी–अधिक फरकाने भ्रष्ट असतात. भांडवली व्यवस्था जस जशी प्रगत होत जाते. तस तसा भ्रष्टाचार अधिक नियमित, शिस्तबध्द आणि संस्थत्मक बनतो. भारतासारख्या 'तिसऱ्या जगामध्ये' तुटपुंजी साधन सामुग्री, दारिद्रय आणि विषमता, यांमुळे भ्रष्टाचाराला नवे आयाम मिळतात. त्यातुनच भ्रष्टाचाराचा प्रश्न एक ज्वलंत राष्ट्रीय प्रश्न म्हणुन समोर येतो. भ्रष्टाचाराच्या समस्येच्या भारतातील स्वरुपाबद्दल मत व्यक्त करताना राज्य शास्त्राचे अभ्यासक सुहास पळशीकर म्हणतात 'भ्रष्टाचार ही विसंगतीत अडकलेली लोकशाही आहे. 'अशा या भ्रष्टाचाराच्या समस्येतुन सामान्याचे जेहाल होतात. त्यांची जी पिळवणुक होते खासकरून भ्रष्ट नोकरशाही कडुण होणाऱ्या भ्रष्टाचाराला आळा घालण्याकरिता समाज सुधारक अण्णा हजारे यांनी भ्रटाचार विरोधी जन आंदोलन सुरू केले होते या जन आंदोलनाच्या माध्यमातुन अण्णा हजारे यांनी काही प्रमाणात नोकरशाहीचा, सरकारी मंत्र्यांचा भ्रष्टाचार उघड करून त्यांच्यावर कारवाई करण्यास शासनाला बाध्य केले. व भ्रष्टाचाराच्या प्रतिबंधासाठी शासनाला कायदे नियम बनवण्यास व त्याची अंमलबजावणी करण्यास बाध्य केले. पुढील काही प्रमुख भ्रष्टाचार विरोधी अण्णांच्या आंदोलनाचा आढावा घेवुन अण्णाच्या कार्याचा अभ्यास करता येईल.

प्रस्तुत शोध निबंधात समाज सुधारक अण्णा हजारे यांनी केलेल्या भ्रष्टाचार विरोधी जन आंदोलनाचा व त्याच्याशी निगडीत, भ्रष्टाचाराचे स्वरूप व व्याप्ती तसेच भ्रष्टाचार मुक्ती साठी शासनाने केलेल्या तरतुदींचा संशोधनात्मक विश्लेषणात्मक प्रयत्न या शोध निबंधाव्दारे केला गेला आहे.

शोधनिबंधाची उद्दिष्टये

१. अण्णा हजारे यांनी केलेल्या आंदोलनाचे स्वरूप जाणुन घेणे

२. शासनाने केलेले प्रतिबंधात्मक उपाय योजना समजुन घेणे

गृहितके

१. भ्रष्टाचार विरोधी आंदोलनातुन काही प्रमाणात भ्रष्टाचारावर नियंत्रण आल्याचे दिसुन येते.

२. भ्रष्टाचार मुक्तीसाठी शासनाने पुरेशा कायदेशीर तरतुदी केल्या आहेत.

३. भ्रष्टाचारावर नियंत्रण मिळविण्यासाठी समाज जागृती, कायद्याचा धाक, कडक अमंलबजावणी, पुरेशी ठरत नाही.

४. सामाजीक नितिमत्ता खालावली आहे.

तथ्य, संकलन व संशोधन पध्दती

प्रस्तुत शोध निबंधासाठी वर्णणात्मक, अन्वेषणात्मक पध्दतीचा वापर करण्यात आला आहे, त्याच बरोबर तथ्य संकलनासाठी दुय्यम साधनाचा वापर करण्यात आला आहे. त्यामध्ये संदर्भग्रंथ, मासिके, वर्तमान पत्रातील लेख, संकेत स्थळ. इत्यादी साधनाचा वापर करण्यात आला आहे.

अण्णाहजारे यांचे भ्रष्टाचार विरोधी जन आंदोलन

समाज सुधारक अण्णा हजारे यांनी आपल्या जीवनात महात्मा गांधी. स्वामी विवेकानंद, या सारख्या महापुरषांच्या विचारांचा अंगीकार करून ज्येष्ठ समाज सेवक अण्णा हजारे यांनी ते विचार प्रत्यक्ष जीवनात उतरविले व त्या विचारांच्या सहाय्यानें एक आदर्श उभा केला. महात्मा गांधीच्या विचारातुन स्वयं पुर्ण खेडे, स्वयंशासित खेडे, स्वावलंबी खेडे, आदर्श गाव यांसारखे महत्वपुर्ण विचार अण्णा हजारे यांनी घेतले व ते विचार प्रत्यक्ष कृतीत उतरवले त्याचेच एक उदाहरण म्हणजे राळेगण सिध्दी हे एक आदर्श गाव आपल्याला डोळयासमोर ठेवता येईल अण्णा हजारे यांच्या कार्याचे व्यवस्थित अवलोकन केले तर असे दिसुन येते की अण्णा हजारे यांनी एका बाजुला समाज, गाव, राज्य, देश सुधारणेकडे लक्ष देउन कार्य केले तर दुसऱ्या बाजुला भ्रष्ट शासन, भ्रष्ट प्रशासना विरूध्द आंदोलन वेळोवेळी पुकारले. म्हणजे अण्णा हजारे यांना केवळ समाज सुधारणाच अपेक्षित नव्हत्या तर शासन व्यवस्था, प्रशासन यात पारदर्शकता अपेक्षित होती.

देशाची आजची जी दुरावस्था झाली आहे; तिला प्रत्येक क्षेत्रात वाढलेला भ्रष्टाचार हे एक प्रमुख कारण आहे. असे अण्णा यांचे ठाम मत होते. लोक योजनांसाठी शासन जर एक रूपया खर्च करत असेल तर भ्रष्ट यंत्रणेमुळे प्रत्यक्षात फक्त १० पैसे लाभार्थि पर्यंत पोहोचतात. या स्व. राजीवगांधी यांनी म्हटलेल्या वाक्याची प्रचीती अण्णांना पावलो पावली येवु लागली. हा भ्रष्टाचार नियंत्रीत करण्यासाठी अण्णांनी भ्रष्टाचार विरोधी जन आंदोलन सुरू केले. प्रशासनातील भ्रष्टाचार उघड करून त्या विरोधात दाद मागीतली. अण्णांनी भ्रष्टाचार मुक्तीसाठी केलेली आंदोलने ही गांधीजींच्या अहिसेंच्या मार्गावर आधरलेली आहेत. भ्रष्टाचार विरोधी जन आंदोलनही १९९० पासुन सुरू झालेली एक परिवर्तनवादी चळवळ आहे.

भ्रष्टाचार विरोधी चळवळीतील अण्णाचा पहिला यशस्वी लढा

आदर्श गांव राळेगण सिध्दीच्या धर्ती वर राज्यात अण्णांच्या मार्गदर्शनात राज्यातील ३०० उपेक्षित गावांचा विकास करावा त्यांना स्वावलंबी बनवावे यासाठीही स्वतंत्र्याच्या सुवर्ण मोहत्सवी वर्षापासुन सुरू झालेली योजना होती. याचे प्रमुख, मार्गदर्शक म्हणुन अण्णा कार्यकरत होते. हे काम करत असतानाच अण्णाकडे १९९४ साली सामाजीक वनीकरण खात्यातले भ्रष्टाचाराचे प्रकरण आले. त्या

प्रकरणाची स्वत: चौकशी अण्णांणी केली त्यात त्यांना सत्याता अढळली व या प्रकरणाची सरकारने सखोल चौकशी करून दोषीवर कार्यवाही करावी या साठी सरकारला अण्णांनी पत्र व्यवहार केला. या संपुर्ण प्रकरणात एकुण ४२ अधीकारी दोषी असल्याचे सरकारने केलेल्या चौकशीतुन स्पष्ट झाले होते. मात्र शासनाने त्यांच्यावर कोणतीही कार्यवाही केली नव्हती. याचा निषेध म्हणुन केंद्रसरकारने दिलेला इंदिरा वृक्षमित्र पुरस्कार व पद्मश्री पुरस्कार १४ एप्रील १९९४ रोजी अण्णांनी केंद्र शासनाकडे परत पाठविला. वृत्त पत्रात त्यास ठळक प्रसिध्दी मिळाली. त्यामुळे जनतेत जागृती होऊन या आंदोलनास जनतेचा पाठींबा वाढला. शासन कारवाई करण्यास चालढकल करत असल्याने अण्णा हजारे यांनी आळंदी येथे १ मे १९९४ पासुन इंद्रायणी काठी उपोषण सुरू केले. लोकांच्या वाढत्या दबावामुळे सरकारला नमते घेऊन सामाजीक वनीकरणातील त्या भ्रष्ट ४२ दोषी अधिकाऱ्यांवर निलंबनाची कार्यवाही करावी लागली. अण्णाच्या भ्रष्टाचार विरोधी जन आंदोलन चळवळीचा हापहिलाच यशस्वी विजय होता.

युती शासनाच्या काळातील भ्रष्टाचार विरोधी आंदोलन

जगाच्या पाठीवर अनेक देशात भ्रष्टाचार थोडाफार प्रमाणात होतच आहे. परंतु इतर देशांच्या तुलनेत भ्रष्टाचाराचे प्रमाण भारतात जास्त आहे. म्हणुन अण्णा हजारे भ्रष्टाचार विरोधी जन आंदोलनाला आपल्या जीवनातील एक शुभ घटना माणतात. १९९५–९६ साली महाराष्ट्रात युतीचे शासन आले. पुर्वीच्या सरकारच्या भ्रष्ट कारभाराला कंटाळुन जनतेने सत्ता परिवर्तन केले होते. जनतेला आशा होती की हे शासन भ्रष्टाचार मुक्त, लोकोपयोगी कार्य करणारे असेल. मात्र लोकांचा हा भ्रम थोडयाच काळात दुर झाला कारण युतीच्या शासनाच्या काळातही भ्रष्टाचाराची नवनवीन प्रकरणे समोर यायला सुरूवात झाली होती. यात प्रामुख्याने पाटबंधारे खात्यातील भ्रष्टाचाराचे प्रकरण चांगलेच गाजले. पाटबंधारे मंत्री महादेव शिवणकर यांच्या खात्यातील अनेक प्रकरणे अण्णांनी चौकशीसाठी शासनाकडे पाठवली होती. शासनाने वेगवेगळया समीत्या निर्माण करून चौकशा केल्या होत्या. यातीलच एक पुराणीक समीतीने एक मंत्री शशिकांत सुतार यांना दोषी ठरवत शिवणकरांना आरोप मुक्त केले होते. त्यामुळे अण्णांनी पाटबंधारे खात्यातील भ्रष्टाचाराच्या तक्रारीची स्वंतंत्र चौकशीची मागणी मुख्यमंत्र्यांकडे केली होती. त्यानुसार अरूण भटीया यांच्या अध्यक्षते खाली समीती नेमल्या गेली या समीतीने नाशिक, नागपुर, कोकण, अमरावती व औरंगाबाद विभागात कालवे व कोल्हापुर पध्दतीच्या बंधाऱ्याच्या कामाच्या दुरूसत्या व पुर्नबांधनीसाठी शासनाने केलेल्या खर्चाच्या तुलनेत निकृष्ट दर्जाची कामे करून त्यात ७१ लाख रूपयाचा भ्रष्टाचार झाल्याचा निष्कर्ष भाटी या समीतीने काढला होता. यात ३३ अधिकाऱ्यावर आरोप ठेवण्यात आले होते. या सर्व दोषी अधिकाऱ्यांवर निलंबनाची कार्यवाही करावी असे सुचविण्यात आले होते. मात्र शासन कारवाईसाठी टाळाटाळ करत होते. मंत्री व अधिकारी यांना पाठीशी घालत होते. याचा निषेध म्हणुन अण्णांनी शासनाच्या सर्व कमिटयांचा, आदर्श गाव योजनेच्या अध्यक्ष पदाचा राजीनामा दिला व आमरण उपोषणास प्रारंभ केला. उपोषण काळात संपुर्ण महाराष्ट्रात युती सरकारचा विरोधात वातावरण तापले. ठिकठिकाणी मोर्चे व घंटानाद झाले. त्यामुळे सरकारने धाबे दणाणले. मुख्यमंत्र्यानी दोन्ही मंत्र्यांचे राजीनामे घेतले चौकशीसाठी निवृत्त न्यायाधीशांची समिती नेमली.

युतीच्या मंत्री मंडळातीलच सामाजीक कल्याण खात्याचे मंत्री जे मंत्री होण्या अगोदर अत्यंत गरीब कोणत्याही प्रकारचा जमीन जुमला, स्थावर मालमत्ता नसणारे होते. शिवसेना प्रमुखांनी काही त्यांच्या सामान्य कार्यकर्त्यांना सत्तेच्या सिंहासनावर बसवले होते त्यातीलच हे एक होते. परंतु सत्तेची उब मिळाल्यावर याच मंत्री महोदयांनी तीन वर्षातच वडीलोपार्जीत एक गुंठा ही जमीन नसताना नाशीक जिल्हयात ३६ एकर जमीन कमावली. कोणते ही बॅकबॅलंन्स नसताना पत्नीच्या नावे लाखो रूपये या तीन वर्षात जमा केले. हा एवढा पैसा कोठुन कोणत्या मार्गाने आला यासाठी जनतेने आवाज उठवला. अण्णानीही त्याला साद देवुन या मंत्र्याच्या विरोधात दाद मागायला सुरूवात केली. जनमत एकत्र केले. याच उलट परिणाम असा झाला की या मंत्र्यानीच अण्णाच्या विरूध्द आब्रु नुकसानीचा खटला दाखल करून अण्णाना तीन महीने कारावासाची शिक्षा करण्यात हातभार लावला. अण्णानी शिक्षा मान्य करून तुरूंगात जाने पसंत केले. यामुळे साहजीकच अण्णांना पाठिंबा जन सहानुभुती व जनाधार, तसेच इतर सामाजीक कार्यकर्ते यांचे समर्थन मीळत गेले. शासनावर याचा दबाव वाढला याचा परिणाम अण्णांना १५ दिवसातच शिक्षा माफ होऊन तुरूंगातुन सुटका करण्यात आली. सुटका

झाल्यावरही अण्णांनी हे सामाज कल्याण मंत्री भ्रष्ट आहेत याचा पुनरूच्चार केला. सुटके नंतर वरच्या न्यायालयात दाद मागुन अण्णांनी आपल्या वरील दाखल झालेल्या बदनामीचा दावा खोडुन काढला. न्यायालयाने ही अण्णाची बाजु ऐकुण हया मंत्र्याला दोषी ठरवले. व खालच्या न्यायालयाने दिलेला निर्णय रदद् करून मंत्र्यावरील आरोपात तथ्य असल्याचे मान्य केले. पुढे अण्णांनी लाचलुचपत प्रतिबंधक न्यायालयामार्फत या समाज कल्याण मंत्री व त्यांची पत्नी यांची चौकशी करण्याची याची का दाखल केली. न्यायालयाच्या आदेशाने या मंत्री पती–पत्नीची चौकशी करून काही धक्कादायक खुलासे समोर आले. ज्यात हे मंत्री महोदय व त्यांच्या पत्नीने भ्रष्टाचार केल्याचे सिध्द झाले. पुढे त्यांच्यावर गुन्हा दाखल झााला. त्यांना मंत्री पदाचा राजीनामा दयावा लागला. आणि त्याही पुढे या समाज कल्याण मंत्र्याना व त्यांच्या पत्नीला अटकही करण्यात आली. अशा प्रकारे अण्णा हजारे यांच्या भ्रष्टाचार विरोधी आंदोलनाला उशिरा का होईना या प्रकरणात यश मिळाले.

आघाडी सरकार मधील मंत्र्याच्या भ्रष्टाचारा विरूध्दचे आंदोलन

१९९९ च्या विधान सभेच्या निवडणुकात जनतेने युतीला नाकारून आघाडीला संधी दिली. यांच्या काळातही अण्णाच्या भ्रष्टाचार विरोधी जन आंदोलन न्यास या संस्थेकडे भ्रष्टाचाराची प्रकरणे आली. या सर्वा विरूध्द अण्णानी आवाज उठविला. आघाडीच्या काळातील राज्यामध्ये असणाऱ्या सहकार क्षेत्रामध्ये सुरू असलेल्या कोट्यावधी रूपयाच्या भ्रष्टाचाराची प्रकरणे अण्णा हजारे यांच्या जन आंदोलनाच्या कार्यालयाकडे आली. मुख्यमंत्र्या सोंबतच्या झालेल्या बैठकीत अण्णांनी या विषयावर चौकशीची मागणी केली होती. अण्णांच्या कार्यालयाने जवळपास ७३७ प्रकरणाची चौकशी करण्याची मागणी केली होती. अण्णा हजारे यांनी दिलेल्या भ्रष्ट प्रकरणाची शासनाने चौकशी पुर्ण करून त्यातील ४१४ प्रकरणात तथ्य असल्याची कबुली दिली होती. यामध्ये सार्वजनिक बांधकाम खात्यातील ३१, पाटबंधारे खात्यातील २७, सहकार खात्यातील २६, नगर विकास खात्यातील २२, जल संधारणा मधील १९, महसुल मधील १८, गृह खात्यातील १४, ग्राम विकास खात्यातील १३, उर्जा खात्यातील १०, आणि अन्न व नागरी पुरवठा मधील ९ प्रकरणामध्ये भ्रष्टाचार झाल्याचे स्पष्ट पणे उघड झाले. या सरकार मघील चार मंत्र्याचा भ्रष्ट कारभार अण्णनी उघड केला होता. या चार मंत्र्यांना सरकारमधुन काढुन टाकुण त्यांच्या भ्रष्ट कारभाराची चौकशी करण्याचा आग्रह धरला. या साठी अण्णांनी मुंबईच्या आझाद मैदानावर उपोषणाला बसावे लागले. अण्णांच्या उपोषण व वाढत्या जनमताचा दबाव यापुढे सरकारला झुकावे लागले व चौकशीसाठी न्या. सावंत यांच्या अध्यक्षते खाली एक आयोग नेमला.

थोडक्यात सांगायचा मुददा् हा की सरकार कोणत्याही पक्षाचे असो अण्णा हजारे यांना त्याच्याशी काही देणे घेणे नव्हते. त्यांचा विरोध हा फक्त भ्रष्टाचाराला होता. शासन हे लोकांच्या कामासाठी असते. जनतेच्या हाल अपेक्षा, त्यांच्या जीवनात सुधारणा घडवुन आणण्यासाठी असते. सरकारने स्वच्छ पारदर्शक कारभार करून लोकांचे कल्याण साधावे. अधिकारी व मंत्र्यांनी स्वत:चीच पोटभरू नयेत. एवढीच अण्णांची या भ्रष्टाचार विरोधी आंदोलनाच्या मागणीची भुमीका होती.

अण्णा हजारे यांनी केलेल्या भ्रष्टाचार विरोधी जन आंदोलनाचे फलित

अण्णाहजारे यांनी सामाजीक जीवनात प्रवास करत असताना त्यांना सामाजाच्या हालाखीची जाणीव होत होती.अधिकारी, नोकर वर्ग यांच्या कडुन सामान्याची होणारी लुट, मंत्री संत्री यांचा होणारी भरभराट हे पाहता. या सर्वाच्या मुळाशी भ्रष्टाचार हे एक प्रमुख कारण आहे. हे अण्णांच्या लक्षात आले त्यामुळे त्यांनी जेथे कोठे अन्याय होत असेल, गरीबाचा हक्क डावलल्या जाात असेल तेथे तेथे अण्णा हजारे यांनी आवाज एकवटला आहे. अण्णा हजारेंच्या आवाजाला या देशातील राज्यातील जनतेने ते वढीच साद दीलेली असल्याकारणाने अण्णा हजारे यांची भ्रष्टाचार विरोधी जन आंदोलनाची लढाई आजही तेवढयाच जोमाने सुरू आहे.शासनाला अण्णा हजारे यांनी भ्रष्टाचार मुक्तीसाठी केलेल्या सुचना, सल्ले विचारात घ्यावे लागले आहेत. सरकार कोणत्याही पक्षाचे, विचारधारेचे असले तरी ते अण्णा हजारे यांच्या भ्रष्टाचारा प्रतिबंधाच्या मार्गावर अण्णा सोबत असल्याचे दिसुन येते. म्हणुन अण्णा हजारेंच्या जवळपास सर्वच

भ्रष्टाचार आंदोलनात शासनाने उशिरा का होईना पण अण्णांच्या मागण्या मान्य केलेल्या दिसुन येतात. मग, त्यात भ्रष्ट अधिकाऱ्यांचे निलंबन असो, की भ्रष्ट मंत्र्यांना पदावरून काढुन टाकणे असो यासाठी काही कायदे शासनाने निर्माण केले आहेत.

१ दफ्तर दिरंगाई चा कायदा २००६

हा कायदा शासकीय कर्मचाऱ्याने कोणते काम किती दिवसात पुर्ण करावे हे दर्शवितो. या कायद्या नुसार एखादी फाईल एका टेबल वरून दुसऱ्या टेबलवर ७ दिवसात गेलीच पाहिजे. या कायद्याच्या अंमलबजावणी साठी व लोकांना त्यांच्या कामाला किती वेळ लागणार हे दर्शविण्यासाठी प्रत्येक शासकीय कार्यालयात नागरीकांची सनद तयार करण्याचे अभिप्रेत आहे.

२ शासकिय कर्मचाऱ्यांच्या बदल्या संबंधीचा सन २००६ चा महाराष्ट्र अधिनियम क्रमांक २१

या अधिनियमातील प्रकरण २ मधे अखिल भारतीय सेवेतील अधिकारी व राज्य सेवेतील अ, ब, क, वर्गातील कर्मचाऱ्यांची एकाच ठिकाणी सेवा देण्याचा कालावधि ३ वर्ष ठरवण्यात आला आहे.

३ सन २००३ चा महाराष्ट्र अधिनियम क्रमांक २३

२००३ चा महाराष्ट्र अधिनियम क्रमांक २३ हा मुंबई ग्रामपंचायत अधिनियम १९५८ यात सुधारना करण्याकरीता अस्तित्वात आलेला आहे. या कायद्याने ग्रामपंचायत ग्रामसभा यांना जादा अधिकार दिले.

४ माहिती अधिकार अधिनियम २००५

या कायद्याने भारतातील सर्व नागरीकांना भारतातील कोणत्याही प्रशासकिय खात्याचे किंवा विभागाचे माहिती, अधिकाऱ्यांनी नोंदविलेली मतं, शेरे, दिलेले सल्ले, त्यासोबत नमुने, प्रतिकृती, कंत्राटे, दैनंदीनी, इत्यादींची माहिती घेता व पाहता येईल. आणि हे सर्व माफक दरात व वेळेच्या मर्यादित करता येईल.

५ जन लोकपाल २०१४ चा कायदा

जन लोकपाल हा कायदा जनतेने निवडुन दिलेल्या लोकप्रतिनिधिवर नियंत्रण ठेवणारा आहे. या कायद्याने जन प्रतिनिधिंच्या भ्रष्टाचाराची चौकशी करण्याचा अधिकार लोकपालाला प्राप्त होतो. अण्णा हजारे यांच्या भ्रष्टाचार मुक्त जन आंदोलनाचे फलित म्हणजेच शासनाने वरिल कायद्याची केलेली निर्मीती होय. अण्णा हजारे यांच्या जन आंदोलनाचा परिणाम हा खालील आकडेवारी वरूणही लक्षात घेता येतो.

१९९० ते १९९५ साला पर्यंतच अण्णा हजारे यांच्याकडेच ११९ भ्रष्टाचाराची प्रकरणे आली होती.

१९९५ ते १९९९ या काळात अण्णाकडे भ्रष्टाचाराची २५३ प्रकरणे आली होती.

१९९९ पासुन पुढे आघाडी शासनाच्या काळातील भ्रष्टाचाराची ७३७ प्रकरणे अण्णा हजारे यांच्या कार्यालयाकडे आली होती. म्हणजेच आंदोलनापुर्वी भ्रष्टाचाराच्या तक्रारीची संख्या ही कमी प्रमाणात होती तर आंदोलनाच्या परिणामातुन भ्रष्टाचाराच्या तक्रारी करण्यामध्ये वाढ झालेली दिसुन येते. अण्णा हजारे यांच्या आंदोलना पुर्वी भ्रष्टाचारा मधे झालेल्या शिक्षा अगदीच कमी प्रमाणात होत्या अण्णा हजारे यांच्या आंदोलना नंतर मात्र शिक्षा होण्याच्या प्रमाणात वाढ झालेली आहे. यामधे मंत्री, अधीकारी, यांना राजीनामे द्यावे लागले. तर काहींना तुरूंगातही जावे लागले काहींच्या सेवा सुध्दा समाप्त करण्यात आल्या. या आंदोलनाचा परिणाम म्हणजेच प्रत्येक जिल्हयात जिल्हास्तरा वर भ्रष्टाचार निर्मुलण समित्यांची स्थापना करणे कायद्याने बंधनकारक केले. माहिती अधिकार २००५ कायद्या पुर्वी शासनाकडे येणाऱ्या अर्जाची संख्याही खुपच कमी होती. परंतु माहिती अधिकार कायदा लागु झाल्यानंतर यात मोठया प्रमाणात वाढ झालेली दिसुन येते.

महिती अधिकार कायदा २००५ लागु झाल्यानंतर शासनाकडे माहिती प्राप्त करण्याकरिता आलेल्या अर्जाची संख्या

अ. क्र	वर्ष	प्राप्त अर्जाचीसंख्या
१	२००६	१२३५७१
२	२००७	३८५७०४
३	२००८	४६६१५४
४	२००९	४९७८३५
५	२०१०	६०१८१८
६	२०११	७१४९६९
७	२०१२	७७४९२७

स्त्रोत :(डॉ.विजय कूमार फड –माहितीचा अधिकार, कैलास पब्लिकेशन, औरंगाबाद)

वरील तक्त्यातील आकडेवरीही फक्त महाराष्ट्र राज्याशी संबंधीत आहे. देशाचा विचार करताही आकडेवारी किती तरी जास्त प्रमाणात असेल. अण्णा हजारेंच्या भ्रष्टाचार मुक्त जन आंदोलनाचे हे मुख्य फलित आहे. माहिती अधिकार कायद्याच्या अंमंल बजावणीसाठी प्रत्येक शासकीय निम शासकीय सहकारी खासगी कार्यालयात माहिती अधिकारी नियुक्त करणे बंधनकारक आहे.

सारांश

भ्रष्टाचार या विषयाची कारणमिमांसा करताना असे लक्षात येते की, अण्णा हजारे यांनी त्यांच्या आयुष्यात सर्वात जास्त वेळ हा भ्रष्टाचार मुक्ती साठी चालवलेल्या जन आंदोलनाला दिला आहे. लोक योजनांसाठी शासन जर एक रूपया खर्च करत असेल तर भ्रष्ट यंत्रणे मुळे प्रत्यक्षात फक्त १० पैसे लाभार्थी पर्यंत पोहोचतात. या स्व. राजीव गांधी यांनी म्हटलेल्या या वाक्याची प्रचिती अण्णांना सदैव येत होती. या स्थितीत बदल व्हावा. नोकरशाहीच्या कामात पारदर्शकता असावी, जन प्रतिनीधीने जनतेच्या कल्याणासाठी, कल्याणकारी राज्यासाठी कार्य करावे. याकरीता अण्णांनी हे भ्रष्टाचार विरोधी जन आंदोलन अखंड सुरू ठेवलेले आहे.

आज आपणाला याचे काही परिणाम ही बघायला मिळत आहेत. जसे की माहीती अधिकार, भ्रष्टाचार प्रतिबंध कायदा, जन लोकपाल समाजाची झालेली जन जागृती व प्रसार माध्यमांची भ्रष्टाचाराच्या संबंधीची निरपेक्ष भुमिका. आज कोणताही सरकारी अधिकारी सहजा सहजी, लोकांच्या कडुन अवैध मार्गा नेरक्कम गोळा करू शकत नाही. लाकेसेवा विषयक कायद्याच्या माध्यमातुन ठरवलेल्या दिवसातच व्यक्तीचे कामेकरावी लागतात. माहिती अधिकारामुळे सामान्यातील सामान्य व्यक्ती सुध्दा आपल्यावर होणाऱ्या अन्याया बददल माहिती मिळवु शकतो. या कायद्याने नोकरशाहीत बऱ्याच प्रमाणात पारदर्शकता आणण्यात हात भारलावला आहे. अण्णा हजारे यांच्या भ्रष्टाचार विरोधी जन आंदोलनाचा ठळक असा परिणाम हा शासनावर वा त्यांच्या कार्य पध्दतीवर घडुन आला. शासनाला मग ते कोणत्या ही पक्षाचे असो. आपल्या धोरणत बदल करावा लागला, शासकीय कर्मचाऱ्यांना पाठिशी घालण्याचे धोरण सोडुन जो दोषी असेल त्यांच्यावर कडक कारवाई करायला या आंदोलनाने बाध्य केले. भ्रष्टाचार संपवन्यासाठी कायदे मंडळाला जुन्या कायद्यात दुरूस्त्या कराव्या लागल्या. काही नवीन कायदे करावे लागले. भ्रष्ट मंत्र्यांना मंत्री मंडळातुन काढुन टाकुन, प्रसंगी खटले सुध्दा दाखल करावे लागले. पक्ष हित, सरकारचे स्थैर्य या गोष्टींना दुय्यम मानुन समाजकल्याण व देशहित याला प्राधान्य द्यावे लागले.

भविष्यात ही सरकारी यंत्रणेवर, नोकर शाहीवर, जन प्रतिनिधीवर अंकुश ठेवण्यासाठी समाजातील सामान्य लोकांनी चालवलेल्या अशा आंदोलनाची आवश्यकता असेल. अण्णा हजारे यांचे भ्रष्टाचार मिटवण्यासाठी केलेले कार्य महत्वपुर्ण आहेच. त्याच बरोबर समाजाचेही कर्तव्य आहे की, जेथे भ्रष्टाचार होताना दिसत असेल त्याविरूध्द आवाज उठवणे, अण्णांच्या आंदोलनातुन समाजातही जागृती निर्माण झालीअ आहे. ही जागृती आणखी वृध्दीगत होण्यासाठी असे. सरकारी यंत्रणेवर नियंत्रण ठेवणारी आंदोलने समाजाने सदा

कार्यरत ठेवावीत, समाजातील लोकांचा सरकार, व त्यांची यंत्रणा, प्रशासन यावर असणारा दबाव हा कोणत्याही देशाच्या जिवंत लोकशाहीसाठी लोकशाहीच्या विकासासाठी आवश्यक ठरतो.

निष्कर्ष

१. या भ्रष्टाचार मुक्त जन आंदोलनाने सामाजिक परिवर्तन घडवुन आनले.

२. अधिकाऱ्यांच्या वेळ काढु धोरणाला दफ्तर दिरंगाई २००६ च्या कायद्याने लगाम घातला.

३. शासकिय कर्मचाऱ्यांच्या बदल्या मध्ये होणारा भ्रष्टाचार या आंदोलनामुळे उघड होऊन त्यावर नियंत्रण मिळवण्यासाठी महाराष्ट्र शासन अधिनियम क्रमांक २१ अस्तित्वात आला.

४. या आंदोलनामुळेच ग्रामपंचायतींना व ग्राम सभेला ज्यादा अधिकार मिळाले.

५. भ्रष्टाचार मुक्तीसाठी प्रभावी हत्यार म्हणुन माहिती अधिकार कायदा २००५ याच आंदोलनामुळे पास झाला.

६. भ्रष्टाचार नियंत्रीत करण्यासाठी जन लोकपाल कायदा अस्तित्वात आला.

७. शासकीय स्तरातुन भ्रष्टाचार विषयक कायद्यांची कठोर अंमंलबजावणी करण्यास शासनाला याच आंदोलनेने भाग पाडले.

८. या आंदोलनाने समाज जागृती होऊन समाजाला अन्याया विरूध्द लढण्याची प्रेरणा दिली.

संदर्भ ग्रंथ सुची

१. अण्णा हजारे 'माझे गावमाझे तिर्थ' स्वामी विवेकानंद कृतज्ञता निधी साहित्य प्रकाशन, राळेगण सिध्दी–२००२

२. संजय पठाडे 'स्वातंत्र्याची दुसरी लढाई' भ्रष्टाचार विरोधी जन आंदालन न्यास राळेगण सिध्दी २०१२

३. डॉ. दिनकर जाधव 'अण्णा हजारे यांचे जिवन आणि कार्य' सम्यकता प्रकाशन धुळे – २०१३

४. डॉ. बालाजी कोपलवार 'जन लोकपाल' भ्रष्टाचार विरोधी जन आनंदोलन न्यास २०१२

५. अण्णा हजारे 'निर्भर बनो' (मार्गदर्शिका) भ्रष्टाचार विरोधीजन आंदोलनन्यास २००९

६. अण्णा हजारे 'वाट ही संघर्षाची' सिग्नेट प्रकाशन पुणे

मासीके : १ लोकराज्य

वर्तमानपत्रे : १ लोकसत्ता, २ सकाळ, ३ महाराष्ट्र टाईम्स

संकेतस्थळ.

1. http://india against corruption.org
2. www.Annahazare.org

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