



# *Marian Quest*



*A Bi annual Multidisciplinary Research Journal*

**May 2023**

**Volume 15**

**ISSN 2249-7145**



***St.Mary's College (Autonomous)***

***(Re-accredited with 'A+' Grade by NAAC)***

***Thoothukudi***



**Marian Quest**  
**A Bi-annual Multidisciplinary Research Journal**  
**St. Mary's College (Autonomous)**  
**(Re-accredited with 'A+' Grade by NAAC)**  
**Thoothukudi**



---

**May 2023**

**Volume 15**

**ISSN 2249 – 7145**

---

**Patron**

**Rev. Sr. Dr. A.S.J. Lucia Rose**  
Principal, St. Mary's College (Autonomous)  
Thoothukudi

**Associate Editors**

**Dr. Lily**

Assistant Professor of Zoology,  
Rani Anna Government College for Women,  
Tirunelveli

**Dr.V.Sornaganesh**

Assistant Professor of Commerce,  
V.O.Chidambaram College,  
Thoothukudi

**Dr.N.Chandra Lekha,**

Head,  
Department of Chemistry (SF)  
Kamaraj College,  
Thoothukudi

**Dr.N.Jeyakumar,**

Guest Lecturer,  
Dept.of Microbiology,  
Kamarajar Government Arts college,  
Surandai-627859,Tenkasi District.

**Dr.H.Johnson Jeyakumar,**

Head and Associate Professor of Physics,  
Popes College, Sawyerpuram

**Dr.Sasikala,**

Assistant Professor of History,  
V.O.Chidambaram College,  
Thoothukudi

**Dr. Anita Albert**

Assistant Professor of English  
V.O.Chidambaram College,  
Thoothukudi



*Editorial*

**Editorial**  
**Board**

**Dr. P.J. Joslin**  
Research Coordinator  
Department of Zoology

**Dr.M.Mary Hepsibai**  
Assistant Professor  
Department of History

**Dr.Sr.A.Arockia**  
**Jenecius Alphonse**  
Assistant Professor  
Department of Botany

**Dr. K. Vinitha**  
Librarian  
Department of Library

**Dr. A.Lakshmi**  
Assistant Professor  
Department of Chemistry

**Dr. J.Arul Jesthi**  
Assistant Professor  
Department of Mathematics

**Dr. R. Mary Shanthi**  
Assistant Professor  
Department of Botany

**Dr. P.Subavathy**  
Assistant Professor  
Department of  
Zoology

**Dr. D.Shunmugajothi**  
Assistant Professor  
Department of English

**Dr.C.Siluvai Kirubagari**  
**Aneeshia**  
Assistant Professor  
Department of Microbiology

From the Editorial Desk

Welcome to the world of 'Marian Quest,' a journal that embodies the insatiable thirst for knowledge among the academic community at St. Mary's College (Autonomous). Our mission is to foster scientific research and provide a platform for scholars from diverse disciplines to share their valuable insights and findings. In the words of Stephen Hawking, these educators carry the torch of discovery, illuminating the path towards greater understanding.

'Marian Quest' encapsulates our commitment to Quality, Understanding, Excellence, Success, and Training.. With a streamlined submission process and swift publication, our aim is to disseminate a wide spectrum of research articles brimming with innovative information. We proudly offer researchers, educators, and students an authentic platform to showcase high-caliber research across the realms of science and arts. 'Marian Quest' is a repository of research ideas that exudes excellence, making it a dependable resource for researchers, policymakers, and the wider public.

Our editorial board members and external reviewers, distinguished experts in their respective fields, are dedicated to maintaining an unbiased, efficient peer review process. Notably, we take pride in minimizing the time between submission and final publication, thus facilitating authors' journey towards sharing their work with the world. Our overarching mission is to dismantle barriers to scholarly publishing and simplify the experience for authors.

We extend our heartfelt gratitude to the members of the Marian Research Forum, reviewers, authors, our esteemed Principal, the Secretary, and the team of experts whose unwavering support, diligent efforts, and boundless encouragement have paved the way for this Journal's publication. We hold unwavering confidence that the journal will remain a vital conduit for the scientific discourse of St. Mary's College (Autonomous), Thoothukudi. Best wishes,

The Editors

Marin Quest, Marian Research Forum

[marianresearchforum@gmail.com](mailto:marianresearchforum@gmail.com)



### **Guidelines for Submission of Articles**

Marian Quest the Bi-annual Multidisciplinary Research Journal of St. Mary's College (Autonomous), Thoothukudi, publishes articles of high reputation and innovation. The articles intended for publication must be typed in A4 size format, 1.5 line space and Times New Roman Font 12. Tamil papers should be in Bamini Font. The latest writing manual for MLA Hand book should be followed in Literature articles. Footnotes, References, Citation Marks should also be included in the research paper.

For reviewing and correction purpose, kindly send one hard copy with the soft copy. Full paper generally consists of the title, pictures, charts, graphs etc., along with Footnotes.

#### **Instructions to contributors (for Science Articles)**

**Title** : It should be short & informative

**Keywords** : Five or six keywords indicating the contents of the manuscript.

**Address of Authors** : It includes author's name, institution name, telephone number (office only), and e-mail address. Author for correspondence should be indicated with an asterisk (\*).

**Main Heading** : Each article should be divided into the following main headings: Abstract, Introduction, Materials and Methods, Results and Discussion, Conclusion, Acknowledgement and References.

All articles are, as a rule, referred to experts in the subject concerned. Those recommended by the referees alone will be published in the journal.



**TABLE OF CONTENTS**

Sl.No	Name of the Author(s)	Page.No
1	AN INHIBITION STUDY OF HYPERTENSION A BLOCKERS USING MOLECULAR DOCKING <b>T. Munieshwari and C. Zozimus Divya Lobo</b>	1
2	COMPARATIVE STUDY OF GREEN SYNTHESISED HYDROGELS, ITS CHARACTERIZATION AND ANTIBACTERIAL ACTIVITY <b>D. Carolin Jeniba Rachel and S. Ponselvi</b>	8
3	AN EFFECTIVENESS OF LOGO SELECTION AS A KEY FACTOR OF BUSINESS STRATEGY <b>A. Sherabin</b>	18
4	AN ANALYSIS OF WORK STRESS MANAGEMENT AMONG IT EMPLOYEES <b>O. Sony and J. Maria Santos</b>	27
5	A STUDY ON WORKING CONDITION OF EMPLOYEES IN SALTPAN AT THOOTHUKUDI <b>P. Jayamary and S. Selsia</b>	34
6	A STUDY ON CONSUMER PREFERENCE TOWARDS BATH SOAP IN INDRA NAGAR OF THOOTHUKUDI DISTRICT <b>A. Sherlin</b>	43
7	A STUDY ON WOMEN'S SPORTS AND FITNESS IN THARUVAI STADIUM IN THOOTHUKUDI DISTRICT <b>L. Sivasundari</b>	53
8	IMMIGRANT EXPERIENCE IN NOVIOLET BULAWAYO'S <i>WE NEED NEW NAMES</i> <b>B. Jessy Brightlin</b>	63
9	POSTCOLONIALELEMENTIN AMITAV GHOSH'S <i>THE GLASS PALACE</i> <b>S. Madhumitha</b>	70
10	'PEDERASTYEROMENOS': A STUDY OF NARRATIVE, MEMORY AND GENDER IN MADELINE MILLER'S <i>THE SONG OF ACHILLES</i> . <b>R. Nazhath Rizwana</b>	75
11	REPERCUSSION OF COLONISATION: A STUDY OF NGUGI	82



**Marian Quest**  
**A Bi-annual Multidisciplinary Research Journal**  
**St. Mary's College (Autonomous)**  
**(Re-accredited with 'A+' Grade by NAAC)**  
**Thoothukudi**



	WATHIONG'O'SA <i>GRAIN OF WHEAT</i> <b>S. Sudha</b>	
12	THE EARLY NATIONALIST <b>W. Karolin Reby</b>	87
13	PALLAVAS TEMPLE ARCHITECTURE <b>Muthulakshmi. P</b>	94
14	THILLAI NATARAJA TEMPLE – ETHEREAL ABODE OF LORD SHIVA <b>Saranya. R</b>	101
15	LUCKY EDGE LABELING OF TOTAL GRAPH OF PATH AND CYCLE <b>R.Maria Irudhaya Aspin Chitra and T.Anish Praisy</b>	110
16	A STUDY ON INTRA-ORGANIZATIONAL RELATIONSHIP IN E-COMMERCE SECTOR AT JENEF A ENTERPRISES, THOOTHUKUDI <b>J. Jeneva Evangeline and C.S. Purnima</b>	121
17	HEAVY METAL ANALYSIS OF <i>ULVA LACTUCA</i> <b>N. Vincy and T.P. Kumari Pushpa Rani</b>	132
18	SYNTHESIS AND CHARACTERIZATION OF SILVER NANOPARTICLES FROM <i>Parapenaeopsis styliifera</i> SHRIMP <b>S. Rinolaa and R. Shynisha Begam</b>	140
19	SYNTHESIS AND CHARACTERIZATION OF GRAPHENE OXIDE NANO PARTICLES BY MODIFIED HUMMER'S METHOD <b>J. Mahalakshmi, S. Irudaya Sahaya Lancy and P. Padmavathi</b>	148
20	ANTIACNE ACTIVITY OF <i>EUDISTOMA VIRIDE</i> TOKIOKA, 1955 <b>C. Pratheepa and M. Paripooranaselvi</b>	153



## **An Inhibition Study of Hypertension $\alpha$ Blockers using Molecular Docking**

**T. Munieshwari and C. Zozimus Divya Lobo**

PG Department of Chemistry, St. Mary's College (Autonomous), Thoothukudi  
Affiliated to Manonmanium Sundaranar University, Tirunelveli, Tamil Nadu, India

### **ABSTRACT**

Molecular Docking Approach to Assess the Pharmacological Properties of Potential Natural Hypertension Treatments. Alpha blockers' advancement is mostly attributed to the risk factors associated with hypertension, which include genetic, behavioural, and environmental aspects. Blood pressure is one of the hereditary causes because it describes the pressure that blood applies to the artery walls as it travels through them.. In the current investigation, the ability of separated phytochemicals to bind to the intended protein was tested. In order to achieve this, the 3D structure of the current investigation, the ability of separated phytochemicals to bind to the intended protein was evaluated. For this, PyRx was used to replicate the target protein's (3-dimensional) structure ( $\alpha$ -Blockers). To predict the binding mechanisms of these drug-like compounds, the molecular docking of 17 phytochemicals described as  $\alpha$ -blockers inhibitors was carried out using the PyRx software together with reference compounds. The findings showed that they were similar to reference ligands and had remarkable interactions with the target protein's active site residues. In summary, the current work gave the tested  $\alpha$ -blocker inhibitors a computational foundation. The discovery of innovative medicinal compounds for the treatment of should be aided by this information. QSAR studies not taken in this project.

**Keywords:** Molecular docking, Protein, Ligand, Phytochemical compounds, PyRx.

### **Introduction**

#### **Hypertension**

Blood pressure is one of the hereditary causes because it describes the pressure that blood applies to the artery walls as it travels through them[1].Alpha receptors, which are present in arteries and smooth muscle, are the targets that alpha blockers obstruct [2]. They prevent the hormone adrenaline from tightening the muscles and the smaller artery and venous walls by acting as they do. By stopping that effect, the blood arteries relax,

resulting in an increase in blood flow. Alpha blockers, commonly known as alpha-adrenergic blocking drugs, function by preventing messages from travelling to particular areas of the body. Alpha blockers, like other "blocker" drugs, bind to molecules in the body that act decrease in blood pressure[3].

### **Types of alpha block**

Certain alpha-blockers target only specific alpha-receptors. This is known as "selectivity," and it plays a role in the decision-making process when selecting an alpha-blocker to treat a condition. Alpha-blockers can be non-selective for A1 receptors or selective for them. There are no approved selective alpha-2 blockers as of yet [4].

### **Drugs**

Trials that have been conducted on different medication types in combination to treat hypertension have benefited from their complementary effects. The most widely used classes of antihypertensive drugs include angiotensin receptor blockers (ARBs), thiazide diuretics, alpha- and beta-blockers, calcium antagonists (CCBs), and angiotensin-converting enzyme inhibitors (ACEIs). Thiazide diuretics, CCBs, and combinations with rennin-angiotensin-aldosterone system (RAAS) blockers are all useful at lowering blood pressure [5]. There are several options for pairing an ACEI, ARB, and a diuretic or an ACEI with a CCB. The bulk of FDCs on the market right now are based on diuretics. Despite the unmatched safety and effectiveness of diuretics, current findings showing low-grade carcinogenicity has to be further examined [6].

### **Molecular docking**

The completion of the human genome project has expanded the range of therapeutic targets in drug development. In parallel, structural data on protein-ligand and protein complexes has been provided by cutting-edge techniques such high-throughput crystallography, protein purification, and Nuclear Magnetic Resonance (NMR) spectroscopy. These developments led to the creation of molecular docking, commonly known as computer-aided drug design. Both ligand-based and structure-based techniques are used in molecular docking [7] When there is a lot of information about a ligand, ligand-based approaches like QSAR (quantitative structure-activity relationship) are recommended; otherwise, structure-based docking methods are utilised. Using a variety of computational techniques, molecular docking of known synthetic and natural ACE inhibitors was carried out in this study with the goal of finding the best inhibitor, which would ultimately serve as the basis for developing medications against hypertension by blocking ACE [8].



## Materials and methods

### Target selection

The X-ray crystal structure of 2AZ5 was retrieved from Protein Data Bank. The protein energy was analyzed through Ramachandran Plot. The protein energy minimized through the Swiss PDB minimizer and used for further docking studies

### Ligand selection

The SMILES notation of Thirty two phytochemical compounds including alkaloids and flavonoids from various medicinal plants were obtained by drawing their 2D structures in ACD-Chemsketch. The 3D structures of these compounds were generated in PUB Chem software and converted SDF format in to pdbqt by using on open babel and structure file generator.

## Result and discussion

### A Phytochemical Compounds from different Plant Sources

COMPUOND NAME	CID NO.	PLANT SOURCE
Anaferine	443143	<i>Ashwagandha</i>
Apigenin	5280443	<i>Petroselinum crispum</i>
Arctigenin	64981	<i>Arctium Lappa</i>
Astilbin	119258	<i>Engelhardtiaorb</i>
Bis_Demethoxy_Curcumin	5315472	<i>Curcuma longa</i>
Cosmosiin	5280704	<i>Diospyros Kaki</i>
Curcumin	969516	<i>Curcuma longa</i>
Cyanidin	128861	<i>Prunus avium</i>
Engeletin	6453452	<i>Engelhardtiaorb</i>
Licoflavonol	5481964	<i>Diospyros Kaki</i>
Lignans	443013	<i>Larrea divaricate</i>
Liquiritigenin	114829	<i>Glycyrrhiza urallensis</i>
Luteolin	5280445	<i>Ailanthus excels</i>
Moexipril	91270	<i>Angiotension converting enzyme</i>
Oxalacetate	164550	<i>Albizia lebbeck</i>
Pelletierine	92987	<i>Punica granatum</i>
Physaguline-	10100412	<i>Withania somnifera</i>

### Binding site prediction

The amino acid residues in binding site of 2AZ5 protein is defined by using the reference ligand complexed in the retrieved PDB file. The amino acid residues within 6 Å

radius of reference ligand was included in the predicted binding site by using PyRx-Python Prescription (version 0.8).

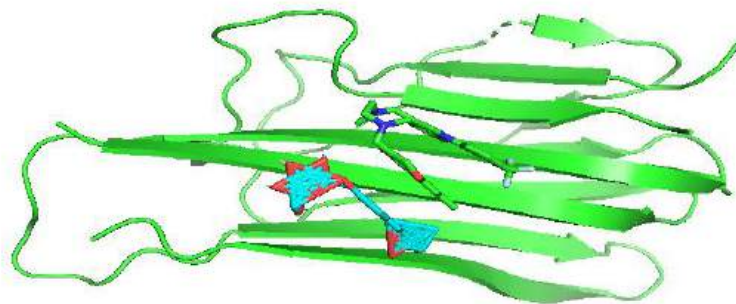
### Virtual screening

The 3D structures of all the selected phytochemical compounds were virtually screened to reveal their binding efficiencies through docking in the predicted binding site using PyRx Python Prescription. Docking values for maximum number of solutions per interaction and also per fragmentations. The binding affinity with their docking scores are given in table.

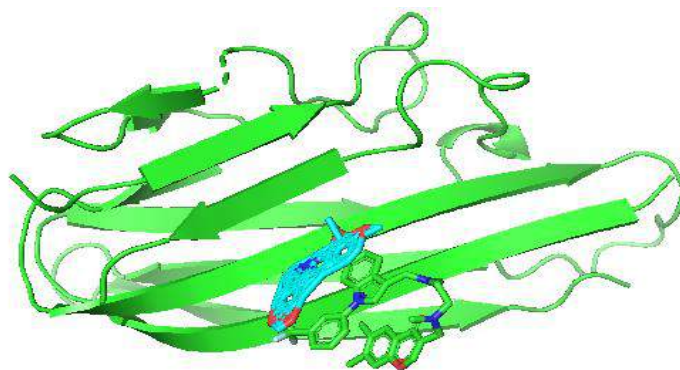
**Binding affinity of phytochemical by using PyRx**

<b>PHYTOCHEMICALS</b>	<b>BINDING ENERGY (Kcal/mol)</b>
<b>Apigenin</b>	-8.4
<b>Arctigenin</b>	-8.3
<b>Astilbin</b>	-8.3
<b>Benazepril</b>	-7.5
<b>Berberine</b>	-10.1
<b>Engeletin</b>	-9.3
<b>Fisetin</b>	-7.4
<b>Glyasperin</b>	-7.4
<b>Glycoumarin</b>	-7.8
<b>Glycyrin</b>	-8.3
<b>Glycyrol</b>	-7.3
<b>Hentriacontane</b>	-4.1
<b>Pelletierine</b>	-5.2
<b>Physaguline</b>	-10.3
<b>Pterostilbene</b>	-7.8

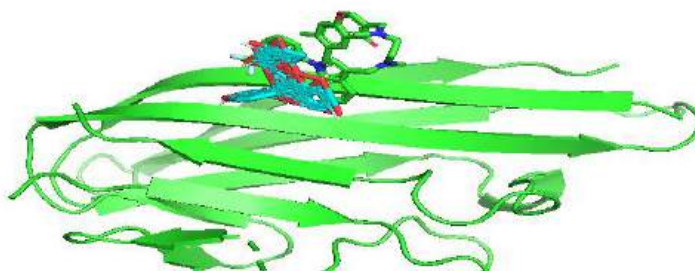
**Docking complex and interaction of PHYSAGULINE (10100412)**



**Docking complex and interaction of BERBERINE (CID No. 2353)**



**Docking complex and interaction of ENGELETIN (CID N0:6453452)**



## Conclusion

The studies on the causes for the disease were conducted through docking in 2AZ5 protein. Phytochemical compounds were selected for protein. Some compounds were not docked and some compounds were docked successfully. Docking compounds are Arctigenin, Glycerin Pterostilben, etc. Docking compounds are Physaguline with dock score (-10.3 kJ/mol), Berberine with dock score (-10.1 kJ/mol), Engeletin with dock score (-9.3 kJ/mol), etc. Docking studies were successfully performed the ligand at the binding site of the receptor and thus inhibiting protein to express that causes Hypertension in ALPHA BLOCKERS. The drug was constructed by modifying it to have less toxic effect and more efficient binding. It can be used as the potential drug helpful in curing ALPHA BLOCKERS. This drug can be made available commercially only after passing through the further studies of pharmacophore mapping and different phases of clinical tests.

## Reference

1. Awais Attique , Muhammad Hassan, Muhammad Usman , Rana Muhammad Atif , Shahid Mahboob , Khalid A. Al-Ghanim , Muhammad Bilal and Muhammad Zohaib Nawaz, “A Molecular Docking Approach to Evaluate the Pharmacological Properties of Natural and Synthetic Treatment Candidates for Use against Hypertension” doi:10.3390/ijerph16060923, 2019.
2. Ruidan Wang, Xin Lu, Qiang Sun, Jinhong Gao, Lin Ma and Jinian Huang “Novel ACE Inhibitory Peptides Derived from Simulated Gastrointestinal Digestion in Vitro of Sesame (*Sesamum indicum L.*) Protein and Molecular Docking Study” doi: 10.3390/ijms21031059, 2020.
3. Chien-Hung Jhong<sup>1</sup> Jirawat Riyaphan<sup>1</sup> Shih-Hung Lin<sup>1</sup> Yi-Chen Chia<sup>2</sup> Ching-Feng Weng “Screening alpha-glucosidase and alpha-amylase inhibitors from natural compounds by molecular docking in silico” DOI No. 10.1002/biof.1219, 2015.
4. Waleed A. M. A. El-Enanya , Sobhi M. Gomhaa,b , Ahmed K El-Ziaty c , Wesam Husseinb , Mohamed M. Abdullad , Shaimaa A. Hassana , Hanan A. Sallamc , and Rania S. Ali. “Synthesis and molecular docking of some new bis-thiadiazoles as anti-hypertensive a-blocking agents” DOI: 10.1080/00397911.2019.1683207, 2019.

5. David O. Kennedy\* and Emma L. Wightman “*Herbal Extracts and Phytochemicals: Plant Secondary Metabolites and the Enhancement of Human Brain Function*” doi:10.3945/an.110.000117, 2011.
6. Suzanne Oparil, Roland E. Schmieder “*New Approaches in the Treatment of Hypertension*”. DOI: 10.1161/CIRCRESAHA.116.303603. 2015.
7. Frishman WH, Kotob F. “*Alpha-adrenergic blocking drugs in clinical medicine. J Clin Pharmacol*”. 1999 Jan; 39(1):7-16. [[PubMed](#)]
8. Nash DT. “*Alpha-adrenergic blockers: mechanism of action, blood pressure control, and effects of lipoprotein metabolism*”. Clin Cardiol. 1990 Nov; 13(11):764-72. [[PubMed](#)]
9. Nash DT. “*Alpha-adrenergic blockers: mechanism of action, blood pressure control, and effects of lipoprotein metabolism*”. Clin Cardiol. 1990.
10. , Muhammad Hassan. “*National Institute of Diabetes and Digestive and Kidney Diseases; Bethesda (MD)*” Jan 8, 2018. Alpha 1 Adrenergic Receptor Antagonists. [[PubMed](#)]

## **Comparative study of green synthesised Hydrogels, its characterization and antibacterial activity**

**D. Carolin Jeniba Rachel and S. Ponselvi**

PG Department of Chemistry, St. Mary's College (Autonomous), Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

### **ABSTRACT**

Almond gum and Flax seed is documented as the world's oldest food source with exceptional medical, chemical, physical, and pharmaceutical values. They can be derived from natural or synthetic sources and are being extensively explored for their potential in tissue engineering, wound dressing, biosensors and drug delivery devices. Polysaccharide base Hydrogel networks of cross-linked Hydrogel was synthesized through a redox initiating free radical polymerization utilizing almond gum and Flaxseed as a grafting backbone, Borax as the cross linker and Potassium persulphate, N,N,N',N'-tetramethylethylenediamine (TEMED) as the redox initiator pair. The both almond gum and Flax seed containing carbohydrates as a major component Hydrogel nanoparticles were characterized using several techniques such as UV-Visible, FT-IR, SEM, EDAX, XRD and TGA. The anti-bacterial study was also studied. The UV-Visible shows peak at 326nm for almond gum and 342nm for Flax seed. The SEM image shows the rocky structure of the prepared nanoparticle. The XRD result concludes the average size of Hydrogel nanoparticles as 2.4280nm and 2.4315nm respectively. The antibacterial effect studies show that the nanoparticle has good zone inhibition against the selected pathogens. The Hydrogel nanoparticle synthesis provides a simple, cost effective, reproducible, rapid, and safe method with numerous applications.

**Keywords:** Hydrogel nanoparticles, Flaxseeds and Almond gum, Antibacterial activity.

### **Introduction**

The purpose of this study is to create and assess various hydrogel qualities utilizing natural items that are readily available locally. Biological processes including the delivery of medications or cells, the regeneration of hard and soft tissues, as well as other applications like agriculture, have drawn the attention of several researchers in recent years. Hydrogel, a polymeric material, has ability to incorporate large amounts of water in



its three-dimensional networks. The first Hydrogel was reported in 1960 and prepared using 1, 2-ethanediol dimethacrylate and glycol methacrylate [1].

There are many types of hydrogel; mostly, they are lightly cross-linked copolymers of acrylate and acrylic acid, and grafted starch-acrylic acid polymers prepared by inverse suspension, emulsion polymerization, and solution polymerization. Among the natural polymers, polysaccharides in particular have some remarkable characteristics and considerable research has been directed towards them for the production of hydrogel [2].

### **Materials**

Almond gum (RS), Flaxseeds (FS), Borax powder, Potassium persulphate (PPS), N, N, N', N'-tetramethylethylenediamine (TEMED), Doubledistilled water (DDW) was used for the synthesis of hydrogel and for other studies.

### **Methods**

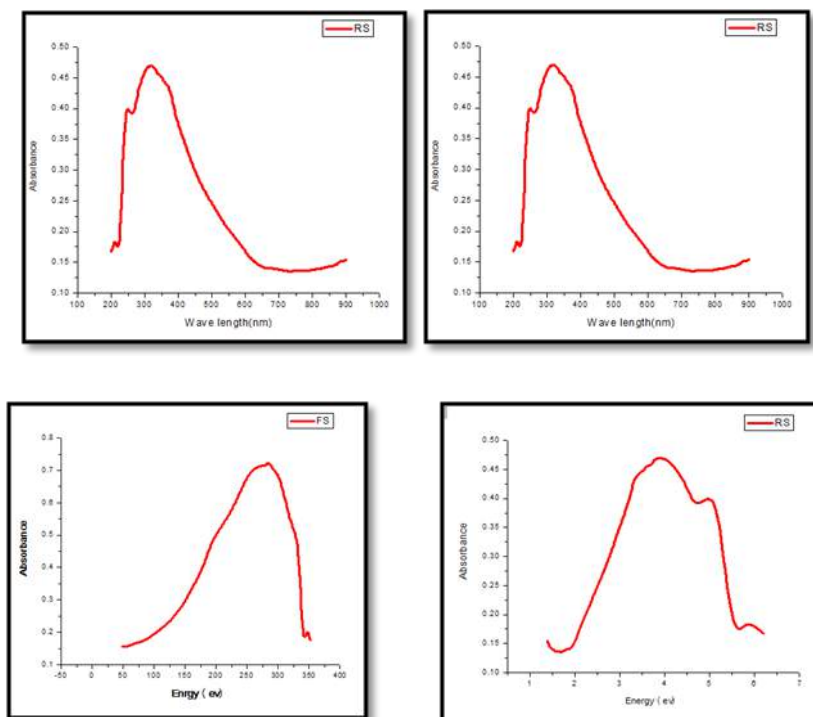
The gum was dried well and powdered using mortar and pestle. It was soluble in double distilled water and concentrated by heating. The concentrated gum was precipitated in an ice Cold ethanol. The precipitated gum was separated and dried at 60 °C. The pure gum was finely Grained and stored in air tight container. AG (0.1 g) was mixed in 5 mL of DDW to get a homogeneous solution. AM (1.0 g) was dissolved in 6 ml of DDW followed by initiator PPS (0.005 g in 1 mL of DDW) and cross-linker Borax powder (0.01 g in 1mL of DDW). Both the solutions were mixed and TEMED (0.02 mL in 1 mL of DDW) was added which, together with PPS, acts as redox-initiating pair and initiates free radical polymerization. The reaction mixture was stirred and heated at 60 °C for 5 minutes. The polymerization reaction results in the formation of hydrogel within 10 minutes of reaction time. The formed hydrogel was equilibrated with water for 3 days to remove unreacted monomers and reagents. The hydrogel was dried in hot air oven to constant weight[3].

### **Result and discussion**

#### **UV-visible**

The UV -Visible spectra observed for RS and FS in the range 200-900 nm shown in fig. 1. The particle shows three absorption peaks at 212nm, 224nm and 326nm for RS and 214nm, 222nm, 342nm for FS. Both RS and FS has an  $\sigma$ -  $\pi^*$ ,  $\pi$ - $\pi^*$  transition corresponding the absorption peaks[4]. The band gap energy in nanomaterials could be obtained from absorption maxima. The band gap energy for RS peaks 5.8eV, 5.53eV and

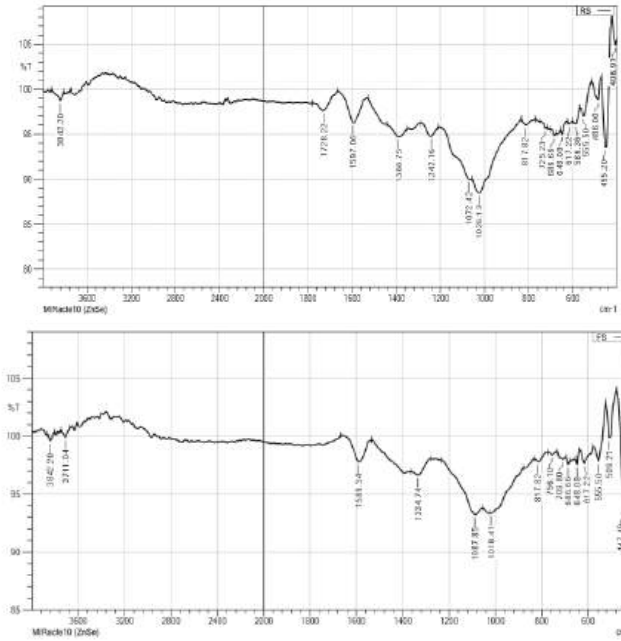
3.62eV respectively and the band gap energy for FS peak is 5.79eV, 5.5eV, 3.6eV respectively.



**Fig 1: UV-Visible spectra for RS and FS**

### FT-IR studies

The functional group analysis for RS and FS were confirmed using FT-IR shown in fig 2.1 and 2.2 respectively. The peak stretching in RS and FS  $3842.20\text{ cm}^{-1}$ ,  $3711.04\text{ cm}^{-1}$ , could be interpreted as an O-H bond. The CHO group-induced bond at RS at  $1728\text{ cm}^{-1}$  [50]. The aromatic skeletal vibration can be observed in the wide bond of RS and FS at positions  $1597\text{ cm}^{-1}$  and  $1589\text{ cm}^{-1}$  respectively. Bands  $1338\text{ cm}^{-1}$  in RS and  $1334.74\text{ cm}^{-1}$  in FS display an aliphatic band for CH,  $\text{CH}_2$ . Polysaccharide is seen in the bands  $1072.42\text{ cm}^{-1}$  in RS and  $1087.85\text{ cm}^{-1}$  in FS. Moreover, the oxygen in the hydroxyl group causes the bands  $1026.13\text{ cm}^{-1}$  in RS and  $1018.47\text{ cm}^{-1}$  in FS. The peak in  $455\text{ cm}^{-1}$ ,  $447.49\text{ cm}^{-1}$  at the RS and FS, respectively, displays a C=C twist [5].

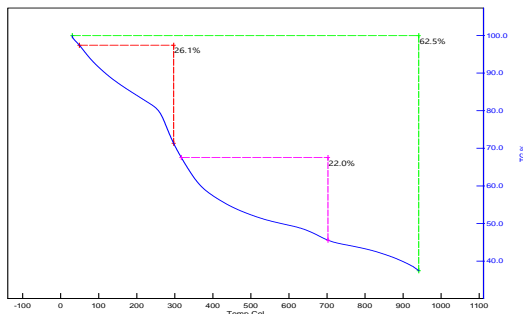


**Fig 2.1 FT-IR Spectrum for RS**

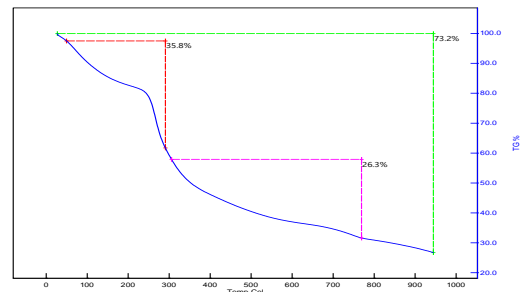
**Fig 2.1 FT-IR Spectrum for FS**

**TGA calculation**

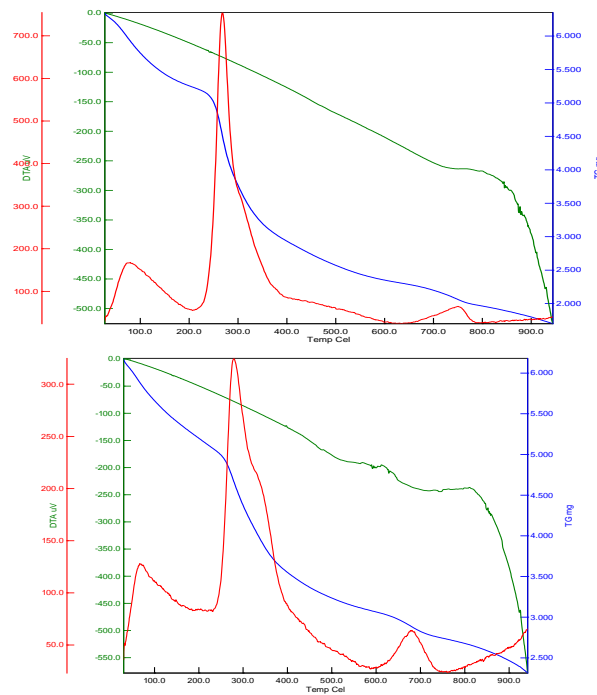
TGA is a precise method for examining the decomposition pattern and thermal stability of hydrogel from the observations. In FS & RS (Fig 3.1 & 3.2) the first stage of weight loss 26.1% & 26.3%, at 30–270 °C and the second stage of weight loss 22.0% & 35.8% at 300°C and 780 °C respectively [6].The main cause of first-stage weight loss is the evaporation of some of the free water included in sample RS and FS. The disintegration of the polysaccharide structure was the primary cause of the weight loss for the second stage[7].Comparison of TGA, DTA and DTG for FS and RS respectively shown in fig 4.



**Fig 3.1 TGA for FS**



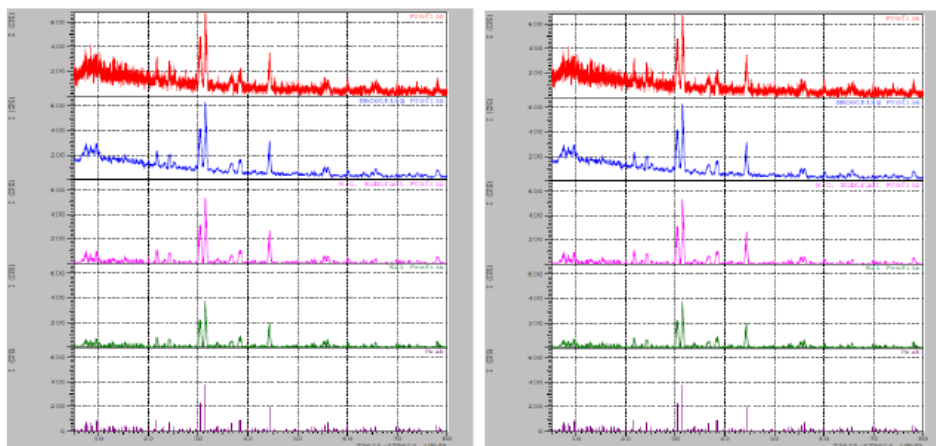
**Fig 3.2 TGA for RS**



**Fig 4: Comparison of TGA, DTA and DTG for FS and RS respectively**

### XRD Calculation

Average crystallite size (D) of synthesized nanoparticle **RS** and **FS** was found to be 2.4280nm and 2.4315nm respectively. The lattice value as **RS** and **FS** was to be  $5.9079\text{\AA}$  and  $6.5102\text{\AA}$  respectively. From XRD studies, the structure for **RS** and **FS** has Face Centered Cubic (FCC) structure [8].



**Fig 4: XRD Spectrum of FS and RS respectively**

## SEM Characterization

The morphology studies for RS and FS hydrogels were confirmed using the Field Emission Scanning Electron. Fig 5.1 and 5.2 show the various magnifications such as  $10\mu\text{m}$ ,  $5\mu\text{m}$ ,  $2\mu\text{m}$  and  $1\mu\text{m}$  for RS and FS respectively. From SEM it is concluded that the RS has flakes like structure and FS petals like morphology [9].

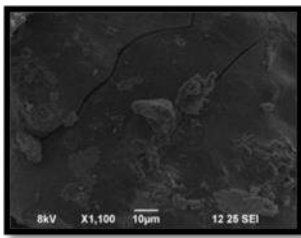


Fig 5.1 (a)

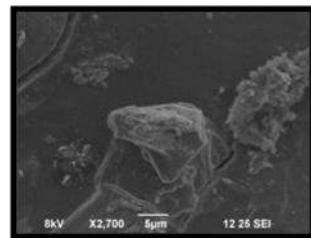


Fig 5.1 (b)

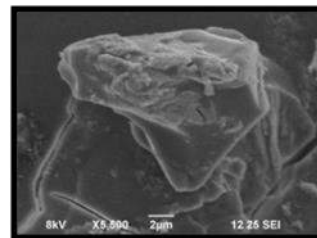


Fig 5.1 (c)

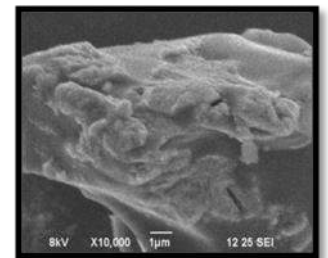


Fig 5.1 (d)

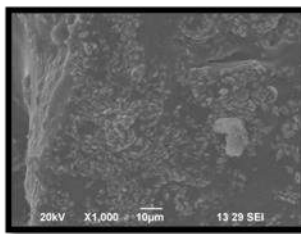


Fig 5.2 (a)

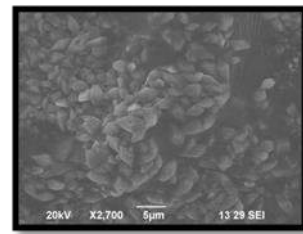


Fig 5.2 (b)

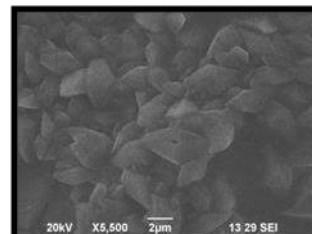


Fig 5.2 (c)

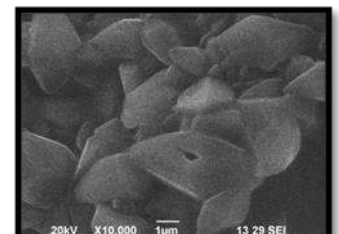
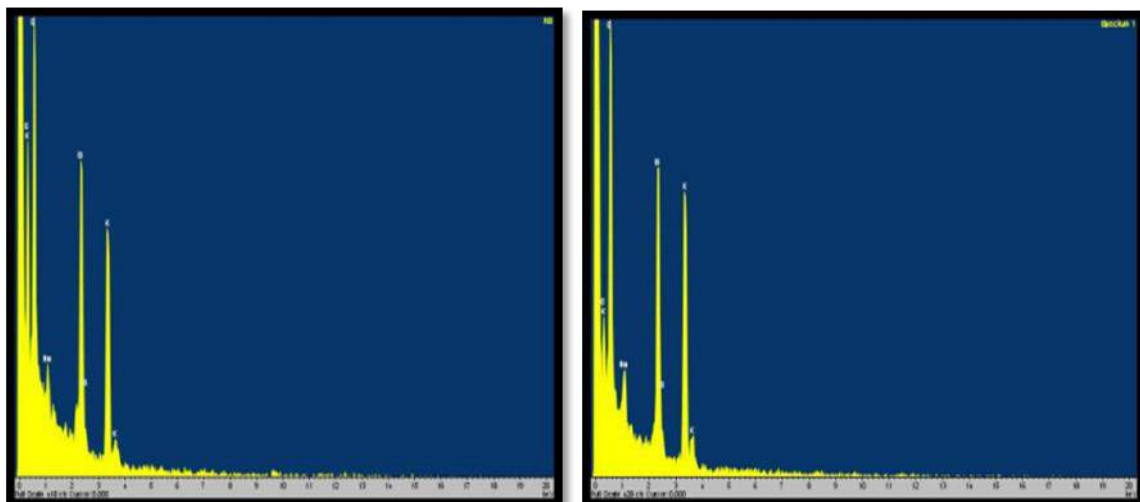


Fig 5.2 (d)

**Fig 5: SEM images of FS & RS at various magnifications such as  $10\mu\text{m}$ ,  $5\mu\text{m}$ ,  $2\mu\text{m}$ , and  $1\mu\text{m}$  EDAX Analysis**

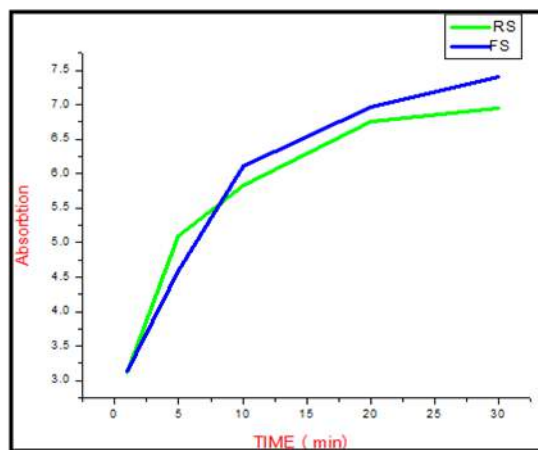
The composition of RS and FS Hydrogels is identified by the Energy Dispersive X-Ray Spectroscopy (EDAX) shown in Fig 6. The results clearly indicate the presence of the carbon in high composition compare to others[10].



**Fig 6: EDAX for RS and FS**

### Absorption Capacity

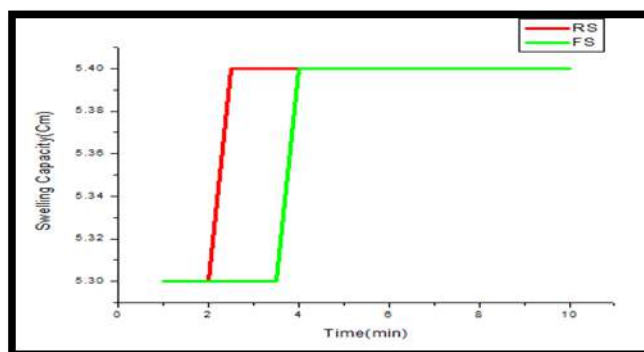
Absorbing capacity of the RS & FS Hydrogels were measured and analyzed which is shown in fig 7. The results indicate that RS have the lowest absorbing capacity at 6.9517 g/g compared to FS. FS has a slightly higher absorbing capacity at 7.4074 g/g compared to RS, indicating FS is the best absorbing material compared RS[11].



**Fig 7: Absorption Capacity for RS and FS**

### Swelling Ratio

Swelling capacity of RS and FS MPH measures the ability to swell inside a known amount of solution shown in fig 8. It is determined by the amount of solution that can be absorbed by it. This result is different from the absorbing capacity result, in which RS has the highest absorbing capacity. The results are not comparable because of the different swelling mechanism of RS and FS[12].



**Fig 8: Swelling Capacity for RS and FS**



### Antibacterial activity

Both Gram negative (*Pseudomonas aeruginosa* and *Escherichia coli*) and Gram positive (*Staphylococcus aureus*, *Bacillus subtilis*, *Bacillus cereus*) bacteria were used for this study [13].

**Table 1 Antibacterial Activity of RS and FS**

Test Pathogens	Zone of inhibition (mm)		
	Ampicillin (Std)	RS	FS
<i>Escherichia coli</i>	14	10	11
<i>Staphylococcus aureus</i>	15	11	9
<i>Bacillus subtilis</i>	12.5	10	16.5
<i>Bacillus cereus</i>	20.5	9	13.5
<i>Pseudomonas aeruginosa</i>	14	13	14.5

On comparing both samples, the sample FS shows higher antibacterial activity than the sample RS for *Pseudomonas aeruginosa*, *Escherichia coli*, *Bacillus subtilis* and *Bacillus cereus*. For *Staphylococcus aureus*, the sample RS have high activity than FS. Among the five pathogens, *Bacillus subtilis* shows the maximum inhibition up to 16.5mm for FS[14].



**Fig 9 (a)**

**Fig 9 (b)**

**Fig 9(c)**

**Fig 9(d)**

**Fig: 9 (a) (b) (c) (d) Antibacterial activity for FS & RS using *Escherichia coli*, *Staphylococcus*, *Bacillus subtilis*, *Pseudomonas aeruginosa* bacteria's respectively**

## Conclusion

Hydrogel was characterized by UV, FTIR, FESEM with EDAX, TGA and XRD. To determine the Microbial activity of Hydrogel nanoparticle using by Disc diffusion method. The synthesized hydrogel have significant properties, such as mechanical strength, biocompatibility, biodegradability, swellability, and stimuli sensitivity. They can deliver drugs or cells, regenerate hard and soft tissues, adhere to wet tissues, prevent bleeding, provide contrast during imaging, protect tissues or organs during radiotherapy and improve the biocompatibility of medical implants.

## REFERENCE

- [1] Vasanthi Sethu et al, “*Performance study of chia seeds, chia flour and Mimosa pudica hydrogel as polysaccharide-based superabsorbent polymers for sanitary napkins*” Materials Today Communications <https://doi.org/10.1016/j.mtcomm.2020.101712>, 2020.
- [2] K. Kabiri, M. Zohuriaan-Mehr, “*Superabsorbent hydrogel composites*”, Polymer Advanced Technology, <https://doi.org/10.1002/pat.356>, 2003.
- [3] J. Febrianto et al, “*Equilibrium and kinetic studies in adsorption of heavy metals using biosorbent: a summary of recent studies*”, J. Hazard. Mater. 162 (2–3) 616–645, <https://doi.org/10.1016/j.jhazmat.2008.06.042>, 2009.
- [4] F. Bouaziz et al, “*Purification, structural data and biological properties of polysaccharide from Prunus amygdalus gum*”, Int. J. Chem. Tech Res. 50 578–584, 2014.
- [5] Sébastien Cambier et al, “*Exploration of the co-structuring and stabilising role of flaxseed gum in whey protein isolate based cryo-hydrogels*”, Microbiol. 74 4264–4270, 2008.
- [6] Yoshimura et al, “*Synthesis and characterization of novel biodegradable superabsorbent hydrogel based on chitin and succinic anhydride*”, Carbohydr. Polym. 61 (3) 322–326, <https://doi.org/10.1016/j.carbpol.2005.06.014>, 2005.
- [7]. Fruitworldmedia, “*A Genius Solution For Fighting Drought In Fruit Production*” – Fruitworldmedia [online] Available at: <https://fruitworldmedia.com/index.php/featured/genius-solution-fighting-drought-fruit-production/> [Accessed 2 May 2020], 2017.
- [8] S. Siebrecht et al, “*What’s happening in the Chia Market?*” [Online] NewFoodMagazine. Available at: <https://www.newfoodmagazine.com/article/96460/the-chia-market/> [Accessed 28 July 2020], 2019.
- [9] T. Pongjanyakul et al, “*Xanthan–alginate composite gel beads: molecular interaction and in vitro characterization*”, Int. J. Pharm. 331(1) 61–71, <https://doi.org/10.1016/j.ijpharm.2006.09.011> 2006.

- [10] M. Cerqueira et al, “A. Vicente, *Structural and thermal characterization of galactomannans from non-conventional sources*”, Carbohydrate. Polym. 83 (1) 179–185, <https://doi.org/10.1016/j.carbpol.2010.07.036>, 2011.
- [11] Emiliano Carretti et al, “A new family of high viscosity polymeric dispersions for cleaning easel paintings”, Journal of Cultural Heritage, <https://doi.org/10.1016/j.culher.2010.04.002>, 2010.
- [12] K. Lee, E.A. Silva, D.J. Mooney, “Growth factor delivery-based tissue engineering: general approaches and a review of recent developments”, J. R. Soc. Interface 8153–170, <https://doi.org/10.1098/rsif.2010.0223>, 2011.
- [13] A.M. Ziemba, R.J. Gilbert, “Biomaterials for local, controlled drug delivery to the injured spinal cord”, Front. Pharmacol. 8 1–20, <https://doi.org/10.3389/fphar.2017.00245>, 2017.
- [14] J. Elisseeff et al, “Controlled-release of IGF-I and TGF- $\beta$ 1 in a photopolymerizing hydrogel for cartilage tissue engineering”, J.Orthop. Res.19 1098–1104, [https://doi.org/10.1016/S0736-0266\(01\)00054-7](https://doi.org/10.1016/S0736-0266(01)00054-7), 2001.

## **AN EFFECTIVENESS OF LOGO SELECTION AS A KEY FACTOR OF BUSINESS STRATEGY**

**A. Sherabin**

PG and Research Department of Commerce, St. Mary's College (Autonomous),  
Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

### **ABSTRACT**

A logo stands as a symbol, offering immediate recognition of a business and its products and services. It is common for many people to assume that a well-built logo is enough for branding their products or services. Logos as a visual cue can help firms communicate their unique identities and capture consumers' attention. The research study helps to understand the effectiveness of logo selection for a well-defined business and marketing strategy. The aim of this project is to analyse the data accumulated through various aspects. As a quick overview, a good logo is simple, memorable and relevant to the desired brand position.

A logo is meant to be long-term as it is intended to become familiar to customers and promote brand loyalty. As a result, logos are generally not redesigned very often. Logos are viewed in two distinct ways i.e. firms' and consumers' viewpoints. By combining these two viewpoints, both academics and practitioners can understand how to link a company's strategy and its desirable consumer.

### **Keywords**

Logo selection, business strategy, redesign, components of logo, brand identity

### **Introduction**

Logos serve to represent an organization or company through a visual image that can be easily understood and recognized. A logo generally involves symbols, stylized text or both. Logos are often created by a graphic artist in consultation with a company and marketing experts.

A logo's mission is to display a business's values and goals. If a logo does not have any strategy behind it, it can display a false message, weakening the brand strategy rather than strengthening it.

A logo is a crucial part of the company's brand identity and can create resonance with potential customers by communicating a bit of the spark that makes the business unique.

## **Materials and methods**

### **(Review of literature)**

*J.K. Singh (2014)* states 'A review on cognitive effects of programming in Logo', particularly on aspects such as prerequisites of computer programming, cognitive effects of programming, stages of programming and levels of programming expertise. This is followed by an analysis of literature with a backdrop on cognitive development leading to the establishment of a need for operational problem-solving with logos.

*Dr. Muhammad Rafiq, R. Hussain, and Shahbaz Hussain (2020)* intend to investigate the effect of logo shapes and redesign, on brand loyalty and repurchase intention. The analysis also explores the mediating role of brand attitudes between logo shape redesign, brand loyalty and repurchase intention.

*Maria Saaksjarvi and Ellis van den Hende (2015)* reports that a brand can be kept both prominent and fresh by using existing logos as well as logo varieties. (i.e. slight modifications to the brand's existing logo).

*Julien Grobert, Caroline Cuny, and Marianela Fornerino (2016)* aim to investigate the impact of brand attachment and familiarity on perceived congruence between the logo and the brand. It explores the role of an under-researched factor, surprise on perceived congruence in the case of a radical logo change.

*Ryan Dew and Asim Ansari (2021)* state logos serve a fundamental role as the visual figureheads of brands. The interplay between logo design and brand identity creation from a data-driven perspective.

## **Statement of problem**

The new business owner either goes with the cheapest route and creates their own logo or spends a few to ripped-off logos. A bad logo makes a business look small and unprofessional. Though an average person doesn't know about the ins-&-outs of design they have an instinctual understanding of good and bad logos.

People are unable to identify the difference between the original and the counterfeit product due to a lack of knowledge of logos. The study helps the consumers to evaluate the visual appearance of the logo and to determine the role and importance of the colour used in it.

The purpose of this research is to detect different brands and logos that are advertised and their way of marketing strategy used by them, to know and create awareness among consumers about the brand logo.

### Objectives

- To study the purpose of logos in marketing strategy
- To know the framework involved in logo design
- To know the importance of logos in businesses
- To know the components of the logo

### Research methodology

Sampling design	Convenient sampling method
Period of the study	December 2022 - March 2023
Data used	Primary and Secondary data
Test for analysis	Percentage Analysis, Likert scale method, Correlation method, Chi- Square Test, Garrett ranking method.

### Limitations of the study

Some of the limitations of the study are:

- Responses generated from respondents are based on their perception which might have caused errors.
- Some of the replies were biased based on brand image.
- Some respondents felt annoyed to respond to the questionnaire as they felt it was too long.



**Results and discussions**

**Table 1: Features of good slogan**

Particulars	Agree	Neutral	Disagree	Total	Average	Rank
Short	222	62	5	289	2.63	II
Show the core value	168	98	5	271	2.46	III
Simple & easy to understand	231	56	5	292	2.65	I
Establish trust & positive emotion	186	74	11	271	2.46	III
<b>Grand Total</b>				<b>1123</b>		

*Source: Primary data*

Inference:

The table 1 reveals that level of satisfaction towards good slogan is more when logo is simple and easy to understand that ranks I, logo is short that holds II rank while logo show the core value and establish trust & positive emotion ranks as III.

**Table 2: Factors that favour the brand over others**

SI No.	$100(R_{ij} - 0.5) / N_j$	Calculated value	Garret value
1	$100(1 - 0.5) / 5$	10	75
2	$100(2 - 0.5) / 5$	30	60
3	$100(3 - 0.5) / 5$	50	50
4	$100(4 - 0.5) / 5$	70	40
5	$100(5 - 0.5) / 5$	90	25

<b>Particulars</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Status	51	31	23	3	2
Familiarity	39	42	23	5	1
Brand loyalty	50	31	23	5	1
Self identification	45	31	22	11	1
Emotional association	31	36	20	13	10

<b>Particulars</b>	<b>Ranks given by the respondents</b>					<b>Total</b>	<b>Score (%)</b>	<b>Rank</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>			
Status	3825	1860	1150	120	50	7005	63.58	I
Familiarity	2925	2520	1150	200	25	6820	62.00	III
Brand loyalty	3750	1860	1150	200	25	6985	63.40	II
Self identification	3375	1860	1100	440	25	6800	61.82	IV
Emotional association	2325	2160	1000	520	250	6255	56.86	V

*Source: Primary data*

**Inference:**

The table 2 reveals that majority of the respondents have given top priority for status and ranked as I with Garrett score of 63.58 percent followed by brand loyalty ranked as II with a score of 63.40 percent, familiarity ranked as III with score of 62.00 percent

self-identification as rank IV with score of 61.82 percent and emotional association ranked as V with score of 56.86 percent for the factors that favour the brand over others.

**Table 3 Correlation between bad logo and colour of logo**

<b>BAD LOGO DESIGN</b>		
<b>Classification</b>	<b>No. of respondent</b>	<b>Percentage (%)</b>
Not scalable	8	7
Outdated	35	32
Offensive	16	15
Uniqueness	27	25
Irrelevant	24	22
<b>Total</b>	<b>110</b>	<b>100</b>

<b>COLOUR</b>		
<b>Classification</b>	<b>No. of respondent</b>	<b>Percentage (%)</b>
Strongly agree	31	28
Agree	52	47
Neutral	22	20
Disagree	3	3
Strongly disagree	2	2
<b>Total</b>	<b>110</b>	<b>100</b>

$r = 0.52$

Inference:

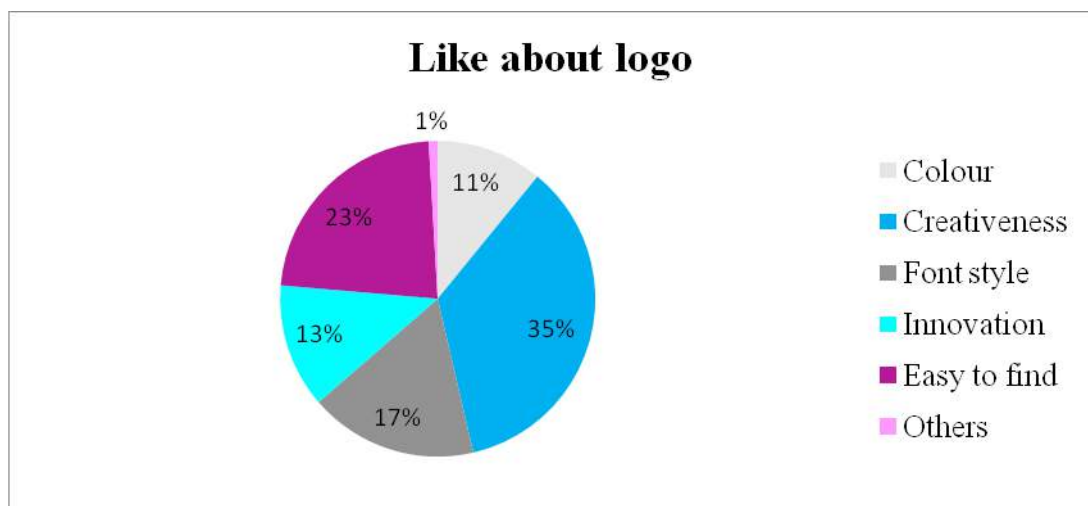
The Table 3 reveals that there is a very good to excellent correlation between bad logo design and colour since it lies between 0 to +1. Hence there is a linear correlation between the two variables.

**Table 4 Like about logo**

<b>Classification</b>	<b>No. of respondent</b>	<b>Percentage (%)</b>
Colour	12	11
Creativeness	39	35
Font style	19	17
Innovation	14	13
Easy to find	25	23
Others	1	1
<b>Total</b>	<b>110</b>	<b>100</b>

*Source: Primary Data*

**Chart 4**



Inference:

The table 4 reveals that 11 percent of the respondents like colour, 35 percent like creativeness, 17 percent like font style, 13 percent like innovation while 23 percent find easy and 1 percent like other things related to logo.

Thus, the majority that is 35 percent of the respondents like the creativeness of logo.

## Findings

- The respondents have given top priority that a good slogan should be simple & easy to understand.
- The respondents have given more priority to status while favouring the brand over others.
- There is a correlation relationship between bad logo design and colour of logo
- 35% of the respondents like the creativeness of logo.
- 54% of the respondents are sometimes misled by counterfeit products.
- The respondents have given top priority to quality that affects the buying decision.

## Suggestions

- Need creativity to make a logo.
- The more impressive logo will lead the customers to buy more commodities.
- Uniqueness of company should also reflect in its unique logo.
- Logos should be defined as it plays a vital role that may affect or create a brand.
- Logo is the important part for the whole brand or marketing field so it must be properly designed.
- Awareness should be created as people do not have much knowledge over logo.

## Conclusion

Logos are one of the most powerful marketing tools that businesses have at their disposal, reflecting the values and principles they advocate. This research focused on understanding the reason behind positive or negative perceptions towards change in brand, especially of logo components. A positive logo selection would enhance the brand identity of the product/service among consumers which ultimately has an impact on brand recall and recognition.

The study also implies that the selection of colour in a logo is dependent upon its cultural value, marketing objectives, desired customer relationship and communication in the world of business.

Logo as a key element of corporate visual identity, help the businesses become easily recognizable and communicate with various stakeholders effectively. Strategic decisions should be made while considering consumers' responses to logos.

## Reference

### Journals

1. Hem, L. E., & Iversen, N. M. (2004) - How to develop a destination brand logo: A qualitative and quantitative approach. *Scandinavian Journal of Hospitality and Tourism*, 4(2), 83—106
2. Kohli C., Suri R., & Thakor M. (2002). Creating effective logos: Insights from theory and practice. *Business Horizons*, 45(3), 58—64
3. Muller, B., Kocher, B. And Crettaz, A. (2013). The effects of visual rejuvenation through brand logos. *Journal of Business Research*, 66, 82-88.

### Websites:

- <https://www.selfmadedesigner.com/logos-in-marketing/>
- <https://www.ukpos.com/knowledge-hub/why-are-logos-important>
- <https://vakilsearch.com/blog/the-four-basic-components-of-logo-designing>
- <https://www.zilliondesigns.com/blog/meaning-and-uses-of-colors-in-logo-design/>
- <https://en.wikipedia.org/wiki/Logo>
- <https://thelogocompany.net/logo-design-evolution/>
- <https://www.artonicweb.com/learn/what-makes-a-bad-logo/>



## **AN ANALYSIS OF WORK STRESS MANAGEMENT AMONG IT EMPLOYEES**

**O. Sony and J. Maria Santos**

Department of Microbiology, St. Mary's College (Autonomous), Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

### **ABSTRACT**

Stress is a mental, emotional, or physical reaction resulting from an individual's response to environmental pressure and similar stimuli. It refers to pressures people feel in life. Stress is already a part of daily living. The word stress is derived from the Latin term 'stringers', which means "to draw tight". Some define stress as the non-specific response of the body to any demands made on it. When the demands on the individuals exceed his capabilities and adjustment resources stress occurs. Stress is different from anxiety, which is a state of uncertainty. It is also different from agitation, which is the physical part of anxiety. Stress also differs from frustration, which is blocked goal attainment. Job stress is the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker. Job stress matters to our health and our work. When we feel stressed, our bodies respond by raising the concentration of stress hormones in our blood. When our bodies continually respond to constant demands or threats, coping mechanisms stay in overdrive, which can be damaging to health over time. Convenience sampling method was adopted for this survey. The questionnaire was circulated, and the data were collected from the employees (122 respondents).

**Keywords:** Stress, Cause of stress, Methods to overcome stress.

### **Introduction**

Stress is a state of mind or an illness. Stress is the way human beings react both physically and mentally to changes, events, and in their lives. Another word for stress is tension or anxiety. Stress occurs where demands made on individuals do not match the resources available or meet the individual's needs and motivational stress will be the result if the workload is too large for the number of workers and time available. When someone experiences stress, there are many different symptoms and repercussion. Depending on the level and frequency of stress, some of these symptoms can become serious and cause a

many of problems. Stress affects people both mentally and physically. The heart rate increases, headaches can develop, and often people become irritated much more easily. People experience stress in different ways and for different reasons. The reaction is based on one's perception of an event or situation.

## **Materials and methods**

### **(Review of literature)**

**Srivastav A.K. (2010)** – The articles focus on the nature of role that causes stress. It says role performance encountered the problems of stress so they should be tried to reduce or eliminated. The nature of role stress was found to be heterogeneous which cannot be dealt with one uniform solution or intervention. Hence, specific problem related solution or interventions should be adapted for better organizational performance and effectiveness.

**Pratibha G. (2010)** – The impact of distress level on the quality of life is negative that may result to serious burnout problems in private banks. The distress level in the banks can only be reduced by various stress management programs or interventions that would also improve the quality of work life.

**Gladies J. J. & Kennedy V.(2011)**- The author revealed a significant correlation between Organizational Climate and Job Stress among the women working in IT companies of India. According to him, learning how to manage stress is a very crucial issue that should be developed in IT companies so that they can reduce or eliminate the causes of stress and poor working environment.

**Rosasa J. H. A, Blevinsb R. C , Gaoc H., Tengb W. Y. & White J. (2011)**– It reveals the levels of stress that differ by occupational position, and not by age and gender. The analysis shows that female had higher stress rates than males.

The main problems faced by students due to stress are sleeping problems, depression and irritability.

## **Statement of problem**

It is important for employers to recognize work- related stress as a significant health safety issue. Job stress directly effects on employee job satisfaction, performance of the employee, and productivity of the organization. There is an opposite relationship among job stress and employee job satisfaction. If employees are not feeling stress on their job and are satisfied with their job have positive impact on organization productivity if

employees feel stress on their job and are not satisfied with their job, then this has negative impact on organizational productivity. Therefore, it is necessary to study the stress and its coping strategies among employees.

### Objectives

- ❖ To Study the factors causing Stress among IT Employers.
- ❖ To know about the Strategies followed by them to overcome Stress.

### Research methodology

Sampling design	Convenient sampling method
Period of the study	December 2022 to April 2023
Data used	Primary and Secondary data
Test for analysis	Percentage Analysis, Chi- Square Test

### Results and discussion

**Table 3.1 Factors subject to stress**

This question was asked to analyze the factorssubject to stress. The table clearly depicts the statistical data of the question.

<b>FACTORS</b>	<b>NO.OF.RESPONDENTS</b>	<b>PERCENTAGE%</b>
Wages	27	22
No compliments	47	39
Extra working time	48	39
<b>Total</b>	122	100

Source: Primary Data

### Inference

The above table concludes that 22% of the employees chose wages as factors that cause stress, 39% chose no compliments, and 39% chose extra working time.

**TABLE 3.2 Stress management**

This question was asked to know the stress relieving factors of the IT employees. The table clearly depicts the statistical data of the question.

MANAGE STRESS	NO.OF.RESPONDENTS	PERCENTAGE%
Going out from work	43	35
Taking leave	35	29
Listening music	29	24
Meditation	15	12
<b>Total</b>	<b>122</b>	<b>100</b>

Source: Primary Data

**Inference**

This above table concludes that 35% of the employees relieve their stress by going out from work, 29% of the employees take leave, 24% of the employees listening music, and 12% of the employees do meditation.

**Hypothesis: H<sub>0</sub>**

There is no significant relationship between income and stress on employees

**Hypothesis: H<sub>1</sub>**

There is a significant relationship between income and stress on employees.

**Table 3.3 Chi- square test on income and stress**

Income \ Stress	Yes	No	Total
Below 30000	25	10	35
30000-50000	60	3	63
Above 50000	21	3	24
<b>Total</b>	<b>106</b>	<b>16</b>	<b>122</b>

ROW/COLUMN	O	E	O-E	(O-E) <sup>2</sup>	(O-E) <sup>2</sup> /E
R <sub>1</sub> C <sub>1</sub>	25	30.40	-5.4	29.16	0.959
R <sub>2</sub> C <sub>1</sub>	60	54.73	5.27	27.77	0.507
R <sub>3</sub> C <sub>1</sub>	21	20.85	0.15	0.022	0.00105
R <sub>1</sub> C <sub>2</sub>	10	4.59	5.41	29.26	6.374
R <sub>2</sub> C <sub>2</sub>	3	8.26	-5.26	27.66	3.348
R <sub>3</sub> C <sub>2</sub>	3	3.14	-0.14	0.0196	0.0062
<b>Total</b>	<b>122</b>				<b>11.195</b>

Degree of Freedom:

$$(r-1) * (c-1)$$

$$(3-1) * (2-1)$$

$$2*1$$

$$2^{\circ}$$

### Inference

The above table indicates  $2^{\circ}$  is 5.991. The calculated value is 11.195. Here calculated value is more than the total value so Null Hypothesis is rejected. Therefore it is concluded that there is a significant relation between Income and Stress.

### Findings

- It is concluded that the responded employees feel stressed maximum when they are subjected to Hybrid model.
- Most of the responded employees exposed that they feel stressed by the top management activities and actions.
- It is found that the relationship of responded employees with their co-workers are neutral in maximum and good.
- It is concluded that most of the employees preferred going out from work when they were asked to manage stress.
- It is suggested that most of the employees needed meditation classes conducted by the company can overcome stress.
- Most of respondents suggested that taking Team dinner or Team out can overcome stress and maintain good relationship among the employees.

## **Suggestions**

### **1. Bring Some Diversions into the Office**

The team that plays together, works better together. There are an infinite number of fun activities you can bring in to reduce workplace stress, whether they're permanent fixtures or for a special occasion. It may sound counterintuitive to bring diversions into a place of work, but allowing your employees to let loose during the day will help them deal with stress in the workplace and boost employee productivity and morale.

### **2. Consider Flexible Work Schedules**

If any of the employees have children or an elder parent in need, the demands of work and home life can quickly become overwhelming. Allowing for employees to have a flexible work schedule will give them time to take care of the people they love, and in turn allow them to be more present at work while they're there. If the employees perform work that could be done remotely, consider days where they can work from home as well if it makes their lives easier.

### **3. Know Your Paid and Unpaid Leave Policies**

Knowing family leave policies in the country and state are an important piece of offering employee support. Whether or not the company decides to offer unlimited vacations, they will have to consider the varied needs and circumstances of the team. For many people, workplace stress actually centers around the difficulty of fitting life events around work — such as pregnancy, family death and illness, and childcare.

## **Conclusion**

Stress is a major concern for individuals and organizations. Exhaustion is the outcome of prolonged stress. Individuals and organizations can take many approaches to lessening the negative health and work outcomes associated with being overstressed. Emotions play a role in organizational life. Understanding these emotions helps individuals to manage them. Emotional labor can be taxing on individuals, while emotional intelligence may help individuals cope with the emotional demands of their jobs. Stress has become the most common cause of employees in all the industries. Stress can make an individual productive and constructive when it is identified and well managed. Positive attitude and meditation will be helpful for coping the stress. Thinking in

a broader perspective of life will definitely change stress. There are many ways for managing stress, such as meditation, Yoga etc.

## References

[https://www.uml.edu/docs/introductiontojobstress\\_tcm18-42460.pdf](https://www.uml.edu/docs/introductiontojobstress_tcm18-42460.pdf)

<https://www.managementstudyguide.com/employee-stress.htm>

<https://www.betterhealth.vic.gov.au/health/healthyliving/work-related-stress>

<https://www.researchgate.net/publication/259985630> Review of Literature-  
Stress Management in IT Sector

<https://www.researchgate.net/publication/332877298> Job Stress in Software Companies  
A Case Study of HCL Bangalore India

[https://www.forbes.com/sites/gilpress/2013/04/08/a-very-short-history-of-information-  
technology-it/](https://www.forbes.com/sites/gilpress/2013/04/08/a-very-short-history-of-information-technology-it/)

<https://wethrive.net/mental-health-at-work/the-top-10-causes-of-stress-at->

[work/https://www.livemint.com/industry/infotech/freshers-in-it-suffering-from-high-  
stress-](https://www.livemint.com/industry/infotech/freshers-in-it-suffering-from-high-stress-)

[11580266813951.html#:~:text=Over%2079%25%20of%20the%20participants,of%20stres  
s%20in%20this%20group.](11580266813951.html#:~:text=Over%2079%25%20of%20the%20participants,of%20stres)

## **A STUDY ON WORKING CONDITION OF EMPLOYEES IN SALTPAN AT THOOTHUKUDI**

**P. Jayamary and S. Selsia**

PG and Research Department of Commerce, St. Mary's College (Autonomous),  
Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

### **ABSTRACT**

Salt is very essential dietary commodity. Common salt is an article of daily necessity for human consumption. It has been important commodity for hundred years. It is used widely in the chemical industry and has various industrial uses. It is considered to be the basic as well as a highly indispensable commodity. Salt can be consumed by both rich and poor only to the limited and fixed quantity irrespective of the price or health. It is produced in our country by the private, Co-operative and Government sectors. India now ranks third in the world in the production of salt. Salt is an important physiological necessity of life. With an enormous and growing population, the demand for salt is vital importance. Salt is used for several purposes. It is used for cooking as table salt and as a preservative in the preparation of condiments, pickles and food stuffs. It is also used to a limited extent in agriculture as an insecticide, wood killer and for stock feeding. It finds use in curing fish, meat packing, dairying and other industries to prevent deterioration. It is used in several industries such as glass, leather, soap, oil purification, dyestuffs, textiles, ceramics, refrigeration etc., The salt workers are exposed to adversities of environmental conditions as well as salt in the environment. There is a lack of information about their occupational health problems. in this regard; the main objective of the study knows the consumer working condition of salt pan workers in Thoothukudi.

**Keywords:** Salt pan, Health Problems, Salt chemical, Salt, Workers, Working conditions, etc...

### **Introduction**

Salt is used for various purposes like edible, industrial, exports, textile industry, fish curing, hides and skin. Salt is widely used as a preservative for meats and is employed in some refrigeration processes, in dyeing, and in the manufacturing of soap



and glass. Salt business generates more employment opportunities. The manufacturer exports salt from their state to another state and or country. While doing such business some unfavourable factors may affect the salt workers. Salt production process followed in Tamil Nadu is very primitive and involves intensive manual labour in the pans. The workers suffer many occupational related health problems. They are required to expend a lot of physical energy in the production process. Working in saline water most of the time, they lose their eyesight at an early age, because of the reflection of sunlight by the salt crystals.

### **Statement of the problem**

Salt is rather an important secondary food than a food additive. Although, unlike others, it is not edible by itself is present in all naturally available food items such as cereals, fruits, vegetables and the like. As a mineral, it is an essential ingredient vital for the bodily metabolic functions of human beings and animals. In addition, it is present as a very important mineral diet in nearly all living organisms including plants. It next in importance only to the primary requirements such as sunlight, air and rain water for the sustenance of life. Like the availability of primary requirements, salt too is abundant by available in nature and hence its importance and utilities have been taken for granted by humans. Yet, its preciousness, that could outweigh that of gold, shall be noted only when it goes scarce. Such an important natural resource is abundantly available in India. Especially, Tamil Nadu which is bestowed with about one thousand kilometers of coastline has vast potential for the salt production and the same potential has rightly been utilized at Thoothukudi, which contributes about eighty percent of Tamil Nadu's salt. Like agriculture, Salt production needs deep human intervention to get quality output. Salt production is seriously affected by the natural constraints such as heavy rainfall, air pollution and other such natural calamities together with economics constraints such as slackness of demand, inadequate supply, shortage of labour, competition from Gujarat, heavy competition prevailing in the local salt market, fluctuations in price and the like. Hence, income from the salt market is largely volatile in nature. The risk bearing capacity of the salt workers is a function based on personal, economic, environmental and chronological factors in consonance with their age, education occupation, income, family, size, nature of management of salt production and the like. Salt production in Thoothukudi has come down drastically in the recent years owing to various factors.

### **Objectives of the study**

- To analyse the socio-economic conditions of employee's working in saltpan at Thoothukudi.
- To study about the working conditions of employees in saltpan at Thoothukudi.
- To know the reasons for working in saltpan at Thoothukudi.
- To identify the problems faced by the employees in saltpan.
- To know the satisfaction level of employees working in saltpan.

### **Reviews of literature**

Kripa Ram Haldiya (2005) said that workers working close to salt milling plants may inhale salt particles floating in the air, leading to a rise in plasma sodium, which in turn, may increase the blood pressure and the risk of hypertension.

Review Shashikala (2006) in her PhD Thesis ' A Study on Nutritional and Health Status of salt Workers, Stated that workers are poor class people and salt production is the only source of their livelihood . Due to lack of modern and latest mechanical devices in the salt industries, the production of salt is slow and minimum and old process of producing salt is still prevalent . As such, workers do not have interest in diversion of business to other field and also their living standard continues to be lower.

Jeyaranjan (2011) in his work examines synoptic view of the tamilnadu's salt manufacturing. For the study, a total of 250 people were chosen, with 150 being salt producers and 100 being the salt traders. The primary data was gathered using a questionnaire. Secondary information was gathered from the salt department's public and unpublished documents. Percentage analysis was used to examine many areas of the study, including the salt including the salt trading distribution chain, various types of the producers and dealers, salt exchanged types ' transportation system, and so on .

Chris Kresser (2012) explored the historical relevance of the salt and its role in humanity's evolution, the physiological role of the salt in the human body, and the regulation of plasma sodium levels in the human body in his research article. He also discussed the causes of the low blood pressure, the recommended salt intake for maintaining a healthy salt level in the body, and diseases linked to low salt intake among other things.

## Research methodology

This study is based on both primary and secondary data. The researcher had a discussion with salt workers Based on this information Interview Schedule was prepared and was administered to a sample of 115 respondents selected at random. The area of study is limited within the geographical area of Thoothukudi town. This study was undertaken during the period between December 2022 to April 2023. Data relating to this study was collected from the salt workers of the selected area during the above stipulated period only. The data collected are original in nature. For the collection of data, the researcher has chosen 115 saltworkers (respondents) from Tuticorin city, a sample of 115 respondents residing in various parts of Thoothukudi were selected by convenient sampling techniques. The Interview schedule was used for collecting great sources of information. The secondary data has been collected from Journals, Articles and Newspaper books and through Internet.

## Tools for analysis

### Demographical profile of the respondents

Particulars	Parameters	Percentage
Gender	Male	43%
	Female	57%
Age	20-30	48%
	31-40	22%
	41-50	18%
	Above 50	12%
Education wise classification	Primary	17%
	Middle	17%
	Higher secondary	44%
	Illiterate	25%
Nature of family	Joint family	68%
	Nuclear family	32%
Residential position	Owned house	65%
	Rented house	35%
Wages	Daily	31%
	Weekly	41%
	Monthly	28%

(Source: primary data)

**Descriptive analyses**

<b>Particulars</b>	<b>Parameters</b>	<b>Percentage</b>
Other work than saltpan	Coolies in construction	28%
	House hold work	29%
	Painting work	27%
	Construction work	16%
Days of leave in a month	1day	22%
	2to 3 days	40%
	3 to 4 days	31%
	Above 4 days	7%
Year of experiance	Below 1 year	20%
	2 to 3years	33%
	4 to 8 years	37%
	Above 8 years	10%
No. of employees working in saltpan	Below 15	23%
	16 to 25	36%
	25 to 50	18%
	Unlimited	23%
Facilities	Education	9%
	Medical	45%
	Transport	30%
	Other facilities	16%
Refreshment	Tea and coffee	51%
	Juice and snacks	19%
	Free food	24%
	Others	6%

*(Source: primary data)*

**Problems related to working conditions of the respondents Table 3**

<b>Particular</b>	<b>Parameter</b>	<b>Percentage</b>
Use shoes or bare leg	With shoes	73%
	Without shoes	27%
Shoes are provided by	Employer	62%
	Self	38%
Employer give bonus	Yes	71%
	No	29%
Problems faced by workers	Scolding	9%
	Punishment	18%
	Cutting of wages	24%
	Caste difference	27%
	Insecurity	22%
Health problems	Skin problems	33%
	Eye problems	27%
	Diabetes	16%
	Blood pressure	24%

*(Source: primary data)*

**Likert scale techniques**

Statement showing the rank according to respondent’s opinion on the following factors

Table 4

Particulars	Strongly agreed	Agreed	Neutral	Disagree	Strongly disagree	Total	Mean square	Rank
Getting sufficient wages	295	168	24	10	1	597	5.19	I
Satisfaction in working hours	105	264	63	6	4	442	3.8	II
Receiving enough festival bonus	145	160	102	16	4	427	3.7	III
Satisfied in working environment	60	112	81	48	24	325	2.8	IV
<b>Grant Total</b>						<b>1791</b>		

(Source: primary data)

For finding the level of satisfaction based on its factors LIKERTS FIVE POINT SCALE was used for computing total score certain weight have based on various degree of opinion

**Findings**

- Most of the respondents are (52%) female in the selected salt industries in Thoothukudi District.
- It is evident from the analysis that 48% of the respondents are in the age group of 20-30
- Most of the samples respondents (51%) are working in the saltpan belong to Christian.

- Majority (56%) of the respondents were married.
- It is analyzed that 44% of the respondents are higher secondary.
- Majority (68%) of the respondents are in nuclear type of family.
- Majority of the respondents having owned house (65%).
- Majority (47%) of the respondents having weekly wages.
- Most of the respondents (64%) houses are situated in rural areas.
- It found that 36% of the respondents are travel from 2 km to reach working area.
  - Majority of the respondents (32%) are travel to reach the working area by two wheeler.
  - It found that (43%) of the respondents, only 1 members in the family work in saltpan.
  - Majority of the respondents (76%) have a habit of saving.

### **Suggestions**

- Attempts could be made to implement adult education programme among the workers.
- Separate employee bus is more essential for avoiding the travelling problems.
- Provide rest sheds
- Improve work place amenities, such as access to portable drinking water and sanitation.
- Set up child crèches and schools.
- Clothes and shoes are safety materials while doing their work.
- Like to raise their wages to meet their needs and also can maintain their living standards.

### **Conclusion**

Salt has played a prominent part in the development of workers activities and every sector of the country accepts and do favour for their development Worker has a very weak bargaining power, workers are almost poor and have no reserve funds. They cannot easily with hold their worker from the market. Worker is not so mobile as capital. It is because of the different environment, languages, and customs. The workers face difficulties in their movement from one place to another. While taking any worker policy

into consideration, we have to keep in mind that worker is not only a factor of production but is also an end of production Workers have become the equal participants in many at all levels of society and their contribution is being acknowledgement. Workers are large in numbers. They do not depend on others and they have to fulfil their own satisfaction. The role of workers in economic development of our country is very important. The participation of worker is increasing in almost all the field. All efforts to promote participation initiatives can be viewed only in the context of economic independence and empowerment of workers. Almost all countries' salt production has increased. In comparison to other countries, India's salt production is increasing at a rapid pace. Natural factors such as rainfall, air humidity, climatic conditions, temperature, and other factors have a significant impact on Thoothukudi production figures.

### Reference

- J. Jeyaranjan. "Increasing the Quality and Quantity of Edible Salt Produced by Salt Co-operatives in Tamil Nadu and Andhra Pradesh" Published Research Article. Submitted to The Global Alliance for Improved Nutrition (GAIN), Institute of Development Alternatives, Chennai, 2014.
- Laxmi. VV. and Selva Mathan, TP.S. "Dip in Salt Export from Thoothukudi", The Hindu, January 2, 2013,
- M Krishnamurthi, "Welfare Board Sought for Thoothukudi Salt Workers". The Hindu September 9, 2013,
- Natarajan. M. "A Study on Economic Activities of Unorganized Sector with Special Reference to Saltpan Workers in Southern Tamil Nadu". Unpublished Research Article. Department of Commerce, MK University, Madurai, 2009
- Petchimuthu, S., Salt Production up in Thoothukudi Times of India, July 2015.
- Prabhakaran John, B. and Jegadis Chandrabose, M.M. "Fall in Salt Export from Thoothukudi". The Hindu. April 11, 2015,
- R. Banumathi and S Nadarajan, "Marketing Strategies and Practices with Reference to Salt Industries in Tamil Nadu India" International Journal of Management (UM), Dept. of Management Studies. Anna University. Tirunelveli, Volume 6, Issue 3, March 2015,



➤ Ramakrishna raj, P. "Income and Expenditure Pattern of Salt Workers in Sahupuram of Arumuganeri" Unpublished Research Article, Department of Economics, Bharathidhasan University, Tiruchirappalli, 2009 16.

**Websites**

- [www.google.com](http://www.google.com)
- <https://www.researchgate.net>
- <https://eed.compernics.org>
- <http://www.cibtech.saltcomindia.com>
- [saltcomindia.com](http://saltcomindia.com)



## **A STUDY ON CONSUMER PREFERENCE TOWARDS BATH SOAP IN INDRA NAGAR OF THOOTHUKUDI DISTRICT**

**A. Sherlin**

PG and Research Department of Economics, St. Mary's college (Autonomous)  
Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

### **ABSTRACT**

The consumers who were not that conscious about discretionary products have started paying lot of attention on the features and the attributes that a particular product is providing. With more and more youth coming into the scene who are more skin conscious than other factors have change the face of the industry. But still a larger population is in the rural area and their attributes of selection are altogether different. So there is wide scope for consumer research. as the consumers taste, consumers likes, consumers preferences etc., change often because of financial, psychological, sociological and some other factors. The present study would help the company to know the satisfaction of the respondents towards bathing soap and various soap brands and how potential target of the market must be matched with marketing mixes and then best attractive strategies to be chosen for implementation. The companies would be in a better position to make and utilize their marketing strategies to gain more and more customers.

**Keywords:** Consumer's Preference, Discretionary Products, Marketing Mixes and Marketing Strategies, Buying behavior, Brand loyalty.

### **Introduction**

In our modern world the living style and consumption behavior of people are changing day by day. They are more conscious about their purchasing. Most of the people are prefer branded items than non-branded items. Brand becomes an unavoidable element in the consumer purchasing. Many people see the brand as a part of a product or services. That helps to show its quality and value. Customers are valuable assets of any organization. Customer is an Individual who selects, purchase and uses the products, services ideas or experience to satisfy needs and desires. Behavior simply refers to doing of anything. According to international dictionary of management “consumer are purchasers of goods and services for immediate use and consumption.” Behavior is a mirror in which everyone display his/her image. Consumers brand preferences

represent a fundamental step to the marketers to understand the consumer choices. Based on this, the company can design the better marketing program and build a long term relationship with potential consumers. There has been a long standing interest from marketers to understand how buyers form their preferences toward a particular brand. Brand preference is closely related to brand choice which can assist consume decision making and activate the brand purchase actions.

### **Factors affecting buying behavior**

- 1) Price is the most important factor which effects the buying behavior of consumer, by which a consumer goes for the various segment of soap like premium, popular, sub popular and carbolic which are basically decided by the cost factor and fat content in the soap.
- 2) The buying frequency is either monthly that is done by the families or in case of bachelors it is more than once in a month. The occasions when premium soaps are purchased are usually when there are festivals and ceremonies. Moti Sandal and rose version Soaps are usually presented during festivals and occasions for presents and gifts.
- 3) The promotional techniques help to boost sales. Various tactics like the price off's, buy one get two free, free gifts and other schemes help boost sales in short run and also help in clearing stocks.
- 4) One of the important points a soap marketer should note is that the soaps are usually purchased by women in urban areas as most of the day to day consumption of personal care products are made by women. A point to note is that women use more personal care product than men do and hence premium soaps are mostly targeted at them. Men normally make purchase decisions in rural areas. Hence the marketer has to adopt different strategy for such a market.

**Benefits sought by various customers from various brands are**

1. Beauty – Lux
2. Freshness – Liril, Cinthol
3. Family—Santoor, lifebuoy, Mysore sandal.
4. Baby – Johnson & Johnson, Doy
5. Cream – Dove, Doy Care (moisturizing)
6. Medicated – Dettol, Savlon,
7. Glycerin – Pears,
8. Herbal – Medimix, Margo

**Attributes of Bath soap**

- Quality
- Product design style and color
- Brand name
- Price
- Innovation
- Health aspects
- Promotional offers
- Brand trust
- Influence of advertising
- Durability
- Lather & TFM content.

**Types of soap**

- ❖ Beauty soap
- ❖ Health soap
- ❖ Complexion soap
- ❖ Deodorant soap
- ❖ Freshness soap
- ❖ Baby soap
- ❖ Herbal or medicinal soap

### **Total Fatty Matter (TFM)**

Soaps are graded in terms of total fatty matter or TFM. Bureau of Indian standards (BIS) has categorized bath or toilet bar soaps. The soaps as 'normal', baby, transparent, and antibacterial soaps. The last three are called specialty soaps targeted to specific users. Toilet soap is a cosmetic by law and it must fulfill the relevant Indian standard. T.F.M or total fatty matter is a measure for identifying the amount of Fatty matter present in soaps. TFM of a sample of soap can be determined as follows. A known weight of the soap is dissolved in water and solution is treated with dilute sulphuric acid. The soap decomposes to sodium sulphates and fatty acids. The fatty acids so formed can be estimated. From this TFM can be calculated on the basis TFM, bath can be classified into three grades.

- Transparent soap
- Baby soap
- Medicinal soap

### **Bath Soap for all Skin Types**

Owing to our rich industrial experience, we are offering superior quality Bath Soap for All Skin Types such as

- i. Spa Soap
- ii. Herbal Soap and
- iii. Aloe Vera Soap.

These soaps are processed using natural extracts under the supervision of our quality experts who maintain optimum hygienic level. Offered soaps are tested on several parameters by our quality experts. These soaps are known for purity, high effectiveness, long shelf life and low liquidate property. We offer these soaps in different pack sizes as per the requirements of clients.

### **Objectives of the study**

- To study the consumer perception towards bathing soaps.
- To Study the awareness regarding various bathing soap.
- To identify the factors considered before buying bathing soap.
- To identify the product have best range of prices, attractive packing and easy availability.
- To access the factor influencing the consumer to purchase the soap.

## **Methodology**

### **Research Design**

Descriptive research design is being adopted in this study.

### **Area of Study**

Survey is conducted at Thoothukudi district. Primary data is collected through questionnaire containing open ended and close ended questions.

### **Sample Size**

The sample size of 120 respondents was selected in Thoothukudi district for this study.

### **Type of Sampling**

Convenience sampling and Random sampling is adopted for this study.

### **Hypothesis:**

- Significant number of respondents perceives that price has no effect on the purchase behavior.
- Significant number of respondents perceives that quality parameter has no effect on the purchase behavior.

### **Primary Data**

To collecting primary data, questionnaires have been distributed to the sample respondents to get information regarding the case study.

### **Secondary Data**

The secondary data also collected from various journals, books, Newspapers, etc.

### **Scope of the Study**

There is wide scope for consumer research. As the consumers, taste, likes, preferences etc., change often because of financial, psychological, sociological and some other factors. The present study would help the company to know the satisfaction of the respondents towards bathing soap and various soap brands. The companies would be in a better position to make utilize of their marketing strategies to gain more and more customers.

**Need for the study**

Bath soaps, despite their divergent brands, are not well differentiated by the consumers. It is, therefore, not clear if it is the brand loyalty or experimentation lured by high volume media campaign, which sustain them. A consequence is that the market is fragmented. It is obvious that this must lead to a highly competitive market.

**Statement of the problem**

At present there are a lot of brands of bath soaps available in the market. So it is essential to know the brand which is most preferred by the people. Greater loyalty levels lead to less marketing expenditure because the brand loyal consumers promote the brand positively. Also, it acts as a means of launching and introducing more products that are targeted at same customers at less expenditure. It also restrains new competitors in the market. Brand loyalty is a key component of brand equity.

**Result and Discussion**

S.No	Items	Particulars	Numbers	Percentage
1	Age	Below 30	26	22
		30-40	38	32
		40-50	23	19
		50 Above	33	27
2	Gender	Male	48	40
		Female	72	60
3	Income	Less than 10000	34	28
		10000 – 15000	28	23
		15000- 20000	31	26
		Above 20000	27	23
4	Monthly Expenditure	Less than 10000	45	37
		10000 – 15000	31	26
		15000- 20000	25	21
		Above 20000	19	16
5	Purchase of Bath soap Regularly	Yes	88	73
		No	32	27
6	Qualities required in the bath soap	Fragrance	48	40
		Good Brand	36	30
		Colorful	21	17
		Low Price	15	13
7	Sources of Information about bath	Family	26	22

	soap			
		Friends	48	40
		Newspaper	15	12
		TV	11	9
		Internet	20	17
8	Promotional scheme	Price discount	56	47
		Free Offer	16	13
		Quality deal	30	25
		Distribution of samples	18	15
9	Importance to the soap fragrance	Yes	78	65
		No	42	35
10	Fragrance	Rose	25	21
		Sandal	36	30
		Lemon	18	15
		Neem	14	12
		Turmeric	27	22
11	Reason to switch over the brand	Low quality	34	28
		High price	45	37
		Fragrance	41	35
12	Satisfaction of the bath soap	Yes	88	73
		No	32	27
13	Reason for bathing	Cleaning	76	63
		Body fresh	21	17
		Dryness/oiliness	23	20
14	Use of antibiotic soap	Yes	56	47
		No	64	53
15	Buying Bath soaps	Super Markets	43	35
		Bazars	18	15
		Online	46	38
		Nearby home shop	13	11

## Findings, suggestions and conclusions

### Findings

1. Majority of the respondents belong to the age group of 30-40 (32%)
2. 60% of the respondents are female.
3. Majority of respondents 28% monthly income less than Rs.10000
4. Maximum of the respondents 37% monthly expenditure is Rs. 10000
5. 73% of the respondents purchase their bath soap regularly.
6. 40% of the respondents they needs some qualities ex: Fragrance
7. Maximum number of the respondents to know the information about bath soap to their friends. (40%)
8. Majority of the respondents 47% to prefer the price discount of their bath soap..
9. Maximum of the respondents liked sandal fragrance.
10. 37% of the respondents choosing their bath soap at high price.
11. Majority of the respondents 73% of their bath soap gives full satisfaction.
12. 63% of the respondents believe their bath soap cleaning their body.
13. 53% of the respondents use antibiotic bath soap.
14. Maximum of the respondents 38% buying their bath soap in online.

### Suggestions

- Dealer should fulfil the consumers' needs speedily in an effective manner, the Dealer should be consumers friendly. So that the seller can improve the sales volume to all type of consumers.
- The dealer should be made more effective in providing instructions to the Consumers to meet the competitors.
- Most of the respondents are under the age gathering of 30 -40 years so organisation should take Efforts to attract other age group people in order to increase their sales.
- Most of the respondents are under the salary gathering of less than 10000 every month. So the organisation should take efforts to position their products in this group in order to increase their sales. As a quality is the first influencing factor of the company has to focus on quality and improve it for better sales.
- The company may give more and more offer and discount to improve the sales.



- While preferring baby skin care brands, must consider quality instead of their popularity.
- Price is still sensitive issue to them. So the producers must justify its price.
- Issues related to the side effects of the products to be corrected effectively.
- Fair advertisement to be required for baby skin care products.
- Quantity of baby skin care products to be increased with the prevailing price rate.
- The baby skin care products should be easily available to consumers at their nearest shop.
- Packaging of the products should be made more attractable.

### **Conclusions**

Customers are the king of the market, superiors in an organization and Goose laying Eggs. Customers' satisfaction plays a significant role in modern marketing era. Bath Soap is an important product for the day to day consumption of the Consumers. Nowadays competition is going on with a flame of advertisement war. Lot of Varieties of soap is being introduced by several producers. In these competition situations, some soap because evil effects due to a mixture of chemical compounds. People need quality of soap for which they are ready to have brand loyalty or switch over from one brand to another. In order to capture the needs of all the segments of people, the products are introduced in different quantity for perfect quality of users. So, the soap will definitely bring more market potential for Bath soap. This investigation has concentrated its attention the consumer's preference and satisfactions towards the bath soap products in Madurai city and also it has focused on the buying habits of the consumers. The findings system direct outcomes of study as the study portray the consumer's preference towards product of the consumer .the findings system direct outcome of study. As the study portray the consumer's preference towards product of the consumer. I have gained abroad knowledge during this survey. Trust this study experience will be a will be a step to build up my carrier in future.

## **Bibliography**

- ❖ Blackwell, R.D.; Miniard, P.W.; Engel, J.F. (2001). *Consumer Behavior* (Ninth Edition). Fort Worth: Chervin, Alex. (1997). The effect of common features on brand choice: Moderating role of attribute.
- ❖ Euro monitor International: *Country Market Insight*. (2006). *Cosmetics and Toiletries – India*, August.
- ❖ Loudon, D. Della Britta (1986). *A consumer Behavior. Concepts and Applications*, New York: McGraw-Hill.
- ❖ Malhotra, Pervin (2003, May 2). *The Beauty of Being a Beautician*. Chandigarh, TheTribune.Ijreiss Volume3, Issue 3(March 2013) Issn: 2250-0588International Journal of Research in Engineering, IT and Social Sciences.
- ❖ Sinha, P. K. (2003). *Shopping Orientation in the Evolving Indian Market*, Vikalpa, 28(2), 13-22.
- ❖ Vigneron, Franck and Johnson, Lester W. (1999). *A Review and a Conceptual Framework of Prestige-Seeking Consumer Behavior*. *Academy of Marketing Science Review*, 1999 (1), 1-15.
- ❖ *New Frontiers in Branding: Attitudes, Attachments, and Relationships* Santa Monica, CAC. Whan Park 2007 Copyright @ society for consumer psychology.
- ❖ Kotler, P., & Keller, K. L. (2006). *Marketing Management* (12e ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

## **A STUDY ON WOMEN'S SPORTS AND FITNESS IN THARUVAI STADIUM IN THOOTHUKUDI DISTRICT**

**L. Sivasundari**

PG and Research Department of Economics, St. Mary's college (Autonomous)  
Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

### **ABSTRACT**

First of all, playing sport is good for health. By playing sport, we feel more relaxed. Sport exercises allow us to meet people, for example, at the gym. In my opinion, relationships with others are a very useful method to fight stress. Physical activity of any type stimulates our body to produce endorphins, known as a "feel-good" hormone, which decrease pain and help release symptoms of stress, depression and anxiety. Sports training include physical, skill, tactics, psychology and intelligence ability training. The physical training is an important part of sport training among them. Physical condition has direct influence on the athletes' performance level. We should carry on the analysis on the physical training of the athletes, and point out the role of physical training in the course of the game, at the same time, point out the existing problems of the development of physical training and some related measures and suggestions.

**Keywords:** Physical activity, Physical fitness, Self-esteem, Self-confidence, Gym, Stress Relief, Physical development, Sports, age, physical training.

### **Introduction**

In sports training, physical training plays a key and leading position. If a great athlete wants to achieve excellent results and climb up to the peak of world sports fitness, the first is to lay a good foundation on physical fitness. Physical fitness is a key factor which affects the improvement of the level of the movement, so we should grasp the athlete's physical training. The traditional athletics powers have attached great importance to the physical training, not only the development of systematic theory; practice experience is also very rich. In China, both in theory and in practice, there is not paying enough attention to physical training, which needs leading to many physical educators' reflection on the prospects for the development of sports.

Physical fitness includes physical ability of actively adapting to life, the ability of

working and excising, and the ability of keeping resistance to disease, adapting to the environment of the survival. Moreover, it also includes tissue and organ system function, the basic sport ability in sports activities. Classified from the training point of view, it includes the general physical training, special physical training and comprehensive physical fitness training. It is determined by the human congenital and acquired exercise body shape, physiological function, physical quality and other factors.

### **Sports Activities**

Sport has been one of the most important socialist-cultural learning experiences for boys and men for many years. Those same benefits should be afforded our daughters. It is important for all of us to know that: High school girls who play sports are less likely to be involved in an unintended pregnancy; more likely to get better grades in school and more likely to graduate than girls who do not play sports. Girls and women who play sports have higher levels of confidence and self-esteem and lower levels of depression. Girls and women who play sports have a more positive body image and experience higher states of psychological well-being than girls and women who do not play sports.

### **Girls and Women Need Encouragement and Aspirational Role Models**

Many people think that girls are not as interested in sport as boys. Women's Sports Foundation research shows that boys and girls between the ages of 6 and 9 and their parents are equally interested in sports participation. However, by the age of 14, girls drop out of sport at a rate that is six times greater than boys. Girls and women simply do not receive the same positive reinforcement about their sports participation. Boys receive balls, gloves and sports equipment by the age of 2. They see their images on television as sportsmen, they see their photos in the sports section and know from their parents and friends that they are expected to play sports.

Even though our daughters are not as likely to be discouraged from playing sports as they were 10 years ago, they simply aren't encouraged to the same extent as little boys. As a result, they enter organized sport two years later than little boys and are, therefore, less likely to have the skills necessary for early success experiences. If a child is unskilled, he or she is unlikely to have fun. It's no fun to strike three times in row. The no. 1 reason why boys and girls play sports is because it's "fun."

We must do a better job of supporting our daughters' sports participation. For Christmas and birthdays, we must find books about girls in sports; give gifts of sports equipment and sports lessons. We need to take our sons and daughters to see women playing sports so they grow up appreciating and respecting the sports skills of women and

so our daughters see images of themselves excelling in sports because she is not

Going to see those images on television or in the newspapers. It's no accident that girls' sports participation in Olympic sports increases significantly following the Olympic Games, one of the few times that coverage of women's sports is equal to that of men's sports. Inspirational role models drive youth demand for sports. This top to bottom synergy has not yet become commonplace in women's sports because of limited college and professional sports opportunities and television coverage.

However, the trend is clear: the increased participation and success of female athletes at the Olympic Games, increased television coverage of women's college sports, new women's professional sports leagues and the participation increases of females in all sports and all age levels.

### **Physical Fitness**

Physical fitness leads to better athletic performance, and persistent training will usually develop physical fitness. Detailed analyses of the anatomic and physiological characteristics of famous athletes show that it is possible to make fairly reliable predictions of athletic performance. Scores obtained by various static and dynamic tests exhibit various degrees of correlation with the scores made in competition, and it has been easy to pick out the tests that give the highest coefficients of correlation. Dynamic tests thus are shown to have higher predictive value than static tests. Type of physique, strength and power, respiratory efficiency, and cardiovascular components are among the factors that determine performance, but no two, or three, or four factors, even when combined in an optimum manner, measure all aspects of fitness. Fitness tests applied to former champions gave the best results in those athletes who were in continued training. Endurance training makes marked improvements in cardiovascular function. Ability of the endurance athlete to use oxygen is related to circulatory and respiratory capacity, but in sprints, weight lifting, and swimming there are many other important specifics.

### **The importance of sports to health and fitness**

Playing sport is generally an excellent way to improve your health and fitness. Sometimes you don't feel the motivation to pound away on a treadmill or in the gym, but an invitation to play some sport would get you moving. While playing sports is not a substitute for your workout, you can embrace many benefits that would help you stay on

top of your health and fitness. The following are some of the health and fitness benefits of embracing a new sport.

### **Statement of the Problem**

It is known that physical activities refreshes body and good logical problem solved refreshes the brain and increases self-esteem this research study wholly attempts to find whether there is link between the both i.e. physical activities and mental happenings and also leadership skills, team building/coordinating skills tied up with active involvement in sports and games.

### **Objective of the Study**

The main objective is to maintain the physical health if people by encouraging them to take part in various physical exercises. The improvement in physical state brings changes to our mental and social well being. A sport also makes the growing young population of the world, a healthier personality.

- To find out the fitness can help reduce the stress
- To know the fitness can help the creative idea for any task
- To know the fitness to attain achieve the goal.
- To study about fitness to maintain the good health.
- To study about the fitness to make a fresh in everyday.
- To find out the fitness to feel young among the people

### **Methodology**

The methodology adopted for the present investigation including selection of the women sport& their fitness. Consistent with the objectives of the study, different techniques have used for the analysis of the data. The data pertaining to the study has been analyzed and presented in tabular forms to make the findings meaningful and easily understandable with simple statistical tools of analysis like ratios, percentages etc.The research work depends upon the primary data and secondary data. The primary data collected through survey, personal interviews & questionnaire. The secondary data were collected from Books, Journals, Google, and etc... Totally 120 sample respondents were

selected from the tharuvai stadium at thoothukudi district.

### **Collection of Data**

The study has made use of primary and secondary data. The required data has collected from the thoothukudi tharuvai stadium by making use of the random sampling method. This study follows questionnaire to have the actual information regarding women participations in sport. The collected information have compiled, tabulated, and tested with the statistical tools. Secondary data collected from magazines, journals, library book, article, and websites.

### **Sample Size**

For the present study from tharuvai stadium ground 120 sample respondents totally selected by using simple random sampling method. The data was collected by personal interview using structured questionnaire.

### **Tools for Analysis**

Based on the nature of data and relevance of information required, statistical tools like percentage, bar diagram and averages were used for the analysis of data

### **Period of the Study**

This study takes active period from December 2022 to April 2023

### **Limitations of the Study**

The research primarily focuses on the among the different age group of students, and women's. The research primarily focuses on the among the different age group of students, and sports is given more focus and not much on fitness activities, the other general limitations while conducting the study. Firstly, the research instrument used to collect the data was a questionnaire which was circulated among students mainly teenagers and gender. The results obtained from this entirely depend upon the perception of the student and how well he understands it. So, the quality of data relies on the students. Thus, the honesty with which the students responded definitely affects the results and the interpretation of the data. Besides, there is also a chance of misconception in the way researchers have concluded the data. It may be possible that the researcher's interpretation might differ from what the student actually wanted to convey. Secondly, due to limited resources and time, this research was conducted randomly on different students of the

required demographic characteristics. So, it cannot be concluded that the results interpreted in this research paper represent the situation of the whole student community.

### Signification of the Study

Sports can help you reach your fitness goals and maintain a healthy weight. However, they also encourage healthy decision-making such as not smoking and not drinking. Sports also have hidden health benefits such as lowering the chance of Osteoporosis or breast cancer later in life. Sports are a crucial part of a student's growth and development. They help in the development of mental health and physical fitness of the body. Through participation in sports and games, a student gains various skills, experience and confidence that are helpful for developing their personality. Physical fitness leads to better athletic performance, and persistent training will usually develop physical fitness. Detailed analyses of the anatomic and physiological characteristics of famous athletes show that it is possible to make fairly reliable predictions of athletic performance.

### Result and discussion

S.No	Items	Particulars	Numbers	Percentage
1	Age	Below 10	33	27.5
		10-20	31	25.8
		20-30	48	40
		30-40	8	6.66
2	Sex	Female	55	46
		Male	65	54
3	Marital Status	Married	45	37.5
		Unmarried	60	50
		Widow/widower	15	12.5
4	Educational Qualification	Primary Level	25	20.84
		Secondary Level	30	25
		Graduate	45	37.5
		Uneducated	20	16.66
5	Participation Of Physical Activity	Once daily	40	33.33
		Twice daily	25	20.84
		When I'm free	36	30
		Weekly once	19	15.83
6	Per Day Working Hours	20 Minutes	35	29.16
		1/2 Hours	48	40
		45 Minutes	20	16.66
		1 Hours	17	14.18



7	Current Level Of Fitness	Perfect	59	49
		Very Good	30	25
		Good	21	17
		Average	10	9
8	Physical Fitness Related To The Issue& Lean Tissue	Flexibility	39	32.5
		BMI	22	18.5
		Body Composition	38	31.5
		Full fitness	21	17.5
9	Activities To The Physical Fitness	Gymnastics	26	21.66
		Sprinting	20	16.66
		Swimming	34	28.33
		Running	40	33.35
10	Reduce The Stress	Yes	70	60
		No	50	40
11	Creative Ideas Of Any Task	Agree	48	40
		Strongly agree	22	18.31
		Disagree	34	28.34
		Neutral	16	13.35
12	Sports Can Help Attain The Goal	Agree	35	29.16
		Strongly agree	28	23.34
		Disagree	27	22.5
		Neutral	30	25
13	Maintain The Good Health	Agree	39	32.5
		Strongly agree	21	17.5
		Disagree	36	30
		Neutral	24	30
14	Fitness Make Fresh In Every Day	Agree	44	36.66
		Strongly Agree	37	30.83
		Disagree	13	10.84
		Neutral	26	21.67
15	Sports And Fitness Can Help To Maintain Young Body	Yes	85	70.8
		No	35	29.2

## Findings, suggestions and conclusion

### Findings

1. Majority of the sample respondents belong to the age group of 20-30.
2. 54% of the sample respondents are Male.
3. Majority 50% of the respondents are unmarried.
4. Out of 120 sample respondents 37.5% are graduates.
5. 40 % of the sample respondents are daily working their physical activities.
6. Majority 49% of the respondent's current level fitness is perfectly.
7. 33.5% of the respondents their getting fitness from doing running.
8. 60% of the respondents agree the sports help their fitness
9. 40% of the respondents to agree the sports & fitness to help creative ideas of any task.
10. Majority of the sample respondents 29.16% to agree sports & fitness can help the achieve their goal.
11. 32.5% of the sample respondents to agree sports & fitness to maintain the good health
12. 36.66% of the sample respondents to feel the sports and fitness to make a fresh in every day.

### Suggestions

- Engaging in a sport can help increase feelings of self-esteem and self-confidence, which can be a powerful mechanism for stress relief.
- Playing sports helps to take our mind off of whatever is troubling us.
- Exercising on a regular basis increases emotional well-being. Active individuals report less stress in their lives.
- Exercising or being active boost the endorphins that make you feel emotionally and physically good.
- Physical activity helps increase the brains neurotransmitters that make a person feel good.
- Regular exercise increases self-confidence and lowers the chances of getting mild depression and anxiety. Also regular exercise improves a person's sleep where anxiety, stress, and depression can occur from. A physical activity improves the attention span during the day, helps the ability to focus on one thing at a time without feeling overwhelmed or anxious.

- Also helps people lose weight and lower the risk of getting a disease and exercising can help a person age well.
- Exercising is important as it can benefit the entire human body. Getting the right amount of exercise can increase energy levels and improve your mood. Experts have found that teens need about an hour of physical activity each day because of many reasons. It can help people with their self-esteem, mood, sleep pattern, etc.

### **Conclusion**

Playing sports help us in building and improving confidence level. If we practice sports on regular basis, we can be more active and healthy. Being involved in the sports activities help us in getting protected with numerous diseases such as arthritis, obesity, obese, heart problems, diabetes, etc. Sports in a way are a great source of knowledge of what life is. We develop skills like Leadership, Teamwork, Patience, Competitiveness and Determination of Success. These are some of the good and must qualities that a person must have in his/her own life. Sports are generally played for fitness, passion and success. A sport is a mode with the help of which a kid is introduced into a different dimension completely. He is exposed to a new outlook to develop his interest and optimistically channelize his efforts to a way. Thus, whenever you search for your child's right education, don't forget to think about including the importance of sports activities too. It will assuredly help in the holistic growth of your kid. All in all, sports are the best way to help your body regulate itself in the urban setting where we do not use our bodies as much as we should. Like with many other things in life you have to maintain the right attitude, stay disciplined and finds the right balance and all will be good.

### **Bibliography**

1. Inslee V, Melded H, Mashiah S, Monselise M, Lunenfeld B, Rabun E. Functional classification of patients selected for gonad tropic therapy. *Obstetric Gynecol.* 1968; 32:620–6.
2. Collins BC, Rake RW, Larson AA, Baumann CW, Xie N, Cabelka CA, et al. Estrogen regulates the satellite cell compartment in females. *Cell Rep.* 2019; 28:368-381.6.
3. Sepia S, Finnie T, Covalent V. Estrogen influences on neuromuscular function in post-menopausal women. *Calcify Tissue Int.* 2015; 96:222–33.
4. Wireman ME. Sex steroid effects at target tissues: mechanisms of action. *Adv Physiologic Educ.* 2007; 31:26–33.
5. Gnus, D., Rental, S., and Wiles, J. (2013). Making sense of big text: a visual-first approach for analyzing text data using Leximancer and Discourses. *Int. J. Soc. Res. Method* 1. 16, 261–267. Doi: 10.1080/13645579.2013.774186

6. Boyle, R. (2017). Sports journalism: changing journalism practice and digital media. *Digit. J.* 5, 493–495. doi: 10.1080/21670811.2017.1281603
7. Brennan, C. (2021). NWSL Teams are Riding Social Media Growth into Milestone Season. Available online at: <https://justwomenssports.com/nwsl-teams-are-riding-social-media-growth-into-milestone-season/> (accessed September 20, 2021).
8. Bruce, T. (2016). New rules for new times: Sportswomen and media representation in the third wave. *Sex Roles* 74, 361–376. doi: 10.1007/s11199-015-0497-6
9. Burton, L. (2015). Underrepresentation of women in sport leadership: a review of research. *Sport Manage. Rev.* 18, 155–165. doi: 10.1016/j.smr.2014.02.004
10. Gerber, E.W., Fleshing, J., Berlin, P., & Wyrick, W. (Eds.). (1974). *The American woman in sport*. Reading, MA: Addison-Wesley.

**IMMIGRANT EXPERIENCE IN NOVIOLET BULAWAYO'S *WE NEED******NEW NAMES*****B. Jessy Brightlin**

PG and Research Department of English, St. Mary's college (Autonomous),  
Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

**ABSTRACT**

This paper explores the notion of home in Noviolet Bulawayo's debut novel *We Need New Name*. Africa is seen as a continent of diaspora and identity crisis, political instability caused by poverty. It explores the relationship between the individual and society, and the role external social forces such as place, community, and language play in individual identity formation. Political instability deals with the theme of politically corrupted society and it historically explains the higher-class domination towards the ordinary people. Bulawayo's life experience has been a great factor in her creative writing and in creating her character. This feeds on the experience she made growing up in Zimbabwe and her transition to her following life in U.S. The story centres around the life of a young girl named Darling who always with her friends, lived in the shanty town called Paradise ironically named. Later the second shift, Darling away to America by her Aunt Fostaline. In America she experiences the new space in complicated ways that she never imagined. This situation to be changed as a whole. After the Migration she recollects all the past memory in the novel.

**Key Words:** Darling, poverty, Diasporic, Identity, political Instability.

*We Need New Name* is the debut novel Noviolet Bulawayo, a young writer born in Zimbabwe and relocated in the USA at the age of 18, defined for this reason a "child of two lands". The novel itself was born out of the living in-between these two realities and the physical dividing them. This novel discourse on twenty-first-century African diaspora aids to rethink current method of thinking about migration and blackness. The story centres on the life of a young girl named Darling who lived in a shanty town called paradise is a fictionalised description of Zimbabwe. Moving from the home makes Darling, Chipso, Bastard, Godknows and other friends find ways to enjoy themselves by making games and routing towards the Budapest, the neighbourhood town. To steal

guavas where it occur plenty. In their games, we can find the children's dream of leaving their shanty town Paradise for prosperity and for big cars and of fancy houses, but it's largely seen as a game. Then in a sudden shift, Darling is moved away to America by her Aunt Fostaline and the second half of the book follows her life there as she fights with an American where she faces complexity of life and it is less attracting than she had imagine.

Darling was influenced by backward culture in Paradise, which was poor technological development. Her direct contact to digital technology begins when she moves to Michigan and succeeds in it. Television and the Internet become her primary source of information helping her to fit in, especially since her Aunt and Uncle, who are immigrants themselves are unable to provide roadmaps. She observes the American culture hastily and makes open her hands on to welcome the new thing and lead it, even though she doesn't clearly believe in the superiority of that culture. Early in her move, she says that she has;

Decided the best way to deal with it all is to sound American, and the TV has taught me just how to do it. It's pretty easy, all you have to do is watch Dora the Explorer, The Simpsons, SpongeBob, Scooby Doo. I also have my list of American words that I keep under my tongue like talismans. Ready to use: pretty good, pain in the ass, for real, awesome, totally. Skinny, dude. The TV has also taught me that if I'm talking to someone, I have to look him in the eye, even if it is an adult, even if it's rude. (193)

This shows her acceptance. Though Darling accepts this form of popular culture, she does it outwardly. She uses these Americanisms to protect her from the unfamiliar world, but still American culture remains as a vague thing to her. She is confused about her challenges in American society, constantly seeing herself as outside it trying to fit in. She fails, because her aim for America is not what she faces here, rather than create an identity for herself. Her only relationship with digital technology is informative and helpful to her in the new land. In Darling's case the presence of digital technology does not help her to become American. However, her culture and herself dominates and she is affected by her home going syndrome and fully filled with nostalgic feeling these things act as a barrier to her, to become an American.

At first, in America she feels everything new to her and it totally differs from her Paradise. She is not familiar with her new surroundings. The great challenge she faces in

the beginning is the climate. The cold climate in America makes her realise the beautifulness of warmth in Paradise. She starts to compare the new surrounding with her old and continued this type comparison throughout her life in America. The new America doesn't do anything new to her and she searches her homeland in America but it is not like her country and her people. It shows that her dream for America fails here the climate makes her to remain all the day inside the house where she is surrounded by an unknown setting in Detroit, she initially expects and thinks everything will turn good as she desires and continues her life. It is winter when Darling arrives to Detroit and she was unaccustomed to snow, she hopes to see a known and familiar landscape when it melts.

Once the snow is gone it will be possible to go outside and see what this Detroit is all about. Maybe I will finally see things that I know, and maybe this place will look like ordinary at last. I will go out there and smell the air, maybe catch some grasshoppers and find out what kind of strange fruits grow on all these big trees. (159)

The new place is alien to her and makes her to think the new atmosphere as a ghost like place. Darling is constantly betwixt and between two different cultures and lives liminal and temporally trapped in between the idealised past in Paradise and the future oriented my America. With regards to a sense of home in Darling's mind she has only two, she says. “There are two homes inside my head: home before Paradise, and home in Paradise; home one and home two” (291).

In the novel and as in real life, language is a shared knowledge system which plays a role in perpetuating culture, shaping cultural identities and even determining social class. In the community of Paradise, English is revered as a powerful language, and the ability to speak it is a key to ascending in social rank. Despite being her junior, Darling looks down upon Mother of Bones when singing a hymn at church “because she doesn’t know all the English words because she doesn’t speak the right English because she didn’t go to school” (Bulawayo 32) yet ironically, Darling’s English is frequently littered with such run-on sentences and repeated conjunctions

When Darling moves from Zimbabwe to America, her status as an English speaker falls drastically from being seen as at least semi-proficient to that of a lowly English student. This has an impact on both her identity and social capital in her new country. She regrets that he problem with English is

You usually can't open your mouth and it comes out just like that - first you have to think what to say. Then you have to find the words. Then you have to carefully arrange those words in your head. Then you have to say the words quietly to yourself, to make sure you got them okay. And finally, the last step, which is to say the words out loud and have them sound just right. (Bulawayo 195)

Darling unable to join the fluent-English middle social class, forms her own socio-lingual subgroup with her two other African expatriate friends, Marina and Kristal, and they engage in their own 21st century technological lingua franca, with elements borrowed from their new American culture:

Wt u doin?

nuthin. trynna study stupid bio...

lol, y is it stupid? I kinda lykit...

thts coz u wanna be a doc. nt feelin it...

wl u know my dad wants me to. n-e-ways wt u gonn do? (Bulawayo 277)

Aunt Fostalina's character delves deeper into the assimilation of the American identity and the way she wishes to be seen, as an American. It seems farcical and a mockery of living the American Dream. She starves herself in order to achieve the beauty standards she has internalized through media, tries to speak in the American accent in the hope that she will not be treated as the 'other' and hence with respect. Back home, she is perceived as a successful immigrant who has been successful in achieving the American Dream as she is able to send money to her family, but the reality is daunting. She is still treated as a 'foreigner' and hasn't been accepted by the society as one of their own. She has lost her true self in the hope of being socially accepted and treated as an equal. The imitation, the innate desire to belong to America gnaws away at her individuality and the narrative finds her struggling to comprehend and accept her position that she will always remain the 'other'. The employment conditions of illegal migrants are deplorable as is evident in the narrative and describe that Darling and multiple other immigrants from different nations have to resort to all kinds of jobs in order to earn money. Their illegal status prohibits them from applying for positions that might be less exploitative and more aligned to their education and work experiences but they are never able to.

In *We Need New Names*, it is not only people who lose their identity: countries and entire continents do also. Darling describes the complex and confusing identity of Zimbabwe, itself renamed from Rhodesia, resulting from its colonial history and ongoing political turmoil.



There are three homes inside Mother and Aunt Fostalina's heads: home before independence, before I was born, when black and white people were fighting over the country. Home after independence, when black people won the country. And then the home of things falling apart, which made Aunt Fostalina leave and come here... There are four homes inside Mother of Bones's head: home before the white people came to steal the country and a king ruled; home when the white people came to steal the country and there was war; home when black people got our stolen country back after independence; and then the home of now. Home one, home two, home three, home four. (Bulawayo 192-3)

The political violence in Africa affects the human rights of the people. They were not allowed to vote independently and if they vote against the government independently on the basis of their wish, it was not accepted by the government. This result is the consequences of Paradise people. They were not allowed to live freely as their wish and not even allowed to vote independently or express their thoughts. Bornfree, who raised his voice for rights and against the government, is brutally killed by his opposition party member. When Bornfree raised his voice against the system and makes the people realise the real development and induce them to make new government system. His rebellious thought was not endured by the opposition party, so they took revenge by killing him and described as a terrorist. The opposition people caught him beaten and says, Who is paying you? America and Britain? Why don't you scream for America and Britain to help now? Friend of the colonist! Selling the country to whites! You think you can just vote for whoever you want? Vote right now, we want to see, sell out! You want change, today we'll show you change! Here's your democracy, your human right, eat it, eat eat eat! (Bulawayo 144)

By doing like these the rebellions prove that if anyone talks against the government they too will meet the same end. When Bornfree's mother is crying out nobody helps and rescue her son, the people were ordered by the authoritarian not to help him. These incidents cause extreme fear in the mind of the people living in Zimbabwe. The main political parties were taking this matter for attention seeking from his death. His death is an unthinkable in African culture where the dead including those who might have been saintly in their earthly business, are expected to be respected. Bastard's rude reply to the BBC reporter it shows that the young children in the country also aware of politically sensitive subject in his country.

Political instability is also found in America, which is a new paradise for Darling. Where children bring loaded guns to school and watch pornography instead of doing homework and lie that they are going to study while they go to partying and steal parent's cars for joy rides. We also find everywhere police with weapon to spot and arrest the black youths as terrorist, it shows the superiority of the country. In America parent's neither do not care their children a lot nor maintain family relationship. Uncle Kojo and Aunt Fostaline faces lot of problems as they come from different part of America they get married but never tries to build bridges to connect their two worlds instead they settle with borrowed culture in the new land but it is not adequate to them. They always give the view that two of them are individuals sharing the roof and not live as a family. Tk his son never asks about his suggestion, he himself joins the military even though he rejects Kate, Eliot's daughter attends one of the best school in America yet she is not happy and malnourished, she cannot eat the food still she has plenty of food in the fear of gaining weight which is being labelled by her society as ugly and her boyfriend neglects her in the past as she gained weight even though she was more beautiful. And the society reflects single parent family set up as fine for them but it affects their own children and this is clearly seen in the life of Kate, Tk, Darling and other children of Africa and their suffering shows the impact of fatherless or motherless condition of offspring is loud and worst. Kate and Tk badly need their mother, Darling misses her father and awaits a long time for her father who leaves her homeland to South Africa and returns with AIDS. Some children suffer by missing both their parents.

From this political instability we learn things fall down and everything in the country is destroyed. It also shows the victory for one politically charged group which meant doom for the others. It doesn't require a political science professor to conclude that a political and economic thunderstorm is occurring and a quick solution for their sufferings.

*We Need New Names* can all be read as a fictional depiction of what the current immigrant experience is for many immigrants today all over the world. It may be that their heritage cultures are too different and because of their divergence, many people therefore end up as marginal. At the end of the novel, Darling regresses to a melancholic attachment of their past.



### **Work Cited**

Bulawayo, NoViolet. *We Need New Names*. 2013. London, Vintage, 2014.

Bulawayo, No Violet. Interview by Jill coats. British Council voice 20 Sept. 2013.

Chitando, Anna. “The Girl Child’s Resilience and Agency in NoViolet Bulawayo’s *We Need New Names*” *Journal of Literary studies*.

<http://www.littlebrown.com/rgg/WeNeedNewNamesReadingGroupGuide.pdf>

**POSTCOLONIALELEMENTIN AMITAV GHOSH'S  
*THE GLASS PALACE***

**S. Madhumitha**

PG and Research Department of English, St. Mary's College (Autonomous) Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

**ABSTRACT**

Indian writing in English reveals the dialectics of imperialism in its journey from the periphery to the centre and echoes a deep core of neo-colonialism based on power politics. Amitav Ghosh, one of the widely known Indian writers, is a serious novelist and anthropologist writing from a postcolonial consciousness. He belongs to the nation that was once conquered and ruled by Imperial Britain. The novel *The Glass Palace* is a saga about three generations of two closely linked families in Burma, India and Malaya. Identity construction has been thus discussed time and again, but one must acknowledge that an individual's identity is to a large extent formed by his or her social location which includes his or her race, class, gender etc. Amitav Ghosh's novels present characters engaged in search for their identity and of reason, and truth. In this sense, they are veritable discourses on human quest. Colonization makes the people completely unconscious of their roots and makes them feel alienated in their own country. The research paper aims to explore the postcolonial elements in Amitav Ghosh's *The Glass Palace*.

**Keywords:** Hybrid Identities, Displacement, Alienation, Postcolonialism, Imperialism.

A powerful, postcolonial writer Amitav Ghosh is probably the most scholarly practitioner of the by-now-distinct genre of Indian writing in English. Ghosh has produced some of the most lyrical and insightful works on the effect of colonialism on the native people. He occupies a curious place in the landscape of contemporary English-language authors from the Indian subcontinent. Ghosh's fiction has, over the years, pushed at the boundaries of the genre, probed its unlit corners, and brought it into powerful dialogue with other places, peoples and times.

With his *The Glass Palace*, a 500-page magnum opus Ghosh returned to a more traditional, though hardly less challenging form, the historical novel. Almost unique in its attention to proximate regions beyond the immediate subcontinent, Ghosh's fictional work is enriched by its roots in his own travels, encounters and research. The novel visits the regions where the displacements of colonialism and war became the mass experience of

millions, generating enormous suffering but also the making of new communities. Palace moves with an epic sweep across the late 19th century to the present-day, knitting together the stories of the doomed last King of Burma and his family, their servant, Dolly, an Indian-Burmese orphan named Rajkumar, and Uma, a widow who becomes a famous participant in the Indian freedom struggle. As it illuminates the links between the histories of India, Burma and Malaysia, the novel reminds us that the texture of history is always to be felt in the complex predicaments of individuals and families. In her review of the novel critic Ira Pande stated that: “Ghosh, a historian by training, an adventurous traveller and a sensitive writer of fiction, it becomes a confluence of all three” (70).

Postcolonial and post-partition Indian authors use novels as a vehicle for cultural representation, emphasizing the silencing and marginalizing of the post-colonial voice by the imperial centre. Amitav Ghosh’s writing has been impacted by the political and social climate of India and the liberation movement. Amitav Ghosh combines history and fiction to explore pre-colonial, colonial, and post-colonial India in his novels.

*The Glass Palace* is a historical fiction book that examines the cultural recoding of Indian society and identity in Burma in the late 19th and early 20th centuries. Immigrant experience, loneliness and alienation due to lack of flexibility, and an inability to connect with their surroundings are the major themes of the novel. Rajkumar is a self-made individual who transforms an exiled nation into a prosperous one through the teak, rubber, and slave trades. He seeks out Dolly and weds her with Uma’s help. Raj Kumar’s delight comes from his adopted nation, while Thebaw and Supalayay continue to be remembered by their nation. This book depicts human powerlessness, conflict and displacement, exile and rootlessness, and the mingling of races and classes. It conveys the hopes, setbacks, and disappointments of displaced people.

Postcolonial theory looks at the broader interactions between European nations and the societies they colonized, emphasizing hybridity and the mingling of cultural signs and practices between colonizer and colonized. Amitav Ghosh is a postcolonial writer who examines colonialism through dialogical exchanges between words. *The Glass Palace* presents a counter narrative to colonialism, emphasizing how imperial forces develop a corpus of thought and practise to achieve their objective. Identity is now seen as temporary and contextual, linked to shifting power dynamics and cultural settings. Saya John’s dual identity destabilizes imperialist notions of identity. The postcolonial viewpoint understands that all cultures are hybrid, heterogeneous, and unmonolithic, and how power interacts with identity. “Colonialism created non-mutual and hierarchical relations in which

the colonizer was always inescapably the Self to the marginalized Other of the colonized” (Griffiths 165).

The distinction between a native and an alien is no longer based on some fundamental geographical classification but based on absolute and final concepts like the unique sociohistorical, political, and cultural setting. Instead of Mandalay, her earlier Burmese national home, it is Ratnagiri that gives her a feeling of home, ““And where would I go?” Dolly smiled at her. ‘This is the only place I know. This is home’” (Ghosh 119).

*The Glass Palace* reveals the plans of colonialists to justify their involvement and challenge imperialistic notions of fixed and monolithic identity. It also makes the case against imperial countries’ right to establish standards for others. Uma and Dolly expose the colonial authorities’ attempt to usurp Indian culture, but Dolly’s counter questions reveal the falsity of these accusations. The acceptance of colonial culture resulted in a mimicry of the centre, leading Indian soldiers to immerse themselves in the imported culture, denying their origins.

The postcolonial viewpoint looks at how language was used to achieve colonial power, with the top of Indian culture and educated population taking pleasure in using English. *The Glass Palace* rejects the reconstruction of pre-colonial reality as a form of decolonization and promotes the idea that all forms of colonialism should be resisted and eliminated. Novelistic discourse reveals the many manifestations of colonialism and imperialism through the experiences of three generations. The despotic and imperialist actions in Burma highlight the diversity of viewpoints and voices within a culture, which are exploited by both British and native administrators.

The postcolonial discourse in *The Glass Palace* is an open-ended and decentralized enterprise that criticizes the view that associates colonial thinking to the western powers only. Dinu and his young wife, Daw Thin Thin Aye, expose how the oppressive forces in Myanmar exercise their control and use brutal force to justify their practices. The postcolonial perspective does not challenge imperial powers through nationalist assertion, but rather challenges the worldview based on the polarity of governor and the governed, ruler and ruled as essentialist. This view envisions a world free from the politics of power.

Rajkumar is a vagabond whose personal past is intertwined with colonial history to construct and destroy histories. Rajkumar and Saya John, two Malaysians and Indians, relocate from Burma to India and Malaysia in search of refuge, but their dual identities prevent them from adhering to a certain national identity. Uma Dey is a self-assured person

who fights for peace and non-violence, escaping Hindu widowhood and becoming a pivotal character in the fight for independence. Uma, the wife of an Indian officer, realizes that British imperialism is not the only force fighting against the spirit of mankind, and sets herself against the colonizing mission to liberate India.

Such a realization has a long history in both British and Indian history. As Indians and Burmese struggle over separating Burma from British authority, Uma's eyes blaze. Rajkumar, a neo-colonist, is criticized by Uma and called out for, "It's people like you who're responsible for this tragedy. Did you ever think of the consequences when you were transporting people here? What you and your kind have done is far worse than the worst deeds of the European?" (Ghosh 247).

Arjun is a Bengali officer in the British Army who rebels against the authorities and learns about his loss of identity. He is an example of the influence of western academic disciplines and his recognition of colonial rulers' supremacy. Arjun's struggle to reconcile his patriotism and devotion to the British leads him to protest against the Empire to protect the interests of the locals. Ghosh's story rejects a rigid idea of human identity and presents a dialogical viewpoint on humanism, advocating for total freedom, sovereignty, and dignity.

Amitav Ghosh has experimented with new methods to express exceptional ideas, including polyphonic manuscripts, which are collections of multiple voices and heteroglossia is assumed as the social assortment of speech. Amitav Ghosh's *The Glass Palace* is a polyphonic novel that explores the influence of colonialism on the social, cultural, and political lives of the people of the colonized country. It follows Jaya's son Rajkumar, who is the speaker of the story and reflects on his childhood memories of his great aunt Uma and his great grandfather. The novel also features other stories interlaced into the surface, making it a polyphonic novel.

Ghosh's novel *The Glass Palace* uses polyphony to explore the splendour of Dolly, and the narrator is an eleven-year-old urchin Rajkumar who is awestruck by the palace. The omnipresent narrator of the novel, Ghosh, presents the history of India and Burma through the eyes of the colonized people. The narrator has a keen eye for minor details, such as Raj Kumar's story of success, which illustrates how colonialism is a process where people and values are always compromised. The narrator also reveals the irony of the situation, showing how the Burmese were oppressed and exploited while the Indians were given much chances to flourish. In analysing the splendour of Dolly, Ghosh makes use of polyphony. Her loveliness, when imitated through 'multiple voices' becomes all the more

stimulating. In Rajkumar's variety, she seemed to be beautiful beyond acceptance. He says, "She was like the palace itself, a thing of glass, inside which you could see everything your imagination was capable." (Ghosh 144)

The novel has polyphonic voices, independent individuals whose truth emerges in contact with another. Character focalizers expose the reality of British Empire, exploiting young English men to extend its hold and strengthen its power. Ghosh uses Aung San Suu Kyi as a symbol of the voice rising for the dignity and sovereignty of man. Ghosh uses polyphony and heteroglossia to explore different possibilities through dialogism, exposing the role of socio-political institutions in stifling human voice.

Thus, the paper analysed the postcolonial elements in the novel, *The Glass Palace*. The complexity of *The Glass Palace* is astounding. Amitav Ghosh poignantly depicts the struggles of Rajkumar and his family; their struggle for survival through the political and social turmoil. The historical descriptions are so dynamic and montage of image of the myriad sounds, smells, sights and feelings of that period. The key theme of *The Glass Palace* is colonialism. The characters are oppressed by colonialism because of this colonialism they lost their identity and they are striving to get back the recognition. *The Glass palace* is about human relationships, love, and loss; a slow unravelling of memory in the passage of time.

### Works Cited

Ghosh, Amitav. *The Glass Palace*. Harper Collins Publishers, 2017.

Griffiths, Gareth. "The Post-Colonial Project: Critical Approaches and Problems."

*New National And Post-Colonial Literature: An Introduction*, edited by Bruce King, Clarendon Press, 1996.

Pande, Ira. Review of *The Glass Palace*, by Amitav Ghosh. Outlook, 2001.



**‘PEDERASTYEROMENOS’: A STUDY OF NARRATIVE, MEMORY AND GENDER IN MADELINE MILLER’S**

***THE SONG OF ACHILLES.***

**R. Nazhath Rizwana**

PG and Research Department of English, St. Mary’s College (Autonomous), Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

**ABSTRACT**

There are legends and stories that represent Achilles as a hero, claiming him to be the greatest of all Greek warriors and mostly talks about his skills in warfare. Madeline Miller’s novel *The Song of Achilles* shows a different perception about the great Achilles. This novel of Miller in a unique manner unfolds the homosexual relationship and love between Achilles and Patroclus. The entire novel is narrated from the perspective of Achilles’ highborn companion Patroclus right from their first meet to their inseparable death. This paper through the relationship of Achilles and Patroclus brings out the narrative, memory and gender which plays an important role in shaping the novel.

**Keywords:** Pederasty, Eromenos, Erastes, Myth, Trojan war.

Madeline Miller is an American Novelist. She has a BA and MA from Brown University in Latin and Ancient Greek. She has also studied at the Yale School of Drama and has also specialized in adapting classical tales to modern Audience. *The Song of Achilles* is Miller's first novel. It is a 2011 novel, which is a retelling of Homer's *Iliad* from Patroclus' point of view and is set in the Greek Heroic Era. With a focus on their romantic relationship, the book covers Patroclus and Achilles' relationship from their first encounter to their adventures during the Trojan war.

Mythology has been a crucial component of human narrative for thousands of years and the American literature draws on a wide variety of mythical traditions. American literature and mythology have a complicated relationship. The use of conventional myths and tales as source material is one way mythology shows up in American literature. For instance, numerous American authors have transformed Norse tales like the tale of Ragnarok or Greek myths like the tale of Orpheus and Eurydice into new works of fiction. Mythology also plays a larger role by offering a collection of archetypes and

symbols that authors can use to infuse their works with meaning. For instance, the hero's journey, a form of narrative that may be found in many mythical traditions, is a recurring subject in American literature, from *Huckleberry Finn's* experiences to *The Great Gatsby's* pursuit of the American Dream. The relationship between American literature and mythology is complex and multifaceted, with mythology serving as a rich source of inspiration and meaning for writers across many genres and traditions.

Just like the other works of American literature, Madeline Miller in her novel *The Song Of Achilles* takes mythology as a source material and frames her story plot. Miller's novel is based on Homer's *Iliad* which explicitly discusses about the Greek mythological hero Achilles. When Homer in his poem brings his main concepts as the end weeks of Trojan war and life of great hero Achilles, Miller in her novel interprets this concept of Homer by retelling the life of Achilles through the narrative of Patroclus who is the major character in Miller's novel but a very minor character in Homer's poem. Patroclus is shown just as a mere friend of Achilles in Homer's poem, whereas Miller in her novel shows him as lover and a high-born companion.

Miller has made Homer's minor character Patroclus as her narrator. Through his narratology, the narrative techniques of Miller such as foreshadowing, imagery, flashbacks, symbolism and allusions are explained. A first-person point of view is one of the main narrative devices in the book. The reader may comprehend Patroclus's thoughts, feelings, and motivations because the story is recounted from his point of view. The story is more captivating and emotionally resonant as a result of this personal perspective, which forges a deep emotional bond between the reader and Patroclus. The work also uses a non-linear style for its storyline. The narrative is told through a sequence of flashbacks and memories, allowing for the investigation of memory and how it affects the sense of self in the characters. When the reader pieces together the sequence of events that lead to the story's conclusion, this literary method builds tension and suspense. Miller enhances the story of the book with symbolism and imagery. For instance, the sea is a reoccurring theme in the narrative and stands for both risk and opportunity. The use of imagery and symbolism deepens the meaning of the story and makes reading more engaging.

Miller gives each character a unique narrative voice by using language and dialogue. Patroclus has a more reflective and expressive voice than Achilles, who speaks in a more formal and heroic manner. The characters' personalities and goals are more

subtly portrayed through language and discourse used to separate them from one another. The narrative strategies used in *The Song Of Achilles* contribute to the creation of a rich and compelling novel that covers difficult concepts like love, gender, and bravery. The novel's strength and emotional resonance are a result of the first-person point of view, non-linear narrative structure, symbolism and imagery, and distinctive narrative voices. The Trojan War's events and their relationship with Achilles are seen through Patroclus' perspective. Throughout the course of the book, Patroclus is a complicated character, experiences substantial growth and development. He is a shy, insecure little child at the beginning of the novel, and his father views him as a disappointment. But when he is transferred to live with Achilles and his father, Peleus, his life takes a drastic change. He discovers love and acceptance there, and his friendship with Achilles becomes the plot's main focus.

Patroclus, the narrator, offers a distinctive viewpoint on the Trojan War's events. He is not a hero or a fighter; rather, he is a spectator who views and participates in the conflict from a distance. In contrast to the heroic and romanticised picture of the war that is frequently portrayed in literature, this enables the reader to perceive the human aspect of the conflict. Furthermore, the story is given further emotional depth by Patroclus's love for Achilles. The ultimate expression of their love, his sacrifices for Achilles are the result of his unshakable commitment to Achilles, which is both beautiful and devastating. The voice Patroclus provides for *The Song Of Achilles* is outstanding. One can see the human aspect of the Trojan War through his eyes, and his love for Achilles lends an emotional depth to the narrative that is both potent and moving. Among the narrative techniques which are used by Miller in her novel flashbacks also remain as a major narrative technique. More precisely flashbacks are about the explicit memories of the characters which further prolongs and acts as source of trauma. The Theory of Explicit Memory was first introduced by an Estonian scientist named Endel Tulving in his 1972 book entitled *Organisation of Memory*. Explicit memory is a type of long-term memory that involves the conscious and intentional recollection of past experiences and information. It is also known as declarative memory because it involves the ability to declare or explicitly state the information that is being recalled. The connection between explicit memory and trauma is one of the book's major themes. Both Achilles and Patroclus are plagued by their memories and prior events throughout the entire book. Achilles is driven to pursue glory and immortal fame on the battlefield by the agony of having his mother forsake him as well as his awareness of his

own mortality. On the other side, Patroclus seeks comfort in Achilles' arms as a result of his childhood memories of cruelty and neglect. "I am made of memories" (Miller 350).

It becomes evident later in the book how both individuals' suffering has affected both their personalities and their behaviour. Patroclus battles emotions of inadequacy and a sense of being unworthy of Achilles' love while Achilles contends with his need for glory and fear of dying. Through the course of the book, Miller examines the nuanced connection between memory and trauma, emphasising how trauma can affect how we perceive the outside world and how we view ourselves. The novel ultimately contends that facing trauma head-on, acknowledging and processing the grief, and seeking out love and connection as a form of healing are the only ways to release oneself from the grip of trauma.

Another major theme of the novel is Gender. The novel heavily emphasises how gender shapes the identities and lives of the characters. The idealisation of masculinity and the expectations that go along with it are one of the book's major themes. Achilles is the epitome of the ideal warrior strong, courageous, and adept in battle. On the other side, Patroclus is a gentler and more sensitive figure who tries to conform to the manly ideal but is not able to. He is shunned and mocked throughout the book for not being like other soldiers, and his friendship with Achilles is frequently perceived as shaming men. Yet, the book also questions conventional gender roles by highlighting the strength of Achilles and Patroclus's love as something that defies expectations of gender. The two men fall in love and find solace in one another, and their relationship ends up being the most important thing in their lives despite the pressure from society to conform to a heteronormative ideal.

In the book, Miller primarily employs the characters of Achilles and Patroclus to illustrate the range of masculinity and femininity. In Homer's *Iliad*, Achilles, the most renowned of the Greeks, is characterised by his beauty and might is provided in a gentler way. As in Homer's original story, Miller presents the reader with an Achilles who is motivated by pride, but also by his sense of duty and his undying love for Patroclus. He opposes both the mistreatment of slaves and the standards set by his society for what constitutes appropriate male behaviour and romantic relationships.

Also, as evidenced by the episodes of Briseis' kidnapping and his chat with Peleus, he is regretful when he behaves wrong. Yet, Miller does not absolve him of responsibility when he feels at fault, forcing him to face the consequences. Even though the moral

standards upheld by his civilization are different from those upheld by other societies, he must face the reader and show how his actions are contrary to those that should always be respected. Patroclus serving as the story's narrator was a brilliant choice made by Miller. Without a question, his persona deviates the most from the stereotypes of traditional masculinity. He was previously seen as kind in Homer's poem, being the moral compass for other characters, which was a trait uncommon for men in the ancient society and was developed through his narrative of every occurrence in Miller's work. The reader sees how gender discrimination and injustice have persisted throughout the history through narration of Patroclus. Not being afraid to describe the horrific brutality that women like Brieses had to experience at the hands of males neither ignoring the specifics nor defending the abusers. For everyone who reads the account, he is making it apparent that these moral standards weren't upheld back then, and they still aren't today. As De Beauvoir noted and covered in her writing *The Second Sex*, "whether a woman was a free person or a slave, her rights were severely limited and seldom respected because the male sex was seen as superior and the female sex as an inferior being that had to be subjugated" (9).

According to Gandhi, women have the right to be born free and equal. She is qualified for any role in life. Gandhi forced women to leave their homes and participate in all facets of society. Under his leadership, thousands of women played key roles in independence campaigns. If men and women are essentially the same, their issues must also be the same. Both of them share the same emotions and way of life. The two are essential to one another.

Mahatma Gandhi in his book *Mind Of Mahatma Gandhi* describes;

To call woman the weaker sex is a libel; it is man's injustice to woman. If by strength is meant brute strength, then, indeed, is woman less brute than man. If by strength is meant moral power, then woman is immeasurably man's superior. Has she not greater intuition, is she not more self-sacrificing, has she not greater powers of endurance, has she not greater courage? Without her, man could not be. If nonviolence is the law of our being, the future is with woman. Who can make a more effective appeal to the heart than woman?(12)

Since *The Song Of Achilles'* release ten years ago, society's understanding of societal standards like gender equality and women's rights has undoubtedly changed. The

story of Miller deviates from the prevailing social ideals. Some people disagree with her humanized readings of Homer's characters, arguing that new storylines should highlight their questionable behaviour rather than redeem them. Some do not think she gave her female characters enough credit to be deemed a feminist book. With amazing deftness, Miller introduces these classic masterpieces to a new audience. She addresses the majority of the more pressing historical social issues via her unique lens, highlighting the human qualities of the epic characters who inspired Homer's most well-known works.

Pederasty or paederasty is a sexual relationship between an adult man and a boy. The term pederasty is primarily used to refer to historical practices of certain cultures, particularly ancient Greece and ancient Rome. In the novel through Achilles and Patroclus's relationship one can understand that though initially Achilles is not a man by age, he is a man in terms of his prowess and valour, then gradually when he becomes an adult, he happens to be stronger and his physical features become more manly. On the other hand, Patroclus is considered to be a boy, even in his adulthood as he is not physically strong. Through their relationship and characteristics Patroclus can be considered as 'Eromenos' a younger and passive homosexual companion of Achilles who is the 'Erastes' an adult man and active partner. Hence both Eromenos Patroclus and Erastes Achilles form Pederasty through their purest love. By their pure love and Pederasty, Miller brings out the study of narrative, memory and gender in her novel *The Song Of Achilles*. The novel's narrative structure significantly influences the characters' memories and experiences, which in turn affects how they see and embody gender roles. The majority of the book is told through Patroclus' perspective as he narrates his memories of his time spent with Achilles. The plot is told in a sequence of flashbacks and memories, and the narrative has a non-linear structure. The examination of memory and its effects on the characters' perceptions of their gender identity and sense of self is made possible by this format. Patroclus frequently muses on his background and how his experiences have impacted him as he tells the story. His feelings of alienation and disconnection from conventional gender norms are influenced by his memories of being bullied as a child for not being manly enough and his subsequent expulsion from his home. Similar to this, Achilles' childhood recollection of becoming a male hero and his desire to uphold that standard influence how he views manhood.

The characters' memories and interpretations of events are also impacted by the gender norms placed on them. For instance, Patroclus struggles with the idea of femininity



and the guilt he feels for not being manly enough when he is forced to disguise as a woman in order to hide from his foes. Similar to how his memories of his act and how he perceives them are influenced by his ambition to be a great warrior and keep his macho ideal. The intricate ways in which cultural expectations impact our memories and our sense of self are highlighted by the interaction between narratology, memory, and gender in *The Song of Achilles*. The book questions gender roles and investigates how memory and storytelling might influence how we perceive the world.

### **Works Cited**

- Beauvoir, Simone de. *The Second Sex*. Manchester University Press, 1949.
- Gandhi, Mahatma. *Mind of Mahatma Gandhi*. Oxford University Press, 1945.
- Miller, Madeline. *The Song of Achilles*. Bloomsbury, 2019.
- Tulving, Endel. *Organization of Memory*. Academic Press, 1972.



**REPERCUSSION OF COLONISATION: A STUDY OF NGUGI****WATHIONG'O'SA *GRAIN OF WHEAT*****S. Sudha**

PG and Research Department of English, St. Mary's College (Autonomous), Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

**ABSTRACT**

*A Grain of Wheat* takes place for four days before Kenyan independence in December 1963, the author recalls events that occurred as early as the British colonisation of Kenya in the first two decades of the 20th century, when the British occupiers drove tribal groups off their land, turned them into squatters, and frequently used them as forced labour to advance their expansion across Kenya. The Mau Mau Uprising, also known as the Emergency, in which Ngugi's own family participated, is nonetheless the event that has the greatest impact on the narrative. A coalition of Kenyan ethnic groups, including the Gikuyu, Meru, and Embu, as well as British Army soldiers and Gikuyu who sided with the British occupiers, launched the Mau Mau Uprising in 1952. In *A Grain of Wheat*, the Gikuyu can only confront British oppression through bloodshed. The battle between the coloniser and the colonised is resolved when Kenya declares its independence from Britain at the end of the novel. The moral case against such colonisation by any country remains strong, the author notes that Britain still practises imperialism.

**Keywords:** Colonisation, Imperialism, Gikuyu, Mau Mau, Identity, Domination

Ngugi wa Thiong'owas a Kenyan novelist, playwright, and critic of literature. His books include, *Devil on the Cross* (1977), *Weep Not, Child* (1964), *The River Between* (1965), and *A Grain of Wheat* (1967). The colonial legacy, traditionalism, cultural nationalism, and the role of the intellectual in the postcolony are his key subjects. His works explore the tensions between the present and the past as well as the colonial and postcolonial inconsistencies of Kenyan and Gikuyu society. He is renowned for having the best characterization skills in all of Africa.

Kenyan people are completely helpless in the face of the economic, psychological, and cultural changes brought about by the colonial system of dominance and



expropriation. Social interactions were hampered, and society as a whole disintegrated. Throughout the early colonial assault, the Emergency, and the Mau Mau insurrection, people fall to irrepressible passions against the backdrop of great personal suffering, which leads to a deceitful betrayal of their ethnic ideals as well as of themselves. Fanon in his *“The Wretched of the Earth”* apprehends that Kenyan Uhuru “instead of being the all-embracing crystallization of the innermost hopes of the whole people” turns out to be “only an empty shell, a crude and fragile travesty of what it might have been” (Fanon 121). Shame frequently follows when social failure is realised as a result of social fabric breakdowns. Likely, most traitors don't feel guilty. However, the entire African civilization felt profound regret for its betrayal.

The four protagonists, who had participated in the events leading up to Uhuru, are now held captive by their recollections of their shortcomings. All of the protagonists are overcome with guilt, humiliation, and jealousy on the eve of Uhuru as a result of the oppressive circumstances they had to endure. They feel so uneasy because they can't even trust themselves. Similar to how betrayal symbolises individual guilt, individual guilt also represents the collective guilt of a whole civilization. Everyone who chose not to take part in the struggle for freedom is guilty. Each one of them tries to create a purpose for his life, much as the villager Githua relates his amputated leg to a wound sustained during the battle. Mugo is a strong-willed individualist who finds himself in a dangerous colonial setting at a time when society is rapidly shifting from a lifestyle centred on the community to one centred on the individual.

Mugo has long harboured grandiose fantasies, believing himself to be Moses, chosen to guide the populace into the Promised Land of Peace and Uhuru. But when Kihika shows up in his hut one night, it exposes his self-deception since he prefers to be a Judas to a Moses. Mugo prioritises his survival above all else and prefers to live in exile. Kihika dispels Mugo's delusions that he can achieve social standing through perseverance since he believes Kihika has everything while he, Mugo, has nothing. While Mugo can only dream of power and success, he can never bring himself to take part in the independence struggle. Kihika enjoys the respect of his family and the people look to him as their leader. Seeing that Kihika's presence in his life will undermine all of his ambitions and efforts to succeed, Mugo eventually betrays Kihika.

Man's inner anxieties and goals are frequently rationalised through public activities. In *Guilt: Theory and Treatment*, Edward Stein discusses people with sociopathic personalities. Stein quotes The American Psychiatric Association which refers to such a

personality as “a person whose behaviour is predominantly amoral or anti-social and characterized by impulsive, irresponsible actions satisfying only immediate and narcissistic interests without concern for obvious and implicit social consequences” (85). The inevitable result of Mugo’s efforts to protect his well-being and an act of retaliation against Kihika for crushing his dreams is his betrayal of Kihika. He toiled in a never-ending nightmare with demons for a week after that. Mugo eventually decides to turn against Kihika and the cause rather than stand at the centre of the action because he is unwilling to do so. Mugo’s confession to the D.O. Robinson is his first contact with another man and in this betrayal, he discovers the power and authority of his own knowledge and delicious joy at his daring.

Both Mugo and Gikonyo, another villager, suffer from mental anguish as a result of carrying around remorse for long-hidden atrocities. Despite their attempts to escape their guilt, both men come to the realisation that they can only find forgiveness and solace by voluntarily accepting responsibility for their actions and accepting the consequences. *A Grain of Wheat* makes the case that forgiveness and freedom from guilt can only be attained through frank confession and a readiness to accept the consequences of one’s acts through the parallel travels of Mugo and Gikonyo. Gikonyo and Mugo both conceal shameful secrets from everyone. Even though there is little risk of either of them being discovered, the shame they both carry torments them emotionally, showing what a terrible burden concealed guilt can become.

Although Mugo is falsely viewed by the Thabai people as a courageous, noble hero who provided sanctuary to Kihika, it is revealed in the novel that Mugo was the one who killed Kihika by betraying him to John Thompson to escape the control of the whites. Mugo is tormented by guilt, showing how the internal burden of guilt can haunt and overshadow one’s worldly triumphs, depriving them any rest, even though it is impossible for this to be discovered and his fellow villagers want to make Mugo a chief and a leader. Although Gikonyo does not publicly repent before the novel ends, Mugo’s example inspires him to do so and to make amends with Mumbi, putting a hopeful climax to the tale. Mugo’s sacrifice shows how one redemption may have a good effect on a whole community by not only bringing about his atonement but also sowing the seeds of redemption for Gikonyo.

Colonialism is the practice or policy of people or powers having authority over another people or region. In Ngugi’s *A Grain of Wheat*, he focuses on the fight against the

colonisers for the liberation of Africans. The novel was set in Kenya on the eve of independence and focuses on the events leading up to independence, particularly the gradual awakening of African consciousness against the backdrop of historical events that results in the formation of a party under the leadership of Jom Kenyatta and Harry Thuku for freedom. The novel centres on the white men who attempt to put an end to the independence struggle paralleled by that of the Mau Mau, whose members were captured, imprisoned, and tortured horribly in detention facilities for daring to oppose the colonial administration.

The great warrior Waiyaki, buried by the white masters, protested against British rule. The colonial empowerment and enforcement manifest the power of the colonisers. Meanwhile, Harry Thuku fought against the heavy taxation that made the white settlers rich, so he formed a movement and asked others to be the voice of the movement. Each word from Harry Thuku became news and spread over the ridges in the Thabai village. As a result, the rebellions were hanged and buried by the colonisers. Those who opposed the British rulers were severely punished by the British during the colonial era. They attempt bomb blasts and gunfire among the people, and many warriors are killed.

Gikonyo enters prison with the conviction that the emergency will have a positive outcome. The information that Jomo lost his case, was tried, and was found guilty, however, has severely wounded him. Gatu, the sole pillar of goodness among the inmates of Yala Camp, hangs himself out of despair, further weakening it. The psychological anguish of living in the camps causes him to go through a phase of craziness. He renounces the oath and goes back to Mumbi after his health has been restored. He has made up his mind to accept the deceit that his renunciation implies. Mumbi is currently caring for Karanja's child out of love. This explains why he turned down Mumbi. Kihika is momentarily confused. He persistently makes this argument rather than conceding to Karanja's arguments.

I die for you, you die for me, and we both become sacrifices.

For one another. So I can say that you, Karanja,  
are Christ. I am Christ. Everybody who takes  
The Oath of Unity to change things in Kenya is  
Christ (Thiong'o 110).



People respond in diverse ways to the accomplishments of freedom and this new position, a scenario of independence, is almost imperceptibly a renewal, a new beginning since it provides the Africans with an opportunity to assert their humanity, strengthen their sense of self, and rebuild their lost confidence. *A Grain of Wheat* emphasises the value of effort and sacrifice for the sake of freedom. The phrase sprouts like a sapling and represents how freedom will resurrect the country through the sacrifice and martyrdom of patriots. Mugo also had a fear of home guards, due to Kihika's disappearance, he now has the same dilemma. Fear, sacrifice, guilt, and anxiety are human emotions formed by the colonisers among the African people. If Africans were not colonised by the coloniser, Mugo would not have betrayed Kihika, and Mumbi would not betray Gikonyo.

### **Works Cited**

Fanon, Frantz. *The Wretched of the Earth*. Penguin Books, 1968.

Stein, Edward. *Guilt: Theory and Therapy*. George Allen and Unwin, 1969.

Thiongo wa Ngugi. *A Grain of Wheat*. Heinemann, 1967.

## THE EARLY NATIONALIST

**W. Karolin Reby**

PG and Research Department of History, St. Mary's College (Autonomous), Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

### ABSTRACT

Indian National Congress a Political party from 1885 to 1947 worked for independence of India from British through Ahimsa and satyagraha which occupied a unique position in the world history. It is a national body; it is not a sectional sectarian or communal body, because, it claims to represent all interests and all community, no particular class, on particular interest. Its membership has been and is open to all men and women who love Indian and are prepared to work and suffer for her sake. There were Hindus, Muslims, Parsis, Sikhs, Christians and European and Anglo- Indians. They have contributed more to its growth. It was conceived in the brain of an Englishman and noble minded Parsis, pharos shah Mehta and Dadabai Naoroji. In its initial years the congress was led by a group of leaders known as the Early Nationalists. The members of this group were drawn from the educated middle class consisting of professionals like lawyers, barristers, teachers and officials, who drew inspiration from western thought. Many of them were educated in England and felt that the British intended to be just to Indians but they were unaware of the true state of affairs in India.

**Keywords:** Ahimsa, Satyagraha, India National Congress, Moderates

### Introduction

Indian nationalism arose in the latter half of the 19<sup>th</sup> century as a result of various factors like western education, socio-religious reforms, British political reforms and so on. In 1885, the Indian National congress was formed which played a significant role in India's freedom movement. The movement was initiated by Indian nationalists as well as people belonging to the congress party against British rule. The time period from 1885 to 1905 can be called the 'Moderate Phase'. The leaders of this phase are called moderates.

The history of the Indian National movement can be broadly be divided into three phases:

1. The Early Nationalist phase (1885-1907);
2. The Assertive phase (1907-1916) ; and
3. The Gandhian Era (1915-1947).

### **The Early Nationalists**

In its initial years the congress was led by a group of leaders known as the Early Nationalists. The members of this group were drawn from the educated middle class consisting of professionals like lawyers, barristers, teachers and officials, who drew inspiration from western thought. Many of them were educated in England and felt that the British intended to be just to Indians but they were unaware of the true state of affairs in India.

The Early Nationalists included leaders from all parts of the country as:

1. W.C. Bonnerjee, Rashbehari Ghosh, Surendranath Banerjee and R.C. Dutt from Bengal;
2. DadabhaiNaoroji, Gopal Krishna Gokhale Pherozeshah Mehta and Justice Ranade from Maharashtra and Gujarat;
3. P.R. Naidu, Subramania Iyer and Ananda Charlu from Andhra Pradesh and Tamil Nadu;
4. Pandit Madan Mohan Malviya from Uttar Pradesh;
5. Liberal Englishmen like Hume and Wedderburn.

The Early Nationalist leaders who led the congress and the National Movement in its initial years were staunch believers in open-minded and ‘moderate’ politics. They believed in loyalty to the British crown. B.C. Pal an early nationalist leader, quoted in 1887, “I am loyal to the British government is identical with loyalty to my own people and my own country.” They wanted that Indians should have their proper and legitimate share in the Government.They asked for constitutional and other reforms within the framework of the British rule as they had faith in the British sense of justice and fair play. They believed that continuation of the British connection with India was in the interest of both England and India. They concerned themselves with the demand for reforms.Their demands were moderate in nature.

### **Beliefs of Early Nationalists**

The Early Nationalists had faith in the sense of justice, honesty and integrity of the British. It was their hope that the British would grant 'Home Rule' to Indians. They relied on the solemn pledges made by the British government. They believed that the British rule had many benefits. It aided in cleansing social ills like sati, untouchability and child marriage. They were of the opinion that Britain would help Indians govern themselves according to western standards. They said that the main obstacle in India's progress was social and economic backwardness of Indians and not the British colonial rule. They relied on constitutional and peaceful methods to achieve their aims. They believed in patience and reconciliation rather than in violence and confrontation.

### **Constitutional Reforms**

The Early Nationalists wanted a larger role in the government of their country. They believed that eventually India should move towards democratic self-government. However, they did not ask for immediate achievement of their goal as they feared that the Government would suppress their activities. They, therefore, aimed at winning freedom through a gradual process. They made the following demands:

1. Abolition of India council.
2. Expansion of the Legislative council and Legislative Assemblies-both at the centre and provinces.
3. Increase in the membership of Indians by including some members elected by local bodies like chambers of commerce, universities, etc., in these councils and by giving greater powers to them. They demanded Indian control over the public purse and raised the slogan 'No taxation without representation'.
4. By the beginning of the 20<sup>th</sup> century, they made a demand for Swarajya or self-government colonies of Canada and Australia.
5. Adequate representation of Indians in the Executive council of the Viceroy and those of the Governors.

### **Economic Reforms**

The economic issues raised by the Early Nationalists included:

1. Reduction in land revenue and protection of peasants against unjust demands of the zamindars.

2. Reduction in expenditure on the army and the money thus saved to be spent on welfare activities such as health and education.
3. An enquiry into India's growing poverty and famines.
4. Availability of cheap credit to peasants through agricultural banks.
5. Development of banking, irrigation, medical and health facilities for the people.
6. Industrial growth through trade protection meant that a heavy tax should be imposed on imported goods and the government should give loans for the development of iron, coal, paper and sugar industries in India.
7. Total abolition of salt Tax and the duty on sugar

### **Administrative Demands**

The Early Nationalists made the following demands in the administrative sphere:

1. Demand for Indianization of services through simultaneous Indian civil service examinations in England and India.
2. Complete separation of the executive and the judiciary. They made this demand to protect Indians from the arbitrary acts of the police and the bureaucracy.
3. Increase in the powers of the local bodies and reduction of official control over them.
4. Repeal of the Arms Act and Licence Act.
5. Wider employment of Indians in the higher grades of administrative services.
6. Spread of primary education among the masses.
7. Improvement of the police system to make it honest, efficient and popular.

### **Defence of Civil Rights**

The Early Nationalists defended civil rights whenever the British government tried to curtail them. In fact, it was because of the political work done by the Early Nationalists that democratic ideas began to take root among Indians. The Early Nationalists demanded the following civil rights:

1. Removal of the restrictions imposed by the British Government especially freedom of speech, and the Freedom of the Press.
2. Abolition of the preventive Detention Act and restoration of individual liberties.
3. Restoration of right to assemble and form associations.



The Early Nationalists were practical; they wanted to win freedom by a gradual process. They did not aim at high demands because they wanted to work on the lines of least resistance. Besides, they did not want to arouse serious opposition.

### **Methods of Early Nationalists**

The method popularly known as constitutional Agitation Method was followed by the Early Nationalists. They believed in the policy of constitutional agitation within the legal framework, and slow orderly political progress. The methods adopted by the Early Nationalists had two objectives.

#### **Methods**

Their first objective was to educate people in India in modern politics, to arouse national political consciousness and to create a united public opinion. For this purpose, they relied on the following methods:

1. They held meetings where speeches were made and resolutions for popular demands were passed.
  2. They made use of the press to criticize government policies.
  3. They sent memorandums and petitions to government officials and the British parliament. These petitions were carefully drafted with facts and arguments. Though these petitions were addressed to the government, their real aim was to educate the Indian people.
1. They made use there p's i.e. petitions, prayers and protests. They sent petitions, requests and letters of protest to the British government to look into the problems of the Indians.
  2. A British committee of the Indian National congress was set up in London in 1889, which was published as a weekly journal, to present India's case before the British public.
  3. Deputations of Indian leaders were sent to Britain. These political leaders carried on active propaganda in Britain. For example, Dadabhai Naoroji spent a major part of his life in Britain to create awareness among British people and politicians about the plight of Indians.

## **Achievements of the Early Nationalists**

The Early Nationalists represented the most progressive force of the time. They made the following contributions to the Indian national movement:

1. The Early Nationalists created national awakening among people that they belonged to one common country India. This made Indians conscious of the bonds of common political, economic and cultural interests that united them.
2. The Early Nationalists trained people in politics by popularizing the ideas of democracy, civil liberties, secularism and nationalism.
3. The Early Nationalists did pioneering work by exposing the true nature of the British rule in India. They made people realize the economic content and character of British imperialism. By doing so, they weakened the foundations of the British rule in India.
4. Their political and economic programmes established the truth that India must be ruled for the welfare of the Indians.
5. The efforts of the Early Nationalists led to the following reforms:
  - The appointment of a public service commission in 1886;
  - A resolution of the House of commons (1893) for simultaneous examination for the I.C.S. in London and India;
  - Appointment of the webby commission on Indian Expenditure (1895);
  - The Indian councils Act of 1892.

These achievements of the Early Nationalists served as a base for the national movement in later years.

## **Conclusion**

These achievements of the Early Nationalists served as a base for the national movement in later years. The nationalists were, able to build a national movement while undermining the political and moral influence of imperialist rule. This helped in generating anti-imperialist sentiments among the public. But, at the same time, the nationalists failed to widen the democratic base of the movement by not including the masses, especially women, and not demanding the right to vote for all.

## References

1. Burke,S.M.,Al-Din Salim,*The British Raj in India: An Historical Review*, Oxford University Press, New York, 1997, pp.325-332.
2. Burton stein,*A History of India, Vol.I*. Oxford University Press, New Delhi,pp.254-255.
3. David Ludden, *India and South Asia: A short history*, pp.135-139.
4. Bhattacharya,D.C., Ghai, K.K., *Indian History*, Dayal publishers, 2009,pp.60-61.
5. Jim Masselos, *Indian Nationalism: An History*, Sterling Publishers, Bangalore, 1991,pp.157-158.
6. Sharma, L.P., *Indian National Movement and Constitutional Developments*, Lakshmi Narain Agarwal, Agra, 2007, pp.67-68.

## PALLAVAS TEMPLE ARCHITECTURE

**Muthulakshmi. P**

PG and Research Department of History, St. Mary's College (Autonomous), Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

### ABSTRACT

The Pallava art and architecture represent an early stage of Dravidian art and architecture which blossomed to its fullest extent under the Chola dynasty. The first stone and mortar temples of South India were constructed during Pallava rule and were based on earlier brick and timber proto types. Three great dynasties of South India rose to power in the second half of the 6<sup>th</sup> century CE. These dynasties were to exercise not only tremendous political power but were to create architectural works of exceptionally high standards, the Chalukyas of Badami, the Pallavas with their capital at Kanchipuram and the Pandyas of Madurai ruled for long periods. The Pallavas emerged as a formidable power in South around 4<sup>th</sup> century A.D. and were at the height of their power in the 7<sup>th</sup> A.D. They were able to sustain their rule for about 500 years. They built great cities, centres of learning, temples and sculptures and influenced a large part of South East Asia in culture. The temples played an important role in the social and cultural life of people in ancient and medieval India. Many of these structures which were made in stone or bricks survive to this day and are a reflection of the architectural magnificence and the crucial role these temples had in the sociocultural space of the society. Their contributions are still extent because granite was used for building temples and carving sculptures.

**Keywords:** Pallava, Hindu temples, Dravidian, Sculpture, Architecture

### Introduction

The beginning of the temple architecture in South India is attributed to the Pallavas who ruled the country during the 6<sup>th</sup> and 7<sup>th</sup> centuries A.D. The Pallavas introduced the stone architecture in the Tamil country. The Pallava period marked the construction of structural temples had started. These temples structures were built with the use of granite slabs. Hence, they are known as structural temples. During the period, the Pallavas were great builders and build many temples. The most important temples were, the famous Shore temple, Kanchi Kailasanatha Temple, Ekambaresvara Temple and Vaikuntha Perumal Temple etc.

## **Shore Temple**

The Shore Temple is the first of the structural temples built by the Pallava monarch, Narasimhavarman II, also called Rajasimha. The Shore Temple is actually a complex of three shrines.

### **Structure of the Shore Temple**

According to a recent Archaeological Survey of India (ASI) report, the monument at Mahabalipuram (now Mamallapuram) in Tamil Nadu is the most visited centrally-protected ticketed monument for foreign visitors during 2021-22. Shore Temple, overlooking the Bay of Bengal, is one of the most prominent monuments of Mahabalipuram.

This is one of the oldest temples in south India. It belongs to the 8<sup>th</sup> century A.D. and is a good example of the first phase of structural temples constructed in Dravidian style. A straight path opposite to the Krishna- mandapa adjoining Arjuna's penance leads to the sea. The Shore Temple, an example of a masonry temple of Rajasimha's time. The vimana top here is somewhat narrow and elongated and the Shore Temple is considered to be the first shrine in South India constructed with granite stones. There are a row of caved bulls and in the veranda there are three raised platforms. Two of them are platform for a flagstaff.

The oldest edifice sits bordering the Bay of Bengal, its walls lined with sculptures of Nandi, the bull beloved of Shiva. The temple is a combination of three shrines. The main shrine is dedicated to Shiva and a small shrine, is dedicated to Lord Vishnu and had water channeled into the temple, entering the Vishnu shrine. The two Shiva shrines are octagonal in configuration. The entrance is through a transverse barrel vault gopuram. The two shikharas have a pyramidal outline. The outer wall of the shrine to Vishnu and the inner side of the boundary wall are extensively sculptured and topped by large sculptures of Nandi. The temple's outer walls are divided by plasters into bays, the lower part being carved into a series of roaring lions. The temple has a Garbha Griha in which the deity, Shiva Linga, is enshrined, and a small mandapa surrounded by a heavy outer wall with little space between for circumambulation. At the rear two shrines facing opposite directions. The Durga is seated on her lion vahana. A small shrine may have been in the cavity in the lion's chest.

### **Kailasanatha Temple - Kanchipuram**

The Kailasanatha temple is located towards the west of Kanchipuram city. It is considered one of the seven sacred cities under Hinduism.

### **History of the Temple**

Narasimhavarman II Rajasimha built this great Shiva Temple at Kanchipuram and named it after his own name-Rajasimha Pallavesvara –Rajasimhesvara. The temple was built around 700 CE with additions in the 8<sup>th</sup> century and restorations in later centuries. It is the first structural temple built in South India by Narasimhavarman II (Rajasimha). The Kailasanatha Temple became trend setter for other similar temples in South India. It is believed that Raja Raja Chola I (985-1014) visited the temple and drew inspiration from this temple to build the Brihadeeswara Temple.

### **Structure of the Temple**

The Kailasanatha Temple stands in a rectangular courtyard, within an enclosure. This enclosure wall contains 58 small shrines, all opening toward the central edifice. The sanctum is placed at the western end of the enclosure. The cells along the eastern wall face west, while those on the west, north and south sides open to the east, as dictated by long traditions of religious considerations.

The small shrines built on the inner side of the enclosure wall add tremendous splendour and beauty to the architectural composition of the Kailasanatha. All these shrines are square based and double storeyed without haras. The griva and the octagonal shikharas form the crowing elements, which are covered with elegant minute carving. The mahanasis on the shikharas have shoval-shaped tops, typical of the Pallava art. The cavities are occupied by heads of celestial maidens. The porches of these small shrines also illustrate the well-planned scheme of architectural details. The Characteristic Pallava lion- based pillar appears on these porches but the sala shrines or the gopura- like shrines have Naga figures on the front pillars.

### **Ekambaresvara Temple**

#### **History of the Temple**

Ekambareswarar Temple is located in Kanchipuram. The shrine of ‘Ekambam’ is mentioned by name even earlier in the 5<sup>th</sup> Century CE. The shrine is also mentioned by Aiyadigal Kadavarkon, identified as Pallava Simhavarman III, the father of Simhavishnu, founder of the Palalva dynasty of rules. The Pallava rulers who succeeded Simhavishnu were devout Saivites. Mahendravarman I was instrumental in popularizing Saivism in Tamil Nadu. Cave temples dedicated to Shiva were carved out of solid granite rocks in different parts of his kingdom in the 6<sup>th</sup> Century CE.

#### **Structure of the Temple**

The presiding deity at Ekambaresvara is Shiva, seated on an eternal source of light in the form of a linga under the mango tree, which is regarded as vedic tree. The goddess is sometimes called Lalithambika and Elavar Kuzhali. The mango tree is regarded 2500 years old and its four branches yield fruits of four different tastes –sweet, sour, astringent and bitter. The small raised platform on which a small shrine has been built functions as an open ambulatory. There is no separate shrine dedicated to the goddess. The mango tree and the shrine are surrounded by a corridor containing a long row of linga -one huge linga and 1008 small stone lingas. Also noteworthy are the sculptural representations of 63 Nayanamars and Uthsavamurthis. A small Nandi pavilion stands opposite the mango shrine.

The temple occupying approximately 23.5 acres of land has five enclosures built around the small central sanctum housing the grand Shivalinga, the source of eternal light. The inner shell of the temple is entered through a long and elegant, columned hall incorporating many small earlier shrines, alters, pavilions and lamp columns. Most noteworthy is the Nandi positioned directly in line with the lingam in the shrine. At the entrance to the inner complex are placed two huge dvarapalas in black stone, now partially covered with white cloth. The Ekambaresvara Temple has a small shrine solely dedicated to pralaya shakti, the protector against destruction. There is also in the first inner corridor on the left hand the linga of ‘Pralayakalanathar’. The ‘Pralaya shakti’ shrine is in acknowledgement of the growing power of the female principle. On the right side of the corridor is the Navagriha sanctum.

The corridor runs around the core structure of the Ekambaresvara Temple built over a slightly raised platform. At the back of the sanctum is the open courtyard of Mavadi - the sacred mango tree. Shiva manifested himself in five elements at five different places in the form of water at Thiruvanaikkaval; as glowing fire at Thiruvannamamai; in the form of air at Thirukalahasti, as representing sky at Chidambaram; and as representing Mother Earth in the form of sand at Kanchipuram.

### **Vaikuntha Perumal Temple**

Vaikuntha Perumal Temple is located Uthiramerur, is dedicated to Lord Vishnu. The temple is constructed in the Dravidian style of architecture. The temple was originally built by Pallavas, with later additions from the Cholas.

### **History of the Temple**

As per the inscriptions in the temple, the Pallava king Nandivarman II (Pallavamalla) 730-795 CE established the village around 750 A.D. It is believed that he donated the village to Vedic Brahmins from SriVaishanva community.

### **Structure of the Temple**

The core structure is surrounded by a raised cloistered gallery separated from the vimana by a narrow passage at the ground level. This gallery is a unique feature of this temple. The pillars in this galley are in sandstone like the rest of the temple structure, excepting the lower sections of the adhisthana, which are in granite. Indeed some of the lion – based pillars derived from the glorious heritage of pallava architecture are also two superposed panels provide an illustrated history of the pallava’s particularly providing a picturesque documentation of events beginning with their ancestor Brahma up to Nandivarman II’s coronation. Only some of these panels have labels of identification. The rest of the labels have all disappeared. But the gallery remains the most fascinating section of the Vaikuntha Perumal.

The architecture of this elegant Vishnu Temple has been inspired by the Dharmaraja Ratha at Mamallapuram in the provision of the three sanctums, one over the other, in the interior. The purpose of the rathas has been a matter of speculation among the historians but they have generally been regarded as the rock-cut versions of original models in wood.

Here the ground storey and the two upper storeys have sanctums to house three different images of Vishnu, in standing, sitting, and reclining postures. The Vaikuntha Perumal has a very dark interior because of these inner walls. The sanctum on the ground storey is enclosed within two ambulatories, an open one at the upana level and another within the cloister. The second storey also has two ambulatories, one with the within the middle wall and the inner most wall, and the other open one on the terrace behind the hara. The third storey has only one open ambulatory between the wall and the hara. The arrangement of the haras ground storey and of the closed and pillared mukhamandapa comprises large corner kutas and panjaras and prominent salas.

The triple-storeyed structure of the Vaikuntha Perumal gives evidence of a great engineering acumen of the Pallavas, who built three concentric walls forming concentric squares, one inside the other containing the ambulatory passages in between as prescribed in the sandhara mode. The innermost wall rises to the height of the three storeys enclosing the three tiers of cells, the intermediate wall rises to the terrace level of the second storey



and the outermost wall rises up to the level of the first storey terrace. There are provisions for flights of steps leading to the top storey. The pyramidal vimana of the Vaikuntha Perumal gives no indication of the intricate but extremely well manipulated interior space. The vimana is square in plan, externally having a side of 47 feet and its sikhara rises to 60 feet from the ground level.

The temple is known for the inscriptions indicating the democratic practices of electing representatives for the village bodies during the regime of Parantaka Chola (907-55CE). The building is declared as a heritage monument and administered by the Archaeological Survey of India. Rajiv Gandhi, the then Prime Minister of India was inspired by the system after paying a visit to the temple and insisted on improving Panchayat Raj, India's system of local bodies in villages.

### **Conclusion**

These Pallava structural temples – the Shore temple, the Kailasanatha, the Ekambaresvara and the Vaikuntha Perumal were showpieces of imperial strength and royal status. Thus the Pallavas rendered invaluable service to the country both within and without as they were one of the torch bearers of Hindu civilization to South East Asia. For more singular is their contribution to architecture transforming the architecture and sculpture from wood to stone. The Pallava architecture was undoubtedly greatly inspired by the religious revival movement of the age. We have found several styles in Pallava architecture. So the Pallavas were mentioned that they were the pioneers of rock cut architecture in Tamil Nadu.

### **References**

1. Surendra Sahai, *Temples of South India*, Prakash Books India Pvt. Ltd, New Delhi, 2010, p.61.
2. Mohideen Badusha, A.H., *History of Indian Architecture*, Sulthans Publications, Tirunelveli, 2009, p.46.
3. Nagaswamy, R., *Mahabalipuram Monumental Legacy*, Oxford University Press, New Delhi, 2008, p.69.
4. Edith Tomory, *A History of Fine Arts in India and the West*, Orient Longman Ltd, New Delhi, 1982, pp.223-224.
5. *The New Indian Express*, Chennai, 30.06.2022.
6. Revathy Girish, *Architectural Tourism*, Wisdom Press, New Delhi, 2012, p. 149.
7. Sharmin Khan, *History of Indian Architecture Buddhist, Jain and Hindu Period*, CBS Publishers and Distributors Pvt. Ltd, New Delhi, 2014, pp.102-103.



8. Revathy Girish, *Cultural Heritage of India*, Wisdom Press, New Delhi, 2010, p.163.

## **THILLAI NATARAJA TEMPLE – ETHEREAL ABODE OF LORD SHIVA**

**Saranya. R**

PG and Research Department of History, St. Mary's College (Autonomous), Thoothukudi  
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

### **ABSTRACT**

India has many places where people worship the Divine. It has more than 2 million Hindu temples recorded during the census, whose number has substantially increased by now. One of the secretive and famous Temple is the one at Chidambaram Temple. The most unique characteristic of the Nataraja Temple is the bejeweled image of Nataraja. Chidambaram Temple, in the temple town of Chidambaram, is dedicated to Lord Shiva and is one of the five holiest Shiva temples. This is an historic and ancient temple. Shiva himself is presented as the Nataraja performing the Ananda Tandav (Dance of Delight) in the golden hall of the shrine. The marvelous golden sculptured image as Nataraja in the dance pose is the inspiration for all dancers of the world. The Nataraja Temple at Chidambaram, 'Temple of Temples' according to Tamil Literature, portrays the impact of the glories of the various dynasties of the Tamil Country, that are responsible for its growth. It is one of the rare shrines where the archaic form of early Indian Temple Architecture is still retained. The celebrated Nataraja Temple at Chidambaram is otherwise called, 'Thillai'. From the early beginning of the origin of the Nataraja Temple at Chidambaram, the most famed of five Southern Temples dedicated to Siva, represent Him as the deity of five elements viz., Earth (Kanchipuram), Water (Thiruvannaikkal), Fire (Tiruvannamalai), Air (Kalashasthi) and Ether (Chidambaram). At Chidambaram, Shiva is represented as the element of Ether (Akasha).

**Keywords:** Worship, Divine, Chidambaram Nataraja Temple, Ananda Tandav, Archaic form, Architecture, Thillai

### **Introduction**

Chidambaram is one of the most important centres of pilgrimage in South India. It is not only a great Shiva Temple, but it also contains a Vishnu shrine of equal antiquity. It is dedicated to Shiva as Nataraja, the Lord of Dance and existed during the eighth and ninth centuries CE. Most of its structures originating in the Pallava and early Chola period have

vanished demolished and rebuild during the 12<sup>th</sup> and 13<sup>th</sup> centuries CE. Hence, it is difficult to find out its original lay out plan.

Chidambaram was known for its architectural glory where the Lord performed the ‘Anandatandava’, the ‘dance of victory’ celebrating the end of the heretics. In ancient times, this spot was known as Thillai for its forest of Thillai trees where Shiva and Kali are believed to have danced in competition to each other. To the devotees of Vishnu, Chidambaram has been known as ‘Tirucitrakutam’. Shrines to both these Gods still stand close to each other at Chidambaram.

### **Etymology**

The name of this sacred centre Chidambaram as Harle explains, “Is derived by a combination of Nirukta, a type of etymological interpretation, and of Sanskritisation from ‘Cirrambalam’. Chit is invisible, and it is probably on this account that the Akasa Linga is believed to be installed in the temple.” The other four elements of the universe – earth, water, fire, and wind are represented as lingas at Kanchipuram (earth), Tiruvannaikkal (water), Tiruvannamalai (fire) and Kalahasti (wind).

Hymns by Shaiva hymnists, devotional verses by the Alvars and Nayanmars, Sthala puranas ad Puranic legends have all contributed to the glory of Chidambaram. Appar, one of the three ancient Shaiva saints and authors of the Tevaram hymns mentions a ‘Panduranga’ dancer at Thillai.

Shiva’s dance at Thillai has been celebrated as the most crucial episode. The principle aim of this project is to set before the reader a detailed description of the Nataraja Temple Chronologically. With this maiden attempt, I hope to take up soon the fascinating work of bringing out the role played by this temple in the religious history of the Tamil Country.

The two intended goals of this paper are: a) to study the symbolic meaning of the dancing form of Siva, a form that developed into an emblem of victory among the Chola kings, and consequently became an object of worship in this temple with the status of a main deity, b) to argue how the symbolism of the dancing image of Siva influenced the architecture of the temple in a notable fashion, both at the level of the ground plan, as well as at the level of proportioning of the deities in the temple. The scope of this project is limited to a) the evolution of the dancing image of Siva in the South and its impact on the architecture of the temple in Chidambaram, b) the significance of the Sabhas (halls) and prakaras (circumambulatory paths) and c) the ritual of the worship of Siva in His Formless state.

### **Legendary Tradition**

When Vishnu told his serpent Ananta (shesha) about the splendour of Shiva's dance, the latter wished to also witness the awe - inspiring performance. Ananta took the form of Pantanjali, a semi - human and reached Chidambaram, where he met another Shiva devotee called Vyaghrapada worshipped the linga - Mulasthana and required flowers untouched by honey bees. He prayed to Shiva for tiger's eyes, claws and feet to enable him climb the trees when it was dark. The bees would appear only at dawn. This wish was granted and Vyaghrapada offered flowers at the linga. Then he was joined by Patanjali, both worshipped the Mulasthana linga close to a sacred pond in the forest. Pleased by their devotion and penances, Shiva appeared before them and promised to dance at Thillai. On a full moon night, Shiva performed his Anandatandava in the presence of Shivakama Sundari, his consort and all other Gods. The place of the dance later became the Sabha or Ambalam and Shiva promised never to stay away from the spot. The traditional image of the Anandatandava symbolizes creation (shrishti), the abhaya mudra of the lower right hand symbolizes hope and assurance, fire in the upper right hand symbolizes destruction (samhara), the lower left hand pointed toward the raised left foot symbolizes mukti or release from the cycle of life and death, Apasmara symbolizes ignorance.

According to another tradition, the Chidambaram temple was built by Simhavarman or Hiranyavarman, a Chola prince, King of Gaudadesa or Bengal in the 5<sup>th</sup> century CE. He was cured of a later terrible disease at the sacred pond where Vyaghrapada worshipped the Mulasthana linga. Simhavarman was cured of the affliction and in gratitude build the temple. He is also believed to have brought back the 3000 Brahmin worshippers called Dikshitaras to Chidambaram to look after the temple worship and rituals. These Dikshitaras had gone to Antarvedi, in North India to attend yajna by Brahma. It is said that when their total number was counted at Chidambaram, it came appeared and asked to be himself counted as the last one to add up to 3000.

Thillai Nataraja Temple, Chidambaram is reportedly 3500 years old build over a 35 acre land in the heart of the city. There have been several renovations and offerings to Chidambaram by the Pallava, Chola, Pandya, Vijayanagara and Chera royals in the ancient and pre-medieval periods. The temple as it stands now is mainly of the 12<sup>th</sup> and 13<sup>th</sup> centuries.

### **Ananda Tandava of Nataraja**

The origin of this dance and the Ananda Tandava of Nataraja at Thillai have given in the inscription the dance poses of Nataraja, which are so common in the temple sculptures here, and in the temples in South India. Nataraja and Sabhapati, in the Hindu Pantheon, are identical in design. Nataraja (the Prince of dancers) is the well-known dancing form of God Shiva. It has four arms and a body besmeared with ashes. The back arm on the right side holds the kettle – drum (Udukai, as it is called in Tamil) while the other presents the raised palm of protection (Abhaya). Of the pair on the left, the upper holds a fire - pot and the lower is bent round across the breast to the right side, its fingers gracefully pointing below, towards the left leg which is raised in a dancing posture. The position of this hand is known as Gaja-Hasta, ‘the elephant – trunk’. The ecstatic and violent nature of the dance, described as Ananda-Tandava in the sequel, whirling quickly round on one leg, placed on the back of the demon – Muyalagan or Apasmara, is indicated by the matted hair (Jata) stretching out on both sides of the head in wavy lines one above the other and by the cloth, partly tied round the waist and partly thrown over the left shoulder also flying in the air. The right hand shows the Abhaya, on its wrist a serpent, which is the usual ornament of Siva and may have 1, 3, 5 or 7 hoods.

Philosophically interpreted, the dance is said to represent the Panchakritya – the five – fold activity of the supreme being, viz., Srishti – Creation or evolution from the drum; Stithi – preservation or continuation from the hand of hope – the Abhaya Hasta; Samhara – destruction from fire; Tirobhava, veiling, illusion or concealment, from the foot held aloft; and Anugraha release – salvation or bestowal of grace from the fourth hand pointing to the lifted foot wherein to seek the refuge of the soul.

### **Rupa and Arupa form of Worship**

The dancing image of Siva is a perceivable ‘Form’, which is called ‘rupa’ in Sanskrit. This image housed in Chit-Sabha is, the heart of the world and the heart of individual self – Chit means ‘consciousness’ and Sabha means ‘hall’ (Hall of consciousness). To the right of Nataraja is an empty space called Rahasya. This space designates the Formless form of Siva, and is called by the term “arupa”, an opposite of ‘rupa’. Arupa form of Siva is also called Akasa Linga, assuming that “Space” is the other manifestation of Shiva in Chidambaram. The ritual of worshipping “Space” developed a new architectural vocabulary of Chidambaram Rahasya (Secret of Chidambaram).

### **Chidambara Rahasyam**

Another distinctive characteristic of the Chidambaram Temple is the ritual by the name of “Chidambara Rahasya” (Secret of Chidambaram). To the right of the Nataraja is a space revered as Chidambara Rahasyam – a conception of the nothingness (space) garlanded with golden bilva leaves. The curtain in front of the Chidambara Rahasyam, symbolizing Shiva in His Formless form (Arupa), is unveiled ceremoniously during rituals. This form of Shiva is also called Akasa Linga, which is referred to as the Linga of space. It is in the work of Manikkavasagar (9<sup>th</sup> century) we find an explicit reference to the “Chidambara Rahasyam” of Chidambaram Nataraja. Other references to this vocabulary of formlessness (Arupa) are available in the verses of Tirumular’s Tirumantiram (ca.10<sup>th</sup> to 11<sup>th</sup> century).

### **Significance of Temple Architecture**

Despite some minor differences in the way, the Hindu mythology, Gods and sculptures are depicted, the Hindu temples of Chola period, in general, demonstrate a common paradigm for the decorative veneers of Gopuras (Superstructure), Mandapas (Halls) Praakaras (circumambulatory paths) and Tanks. An exception to this, however, is the Nataraja’s temple of Chidambaram which differs from the other Saiva temples of Chola period both in conceptual terms as well as in architectural terms. Chidambaram is one of the most ancient, historic and culturally significant shrines in India. Development of mandapas (pavilions) with flat roofs is especially the significant outgrowth of the Chola architecture. Muha Mandapas, Ardhamandapas and Thousand pillar mandapas are some of the components that one can find of the Chola temples.

The place where the Chidambaram Temple stands is the claimed center of the earth’s magnetic equator. This shows the tremendous engineering, geographical and astrological knowledge of the ancient architectures. The temple as it stands had a pre-Chola existence and the architecture is Dravidian with the sanctum sanctorum closely resembling Kerala or Malabar style structures. Indeed, the royal charters mention the rebuilding of the Sanctum using architects from Kerala. However the golden roof is a striking example of Vesara architecture with its apsidal shape.

The temple has nine gateways among which four of them have Gopuras in the East, West, North and South, The Eastern Gopura pagoda has all the 108 dance postures of Bharathanatiam. The South Gopura Sakkaseyan Thirunilai Ezhugopuram was constructed by Pandya king. This is evident from the sculpted fishes (flag of Pandya king) in the ceiling. The smallest Gopuram is the western Gopuram that was constructed in

1150A.D; but there is no evidence available to know the construction of this gopuram. However, there are sculptures depicting the Goddess fighting with buffalo demon. The North Gopuram was constructed around 1300 AD with the brick portion constructed by the Vijayanagar king Krishnadevaraya in the 16<sup>th</sup> century. The East Gopuram was claimed to have been constructed by the Pallava King, Koperunsingan II.

The roof has been laid with 21,600 golden tiles with the word ‘SI VA YA NA MA’ inscribed on them representing 21,600 breaths, which represents the number of breaths taken in a 24 hour period. The golden tiles are fixed using 72,000 golden nails that represents the number of nadis existing in the human body. The roof is topped by a set of 9 sacred pots or kalasas, representing the 9 forms of energy.

The temple contains five sabhas – Kanaka Sabha, Chit Sabha, Nritta Sabha, Raja Sabha and Deva Sabha. The main deity, Lord Shiva is enshrined in Chit Sabha, with black screen covering behind Akasa Lingam. The Kanaka Sabha is located in front of Chit Sabha. The daily rituals are conducted here. Nritta Sabha or Natya Sabha is the hall, where Lord Shiva is said to have danced along with Goddess Kali (an incarnation with ferocious energy) to prove his Supremacy. Raja Sabha or 1000 pillared hall represents the yogic chakra of 1000 petalled lotus. Deva Sabha hall houses Pancha Moorthi (five idols) of Lord Ganesha, Lord Muruga, Lord Somaskanda, Lord’s consort Sivananda Nayaki and Lord Chandikeswarar.

The Chidambaram temple is surrounded by several water bodies in and around the temple complex. The names of the connected tanks are Sivaganga tank, Paramanandha Koobham, Kuyya Theertham, Pulimadu, Yagrpatha Theertham, Anantha Theertham, Nagaseri Tank, Brahma Theertham, Shivapriyai Tank and Thiruparkadal.

### **Significance of the Temple Design**

The layout and architecture of the temple is replete with philosophical meanings. The temple architecture is closely linked with the human body. According to the Hindu conceptualization, universe is in the form of Virat Purusha and Chidambaram temple is considered His heart. The temple has 9 gateways signifying the 9 orifices (namely 2 eyes, 2 nostrils, 2 ears, mouth, rectum, genitals) in the human body.

### **Sculpture**

One of the richest sources in the entire country of Sculptural representations of dance is believed to be in Chidambaram. The Nataraja temple in Chidambaram has some especially marvelous examples of the depiction of dance in sculpture. It is not just by chance and both the Natyashastra and Shilpashastra use the tala as of measurement in



space. Also, both disciplines require a correct and detailed knowledge of the human body, the bone structure joints and their flexibility, the muscular system and the limbs. Our vast architectural heritage dates back to several centuries that are still available to us extensive sculptural treasures in terms of dance documentation. Sculptural imagery of dance is found in stone, wood, metal, terracotta in both classical and regional styles of depiction. The architecture of the temple represents the link between arts and spirituality.

### **Festivals**

The most important festivals of Chidambaram Temple are the Tiruvadira festival conducted in Margali and the Tirumanjanam in Ani; On these occasions, Lord Nataraja is taken out of the Sabha to the Thousand Pillared Mantapa. The Brahmotsava takes place as usual for 10 days. Most of the devotees who have attained Mukthi in this Sthala, Manickavasagar, the author of the famous 'Tiruvasagam' was one. It is said that the saint's songs moved the Lord that He himself appeared before him to take down all his songs and left the Suvadi on the steps of the temple. The next day it reached the hands of devotee who popularized it and the Lord showered His blessing on Saint Manickavasagar and granted him Sayujya. It was here Nandanar, one of the sixty-three famous Nayanars, born in Pulay (Harijan) Community, attained Mukthi by his ceaseless devotion to Thillai Nataraja.

One well - known aspect at Chidambaram is the Arudra Darshan in the Tamil month of Margazhi. Rudra means a roarer, or someone who is very effervescent. Arudra means stable; not the roaring kind but absolutely stable. Rudra also suggests movement and creation. Arudra suggests certain inertia. It is believed that on the day of the Arudra Darshan or Thiruvaathirai, Lord Shiva is able to see our Earth clearly from another heavenly body and performs the cosmic dance joyfully in a red-flamed light. Lord Shiva's incarnation - Nataraja is said to happen on this day. This Arudra Darshan took place on the full moon night in the Tamil month of Margazhi (December – January) and this is also the longest night in a year.

### **Natyanjali Festival**

A whole year for men is said to be a single day for the Gods. Just as six poojas are performed in a day at the sanctum sanctorum, six anointing ceremonies are performed for the principal deity – Nataraja in a year. They are the Marghazhi Thiruvaadhirai (in December – January) indicating the first puja, the fourteenth day after the 'new moon (Chaturdashi) of the month of Masi (February – March) indicating the second puja, the Chittirai Thiruvonam (in April – May), indicating the third puja or Uchikalam, the

Uthiram of Aani (June – July) also called the Aani Thirumanjanam indicating the evening or the fourth puja, the chaturdasi of Aavani (August – September) indicating the fifth puja and the chaturdasi of the month of Purattasi (October – November) indicating the sixth pooja or Arthajama. Of these the Marghazhi Thiruvaadhirai (in December – January) and the Thirumanjanam (in June – July) are the most important. These are conducted as the key festivals with the main deity being brought outside the sanctum sanctorum in a procession that included a temple car procession followed by a long anointing ceremony. Several hundreds and thousands of people flock the temple to see the anointing ceremony and the ritualistic dance of Lord Shiva when he is taken back to the sanctum sanctorum. It is somewhat surprising that a temple so ancient, does not celebrate the annual festival of Brahmotsavam.

### **Temple Administration**

The administration of the temple is also unique; Nataraja temple known as Sabhanayakar Temple is administered by Dikshitaras, who are both priests and trustees of the temple. The temple belongs to the Dikshitaras of the place and others cannot interfere in the administration. Once they numbered three thousands and now there are only about 200 of the community and they function as priests in turn, performing the Poojas according to the Vedic rites. In ancient literary works, the worship was done according to Magudagama rites. There are no properties to the temple. Though all the Dikshitaras have the right of offering Poojas, they strictly follow a time - table assigning the duty to everyone in turn; they meet often to discuss all matters, concerning administration. Similarly numerous festivals are celebrated from the contributions of various devotees. The festivals can be classified as follows: Daily procession of Chandra Sekhara at 9 A.M. around Second Prakara, Procession of Sivakami idol on every Friday around Second Prakara, Fortnight Festival on 'Pradosa' day (Two days earlier and Thirteen days later to Full -Moon days.), Monthly Festival on 'Arudra Nakstra', Two annual ten days festivals in the months of June and December, Six Abhisekams to Nataraja in a year during February, April, June, August, September and December.

All these festivals and the Temple administration is managed by a Committee of nine priests headed by a Secretary by election, while the Committee is formed in turn among the priests themselves. The renovations are being done by independent bodies, but subject to the approval by the managing committee.

## Conclusion

In India, temples are always considered as a part of life and the people believe that visiting temples and worshipping Gods in a way of life. It is evident that worshipping Gods and meditating in the shrines increase our concentration and peace of mind. Each and every temple in India is unique and has interesting histories behind them. Here, Thillai Nataraja Temple alias Chidambaram Temple history is explored. Positioned amidst architectural magnificence and temples of bygone era, Chidambaram is a beautiful town of Tamil Nadu. Its more, values and pious rituals are potted with artistic exquisiteness and charm. In religious history and art, it is difficult to find such an impressive and monumental nucleus anywhere in the country. Passing through a long course of architectural innovations and accepting to play a significant role in the economy of the state, the temple in the peninsula appeared as the cynosure of both the spiritual and the material world, a link between the world of God and the world of man.

## References

1. Coomaraswamy, A.K., *The Dance of Siva Fourteen Indian Essays*, New York, 1924, p.67.
2. Ananda, K., *Introduction to Indian Art*, Delhi, 1969, p.32.
3. Radhakamal Mukerjee, *The Cosmic Art of India*, Allied Publishers Bombay, 1965, p.120.
4. Chandra Sekar, S., *The Nagarathars of South India*, Macmillan Publishers, Madras, 1980, pp.47-52.
5. Michael, W., *Indian Temple Architecture*, New Delhi, 1983, p.78.
6. James, G., *The Illustrated Encyclopaedia of Hinduism*, Rosen Publishing Group, 2002, pp.367-369.
7. Narayanaswami Naidu, B.V., *The Fundamentals of Ancient Hindu Dancing*, Madras, 1936, p.31.
8. Satyamurti, T., *The Nataraja Temple, History, Art and Architecture*, New Delhi, 1978, p.37.
9. Nagaswamy, R., *South Indian Bronzes, The Great Tradition- Indian Bronze*, New Delhi, 1988, p.142.

**Lucky Edge Labeling of Total Graph of Path and Cycle****1. Dr. R. Maria Irudhaya Aspin Chitra****Assistant Professor, Department of Mathematics, St. Mary's College (Autonomous)****2. T. Ashish Praisy****PG Student, Department of Mathematics, St. Mary's College (Autonomous)****Thoothukudi -628001****E-mail: [aspinvjs@gmail.com](mailto:aspinvjs@gmail.com)****E-mail: [lincypraisy531@gmail.com](mailto:lincypraisy531@gmail.com)****Abstract**

Let  $G$  be a Simple Graph with Vertex set  $V(G)$  and Edge set  $E(G)$  respectively. Vertex set  $V(G)$  are labeled arbitrary by positive integers and let  $E(e)$  denote the edge label such that it is the sum of labels of vertices incident with edge  $e$ . The labeling is said to be lucky edge labeling if the edge set  $E(G)$  is a proper coloring of  $G$ , that is, if we have  $E(e_1) \neq E(e_2)$  whenever  $e_1$  and  $e_2$  are adjacent edges. The least integer  $k$  for which a graph  $G$  has a lucky edge labeling from the set  $\{1, 2, \dots, k\}$  is the lucky number of  $G$  denoted by  $\eta(G)$ .

A graph which admits lucky edge labeling is the lucky edge labeled graph.

In this paper, it is proved that Lucky Edge Labeling of Total Graph of Path and Cycle and their subcases are Lucky Edge Graphs.

**Keywords:** Lucky Edge Labeled Graph, Lucky Edge Labeling, Lucky Number,

2010 Mathematics subject classification Number: 05C78.

**1. Introduction:**

A graph  $G$  is a finite non empty set of objects called vertices together with a set of pairs of distinct vertices of  $G$  which is called edges. Each  $e = \{uv\}$  of vertices in  $E$  is called an edge or a line of  $G$ . For Graph Theoretical Terminology, refer [2]. A vertex labeling of a graph  $G$  is an assignment of labels to the vertices of  $G$  that induces for each edge  $uv$  a label depending on the vertex labels of  $u$  and  $v$ .

A graph  $G$  is said to be labeled if the  $n$  vertices are distinguished from one another by symbols such as  $v_1, v_2, \dots, v_n$ .

**2. Preliminaries:****Definition:2.1**

A **Walk** of a graph  $G$  is an alternating sequence of vertices and edges  $v_1, e_1, v_2, e_2, \dots, v_{n-1}, e_{n-1}, v_n$  beginning and ending with vertices such that each edge  $e_i$  is incident with  $v_{i-1}$  and  $v_i$ .

**Definition:2.2**

A **Path**  $P_n$  is a graph with  $n$  vertices and edge set  $\{v_i v_{i+1} : 1 \leq i \leq n\}$ .

**Definition:2.3**

Let  $G$  be a Simple Graph with Vertex set  $V(G)$  and Edge set  $E(G)$  respectively. Vertex set  $V(G)$  are labeled arbitrary by positive integers and let  $E(e)$  denote the edge label such that it is the sum of labels of vertices incident with edge  $e$ . The labeling is said to be **Lucky Edge Labeling** if the edge set  $E(G)$  is a proper coloring of  $G$ , that is, if we have  $E(e_1) \neq E(e_2)$  whenever  $e_1$  and  $e_2$  are adjacent edges. The least integer  $k$  for which a graph  $G$  has a lucky edge labeling from the set  $\{1, 2, \dots, k\}$  is the **Lucky number** of  $G$  denoted by  $\eta(G)$ .

A graph which admits lucky edge labeling is the **Lucky Edge Labeled Graph**.

**Definition:2.4**

The **Total graph**  $T(G)$  of a graph  $G$  is a graph such that the Vertex set of  $T$  corresponds to the vertices and edges of  $G$  and two vertices are adjacent in  $T$  iff if their corresponding elements are either adjacent or incident in  $G$ .

Total graphs are generalizations of line graphs.

**3. Main Results****Theorem:3.1**

Total graph of path is a Lucky Edge graph.

**Proof:**

$$\text{Let } V(G) = \left\{ \begin{array}{l} u_i, 1 \leq i \leq n - 1 \\ v_i, 1 \leq i \leq n \end{array} \right\}.$$

$$\text{Let } E(G) = \left\{ \begin{array}{l} u_i v_i, 1 \leq i \leq n - 1 \\ u_i v_{i+1}, 1 \leq i \leq n - 1 \\ u_i u_{i+1}, 1 \leq i \leq n - 2 \\ v_i v_{i+1}, 1 \leq i \leq n - 1 \end{array} \right\}.$$

$$f(u_i) = \begin{cases} 1, i \equiv 3 \pmod{5} \\ 2, i \equiv 1 \pmod{5} \\ 3, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n - 1 \\ 4, i \equiv 2 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \end{cases}$$

$$f(v_i) = \begin{cases} 1, i \equiv 1 \pmod{5} \\ 2, i \equiv 4 \pmod{5} \\ 3, i \equiv 2 \pmod{5} \text{ for } 1 \leq i \leq n \\ 4, i \equiv 0 \pmod{5} \\ 5, i \equiv 3 \pmod{5} \end{cases}$$

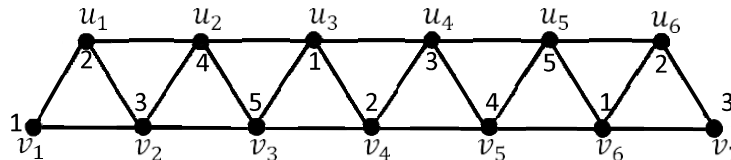


Figure 3.1

$$f^*(u_i u_{i+1}) = \begin{cases} 4, i \equiv 3 \pmod{5} \\ 5, i \equiv 2 \pmod{5} \\ 6, i \equiv 1 \pmod{5} \text{ for } 1 \leq i \leq n - 1 \\ 7, i \equiv 0 \pmod{5} \\ 8, i \equiv 4 \pmod{5} \end{cases}$$

$$f^*(v_i v_{i+1}) = \begin{cases} 4, i \equiv 1 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \\ 6, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n - 1 \\ 7, i \equiv 3 \pmod{5} \\ 8, i \equiv 2 \pmod{5} \end{cases}$$

$$f^*(u_i v_i) = \begin{cases} 3, i \equiv 1 \pmod{5} \\ 5, i \equiv 4 \pmod{5} \\ 6, i \equiv 3 \pmod{5} \text{ for } 1 \leq i \leq n - 1 \\ 7, i \equiv 2 \pmod{5} \\ 9, i \equiv 0 \pmod{5} \end{cases}$$

$$f^*(u_i v_{i+1}) = \begin{cases} 3, i \equiv 3 \pmod{5} \\ 5, i \equiv 1 \pmod{5} \\ 6, i \equiv 0 \pmod{5} \text{ for } 1 \leq i \leq n - 1 \\ 7, i \equiv 4 \pmod{5} \\ 9, i \equiv 2 \pmod{5} \end{cases}$$

The Lucky Edge number of total graph of path is 9, i.e)  $\eta(T(P_n)) = 9$ .

**Theorem:3.2**

Total graph of cycle is Lucky Edge Graph.

**Proof:**

$$\text{Let } V(G) = \left\{ \begin{array}{l} u_i, 1 \leq i \leq n \\ v_i, 1 \leq i \leq n \end{array} \right\}$$

$$\text{Let } E(G) = \left\{ \begin{array}{l} u_i v_i, 1 \leq i \leq n \\ u_i v_{i+1}, 1 \leq i \leq n - 1 \\ u_i u_{i+1}, 1 \leq i \leq n - 2 \\ v_i v_{i+1}, 1 \leq i \leq n - 1 \\ u_n v_1, u_n u_1, v_n v_1 \end{array} \right\}$$

**Case:** when  $n \equiv 0 \pmod{5}$ .

$$f(u_i) = \begin{cases} 1, i \equiv 3 \pmod{5} \\ 2, i \equiv 1 \pmod{5} \\ 3, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n \\ 4, i \equiv 2 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \end{cases}$$

$$f(v_i) = \begin{cases} 1, i \equiv 1 \pmod{5} \\ 2, i \equiv 4 \pmod{5} \\ 3, i \equiv 2 \pmod{5} \text{ for } 1 \leq i \leq n \\ 4, i \equiv 0 \pmod{5} \\ 5, i \equiv 3 \pmod{5} \end{cases}$$

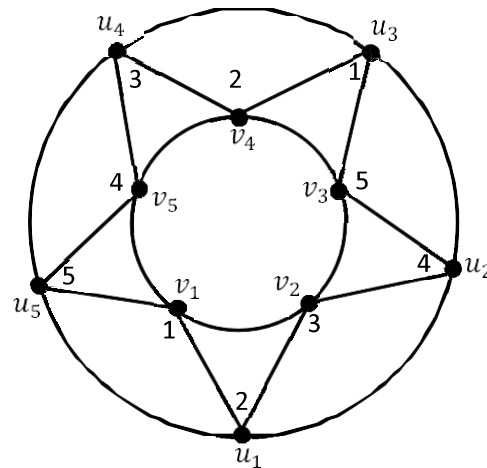


Figure 3.2(a)

$$f^*(u_i u_{i+1}) = \begin{cases} 4, i \equiv 3 \pmod{5} \\ 5, i \equiv 2 \pmod{5} \\ 6, i \equiv 1 \pmod{5} \text{ for } 1 \leq i \leq n - 1 \\ 7, i \equiv 0 \pmod{5} \\ 8, i \equiv 4 \pmod{5} \end{cases}$$

$$f^*(u_n u_1) = 7$$

$$f^*(v_i v_{i+1}) = \begin{cases} 4, i \equiv 1 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \\ 6, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n-1 \\ 7, i \equiv 3 \pmod{5} \\ 8, i \equiv 2 \pmod{5} \end{cases}$$

$$f^*(v_n v_1) = 5$$

$$f^*(u_i v_i) = \begin{cases} 3, i \equiv 1 \pmod{5} \\ 5, i \equiv 4 \pmod{5} \\ 6, i \equiv 3 \pmod{5} \text{ for } 1 \leq i \leq n-1 \\ 7, i \equiv 2 \pmod{5} \\ 9, i \equiv 0 \pmod{5} \end{cases}$$

$$f^*(u_i v_{i+1}) = \begin{cases} 3, i \equiv 3 \pmod{5} \\ 5, i \equiv 1 \pmod{5} \\ 6, i \equiv 0 \pmod{5} \text{ for } 1 \leq i \leq n-1 \\ 7, i \equiv 4 \pmod{5} \\ 9, i \equiv 2 \pmod{5} \end{cases}$$

The Lucky Edge number of total graph of cycle  $C_n$  when  $n \equiv 0 \pmod{5}$  is 9. i.e)  $\eta(T(C_n)) = 9$ , when  $n \equiv 0 \pmod{5}$

**Case:** when  $n \equiv 1 \pmod{5}$ .

$$f(u_i) = \begin{cases} 1, i \equiv 3 \pmod{5} \\ 2, i \equiv 1 \pmod{5} \\ 3, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n-1 \\ 4, i \equiv 2 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \end{cases}$$

$$f(u_n) = 7$$

$$f(v_i) = \begin{cases} 1, i \equiv 1 \pmod{5} \\ 2, i \equiv 4 \pmod{5} \\ 3, i \equiv 2 \pmod{5} \text{ for } 1 \leq i \leq n-1 \\ 4, i \equiv 0 \pmod{5} \\ 5, i \equiv 3 \pmod{5} \end{cases}$$

$$f(v_n) = 6$$

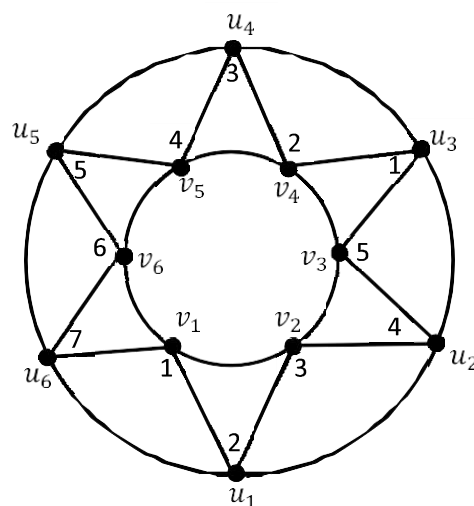


Figure 3.2(b)



$$f^*(u_i u_{i+1}) = \begin{cases} 4, i \equiv 3 \pmod{5} \\ 5, i \equiv 2 \pmod{5} \\ 6, i \equiv 1 \pmod{5} \text{ for } 1 \leq i \leq n-2 \\ 7, i \equiv 0 \pmod{5} \\ 8, i \equiv 4 \pmod{5} \end{cases}$$

$$f^*(u_{n-1} u_n) = 12$$

$$f^*(u_n u_1) = 9$$

$$f^*(v_i v_{i+1}) = \begin{cases} 4, i \equiv 1 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \\ 6, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n-1 \\ 7, i \equiv 3 \pmod{5} \\ 8, i \equiv 2 \pmod{5} \end{cases}$$

$$f^*(v_{n-1} v_n) = 10$$

$$f^*(v_n v_1) = 7$$

$$f^*(u_i v_i) = \begin{cases} 3, i \equiv 1 \pmod{5} \\ 5, i \equiv 4 \pmod{5} \\ 6, i \equiv 3 \pmod{5} \text{ for } 1 \leq i \leq n-1 \\ 7, i \equiv 2 \pmod{5} \\ 9, i \equiv 0 \pmod{5} \end{cases}$$

$$f^*(u_n v_n) = 13$$

$$f^*(u_n v_1) = 8$$

$$f^*(u_i v_{i+1}) = \begin{cases} 3, i \equiv 3 \pmod{5} \\ 5, i \equiv 1 \pmod{5} \\ 6, i \equiv 0 \pmod{5} \text{ for } 1 \leq i \leq n-2 \\ 7, i \equiv 4 \pmod{5} \\ 9, i \equiv 2 \pmod{5} \end{cases}$$

$$f^*(u_{n-1} v_n) = 11$$

The Lucky Edge number of total graph of cycle  $C_n$  when  $n \equiv 1 \pmod{5}$  is 13.

i.e)  $\eta(T(C_n)) = 13$ , when  $n \equiv 1 \pmod{5}$

**Case:** when  $n \equiv 2 \pmod{5}$

$$f(u_i) = \begin{cases} 1, i \equiv 3 \pmod{5} \\ 2, i \equiv 1 \pmod{5} \\ 3, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n-2 \\ 4, i \equiv 2 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \end{cases}$$

$$f(u_{n-1}) = 7$$

$$f(u_n) = 9$$

$$f(v_i) = \begin{cases} 1, i \equiv 1 \pmod{5} \\ 2, i \equiv 4 \pmod{5} \\ 3, i \equiv 2 \pmod{5} \text{ for } 1 \leq i \leq n-2 \\ 4, i \equiv 0 \pmod{5} \\ 5, i \equiv 3 \pmod{5} \end{cases}$$

$$f(v_{n-1}) = 6$$

$$f(v_n) = 8$$



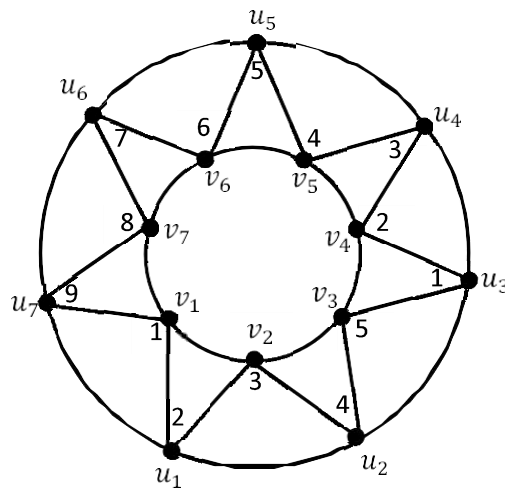


Figure 3.2(c)

$$f^*(u_i u_{i+1}) = \begin{cases} 4, i \equiv 3 \pmod{5} \\ 5, i \equiv 2 \pmod{5} \\ 6, i \equiv 1 \pmod{5} \text{ for } 1 \leq i \leq n-3 \\ 7, i \equiv 0 \pmod{5} \\ 8, i \equiv 4 \pmod{5} \end{cases}$$

$$f^*(u_{n-2} u_{n-1}) = 12$$

$$f^*(u_{n-1} u_n) = 16$$

$$f^*(u_n u_1) = 11$$

$$f^*(v_i v_{i+1}) = \begin{cases} 4, i \equiv 1 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \\ 6, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n-3 \\ 7, i \equiv 3 \pmod{5} \\ 8, i \equiv 2 \pmod{5} \end{cases}$$

$$f^*(v_{n-2} v_{n-1}) = 10$$

$$f^*(v_{n-1} v_n) = 14$$

$$f^*(v_n v_1) = 9$$

$$f^*(u_i v_i) = \begin{cases} 3, i \equiv 1 \pmod{5} \\ 5, i \equiv 4 \pmod{5} \\ 6, i \equiv 3 \pmod{5} \text{ for } 1 \leq i \leq n-2 \\ 7, i \equiv 2 \pmod{5} \\ 9, i \equiv 0 \pmod{5} \end{cases}$$

$$f^*(u_{n-2} v_{n-1}) = 13$$

$$f^*(u_n v_n) = 17$$

$$f^*(u_i v_{i+1}) = \begin{cases} 3, i \equiv 3 \pmod{5} \\ 5, i \equiv 1 \pmod{5} \\ 6, i \equiv 0 \pmod{5} \text{ for } 1 \leq i \leq n-3 \\ 7, i \equiv 4 \pmod{5} \\ 9, i \equiv 2 \pmod{5} \end{cases}$$

$$f^*(u_{n-2} v_{n-1}) = 11$$

$$f^*(u_{n-1} v_n) = 15$$

$$f^*(u_n v_1) = 10$$

The Lucky Edge number of total graph of cycle  $C_n$  when  $n \equiv 2 \pmod{5}$  is 17.

i.e)  $\eta(T(C_n)) = 17$ , when  $n \equiv 2 \pmod{5}$

**Case:** when  $n \equiv 3 \pmod{5}$

$$f(u_i) = \begin{cases} 1, i \equiv 3 \pmod{5} \\ 2, i \equiv 1 \pmod{5} \\ 3, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n - 1 \\ 4, i \equiv 2 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \end{cases}$$

$$f(u_n) = 6$$

$$f(v_i) = \begin{cases} 1, i \equiv 1 \pmod{5} \\ 2, i \equiv 4 \pmod{5} \\ 3, i \equiv 2 \pmod{5} \text{ for } 1 \leq i \leq n \\ 4, i \equiv 0 \pmod{5} \\ 5, i \equiv 3 \pmod{5} \end{cases}$$

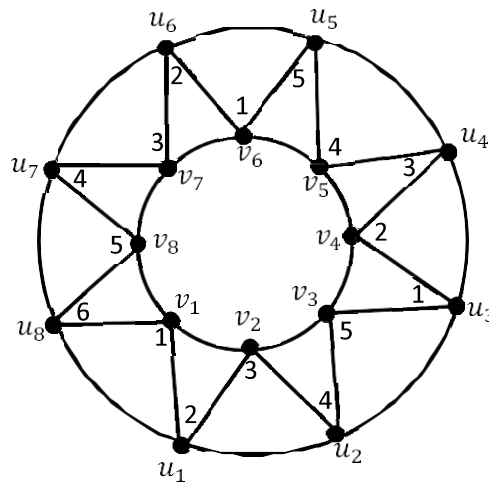


Figure 3.2(d)

$$f^*(u_i u_{i+1}) = \begin{cases} 4, i \equiv 3 \pmod{5} \\ 5, i \equiv 2 \pmod{5} \\ 6, i \equiv 1 \pmod{5} \text{ for } 1 \leq i \leq n - \\ 7, i \equiv 0 \pmod{5} \\ 8, i \equiv 4 \pmod{5} \end{cases} \quad 2$$

$$f^*(u_{n-1} u_n) = 10$$

$$f^*(u_n u_1) = 8$$

$$f^*(v_i v_{i+1}) = \begin{cases} 4, i \equiv 1 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \\ 6, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n - 1 \\ 7, i \equiv 3 \pmod{5} \\ 8, i \equiv 2 \pmod{5} \end{cases}$$

$$f^*(v_n v_1) = 6$$

$$f^*(u_i v_i) = \begin{cases} 3, i \equiv 1 \pmod{5} \\ 5, i \equiv 4 \pmod{5} \\ 6, i \equiv 3 \pmod{5} \text{ for } 1 \leq i \leq n-1 \\ 7, i \equiv 2 \pmod{5} \\ 9, i \equiv 0 \pmod{5} \end{cases}$$

$$f^*(u_n v_n) = 11$$

$$f^*(u_i v_{i+1}) = \begin{cases} 3, i \equiv 3 \pmod{5} \\ 5, i \equiv 1 \pmod{5} \\ 6, i \equiv 0 \pmod{5} \text{ for } 1 \leq i \leq n-1 \\ 7, i \equiv 4 \pmod{5} \\ 9, i \equiv 2 \pmod{5} \end{cases}$$

$$f^*(u_n v_1) = 7$$

The Lucky Edge number of total graph of cycle  $C_n$  when  $n \equiv 3 \pmod{5}$  is 11.

i.e)  $\eta(T(C_n)) = 11$ , when  $n \equiv 3 \pmod{5}$

**Case:** when  $n \equiv 4 \pmod{5}$

$$f(u_i) = \begin{cases} 1, i \equiv 3 \pmod{5} \\ 2, i \equiv 1 \pmod{5} \\ 3, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n-2 \\ 4, i \equiv 2 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \end{cases}$$

$$f(u_{n-1}) = 6$$

$$f(u_n) = 8$$

$$f(v_i) = \begin{cases} 1, i \equiv 1 \pmod{5} \\ 2, i \equiv 4 \pmod{5} \\ 3, i \equiv 2 \pmod{5} \text{ for } 1 \leq i \leq n-1 \\ 4, i \equiv 0 \pmod{5} \\ 5, i \equiv 3 \pmod{5} \end{cases}$$

$$f(v_n) = 7$$

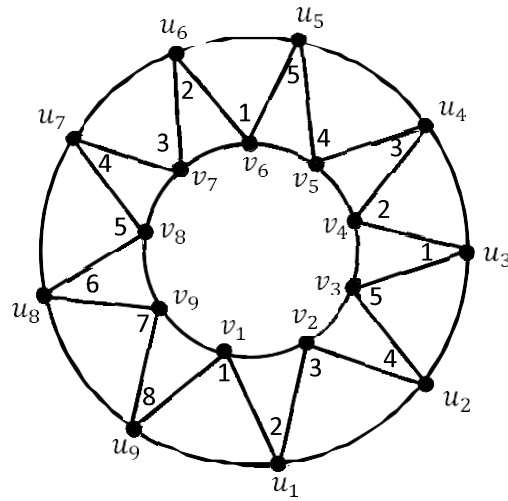


Figure 3.2(e)

$$f^*(u_i u_{i+1}) = \begin{cases} 4, i \equiv 3 \pmod{5} \\ 5, i \equiv 2 \pmod{5} \\ 6, i \equiv 1 \pmod{5} \text{ for } 1 \leq i \leq n-3 \\ 7, i \equiv 0 \pmod{5} \\ 8, i \equiv 4 \pmod{5} \end{cases}$$

$$\begin{aligned}
 f^*(u_{n-2} u_{n-1}) &= 10 \\
 f^*(u_{n-1} u_n) &= 14 \\
 f^*(u_n u_1) &= 10
 \end{aligned}$$

$$f^*(v_i v_{i+1}) = \begin{cases} 4, i \equiv 1 \pmod{5} \\ 5, i \equiv 0 \pmod{5} \\ 6, i \equiv 4 \pmod{5} \text{ for } 1 \leq i \leq n-2 \\ 7, i \equiv 3 \pmod{5} \\ 8, i \equiv 2 \pmod{5} \end{cases}$$

$$\begin{aligned}
 f^*(v_{n-1} v_n) &= 12 \\
 f^*(v_n v_1) &= 8
 \end{aligned}$$

$$f^*(u_i v_i) = \begin{cases} 3, i \equiv 1 \pmod{5} \\ 5, i \equiv 4 \pmod{5} \\ 6, i \equiv 3 \pmod{5} \text{ for } 1 \leq i \leq n-2 \\ 7, i \equiv 2 \pmod{5} \\ 9, i \equiv 0 \pmod{5} \end{cases}$$

$$\begin{aligned}
 f^*(u_{n-2} v_{n-1}) &= 11 \\
 f^*(u_n v_n) &= 15
 \end{aligned}$$

$$f^*(u_i v_{i+1}) = \begin{cases} 3, i \equiv 3 \pmod{5} \\ 5, i \equiv 1 \pmod{5} \\ 6, i \equiv 0 \pmod{5} \text{ for } 1 \leq i \leq n-2 \\ 7, i \equiv 4 \pmod{5} \\ 9, i \equiv 2 \pmod{5} \end{cases}$$

$$\begin{aligned}
 f^*(u_{n-1} v_n) &= 13 \\
 f^*(u_n v_1) &= 9
 \end{aligned}$$

The Lucky Edge number of total graph of cycle  $C_n$  when  $n \equiv 4 \pmod{5}$  is 15.  
 i.e)  $\eta(T(C_n)) = 15$ , when  $n \equiv 4 \pmod{5}$

### Conclusion

Among all labelling lucky edge labelling has a special importance because it is incorporated with coloring of graphs.

### Reference

1. Gallian.J.A, *A Dynamical survey of graphs Labeling*, The Electronic Journal of combinatorics. 6(2001) #DS6.
2. Harray.F, *Graph Theory*, Adadison-Wesley Publishing Company Inc, USA, 1969.
3. V.Lakshmi Alias Gomathi, A. Nagarajan, *Some Labeling Problems in Graphs and its Related Topics(thesis)*.
4. A. NellaiMurugan, R. Maria Irudhaya Aspin Chitra, *Lucky edge labeling of fans', spider, and twig graphs..Proceedings of the UGC Sponsored 2 day National Seminar on Recent Developments in Functional Analysis, Topology and Graph Theory, The MDT Hindu College, Tirunelveli, 26<sup>th</sup> and 27<sup>th</sup> March 2015,243-250.*
5. A. NellaiMurugan, R. Maria Irudhaya Aspin Chitra, *Lucky edge labeling of bi-star, wheel, parachute, complete and complete bipartite graph., Communicating..*
6. R. Sridevi, S. Navaneethkrishnan, *Some New Graph Labeling Problems and Related Topics(thesis)*



7.Nellaimurugan.A- *Studies in graph theory –Some labeling problems in graphs and related topics*, Ph.D, Thesis September 2011...

## **A STUDY ON INTRA-ORGANIZATIONAL RELATIONSHIP IN E-COMMERCE SECTOR AT JENEFA ENTERPRISES, THOOTHUKUDI**

**J. Jenefa Evangeline and C.S. Purnima**

Department of Human Resource Management, St. Mary's College (Autonomous),  
Thoothukudi

Affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India

### **ABSTRACT**

Intra-organizational relationship in e-commerce sector compiles the relationship between the functions of the organization. Intra-organizational relationship are good determinant for intra-organizational communication and decision making. Communication is an important part of organization's daily activities. Intra-organizational systems are the portals serving as a central point of access to all information resources within the organization. It is the developing field in knowledge management that encourages data gathering and exchange within an organization to quickly review the functions of Intra-organizational e-commerce. It is to a great extent, because of the utilization of intra-business commerce at present has become possible for the organization for the flexible relationship within the functions.

**Keywords:** Relationship within intra-organizational functions, Outsource Vendor market, End to End operations.

### **Introduction**

'Intra' means 'within' or 'inside'. Intra organizational means within an organization. This means that people or departments within an organization are working together or collaborating. For example, Marketing department collaborate with customer service departments to ensure that the organizational goals are being met. The benefits of intra organization are that people within the organization are able to work together and bring their expertise to the table in working towards a common goal. Intraorganizational could also refer to the other activities within the organization, such as intraorganizational e-mail, which could occur between branches but still within the organization.

Intra organizational systems are the aggregate of the formal and informal relationships between the members of the organization. Depending on the presence or absence of formal and informal elements in the tie between members of the organization, four elementary types of intra organizational relationships can be distinguished and together they form the intra organizational network system.

**i) Formal relationships**

Formal relationships can be based on vertical authority relations between a hierarchical superior and a collaborator and on a horizontal workflow interdependencies between peers.

**ii) Informal relationships**

In the narrowly defined sense, they are personal ties between members of the organization who are not connected through a formal relationship. Informal personal ties can be positive or negative and weak or strong, depending on the level of mutual expectations and obligations, the frequency, and the degree of multiplicity of their relation. A relation is multiplex if it consists of more than one dimension. For example, friendship and exchange of advice.

**iii) Embedded relationships**

It consists of ties in which both parties are connected through both formal and informal relationship. For example, a boss and his collaborator maintaining friendly relationship.

**iv) Membership relationships**

Finally, even if they are not connected through a formal, an informal, or an embedded relationship, employees can be still connected through a membership relation. Simply being the part of the same organization subunit or project can be highly relevant for how employees behave towards each other.

**Intra organizational e-commerce (B2C):**

In B2C model, a business website is a place where all the transactions take place directly between a business organization and a consumer.

The key to successful intra-organizational relationship in e-commerce is improving value chain efficiency. From a business point of view, at an e-commerce business plan that combines various industry and business applications to collaborate in



synchronization, like-

- ❖ Management Function.
- ❖ Business Function.
- ❖ IT functions.
- ❖ Mobile Functions.
- ❖ Outsource vendor's functions.

### **Statement of the problem**

The major problem of e-commerce sector would be the relationship between the management functions and the Outsource vendor market is satisfactory. The participation level and dedication of the employees towards the organizational objectives are low.

### **Review of literature**

The focus on intra-organizational networks in order to investigate the added value of an individual's social capital that is the structure and quality of all interpersonal ties within a particular working context, in this case one's working organization. As regards our outcome measure, we have chosen for task performance which can be defined as the competency that is the proficiency that an individual portrays with regard to central job tasks (Campbell, 1990)

In the present contribution, we hypothesize that employability mediates the relationship between intra-organizational networking and individual task performance. In other words, we hypothesize that optimal performance at work requires that an individual employee possesses the occupational knowledge and skills that are necessary to meet their organizational demands, and these competences can be enhanced by investing in networking activities (Arocena *et al.*, 2007).

### **Objectives**

1. To find out the participation level of employees in the organization
2. To study the relationship between the employees and the organization
3. To identify the effectiveness of conflict handling and giving solutions.

### **Construction of tools**

Descriptive Research are made for the study which includes surveys and fact finding enquiries of different kinds. The questionnaire is framed and it is limited to 50 for the study. The statistical tool like percentile analysis, chi-square and ANOVA is used for the research.

### **Sampling design**

In the study, the sampling technique used was Convenience sampling. This technique was adopted to the respondents who are the employees of the company. The questionnaire was distributed to collect the primary data.

### **Findings**

- From the survey, it is found that, majority 90% of respondents have chosen the online brand Amazon which they love the most.
- Majority of the respondents answered Customer loyalty as the core feature of e-commerce which is the highest among the other options with 68%.
- From the study, it is understood that most of the respondents with the highest of 72% felt the major disadvantage is the low quality of the product.
- Majority of 90% respondents find the Rabbit app as the useful one to work with.
- It is found that most of the respondents (48%) answered the effective technology that streamline e-commerce is Facebook and Advertisement on television.
- Majority of 46% respondents selected customer reviews as a maintenance customer service at the company.
- It is understood that 44% of respondents are comfortable with the time frame 7am-5pm.
- From the study, it is understood that 84% of the respondents are benefitted with ESI & PF given by the company.
- Most of the respondents with the highest percentage of 72% answered that they came to know about the job through friends and relatives.
- It is found that 36% of the respondents strongly agree that the company motivate them throughout the hurdles.
- Majority of the respondents with 68 percent answered that the company evaluate their performance by Performance appraisal.
- It is found that 44% of the respondents strongly disagree Amazon logistics website

- a better one to work.
- From the study, it is found that 88% of the respondents have chosen On the job training is given to the employees.
  - Most of the respondents answered that the way to promote the employees can be through performance (68%).
  - From the study, it is found that 52% of the employees are highly satisfied with the salary given by the company.
  - Majority of 46% respondents have chosen motivational talk as the part of motivation given by the company.
  - From the study, it is found that 64% of the respondents agree that they terminate the employees/colleague.
  - It is understood that 58% of respondents have chosen owner/proprietor who gives the idea the most on work.
  - Most of the respondents (50%) are highly satisfied with the employee benefits like GPA and GMC.
  - From the study, it is found that majority of 74% respondents answered the success of the company relies in terms of profit.

**Table 1.1 Table showing that how the company maintains their Customer Service**

**Percentile Analysis**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid customer reviews	23	46.0	46.0	46.0
Attending phone calls	6	12.0	12.0	58.0
Answering customers politely	21	42.0	42.0	100.0
Total	50	100.0	100.0	

Source: Primary Data

**Inference**

From the above table, it is understood that Customer reviews are valid with 46%, attending phonecalls is 12% and answering the customers politely has the value of 42%.

- From the Data Analysis, Majority of the respondents chose customer reviews as the better to maintain the customer service.

**Table 1.2 Hypothesis relationship between Experience and agreeable level of Handling the Schedule of packages to employees**

**Chi-Square Tests**

	Value	D f	Asymptotic Significance (2-sided)
Pearson Chi-Square	4.826 <sup>a</sup>	2	.090
Likelihood Ratio	5.303	2	.071
Linear-by-Linear Association	.015	1	.903
N of Valid Cases	50		

Source: Primary Data

**H<sub>0</sub>:** There is no significant relationship between Experience and agreeable level of handling the Schedule of packages to employees.

**H<sub>1</sub>:** There is a significant relationship between Experience and agreeable level of handling the Schedule of packages to the employees

**Inference**

Table 1.2 represents the results of the chi-square test to evaluate the relationship between Experience and agreeable level of handling the schedule of packages to employees. The significance value of chi-square is 0.090, which is greater than 0.05.

Hence, it is inferred that to  $H_0$  and found there is no significant relationship between Experience and handling the schedule of packages. Therefore, Accept null hypothesis and the hypothesized relationship Experience is independent of handling the schedule of packages.

**Table 1.3 Hypothesized relationship between Experience and the way of promoting the employees  
Chi-Square Tests**

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.187a	4	.085
Likelihood Ratio	7.161	4	.128
Linear-by-Linear Association	.947	1	.331
N of Valid Cases	50		

Source: Primary Data

**H0:** There is no significant relationship between Experience and the way of promoting the employees.

**H1:** There is a significant relationship between Experience and the way of promoting the employees.

**Inference**

Table 1.3 represents the results of chi-square test to evaluate the Experience and way of promoting the employees. The significance value of chi-square is 0.085, which is greater than 0.05. Hence, it is inferred that  $H_0$  and found, there is no significant relationship between Experience and the way of promoting the employees. Therefore, Accept null hypothesis, and the hypothesized relationship, Experience is independent of the way of promoting the employees.

**Table 1.4 Hypothesized relationship between Designation and Effective Technological Experience**

**Chi-Square Tests**

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.525 <sup>a</sup>	6	.035
Likelihood Ratio	12.097	6	.060
Linear-by-Linear Association	.084	1	.772
N of Valid Cases	50		

Source: Primary Data

**H<sub>0</sub>:** There is no significant relationship between designation and Effective technological experience

**H<sub>1</sub>:** There is a significant relationship between Designation and Effective technological experience.

**INFERENCE:**

Table 1.4 represents the results of chi-square test to evaluate the relationship between Designation and Effective technological experience. The significance value of chi-square is 0.035, which is lesser than 0.05. Hence, it is inferred that to H<sub>1</sub> and found there is a significant relationship between Designation and Effective technological experience. Therefore, reject null hypothesis and the hypothesized relationship Designation is dependent of Effective technological experience.

**Table 1.5 Analysis of variance between the satisfactory level of salary provided and the satisfactory level of additional benefits (GPA/GMC)**

		ANOVA				
		s	df	Mean Square	F	Sig.
Are u satisfied with the salary given by the company?	Between Groups	.312	2	.156	.254	.777
	Within Groups	28.908	47	.615		
	Total	29.220	49			
Are u satisfied with employee benefits like GPA and GMC?	Between Groups	.465	2	.233	.613	.546
	Within Groups	17.855	47	.380		
	Total	18.320	49			

Source: Primary Data

### Results

The value of F is .254 which reaches the significance with a P-value of 0.777 which is greater than the alpha value, this means there is no statistically significant difference between the means of satisfactory level of the salary provided.

The value of F is .613 which reaches the significance with a P-value of 0.546 which is greater than the alpha value, this means there is no statistically significant difference between the means of satisfactory level of additional benefits.

**Table 1.6 Hypothesized relationship between Designation and Satisfactory level of employees receiving benefits like GPA and GMC**

**Chi-Square Tests**

	Value	D f	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.392 <sup>a</sup>	6	.000
Likelihood Ratio	9.808	6	.133
Linear-by-Linear Association	2.057	1	.151
N of Valid Cases	50		

**Source: Primary data**

**H0:** There is no significant relationship between Designation and satisfactory level of employees receiving benefits like GPA and GMC

**H1:** There is a significant relationship between Designation and satisfactory level of employees receiving benefits like GPA and GMC

**Inference**

Table 1.6 represent the results of the chi-square test to evaluate the relationship between Designation and satisfactory level of employees receiving benefits like GPA and GMC. The significance value of chi-square is .000 which is lesser than 0.05. Hence, it is inferred that to H1 and found, there is a significant relationship between Designation and satisfactory level of employees receiving benefits like GPA and GMC. Therefore, Reject null hypothesis and the hypothesized relationship Designation is dependent of employees receiving benefits like GPA and GMC.

**Suggestions**

- Record keeping of attendance and salary can be maintained through a software



which may reduce the work pressure of the employees.

- Opportunities for career growth and development must be provided by the company to improve the individual's economic growth.
- The company can take certain steps to reduce conflict of the employees through some programs and healthy competition among them.

### **Conclusion**

Intra organizational relationship in e-commerce sector complies the functions of Management, Business, Information Technology, Mobile functions and Outsource vendor. The management functions relies on the Human resource department in the company and Amazon. The e-commerce business mainly targets the vendors known as Delivery Service Partners, they are the main source of the last mile delivery who handles the customer. The Outsource vendor functions compiles the whole who maintains the last mile delivery and customers. As intra organizational relationship refers to the relationship within the group, e-commerce sector maintains the relationship with the synchronization of functions. With the help of these five functions, Intra organizational relationship in E-commerce sector sustain in the harmonious path of growth and development of the company.

### **Reference**

1. Arocena, P., Nunez, I., and Villanueva, M. (2007). The Effect of Enhancing Worker's Employability on Small and Medium Enterprises, 191
2. Campbell, J.P. (1990). Modeling the Performance prediction problem in Industrial and Organizational Psychology, 687

### **Website**

1. <http://troindia.in>
2. [www.botreetechnologies.co](http://www.botreetechnologies.co)

## HEAVY METAL ANALYSIS OF *ULVA LACTUCA*

**N. Vincy and T.P. Kumari Pushpa Rani**

Department of Microbiology, St. Mary's College (Autonomous), Thoothukudi  
Affiliated to Manonmanium Sundaranar University, Tirunelveli, Tamil Nadu, India

### ABSTRACT

The contamination of heavy metals is a serious environmental challenge which threatens human health through food chain. The aim of the present study estimate the concentrations of metals such as iron, zinc, copper, chromium, and lead from the marine seaweed *Ulva lactuca* collected from Tharuvaikulam, the Tuticorin coast, the Gulf of Mannar, South India. The various heavy metals content of *Ulva lactuca* was investigated. Concentration of heavy metal were analysed using ICP-MS. The result showed that the concentration of heavy metals in *Ulva lactuca* is 15.06 for iron, 6.115 for zinc, 4.617 for copper, 2.011 for lead, 1.714 for chromium. The present study indicating a possible contribution from manmade activities.

**Keywords:** ICP-MS, Acid digestion, Chromium, Copper, Seaweed

### Introduction

Macroalgae are aquatic found in nearly all marine ecosystem<sup>[1]</sup>. Marine macrophytes contain high concentration of heavy metals. Algae are diverse photosynthetic organisms found in freshwater and marine environments<sup>[2]</sup>. Macroalgae are fast growing organisms that can grow up to 60m<sup>[3]</sup>. Seaweeds mainly classified into three major classes, viz., Chlorophyceae, Phaeophyceae and Rhodophyceae, on the basis of pigmentation colour, morphological, and anatomical characteristics<sup>[4, 5, 6]</sup>. Seaweeds will be used to monitor and restore the environment. As a result, some seaweed is used as biomonitors to study environmental pollution. Seaweeds are multicellular marine algae species; Red algae (Rhodophyta), Brown algae (Phaeophyta), and Green algae (Chlorophyta). The red algae are multicellular and Brown algae are multicellular and Green algae largely unicellular. Macro algae and seaweeds are affected by elevated CO<sub>2</sub> due to enzyme activity<sup>[7]</sup>. Seaweeds absorb nutrients and store carbon in marine ecosystem<sup>[8,9, 10]</sup>.

*Ulva lactuca* is a common macroalgae that can be found in sheltered harbors up to 10 meters deep, at all intertidal levels, and in northern regions. *Ulva lactuca* is a plant that

thrives on rocky or sandy coastal and estuarine beaches <sup>[11]</sup>. *Ulva lactuca* was the marine algae that were most prevalent along the coastline among seaweeds. It can act as a good bioindicator for pollution in the marine environment since it can reflect the amounts of trace elements <sup>[12]</sup>. *Ulva lactuca*, a marine microalga, is used to remove cadmium ions from aqueous solutions and to investigate how temperature, time, initial metal concentration, pH, and biomass amounts affect the treatment process.

Heavy metal pollution has emerged due to anthropogenic activity which is the prime cause of pollution, primarily due to mining the metal, smelting, foundries, and other industries that are metal-based, leaching of metals from different sources such as landfills, waste dumps, excretion, livestock and chicken manure, runoffs, automobiles and roadworks. Heavy metal use in the agricultural field has been the secondary source of heavy metal pollution, such as the use of pesticides, insecticides, fertilizers, and more. Natural causes can also increase heavy metal pollution such as volcanic activity, metal corrosion, metal evaporation from soil and water and sediment re-suspension, soil erosion, geological weathering. The increasing of heavy metals disturbing the environment especially in aquatic systems. Pollutants and heavy metals released through industrial effluents mostly damage aquatic ecosystems, which pose a risk to both human and ecological health <sup>[13]</sup>.

Lead is a non-biodegradable metal that occurs in nature in relatively small amounts. Because of human activities such as manufacturing, mining, and the use of fossil fuels, atmospheric lead levels are steadily rising. When exposed to levels higher than the optimum, lead is toxic to the human body. Children are more vulnerable to lead poisoning, when they come into contact with lead-contaminated dust, the severity of the poisoning increases. Chromium is a carcinogenic and toxic metal chromium is used in a variety of industries that endanger regional climates. In comparison to natural chromium emissions from the environment, the ferrochrome industry emits the most <sup>[14]</sup>. Zinc is widely used in a variety of industries, including galvanization, paint, batteries, smelting, fertilizers and pesticides, fossil fuel combustion, and zinc is abundant in effluent from these processes <sup>[15]</sup>. Too much zinc, on the other hand, can result in serious health issues like stomach pains, rashes, vomiting, nausea, and anaemia<sup>[16]</sup>. Iron poisoning typically occur from ingestion excess of iron results in acute toxicity. Mild symptoms which occur within hours include vomiting, diarrhoea, abdominal pain and drowsiness <sup>[17]</sup>.

The purpose of this study is to find out the concentration of the heavy metals in seaweeds. Inductively coupled plasma mass spectrometry (ICP-MS) method was used to determine the concentration of heavy metals in seaweed.

## **Materials and methods**

### **Collection and processing of seaweed samples**

The fresh, undamaged seaweed samples were collected from Tharuvaikulam, Tuticorin Coastal region, Gulf of Mannar, Southeast Coast of India. The collected seaweed samples were identified by using standard flora<sup>[18]</sup>, such as green algae (*Ulva lactuca*) (Tharuvaikulam). The collected seaweed samples were washed with running tap water, stored in an icebox. The algae samples were soaked in double-distilled water and washed twice for removal of surface contaminations. Finally, the washed samples were dried at room temperature in dark conditions for 20 days. After complete drying, the seaweed samples were ground to a powder with the help of a homogenizer. The samples were carefully packaged and wrapped with black cloth to protect them from sunlight after receiving the thin powder by sifting and stored at 4°C for later use.

### **Sample preparation and Digestion**

The heavy metal concentration in seaweed samples were analyzed according to the methodology of AOAC (2015). Approximately  $0.50 \pm 0.05$  g (wet weight) of each seaweed samples were weighed in the digestion vessel and 5 mL of 65% nitric acid (Suprapur, Merck, Kenilworth, NJ, USA) and 1 ml of hydrogen peroxide were added and allowed to stand in a fume cupboard for 1 hr at room temperature for pre-digestion. Then the samples were placed in a microwave digester (MARS 6, CEM Corp., Matthews, NC, USA) for digestion. The temperature was set to 180°C at 1000 W with a 20° C ramp from the ambient temperature. The final hold was set at 180° C for 20 min followed by cooling until the temperature was below 90° C. The samples digest were then transferred into separate polypropylene tubes and brought to a 50 ml using MilliQ water (Arium lab water systems, Sartorius, Gottingen, Germany).

### **Instrumentation- ICP MS**

Inductively coupled plasma mass spectrometry (iCAP RQ, Thermo Fisher Scientific, Bremen, Germany) was used to determine the concentrations of trace elements viz. [chromium (Cr), copper (Cu), zinc (Zn), Iron (Fe) and lead (Pb)]. Multi-element standard (ICP multi-element standard XVI; Merck, Darmstadt, Germany) was used for the analysis. The instrument was calibrated using a serially diluted multi-element standard

from 0.1–25 µg/L. Yttrium in a 10 µg/L concentration was used as an internal standard in all standards and samples. Two blank samples were run to check for background contaminant that may arise from reagents and apparatus during each analysis. The blank value was subtracted from the analytic value. Twenty blank samples containing 10% of nitric acid were run in ICP-MS.

## Result and discussion

### Heavy metal composition of *Ulva lactuca* by ICP- MS analysis

Concentrations of the metals (Fe, Zn, Cu, Cr and Pb) were analysed in the collected seaweed *Ulva lactuca* from Tharuvaikulam, Tuticorin Coast, Gulf of Mannar, and Southeast Coast of India. The distribution of metal concentrations in seaweed samples of *Ulva lactuca* is given in table 1.

**Table: 1 Concentrations of heavy metals (ppm) in *Ulva lactuca***

Heavy metals	Concentration (ppm)
Iron (Fe)	15.06
Zinc (Zn)	6.115
Copper (Cu)	4.617
Lead (Pb)	2.011
Chromium (Cr)	1.714

Heavy metal content was determined in seaweed *Ulva lactuca*. ICP-MS analysis of dried and powdered seaweeds indicates that marine seaweed contain heavy metal such as Iron (Fe), Zinc (Zn), Copper (Cu), Chromium (Cr), and Lead (Pb), is present in *Ulva lactuca*.

In the present study, the higher concentration of iron (Fe) in *Ulva lactuca* is 15.06ppm. The concentration of zinc (Zn) content is more in *Ulva lactuca* is 6.115 ppm. The concentration of copper (Cu) content in *Ulva lactuca* is 4.617ppm. The concentration of chromium (Cr) in *Ulva lactuca* is 1.714 ppm. The concentration of Lead (Pb) in *Ulva lactuca* is 2.011 ppm.

Iron contents in marine algae species have been reported in the literature to range from 32.9-103 g/g<sup>[19]</sup>, 20-1,040 g/g in commercially available edible marine algae and 357-8,821 g/g<sup>[20]</sup>. Iron in the diet is critical for lowering the incidence of anemia. Iron deficiency occurs when there is a high demand for iron.

Lead contents in marine algae species have been reported in the literature ranging from 1.67-4.82 g/g<sup>[21]</sup>, 0.02-24.7 g/g<sup>[22]</sup>, 0.1-9.1 g/g and 0.01- 0.64 g/g. Lead (Pb), a heavy metal, is harmful even at low amounts and has unknown functions in living things. High levels of lead (Pb) in the study area's algae could be attributed to the use of fossil fuels and oil pollution<sup>[23]</sup>. Furthermore, Lead (Pb) contamination from sediment particles appears to be theoretically possible<sup>[24]</sup>.

The lowest chromium content in marine algae species was 0.50 g/g in *Porphyra umbilicalis* collected from Rize and *Ulva lactuca* collected from Trabzon, while *Antithamnion cruciatum* collected from Sinop had the highest chromium content of 11.6g/g. In the literature, chromium contents in marine algae species have been reported in the 0.06 - 2.3 µg/g. Chromium is a mineral that is required by humans and has been linked to carbohydrate, lipid, and protein metabolism<sup>[25]</sup>.

According to this study, seaweeds have higher amounts of a few heavy metals than other metals, such as lead and chromium. The amount of heavy metals present in seaweed production is below the safety level set by the national food agency and the environment ministry, according to safety guidelines. Thus, the seaweed that was discovered close to harbours and locations for the disposal of industrial waste is dangerous and unfit for ingestion based on this investigation. Because they are present in the environment in combinations rather than independently, heavy metals end up in humans through the food chain. Given their position at the base of the food chain, macroalgae are likely the primary source of metals for many creatures, including fish and invertebrates that consume them. Consequently, research on heavy metal concentrations in macroalgal species may assist comprehend the environmental load of potentially harmful metal emissions from anthropogenic activities as well as the transfer of elements from abiotic compartment (water and sediments) to humans.

### **Conclusion**

This study showed seaweeds are contaminated with high concentrations of a few heavy metals such as chromium and lead when compared to other metals. Based on the safety standards, the concentration of heavy metals in seaweed production passes the

safety threshold rules issued by the national food agency and the environment ministry. Thus, based on this research, the seaweed that was found in areas near places of industrial waste disposal and harbours is unsafe and not suitable for consumption. Heavy metals do not exist separately but as mixtures in the environment, and they reach humans through the food chain. Since macroalgae are located at the base of the food web, they are probably the main source of metals for many animals like invertebrates and fish that feed on them. Therefore, the investigation of heavy metal concentrations in the macroalgal species may provide useful information on the transfer of potentially toxic elements from abiotic compartments (water and sediments) to humans, as well as help in understanding the environmental load of potentially toxic metal releases from anthropogenic activities. Further studies can be conducted extensively to identify other minerals and potentially toxic heavy metals in seaweeds for healthy safety management.

## Reference

- 1) Maehre. H. K., Malde. M. K., Eilertsen. K.-E. and Elvevoll, E. O., 2014. Characterization of protein, lipid and mineral contents in common Norwegian seaweeds and evaluation of their potential as food and feed. *Journal of the science of Food and Agricultural*. 94: 3281–3290. DOI: 10.1002/jsfa. 6681.
- 2) Bharathiraja. B., Chakravarthy. M., Kumar. R.R., Yogendran. D., Yuvaraj. D., Jayamuthunagai. J., Kumar. R.P. and Palani. S., 2015. Aquatic biomass (algae) as a future feed stock for bio refineries: A review on cultivation, processing and products. *Renew. Sustain. Energy Rev*. Vol (47): 634-653. DOI: 10.1016/j.rser. 2015.03.047.
- 3) McHugh. D.J., 2014. A Bioactive compounds and the properties of seaweeds. *OpenAccess Library journal*. 1(4). DOI: ORG/10.3390/MD 12094934.
- 4) Manivannan. K., Thirumaran. G., Karthikai. D.G., Anantharaman. P. and Balasubramanian T., 2009. Proximate composition of different groups of seaweeds from Vedalai coastal waters. *Journal of Science Research*. 4(2): 72–77. DOI: 10/1007/s 13762-016- 1202-1.
- 5) Pramanick. P., Zaman. S. and Mitra. P., 2014. A review on tropical seaweed diversity and benefits, *Journal of Chemical Biology and Physical Science*. 3909 –3920.
- 6) Mitra. A. and Zaman, S. 2016. Blue carbon reservoir of the blue planet, Published by Springer, ISBN 978. 81-322-325. DOI.org/j.protis.2016.01.003.



- 7) Hofmann, L. Yildiz. G., Hannelt D. and Bischof K., 2012. Physiological responses of the calcifying rhodophyte coralline officinalis (L), to future CO<sub>2</sub> Levels. *Marine Biology*. **159**(4): 783-792.DOI: 10.1007/s 10608-012-9476-1.
- 8) Filbee-Dexter. K. and Wernberg. T. 2020. Substantial blue carbon in overlooked Australian kelp forests. *Scientific Report*.10: 12341.
- 9) Chen. Y. and Xu. C. 2020 Exploring new blue carbon plants for sustainable Ecosystems. *Trends in Plant Science*.25: 1067–1070.DOI:10.1172/JCI137244.
- 10) Krause-Jensen. D., Duarte. C.M., 2016. Substantial role of macroalgae in marine carbon sequestration. *Nature Geoscience*, 9:737–742.DOI: 10.1101/cshperspect. a027029.
- 11) Aslan. A., Apaydın. G., Yazıcı. K., Cengiz. E., Aylıkçı. V., and 2010. Analysis of Trace Element Concentrations of Some Lichens of Turkey. *Asian Journal of Chemistry*. 22(1): 389–400.
- 12) Saleh, B. 2015. Physiological Response of the Green Algae *Ulva lactuca* (Chlorophyta) to Heavy Metals Stress. *Journal of Stress Physio. & Bioch*. 11(3):38-51.DOI.org/10.1016/j.sbspro.2015.07.043.
- 13) Rai, P.K., 2010. Phytoremediation of heavy metals in a tropical impoundment of Industrial region. *Environ molit assess*. 165: 529-537.DOI.org/10.2174/1874378101004010184.
- 14) Coetzee.N., Bansal. And E.M.N. Chirwa 2016.Chromium in environment, its toxic effect from chromite-mining and ferrochrome industries, and its possible bioremediation Expo Heal 12(1)51-62.DOI: 10.1007/s12403-018-0284-z.
- 15) Parmar, M, and Thakur. L.S. 2013. Heavy metal Cu, Ni and Zn: Toxicity, health hazards and their removal techniques by low cost adsorbents: A short overview. *International Journal of Plant, Animal and Environmental Sciences*.3 (3):143-157.
- 16) Fu F. and Wang. Q., 2011. Removal of heavy metal ions from wastewaters: A Review. *Journal of Environmental Management*. 92(3):407-418.
- 17) Manivannan. K., Thirumaran. G., Karthikai. D.G., Anantharaman. P., and Balasubramanian T., 2009. Proximate composition of different groups of seaweeds from Vedalai coastal waters. *Journal of Science Research*.4(2):72–77.
- 18) Aleem A.A., 1993. The marine Algae of Alexandria, Egypt. Aleem, A.A. (Ed.), Faculty of Science, University of Alexandria, Egypt, 1-138.



- 19) Ruperez. P., 2002. Mineral content of edible marine seaweeds. *FoodChemistry*.**79**: 23–26.DOI: 10.1021/jf010908o.
- 20) Topcuoglu. S., Guven, K. C., Balkis. N., & Kirbasoglu. C., 2003. Heavy metal monitoring of marine algae from the Turkish coast. *Chemosphere*.**52**, 1683–1688.
- 21) Conti. M. E., & Cecchetti. G., 2003. A biomonitoring study: Trace metals in algae and mollusks from Tyrrhenian coastal areas. *Environmental Research* **93**:99–112.DOI.org/10.1016/S0013-9351 (03)00012-4.
- 22) Sawidis. T., Brown. M.T., Zachariadis. G., Sratis. I., 2001. Trace metal concentration in marine macroalgae from different biotopes in the Aegean Sea. *Environmental International***27**(1): 43-47.DOI: 10.1016/S0160-4120(01)00052-6.
- 23) Dadolahi. A., Nikvarz. A., Mohamad. S., Nabavi. B., Safahyeh, A. and Ketal, M.2011. Environmental monitoring of heavy metals in seaweed and associated sediment from the Strait of Hormuz, I.R. Iran. *World J. Fish & Marine Science*.**3**(6):576-589.
- 24) Giusti, L., 2001. Heavy metal contamination of brown seaweed and sediments from the U.K. coastline between the Wear River and Tees River. *Environment International*, **26**: 275-286.DOI: 10.1016/s0160-4120(00)00117-3.
- 25) Washington D.C. 1989, Recommended Dietary Allowances. 10<sup>th</sup> edition, National Academies Press (US).

## SYNTHESIS AND CHARACTERIZATION OF SILVER NANOPARTICLES FROM *Parapenaepsis stylifera* SHRIMP

S. Rinolaa and R. Shynisha Begam

Department of Microbiology, St. Mary's College (Autonomous) Thoothukudi  
Affiliated to Manonmanium Sundaranar University, Tirunelveli, Tamil Nadu, India

### ABSTRACT

Nanoparticles are at the forefront of nanotechnology developments in biomedical research. Due to their adaptability in application and broad spectrum activity against microorganisms, silver nanoparticles (AgNPs) provide a fresh and inventive alternative to conventional medications to treat infectious disorders. Silver nanoparticles have shown remarkable results not only as antimicrobial and antiviral agents but also as anti-tumor agents. Studies report on an eco-friendly solution with multipotency of silver nanoparticles fabricated from shrimp. *Parapenaepsis stylifera* Shrimp were collected and shade-dried to remove their moisture content and AgNPs were extracted using wet chemical method. UV–visible spectrometry was used to characterize the AgNPs and the reaction process. Marine-derived nanomaterials, which may be whole extracts or pure constituents, are used as nanocarriers in drug delivery.

**Keywords:** Nanoparticles, AgNPs, *Parapenaepsis stylifera*, Wet Chemical Method, Characterization, UV- Vis Spectrometry, Nanocarriers

### Introduction

Nanotechnology diagnoses and treats disease at this very small level. It uses nanoparticles, which are particles 100 to 10,000 times smaller than human cells. Their small size allows them to target cancer cells more effectively, which aids in diagnosis and treatment. Though science hasn't figured out how to shrink doctors, it has been able to make tools to treat cancer and other diseases smaller than a human cell. Due to their small size, nanotechnology can detect changes in very few cells. It can tell the difference between normal cells and cancer cells. Currently, scientists have limited ability to translate promising molecular discoveries into benefits for cancer patients. Nanotechnology, the science and engineering of manipulating materials at the molecular level to create devices

with novel chemical, physical and/or biological properties, can provide engineered controls and tools to enable the development of new diagnostics, treatments and prevention.

Nanoparticles are a promising type of drug delivery system. It is widely agreed that nanoparticles are clusters of atoms in the size range of 1–100 nm<sup>[1]</sup>. These small particles, called nanocarriers, can bind to the drug and protect it from degradation until it enters the tumor cells. However, their effectiveness as drug delivery and drug-protecting agents and their potential toxicity to patients are highly dependent on their size, composition, and chemical properties. Nanoparticles can be modified to cross the brain blood barrier for medical applications, but this suggests other synthetic nanoparticles may unintentionally cross this barrier<sup>[2]</sup>.

Metallic nanoparticles exhibit size and shape-dependent properties that are of interest for applications ranging from catalysts and sensing to optics, antibacterial activity and data storage<sup>[3]</sup>. The most widely used technique for creating stable, colloidal dispersions of AgNPs in organic or water-based solvents is chemical reduction. Boron hydride, citrate, ascorbate, and elemental hydrogen are frequently used reductants. Colloidal silver with particle sizes of several nanometers is typically produced when silver ions (Ag<sup>+</sup>) are reduced in aqueous solution. Silver atoms (Ag<sup>0</sup>) are initially created when different complexes are reduced with Ag<sup>+</sup> ions, and they then aggregate into oligomeric clusters. Colloidal Ag particles eventually form as a result of these clusters. Due to their distinctive physical and chemical characteristics, silver nanoparticles (AgNPs) are being employed more and more in a variety of industries, including medicine, food, health care, consumer goods, and industrial applications. The silver nanoparticles have also found diverse applications in the form of wound dressings; coatings for medical devices, silver nanoparticles impregnated textile fabrics, etc<sup>[4]</sup>. They include high electrical conductivity, optical, electrical, thermal, and biological characteristics. Generally metal nanoparticles can be prepared and stabilized by physical, chemical and biological methods; The chemical approach, such as chemical reduction, electrochemical techniques, and photochemical reduction is most widely used<sup>[5]</sup>. The chemical reduction method requires three reactants, namely, a silver precursor, a capping agent, and a reducing agent. The reducing agent reduces the silver precursor to the state of silver particles, while the capping agent covers the outer layer of silver particles, making them less likely to

aggregate. The morphology of the AgNPs can also be changed by adjusting the concentration and dosage of the reagents, among other factors.

The chemical approach is the one in which the metal ions in solution is reduced in conditions favoring the subsequent formation of small metal clusters or aggregates [6]. Based on chemically reducing aqueous salts of metals, such as silver nitrate (AgNO<sub>3</sub>) in the case of silver nanoparticle production, chemical reduction is an efficient wet-chemical technique for producing zero-valent nanoparticles. The sizes of the silver nanoparticles were controlled by varying some experimental conditions. It was found that the antibacterial activity of the nanoparticles varies when their size diminishes<sup>[7]</sup>. At least one reducing agent is utilised to provide electrons for metal ions, reducing them to zero-valent state in order to reduce the precursor metal salt. The nanoparticles which are derived from among other things, chitin, a natural and organic polymer that forms the shell of shrimp.

Bioactive compounds from marine animals have been reported to have a wide range of bioactive properties. More and more recent studies focus on bioactive peptides with potential anticancer activity isolated from various marine animals such as shrimp, sponges, marine sediments, molluscs, fish and other marine organisms.

*Papenaeopsis stylifera*, popularly known as Kiddi shrimp, constitutes an important fishery resources along the Indian coast with wide geographical distribution. It matures in a year at a size of 65 mm (male) to 75 mm (female). Along the Indian coast, Penaeid shrimps (0.19 Mt) form a considerable proportion of crustaceans (0.4 Mt) followed by non-penaeids (0.18 Mt), stomatopods and lobsters. Among penaeids, *P. stylifera* is the most dominant species across the Indian coast (CMFRI, 2019). Especially, on the west coast of India (Maharashtra), this species contributes up to 48–50% of total penaeid landings (CMFRI, 2019). Despite its fisheries dominance and economic importance, *P. stylifera* genetic management units/genetic stocks have not been well defined and the entire stock is being treated as a single management unit [8].

UV spectroscopy or UV–visible spectrophotometry (UV–Vis or UV/Vis) refers to absorption spectroscopy or reflectance spectroscopy in part of the ultraviolet and the full, adjacent visible regions of the electromagnetic spectrum. This method is frequently employed in a variety of practical and theoretical applications since it is reasonably affordable and simple to execute. A simple technique that allows for quick detection and description of silver nanoparticles is UV-visible spectrophotometry. Due to the interaction

between light and the moving surface electrons of silver nanoparticles, it produces a powerful absorbance band in the 400–500 nm region known as surface plasmon resonance (SPR). The concentration of sample is required to measure the absorption spectrum on a UV/Vis Spectrophotometer is the range  $1 \times 10^{-4}$  Moles. The UV region covers the wavelength range 100-400 nm and is divided into three bands: UVA (315-400 nm) UVB (280-315 nm) UVC (100-280 nm).

## Materials and methods

### Sample Collection

The shrimp species namely *Parapenaeopsis stylifera* were collected from in and around Thoothukudi, Tamilnadu, India.

### Preparation of shrimp powder

The shrimp were rinsed with distilled water to remove dirt and associated debris and shade dried for about 25-30 days. Then the dried materials were grinded to fine powder using homogenizer and stored in airtight bottles.

### Extraction of the sample:

Five grams of finely powdered shrimp was added with 100 mL of double distilled water and boiled at 80°C for 10 min. The obtained extraction was filtered using Whatman No. 1 filter paper, and the filtrate was collected in 250 mL bottle and stored at room temperature for further usage.

### Synthesis of Silver Nanoparticles

In the present investigation, we report the easy synthesis of silver nanoparticles by an environmental friendly procedure involving the in situ reduction of Ag by *Parapenaeopsis stylifera*

Silver nitrate used in this study was obtained from Himedia Laboratories Pvt. Ltd., Mumbai, India. The synthesis of AgNPs was carried out using a pure aqueous extract solution of shrimp. Take 50 mL of extract was added to 50 mL of 1 mM AgNO<sub>3</sub> solution at room temperature, and the reduction of Ag NPs was clearly observed. For silver nanoparticles, the solution turned from yellowish to bright yellow and to dark brown. The Erlenmeyer flasks were incubated at 37 °C under agitation (200 rpm) for 24–48 h<sup>[9]</sup>.

## Characterization of synthesized silver nanoparticles

The following technique is crucial for validating the synthesis of silver nanoparticles. The chemically created nanoparticles were identified using the following identifying technique.

### UV-Visible Spectrophotometer Analysis

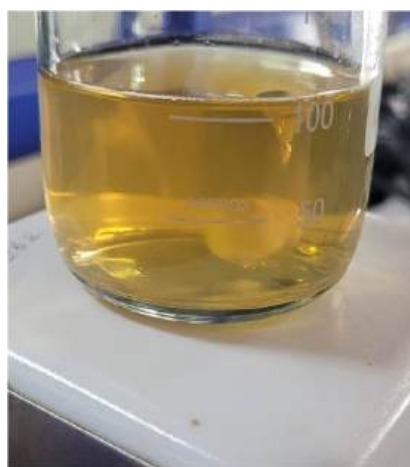
To validate the creation of silver nanoparticles, the colour of the sample is analysed in a UV-Visible spectrophotometer after changing from pale yellow to reddish brown.

Synthesized silver nanoparticles was confirmed by sampling the aqueous component of different time intervals and the absorption wavelength was noted.

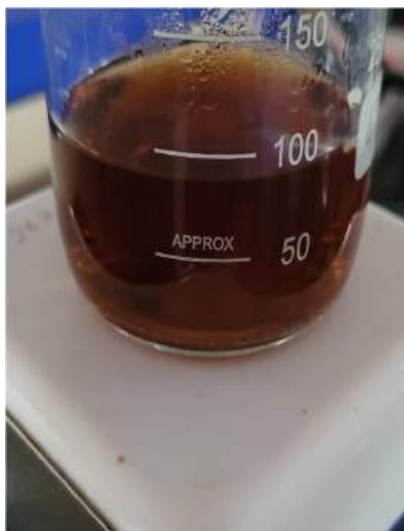
## Result and discussion

### Visual Observation of the chemically synthesized nanoparticles

Formation of silver nanoparticles through reduction of silver nitrate into silver ion is known to be associated with colour change (Fig. 2). The reaction mixture of  $\text{AgNO}_3$  and the extract of *Parapenaeopsis stylifera* Shrimp turned brown indicating formation of silver nanoparticles. The generation of brown colour is due to the Surface Plasmon Resonance (SPR) exhibited by the nanoparticles. The intensity of the colour increases after 24 h of incubation.



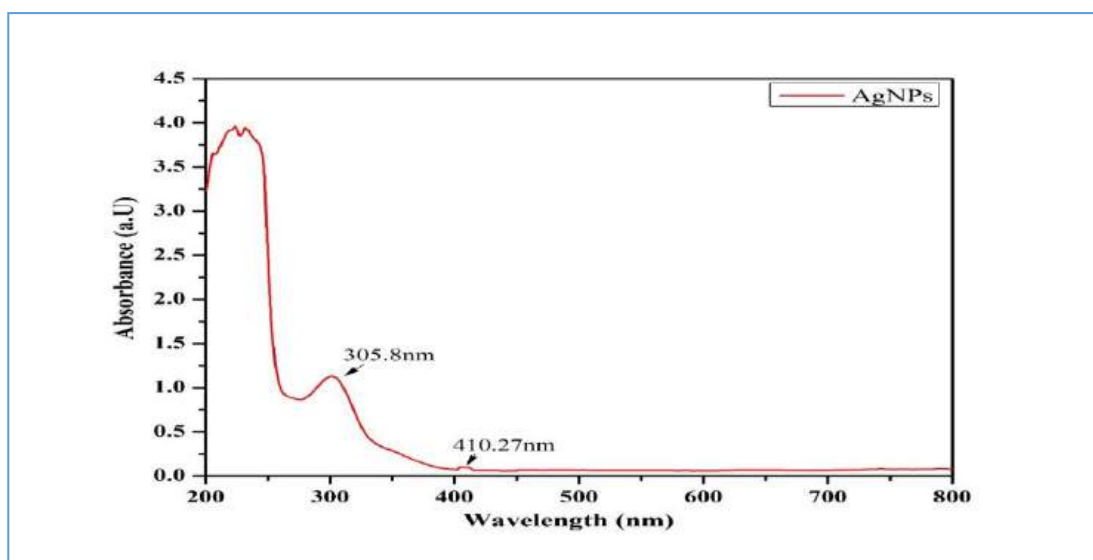
**Fig 1: Colour change after 30 minutes**



**Fig 2: Colour change after 60 minutes**

### UV analysis:

Synthesized silver nanoparticles was confirmed by sampling the aqueous component of different time intervals and the absorption maxima was noted by UV–Vis spectrophotometer wavelength at 410 nm.



**Fig 3: UV Vis Spectroscopy graph of Ag NPs with maximum absorption at 410nm**

The UV-visible absorbance spectroscopy is a characterization technique that shows absorbance of the material which is studied as a function of wavelength. The visible region of the spectrum is in the wavelength where the absorption was noted at 305.8nm and

410.27nm. The UV-visible spectrophotometer analysis was performed over the wavelength range 200 – 800 nm.

## Conclusion

The silver nanoparticles were synthesized from shrimp *Parapenaeopsis styliifera* by reducing silver salts by using chemical reduction method. The synthesized nanoparticles were characterized using UV-Vis spectroscopy. Synthesized silver nanoparticles was confirmed by sampling the aqueous component of different time intervals and the absorption maxima was detected by UV-Vis spectrophotometer wavelength at 410 nm. But, additional research is needed to use the particles beyond the laboratory.

## References

1. David Williams, (2008). The relationship between biomaterials and nanotechnology. *Biomaterials*. 29(12):1737-1738.
2. Matthew A. Albrecht, Cameron W. Evansa and Colin L. Raston (2005). Green chemistry and the health implications of nanoparticles. *Green Chemistry*.8:417-432.
3. Yoosaf, K., Ipe, B.I., Suresh, C.H. and Thomas, K.G. (2007). In Situ Synthesis of Metal Nanoparticles and Selective Naked-Eye Detection of Lead Ions from Aqueous Media. *The Journal of Physical Chemistry*. 111:12839-12847.
4. S. Silambarasan, J. Abraham (2013). Biosynthesis of silver nanoparticles. *African Journal of Biotechnology*. 12(21):3088-3098.
5. Frattini, A., Pellegrini, N., Nicastro, D., De Sanctis, O., (2005). Effect of Amine groups in the synthesis of Ag nanoparticles using aminosilanes. *Materials Chemistry and Physics*.94:148–152.
6. Khomutov G.B. and Gubin S.P., (2002). Interfacial synthesis of noble metal nanoparticles. *Materials Science and Engineering*,22:141-146.
7. Martínez-Castañón GA, Niño-Martínez N, Martínez-Gutierrez F, Martínez-Mendoza JR and Ruiz F., (2008), Synthesis and antibacterial activity of silver nanoparticles with different sizes. *Journal of Nanoparticles*.10(8):1343–1348.
8. Labrechai Mog Chowdhury A., Kathirvelpandian, P.R. Divya, V.S. Basheer, Chelath Mohitha A.,Pavan-Kumar and Gopal Krishna (2021). Genetic characterization of Kiddi shrimp, *Parapenaeopsis styliifera* (H. Milne Edwards,





1837) along the Indian coast using microsatellite markers. *Fisheries Research*.244:106-128.

9. Kasthuri J, Veerapandian S, Rajendiran N (2009). Biological synthesis of silver and gold nanoparticles using apiin as reducing agent. *Colloids Surf B Biointerfaces*. 68(1):55-60.

## **SYNTHESIS AND CHARACTERIZATION OF GRAPHENE OXIDE NANOPARTICLES BY MODIFIED HUMMER'S METHOD**

**J. Mahalakshmi, S. Irudaya Sahaya Lancy and P. Padmavathi**

Department of physics, St. Mary's college (Autonomous), Thoothukudi  
Affiliated to Manonmanium Sundaranar University, Tirunelveli, Tamil Nadu, India

### **ABSTRACT**

Graphene oxide (GO) has recently attracted great attention due to its unique chemical and physical properties. Pure Graphene oxide nanoparticles was prepared by modified hummer's method. The resulting product was characterized by X-Ray Diffraction(XRD). X-ray diffraction confirmed the prepared nanostructures as Graphene oxide. The size of the particle is found to be 7nm. The structure of the as prepared nanoparticle is hexagonal which is confirmed with JCPDS file no.25 -284.

**Keywords:** Graphene oxide, nanoparticles, XRD.

### **Introduction**

In recent years, nanoscale materials have become essential in our daily lives, as they are included in electronic and opto electronic devices, biological applications, cosmetics. These nanoscale materials have large surface- to-volume ratio when compared with bulk materials. Semiconductor nanocrystals can exhibit unique properties, such as high extinction coefficients, rapid charge separation, good chemical, thermal, environmental stability and ease of synthesis. When the size is reduced to nanoscale, their physical, chemical, optical, electrical and photo response properties change drastically, resulting in unique properties. One of the most promising material is graphene oxide. Graphene is a one-atom-thick planar layer of sp<sup>2</sup> hybridization carbon atoms which arrange in a hexagonal structure. It has unique and remarkable mechanical, thermal, optical, and electrical properties. In addition, the two-dimensional structure causes graphene to have a zero band gap and to act as a semimetal.[1,2] Graphene is a novel material with outstanding electrical, thermal, optical properties, large surface area, high catalytic ability, distinguished biocompatibility, increased heterogeneous charge transfer rate, good stability etc., Hence it is used in a wide range of applications mainly in sensors, supercapacitor, gas sensing, photodegradation, Li-ion batteries, catalysis, drug delivery, and reduction of toxic metals. Compositing graphene with metal oxide prevents the restacking which in turn leads to increases in surface area and conductivity due to

thesynergetic effect. Graphene based materials are considered to be an important class of materials with a lot of applications. The rapid development of graphene-based materials for various applications particularly electrochemical sensors has been motivated by their unique structural features, high stability, novel physicochemical properties and low cost. Graphene can be synthesized by various methods such as chemical vapor deposition, mechanical exfoliation and cleavage, and annealing a single-crystal SiC under ultrahigh vacuum. These methods, however, have many disadvantages including high energy requirement, low yield, and limitation of instrument. Up to now, the chemical method has become a promising route to produce graphene sheets, although graphene derived by this method could contain a significant amount of oxygen functional groups and defects. This is because it is simple, inexpensive, and suitable for large-scale or mass production. In this present work, Hummer's method is used to produce the pure graphene oxide nanoparticles and their structural properties are studied using X Ray Diffraction method.

## **Material and methods**

### **Materials**

Graphite oxide (GO), formerly called graphitic oxide or graphitic acid, is a compound of carbon, oxygen, and hydrogen in variable ratios, obtained by treating graphite with strong oxidizers and acids for removing of extra metals. The maximally oxidized bulk product is a yellow solid with C:O ratio between 2.1 and 2.9, that retains the layer structure of graphite but with a much larger and irregular spacing.[3,4] The discovery of allotropes of carbon has transformed the electronic and optoelectronic industry due to their encouraging properties leading to a large spectrum of applications. An interesting characteristic of carbon is its ability to form many allotropes due to its covalency. In recent decades, various allotropes and forms of carbon have been discovered, including fullerenes, carbon nanotubes (CNTs), and graphene. Since the inception of nanotechnology, carbon allotropes based nanocomposites have become a leading sector of research due to their unique bonding properties. Fullerenes and carbon nanotubes-based polymer nanocomposites have attracted significant research interest due to their vast applications in various spheres of science and technology. The reduction of electrically insulating graphene oxide, which is exfoliated from graphite flakes, and use of the colloidal suspensions of reduced graphene oxide is one of the most promising ways to produce electrically conducting graphene-based platelets on large scale [5]. The bulk material spontaneously disperses in basic solutions or can be dispersed by sonication in

polar solvents to yield monomolecular sheets, known as graphene oxide by analogy to graphene, the single-layer form of graphite.[6] Graphene oxide sheets have been used to prepare strong paper-like materials, membranes, thin films, and composite materials. Initially, graphene oxide attracted substantial interest as a possible intermediate for the manufacture of graphene.

#### Preparation technique

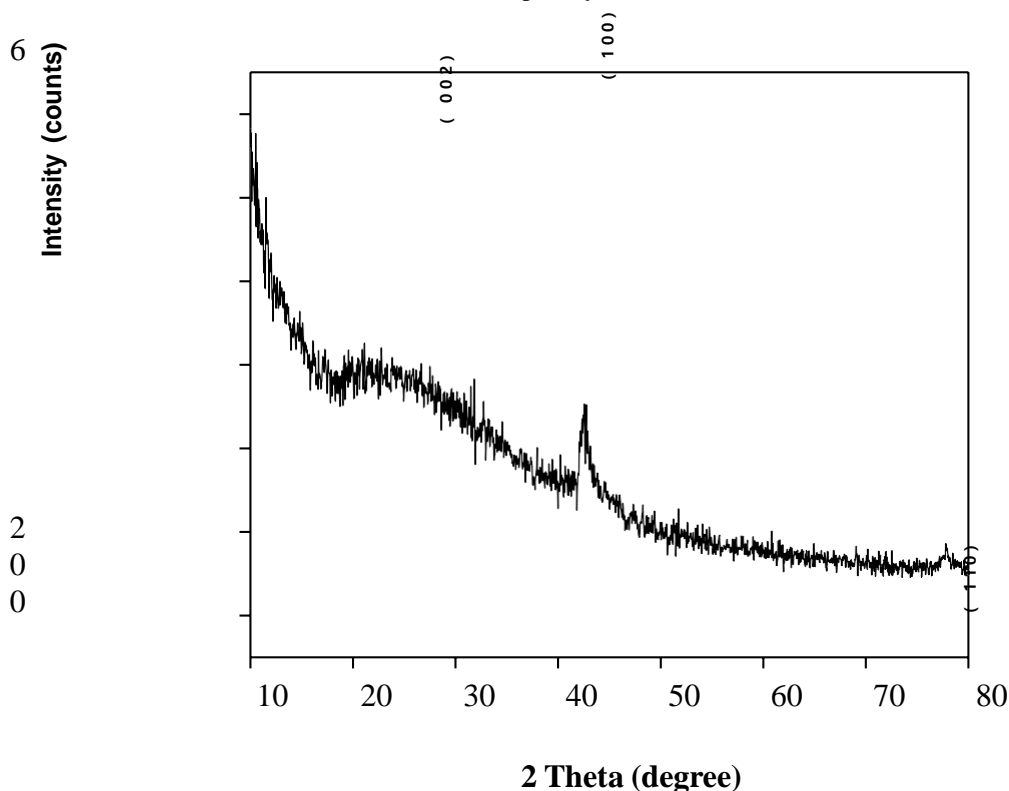
Graphene oxide was synthesized from graphite powder by modified Hummer's method [7]. 2 g of graphite powder is added into 100 mL of concentrated H<sub>2</sub>SO<sub>4</sub> at room temperature. Under constant stirring, the mixture was cooled to 5<sup>o</sup>C using an ice bath, and the temperature of the mixture was kept to be below 5<sup>o</sup>C for 30 min. 8 g of KMnO<sub>4</sub> is then added gradually under stirring and cooling, so that the temperature of the mixture was not allowed to reach 10<sup>o</sup> C. 100 mL distilled water was added into the mixture. And further diluted to approximately 300 mL with distilled water. After that, 20 mL of 30% H<sub>2</sub>O<sub>2</sub> was added to the mixture to reduce the residual KMnO<sub>4</sub>. The solid was filtered, washed with 5% HCl aqueous solution (800 mL) to remove metal ions and with distilled water until pH was 6. The resulting graphene oxide (GO) was air dried for 24 hrs.

#### Result and discussion

The modified Hummers method is used to prepare Graphene oxide nanoparticles. In this present work, the GO nanoparticles are subjected to XRD analysis.

#### Characterization using xrd

In this present investigation, XRD is used to analyse the crystal structure and verify the interplanar spacing of Graphene oxide nanoparticles. The strong high intense peaks are observed at  $2\theta=26.6821^{\circ}$  along the (0 0 2) hkl plane,  $2\theta=42.3686^{\circ}$  along the (1 0 0) hkl plane and  $2\theta=77.6609^{\circ}$  along the (1 1 0) hkl plane respectively which are shown in Fig.3.1



**Fig.3.1. XRD pattern of Graphene oxide nanoparticles**

The d-spacing values are in good agreement with the standard d –spacing values as confirmed with the JCPDS file no.25-284. From this data it is concluded that the as prepared Graphene oxide nanoparticles exhibit hexagonal structure. The standard and observed d-spacing values are presented in table.3.1.

**Table 3.1. Comparison of Observed d –Spacing values with JCPDS d – spacing values of asprepared Graphene oxide nanoparticles**

S.No.	Observed d-spacing (Å)	JCPDS d-spacing (Å)	Observed 2θ (degree)	hkl
1.	3.3411	3.3553	26.6821	0 0 2
2.	2.1333	2.1319	42.3686	1 0 0
3.	1.2295	1.2309	77.6609	1 1 0

From these experimental data, the average size of the GO nanoparticles are found

out using the Debye Scherrer formula,  $D = k\lambda/\beta \cos\theta$ . The size of the particle is  $D=7\text{nm}$ . The average dislocation density is  $\delta=5.7067 \times 10^{15}$  lines/sq.m.

### Conclusion

In this research work, pure GO nanoparticles are synthesised using modified Hummer's method. The GO nanoparticles are subjected to XRD analysis to study the structural properties of the GO nanoparticles. XRD studies clearly indicates that the particles are in nanorange. The average size of the particles are found using Debye Scherrer formula. The average size of the particle is found to be 7nm. It also exhibits hexagonal structure which is confirmed with JCPDS file no.25-284.

### Reference

- 1) A. Arbuzov, V. E. Muradyan, and B. P. Tarasov, "Synthesis of few-layer graphene sheets via chemical and thermal reduction of graphite oxide," in *Proceedings of the International Conference Nanomaterials: Applications and Properties*, 2012.
- 2) V. Singh, D. Joung, L. Zhai, S. Das, S. I. Khondaker, and S. Seal, "Graphene based materials: past, present and future," *Progress in Materials Science*, vol. 56, no. 8, pp. 1178–1271, 2011.
- 3) Hummers, W. S. Offeman, R. E. (1958). "Preparation of Graphitic Oxide". *Journal of the American Chemical Society*. 80 (6): 1339.
- 4) Sadri, Rad (2017). "Experimental study on thermo-physical and rheological properties of stable and green reduced graphene oxide nanofluids: Hydrothermal assisted technique". *Journal of Dispersion Science and Technology*. 38 (9):1302-1310.
- 5) W. Choi, I. Lahiri, R. Seelaboyina, Y. S. Kang, *Solid State Mater. Sci.*, 35 (2010) 52.
- 6) Dreyer, D. R.; Park, S.; Bielawski, C. W.; Ruoff, R. S. (2010). "The chemistry of graphene oxide". *Chemical Society Reviews*. 39 (1): 228–240.
- 7) Vorrada Loryuenyong, Krit Totepvimarn, et al., (2013) "Preparation and Characterization of Reduced Graphene Oxide Sheets via Water-Based Exfoliation and Reduction Methods". Volume-2013.

**ANTIACNE ACTIVITY OF *EUDISTOMA VIRIDE* TOKIOKA, 1955****C. Prathepa and M. Paripooranaselvi**PG and Research Department of Zoology, St. Mary's College (Autonomous), Thoothukudi  
Affiliated to Manonmanium Sundaranar University, Tirunelveli, Tamil Nadu, India**ABSTRACT**

Marine environment has been recognized to be a rich source of bioactive metabolites with varied biological and pharmacological activities. Ascidians rank second with most promising source of drugs. The aim of this work was to investigate the antiacne activity of the ethanolic extract of *Eudistoma viride*. The antiacne assay was measured by agar well diffusion method. The zone of inhibition noted was  $4.5 \pm 0.7$  mm at the highest concentration of 500  $\mu\text{g/ml}$  of ethanolic extract of *Eudistoma viride*. The result from the study showed that the ethanolic extract of *Eudistoma viride* can be used in skin-care products for the treatment of acne.

**Keywords:** Ascidians, *Eudistoma viride*, antiacne, zone of inhibition, *Propionibacterium acnes*

**Introduction**

Skin is a marker of health and beauty. Skin is the organ that comes in contact with the environment. The most common skin condition worldwide is acne. Most people experience acne at some point in their lives. Acne can happen in adults, although it is more frequent in teenagers and young adults going through hormonal changes. Consumption of food having high glycemic index, dairy products, spicy and oily food products exaggerate sebaceous glands activity leading to acne. Smoking and alcohol consumption also leads to acne. The bacteria that cause acne are *Propionibacterium acnes* and *Cutibacterium acnes*. Treatment of acne depends on its condition and degree of severity which may vary from a mild non-inflammatory comedons to an inflammatory papule or pustule. Conventional acne treatments, like salicylic acid, niacinamide or benzoyl peroxide, are proven to be the most effective acne solutions, but they can be expensive and have undesirable side effects, such as dryness, redness and irritation. Natural products may be helpful in treating acne because there are adverse effects from conventional treatments. Antiacne effects of marine resources have not been well reported.

Marine environment has been recognized to be a rich source of bioactive metabolites with varied biological and pharmacological activities. Among the marine

invertebrates, ascidians are the most closely related to humans; they constitute the biggest and most varied class of the sub-phylum Tunicata, comprising about 3000 described species<sup>[1]</sup>. Ascidians are marine invertebrates which ranks second with promising the source of drugs<sup>[2]</sup>. Many different secondary metabolites have been produced by ascidians, some of which have physiological purposes, mostly for protection against their natural predators<sup>[3]</sup>. Ascidians harbour a great microbial community (including bacteria, actinobacteria, cyanobacteria, and fungi), which represents an additional source of natural products, many of which are extremely potent and mainly cytotoxic and antimicrobial, but also antioxidant, anti-inflammatory properties<sup>[4]</sup>. In India, studies on antiacne property of ascidians especially in *Eudistoma viride* are lacking. As ascidians are available along the Tuticorin coast an attempt has been made to assess antiacne property of ascidians.

### **Materials and methods**

Samples of *Eudistoma viride* Tokioka, 1955 were collected during the low tide from the intertidal rocky area of Hare Island. The samples were washed with sea water to remove sand, mud and overgrowing organisms at the site collection and then transported to laboratory. The samples were dried and made into powder. Then the crude extract was prepared using Soxhlet extraction method and the solvent was separated by rotary evaporator.

### **Nutrient Agar Medium**

The medium was prepared by dissolving 2.8 g of the commercially available Nutrient Agar Medium (HiMedia) in 100 ml of distilled water. The dissolved medium was autoclaved at 15 lbs pressure at 121°C for 15 minutes. The autoclaved medium was mixed well and poured onto 100 mm petriplates (25-30ml/plate) while still molten.

### **Nutrient broth**

Nutrient broth was prepared by dissolving 2.8 g of commercially available nutrient medium (HiMedia) in 100 ml distilled water and boiled to dissolve the medium completely. The medium was dispensed as desired and sterilized by autoclaving at 15 lbs pressure (121°C) for 15 minutes.

### **Antimicrobial assay**

The antimicrobial assay was measured by agar well diffusion method. Petri plates containing 20 ml nutrient agar medium were seeded with 24 hr culture of bacterial strains were adjusted to 0.5 OD value according to McFarland standard, (*Propionibacterium acnes*-1951) Wells were cut and ethanolic extract of *Eudistoma viride* was added at various



concentration (500, 250, 100 and 50 µg/ml). The plates were then incubated at 37°C for 24 hours. The antibacterial activity was assayed by measuring the diameter of the inhibition zone formed around the wells. Gentamicin antibiotic was used as a positive control.

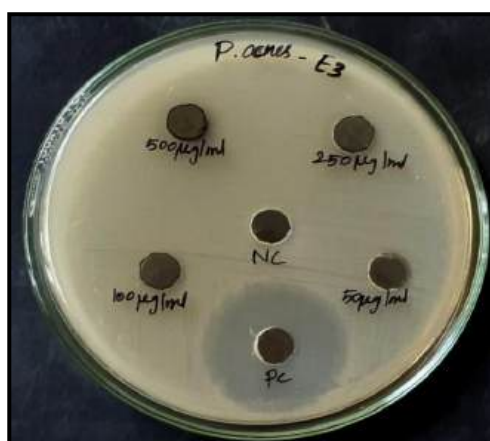
**Results**

In the present investigation, ethanolic extract of *Eudistoma viride* were tested against gram positive, anaerobic bacteria *Propionibacterium acnes*. Table: 1; Figure: 1 and Plate: 1 depict the antiacne activity of *Eudistoma viride*. Antibiotic - Gentamicin was used as positive control. The zone of inhibition noted was 4.5±0.7mm at the highest concentration of 500 µg/ml of ethanolic extract of *Eudistoma viride*. Zone of inhibition was absent in 250, 100 and 50 µg/ml of ethanolic extract of *Eudistoma viride*. In control, the zone of inhibition was 14.5±0.7mm. Statistical analysis of the antimicrobial activities showed that the p value was less than 0.05, which indicates that there was a significant difference in the antimicrobial activity of ethanolic extract of *Eudistoma viride*.

**Table: 1** Antiacne activity of ethanolic extract of *Eudistoma viride* against *Propionibacterium acnes*

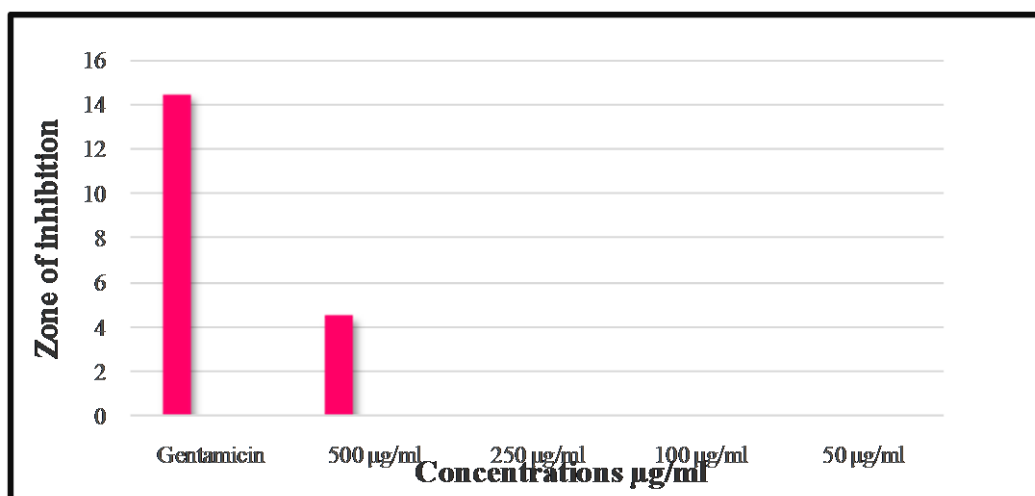
Zone of inhibition (mm)				
500 µg/ml	250 µg/ml	100 µg/ml	50 µg/ml	Gentamicin
4.5±0.7	0	0	0	14.5±0.7

Significance - p< 0.05



**Plate: 1** Antiacne activity of ethanolic extract of *Eudistoma viride* against *Propionibacterium acnes*

**Figure: 1 Antiacne activity of ethanolic extract of *Eudistoma viride* against *Propioni bacterium acnes***



### Discussion

The ethanolic extract of *Eudistoma viride* showed antiacne effect against *Propionibacterium acnes*. The antibacterial activity of the oil of *Citrus limetta* against *P. acnes* may be due to the presence of flavonoids, phenols, tannins and L-ascorbic acid [5]. The *Apis cerana* honey from Banyuwangi has antiacne activity and it may be due to phenolics and flavonoids present in it [6]. The presence of antiacne activity possessed by sea cucumbers may be due to saponin compounds and terpenic compounds in sea cucumbers [7]. Flavonoids are well known antioxidant, with antibacterial and antimicrobial properties [8]. Flavonoids are reported to synthesize in plant by the stimulation of microbial infection, as effective antimicrobial substance. Therefore, it is considered as antimicrobial activity against wide range of microorganisms, possibly due to its capability of forming complex with bacterial cell walls by interacting with extracellular and soluble proteins. Further microbial membrane may also disrupt by lipophilic flavonoids [9]. *Eudistoma viride* contains phenols and flavonoids [10] and the antiacne activity of *Eudistoma viride* may be due to flavonoids and phenols present in it.

### Conclusion

The animal which are considered as the nuisance and affect the economy by corrosion were used for this study. Such a natural product is good for health and devoid of side effects. The result from the study showed that the ethanolic extract of *Eudistoma viride* has confirmed a promising inhibitory effect in acne. The ethanolic extract of *Eudistoma viride* has great potential to be used in skin-care products for the treatment of acne.

## References

1. Shenkar, N., and Swalla, B.J. (2011). Global Diversity of Ascidiacea. *PLoS ONE*. 6(6).
  2. Azumi, K., Yoshimizu, M., Suzuki, S., Ezura, Y., and Yokosawa, H. (1990). Inhibitory effect of halocyanine, an antimicrobial substance from ascidian hemocytes, on the growth of fish viruses and marine bacteria. *Cellular and Molecular Life Sciences*, 46(10), 1066-1068.
  3. Pisut, D. P., and Pawlik, J. R. (2002). Anti-predatory chemical defenses of ascidians: Secondary metabolites or inorganic acids? *Journal of Experimental Marine Biology and Ecology*, 270, 203–214.
  4. Chen L., Hu J.-S., Xu J.-L., Shao C.-L., and Wang G.-Y. (2018). Biological and Chemical Diversity of Ascidian-Associated Microorganisms. *Mar. Drugs*. 16(10).
  5. Qidwai, A., Pandey, M., Shukla, S. K., Kumar, R., Pandey, A., and Dikshit, A. (2016). Antibacterial activity of *Mentha piperita* and *Citrus limetta* against *Propionibacterium acnes* (anaerobic bacteria). *International Journal of Pharmaceutical Sciences and Research*, 7(7), 2917-2924.
  6. Djakaria, S. A., Batubara, I. and Raffiudin, R. (2020). Antioxidant and antibacterial activity of selected Indonesian honey against bacteria of acne. *Jurnal Kimia Sains dan Aplikasi*, 23(8), 267-275.
  7. Ardiansyah, A., Nugroho, A., Rasyid, A. and Putra, M. Y. (2021). Screening of antioxidant and anti-acne activities in 16 sea cucumber in Indonesia. *IOP Conference Series: Earth and Environmental Science*, 695, 1-9.
  8. Qian, H., and Nihorimbere, V. (2004). Antioxidant power of phytochemicals from *Psidium guajava* leaf. *J. Zhejiang Univ Sci*, 5, 676-683.
  9. Tsuchiya, H., Sato, M., Miyazaki, T., Fujiwara, S., Tanigaki, S., Ohyama, M., Tanaka T., and Linuma, M. (1996). “Comparative study on the antibacterial activity of phytochemical flavanones against methicillin-resistant *Staphylococcus aureus*,” *Journal of Ethnopharmacology*, 50(1), 27-34.
  10. Priya, D. S., Sankaravadivu, S. and Christy H. K. S. (2016). Antioxidant activity of a colonial ascidian *Eudistoma viride* using DPPH method. *European journal of pharmaceutical and medical research*, 3(8), 427-429.
-