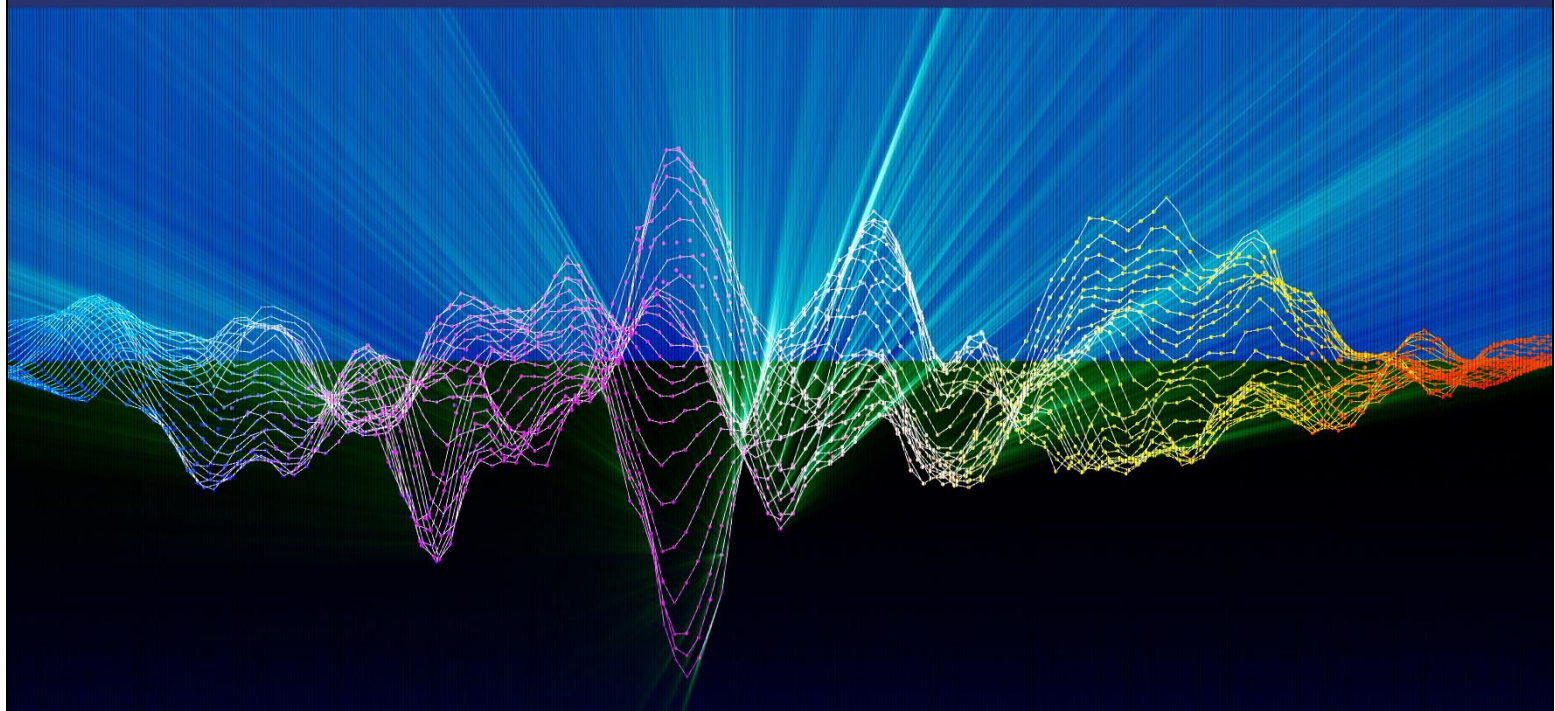


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# TRENDS IN INTERDISCIPLINARY RESEARCH

## VOLUME II



**Editor:**

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**Dr. Eramma N.**

**Prof. Renuka Jyothi S.**

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**Bhumi Publishing, India**



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# Trends in Interdisciplinary Research Volume II

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## **PREFACE**

*In today's rapidly evolving world, the pursuit of knowledge knows no boundaries. The traditional confines of academic disciplines are becoming increasingly porous as researchers recognize the immense potential in collaboration and interdisciplinary exploration. This book, "Trends in Interdisciplinary Research," aims to shed light on the exciting developments and emerging frontiers in this dynamic field.*

*Interdisciplinary research, at its core, seeks to transcend the limitations of disciplinary boundaries and integrate diverse perspectives, methodologies, and expertise. By fostering cross-pollination of ideas, interdisciplinary research has the power to address complex challenges and generate innovative solutions that would otherwise be unattainable within a single discipline. It has the potential to revolutionize our understanding of the world and drive progress in areas such as science, technology, social sciences, arts, and humanities.*

*In this book, we have brought together a diverse group of experts and scholars who have been at the forefront of interdisciplinary research. Each chapter explores a unique area of inquiry and showcases the remarkable achievements and advancements in that field. From the exploration of the human brain to the intersection of art and technology, from the fusion of biology and engineering to the synthesis of social sciences and public policy, this book covers a wide range of interdisciplinary domains that reflect the diverse and multifaceted nature of contemporary research.*

*We hope that this book will serve as a valuable resource for researchers, academics, and students who are passionate about pushing the boundaries of knowledge. By exploring the trends in interdisciplinary research, we aim to inspire and encourage more individuals to embrace interdisciplinary approaches and foster a culture of collaboration, curiosity, and creativity.*

*We would like to express our gratitude to all the contributors who have generously shared their expertise and insights. Their dedication to interdisciplinary research has been instrumental in shaping this book.*

**Editors**

## TABLE OF CONTENT

<b>Sr. No.</b>	<b>Book Chapter and Author(s)</b>	<b>Page No.</b>
1.	<b>INDIA'S FOOTPRINT IN BIOLOGICAL SCIENCES SINCE INDEPENDENCE: STRENGTH, OPPORTUNITIES AND CHALLENGES</b> Arunima Biswas	1 – 10
2.	<b>FOCUSED ON EPILEPSY: A REVIEW</b> Poovizhi Selvi Ravi, Jeevitha Nagaraj, N. Indra, T. Ranjani and A. Saranya	11 – 16
3.	<b>A REVIEW ON BRAIN ABSCESS</b> Poovizhi Selvi Ravi, Priyadharshini Raman, N. Indra, T. Ranjani and A. Saranya	17 – 27
4.	<b>A REVIEW ON RELATIONSHIP BETWEEN ISCHEMIC STROKE AND BRAIN TUMOR</b> Poovizhi Selvi Ravi, Sajitha Venkatesan, N. Indra, T. Ranjani and A. Saranya	28 – 37
5.	<b>A REVIEW ON PARKINSONS DISEASE ETIOLOGY RISK FACTORS AND TREATMENT</b> Poovizhi Selvi Ravi, Sri Enika Dhanabalan, N. Indra, T. Ranjini and A. Saranya	38 – 44
6.	<b>GREEN DENTISTRY- GREENING THE DENTAL INDUSTRY</b> Arnav Bhasin, Saumya Sahajpal, Pallavi Rajand Sahil Thakar	45 – 50
7.	<b>ALZHEIMER'S DISEASE: A REVIEW</b> Poovizhi Selvi Ravi, Sowmiya Sivakumar, N. Indra, T. Ranjani and A. Saranya	51 – 55
8.	<b>ARBOREAL IDENTITIES IN A. K RAMANUJAN'S "ECOLOGY" AND ELISE PASCHEN'S "THE TREE AGREEMENT"</b> Madhumanti Sengupta	56 – 63
9.	<b>MOBILE ONLINE TRANSACTION AND BANKING SYSTEM</b> Ravindra B. Tembhurne	64 – 67
10.	<b>COMPARISON OF LINUX AND WINDOWS AND THEIR SERVER CONFIGURATION</b> Bhavneet Kaur, Sumit Chopra and Gagandeep Singh	68 – 76
11.	<b>ETHICAL ISSUES IN MANAGEMENT</b> Sonit Dutta and Rajib Mallik	77 – 83

12.	<b>INTERDISCIPLINARY TRENDS IN HIGHER EDUCATION - NEED AND IMPORTANCE</b> Pooja Sharma	84 - 88
13.	<b>WHERE TO GO: FAKE NEWS, DEMOCRACY, SOCIAL MEDIA AND ARTIFICIAL INTELLIGENCE</b> Mohammed M. A. Abunahel	89 - 100
14.	<b>E-LEARNING: - TRENDS, USAGES, AND CHALLENGES</b> Ashok Kumar Maurya, Tareef Husain and Laxmi Verma	101 - 107
15.	<b>वर्तमान युग में नारी का राष्ट्र निर्मिति में अवदान</b> वन्दना, विक्की और दीपा त्यागी	108 - 113
16.	<b>EXPLORING INTERDISCIPLINARY RESEARCH IN ACCOUNTING</b> Bhavna Binwani	114 - 115

## **INDIA'S FOOTPRINT IN BIOLOGICAL SCIENCES SINCE INDEPENDENCE: STRENGTH, OPPORTUNITIES AND CHALLENGES**

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### **Abstract:**

Throughout the world, all developing countries are sprinting tirelessly at high pace to achieve scientific excellence and technological supremacy. India is a leading contestant among them, and is expected to be soon on an equal footing with the developed nations. This is highly laudable considering the historical fact that the republic began much of its own scientific plans and programs after becoming independent in 1947. During that period, the focus of the educated elite was on science subjects like Physical Science, Mathematics, Medicine and Engineering. These were considered as higher scientific ventures than studying biology and this trend continued for a long time. Even in the late nineties, India's economic boom was mostly being driven by its IT and service industries. However, in the recent decades, our policy makers have gradually started appreciating the socio-economic-academic importance of modern biology and the crucial role it is predicted to play in the next few decades. Thus, today's India is also relying on biological research for its scientific future. Public interest in biology has greatly increased due to the much-discussed discoveries, developments and prospects. Western countries have an eye on India for possible collaborations. Sadly, India's footprint in modern life sciences is restricted mostly to a few urban institutes and universities. The huge rural population remains ignorant and deprived of its scope and prospects. As the country celebrates 75 years of independence and aspires to become a major international figure in biological research and education, India's greatest challenge will be in broadening its scope of educating, recruiting, and supporting budding biologists from both its rural and urban population to make it an all-inclusive enterprise in global perspective.

**Keywords:** India, independence, modern biology, global perspective, opportunities, challenges.

### **Introduction:**

Since the ancient ages, India has shown a deeply rooted thirst for knowledge and wisdom. The nation has always expressed a profound appreciation for higher education and research. Science and philosophy once blended seamlessly in the Indian tradition and custom. Centuries of foreign rule and oppression took a heavy toll on this quest for scientific learning and experience. Despite the outstanding contributions of a few renowned Indian scientists, for a long period of time, India had only minor impression, influence and participation in the contemporary world of

science from a global perspective (Dhawan *et al.*, 2005). However, today's India is fast becoming a worldwide hub for science and technology (Vale *et al.*, 2009).

Before Independence, India had a little over 20 Universities that provided solid basic education, but none carried out substantial amount of research. The first prominent institutes with a mandate to whole-heartedly pursue scientific research were the Indian Association for the Cultivation of Science (IACS) in Kolkata and the Indian Institute of Science (IISc) in Bangalore (Vale *et al.*, 2009). Soon after its independence, the country set out to gradually build a strong foundation in modern science and research. In the early 1950s, the Indian Government first started to extend its support to the nation's institutes which were dedicated and committed to this cause. Soon there was an agenda to establish higher technical institutes to ensure industrial development of independent India. These institutes were foreseen to be engaged in international level training and research in engineering and technology, much like the MIT (Massachusetts Institute of Technology), USA. Thus, this vision led to the establishment of the IITs (Indian Institute of Technology). The IITs and other research institutes were focused primarily on mathematics, physics, and engineering (Vale *et al.*, 2009).

In the sixties, India led the "green revolution", which helped it in its endeavor to feed all its citizens. It also set the wheels in motion for the nation's economic growth. Even in the 80s and 90s, the prime focus of profitable scientific research continued to be mainly on medicine, engineering and afterwards, on IT as these sectors are easy to commercialize. In contrast, modern biological research gained its popularity much later in India. Indian universities and institutes initially paid little attention to the various upcoming disciplines of modern biology like cell biology, molecular biology and biochemistry, instead preferring more traditional fields of life sciences. Until the 1970s, biological research was mostly directed toward down-to-earth practical applications in agriculture, nutrition, and public health. But the past few decades have seen tremendous changes in the life science sector in India (<https://www.embo.org/people/perspectives-on-the-life-sciences-in-india/>; VijayRaghavan *et al.*, 2008; Vale *et al.*, 2009; [https://tavernarakislab.gr/news/EMBO\\_encounters\\_issue26.pdf](https://tavernarakislab.gr/news/EMBO_encounters_issue26.pdf)).

Until that time, academically strong students were usually directed by their families and teachers to careers in medicine and engineering. But, with the increase of public awareness and interest in novel biological discoveries and developments, the best young minds started to be attracted more and more to this multidisciplinary approach to nature and life (Dhawan *et al.*, 2005; Vale *et al.*, 2009; Osman *et al.*, 2013). Appreciating the important role that biology is predicted to play in the near future, the Indian Government has been expanding and setting up several biological research institutes and making funds available for state-of-the-art equipment and cutting-edge technological tools. These efforts have decreased the earlier large disparity in support facilities between the top research institutes in India and the western countries.



Sadly, the situation of higher education and research is quite different in Colleges and most Universities (Sharma and Sharma, 2015; Sheikh, 2017; Kumar and Joshi, 2017). Prior to the formation of the modern biology research institutes, the top Universities were home to much of India's best biology researchers. However, since the late 1990s the research institutes have been heavily preferred in terms of research funding and recruitment, which has inadvertently led to an unwanted decline in the stature of the Universities. In some colleges and universities, the situation is so pitiful that faculty members are deprived of basic indispensable infrastructure. They even have to combat with daily challenges such as lack of reliable electricity, running water, toilet facility, Internet, etc. (Kumar and Joshi, 2017). Also, insufficient incentive for setting up a successful research program, in addition to mandatory teaching and administrative duties, are discouraging factors. There is hardly any scope of research in undergraduate colleges which is extremely de-motivating for its faculty members having doctoral degrees and post-doctoral experiences. The students are also deprived of sufficient exposure to modern biological techniques and progresses (Raval, 2018). Thus, such institutes are lagging behind in imparting quality education in this discipline which is advancing at a fast pace in this century. Much of India's high-level biology research is pursued only in a handful of institutions so that in global scale, India's footprint in the biological sciences is relatively small, especially considering its large population. Such a situation is also encouraging brain drain which needs to be reversed (Srivastva and Rani, 2022). Moreover, those handful centers of learning are unfortunately restricted to a few urban institutes and universities. The huge rural student population does not have access to such work environment or infrastructure. They still remain ignorant about the giant leaps biology has taken and are clueless about the new initiatives taken by our policy makers to promote research and education in life sciences. Many are unaware how modern biology can lead to successful career, highpaying jobs, respect, prestigious social status, and coveted awards (Reddy, 2004; Gilbert, 2014). This huge potential and privilege are limited only to a meagre percentage of India's vast population.

In order to fulfill its aspirations to become an international figure in modern biology, India has to broaden its scope and support for its next generation of scientific leaders from both rural and urban student community.

### **Strength and Opportunities:**

For a long time since our independence, biology did not have an equal footing with the physical sciences. It was an overlooked field that did not receive much support or funding for its progress. There were other far more pressing needs and rushing demands that kept the nation builders busy and to meet those goals the country did not explore the vast potential of biosciences. But then physical sciences, mathematics and computer sciences all started making inroads into biology, making it a truly interdisciplinary field. With the emergence of modern branches like biophysics, biochemistry, genomics, biotechnology, molecular biology, cell

biology, microbiology, ecology, biodiversity, bioinformatics, etc., modern life sciences provided a more complete understanding of complex biological systems and an ability to manipulate such systems for human benefit. This resulted in an enhanced growth of career interest in these fields (Woese, 2004).

However, undergraduate biology education was still geared to the biology of the past as most courses remained primarily lecture-based, and did not convey the exciting reality of recent developments and new technologies in the field. This called for a paradigm shift in not only what is taught but also how it is taught. The need for a major educational reform was recognized by eminent educationalists all over the world (McCarthy, 2004; Ueckert *et al.*, 2011). Outcomes included the development and implementation of modern interdisciplinary syllabi in all branches of life sciences, modification of the courses to include learner-centered instructional strategies, and creation and implementation of student assessment tool for biology content knowledge and comprehension. This was followed by a sound system of collection and assessment of data to evaluate the success of the modifications. Such feedback analysis steadily started showing an increased student enrollment, satisfaction and success rate (Bhatnagar, 2019).

Over the past few decades, all around the globe, nations have wanted to add contemporary biology to their investment portfolio. Soon the focus started shifting more towards translational research to promote human health and well-being and the idea of commercialization also dawned on policy makers. At present, the market capitalization of globally commercialized life sciences is estimated to be more than \$1 trillion and growing (Global Life Science Tools Market Size & Growth Report, 2023-30).

India has a dedicated department of biotechnology to promote research and development and a full-fledged policy framework to harness this power for the nation's economic growth. Most importantly, the department recognizes the fact that basic research is the backbone of technology driven economy. As a result, investment in such research has led to innovation, invention and product development. Department of Biotechnology is constantly supporting the basic research in life sciences at various levels such as colleges, universities and R&D institutions in order to create knowledge-driven biotech sector. Fund and support are also available from UGC, CSIR, DST and others.

Over the years, UGC has been taking several initiatives to ensure quality improvement in higher education. This is true also for the various branches of biological sciences. Curriculum revision and update are major focus areas keeping in view the fast-evolving discipline, the needs of the society and demand of the job market. UGC's "Learning Outcomes based Curriculum Framework" aims to equip UG students with knowledge, technical skill, critical and creative thinking, ability to formulate hypothesis and research questions, and trouble-shooting expertise (UGC LOCF). Subject specific expert committees have developed model curriculum based on learning outcome. It has been stressed that biology can be better understood with parallel

practical components and so relevant laboratory facility is a major requirement in all higher education institutes. Equally important is the student:teacher ratio. In the CBCS curriculum, introduction of discipline specific elective courses and skill enhancement courses have ensured that students are exposed to a wide range of career options and have the choice of becoming future entrepreneurs. This has also facilitated student progression to further higher studies and research.

The National Education Policy 2020 proposes to revamp all aspects of the education system to align it with the aspirational goals of 21st-century education (NEP 2020). India is being envisioned as a nucleus for research in frontier areas of modern biology in the near future and our government is trying their level best to foster a world-class community of scientists, administrators and policy makers at various levels to fulfill that prediction.

### **Major reforms:**

India has come a long way since its independence and has witnessed major changes in classroom teaching. Active-learning strategies that are being used more and more in current bioscience teaching, simulate the processes involved in scientific inquiry and appeal to many students because they accommodate different interest and learning preferences. Science, itself, is an active process. It involves asking questions, making observations, collecting and analyzing data, drawing inferences which are then used to justify a hypothesis. Active learning strategy in biological sciences requires motivating students to engage not only with the content but to actively interact with teachers and peers in order to seek answers, solve problems, challenge prior theories, and make connections between different ideas (Turner and Patrick, 2004; Driessen *et al.*, 2020; Williams *et al.*, 2021). Classrooms that utilize active learning strategies to encourage student participation, are usually noisy, in stark contrast to classrooms that engage unidirectional content transfer (from teacher to students). Students are encouraged to debate ideas, ask questions, compare and communicate thoughts, consider alternatives and keep their minds open. Sometimes students are made to work in groups to collect data or apply knowledge gained in the classroom in real-life context to address societal problems. These activities help to translate theoretical concepts to classroom practice and mark the beginning of training in translational research that has a "bench-to-bedside" approach. At present, Information and Communication Technologies (ICT) are changing the image of learning places, the roles of teachers and students, and even the entire classroom learning ambience. The increasing accessibility to e-resources has increased the techno-pedagogical possibilities in biology education. Although a daunting concept for many, computer labs are gradually becoming the sites for learning biology. The central government has launched several platforms for e-learning (ICT Initiatives of MoE). Many states in India have started supporting schools and colleges with IT infrastructures and IT-based learning resources. The increased availability of computers and

funding for setting up smart classrooms have resulted in extensive changes with regard to classroom scenarios in various parts of the country.

Of all teaching events, the learning outcomes of practical classes are typically the most closely aligned with the future professional practice of students. The revised curriculum in undergraduate biological sciences aims to ensure that the theory papers provide a broad background of principles and theories, to ascertain all students have similar core knowledge (regardless their academic background), before starting laboratory work. Experiments have been designed to reinforce the theory acquired from lectures/books. The methods employed and the biological principles addressed have relevance across many subject areas so that they can be easily applied at multiple levels, and give students an authentic experience of modern biological tools and techniques. The experiments in each paper are mostly framed as a series of investigations, to give the practical sessions a sense of logical continuity, and an atmosphere more akin to a research project than a traditional practical class. Innovative approaches for engaging students in experiential science learning that also include outdoor experiences and community engagement provide for increased relevance and authenticity and offer a sustainable learning model (Jeronen *et al.*, 2017; Hansen *et al.*, 2021).

All such reforms in higher education and research are fast gaining popularity so that they are expected to have a significant positive impact on India's progress in biosciences, in a global perspective.

### **Challenges:**

The major challenge is that India is racing to achieve scientific supremacy, perhaps too fast compared to what their present educational policies and support schemes can allow or afford (Vale *et al.*, 2009). This is true especially in context of available resources and infrastructure in colleges and universities, which are the major pillars of its higher education system. Most of these institutes have insufficient faculty strength, inadequate funding, unsatisfactory laboratory and technological facilities (Kumar *et al.*, 2017; Standing Committee Report, PRS 2017; Ravi *et al.*, 2019). Moreover, often, over a hundred colleges are found to be affiliated with a single University, thus creating a complex administrative system which is quite hectic for the staff. The colleges and universities are overburdened with examination duties in the semester-based curriculum. Financial constraints and substantial demands on faculty for teaching and administrative duties have made it difficult for biological research to thrive in the current University and college system. Additionally, even institute faculty cite several professional impediments they face including difficulty of getting crucial reagents from international vendors in time, laborious paperwork, lengthy grant review processes, delay in receiving grant money, inadequate support to attend international conferences or seminars abroad and a lower salary compared to their western counterparts or that obtained in industry or private sector (Vale *et al.*, 2009).

Till date, vast majority of the Indian Ph.D. aspirants and Ph.D. graduates prefer to go abroad while the influx of foreign students is very limited (Srivastva *et al.*, 2022). It is absolutely essential to revisit and improve the existing policies for attracting and training students to become life science researchers within India and this should start from college level. Students in colleges are physically separated from research institutes and universities, and are not exposed to the leading scientists or their work. Extensive collaborations between the colleges, universities, research institutes and industry can help bridge this gap (Gandhi, 2014). Another major concern is that most of rural India is cut off from these recent developments and progresses in biosciences. The nation's vast natural resources still continue to run to waste, especially in the backward village areas, simply due to ignorance. The large rural population remains oblivious to the fact that modern biology has the potential to solve the problems of deadly infections, congenital disorders, life-threatening diseases, malnutrition, food insecurity, pollution, climate change, fuel crisis etc. They are unaware of how knowledge in modern biological sciences may even help to remove real life obstacles arising out of superstition, taboos and myths (Reddy, 2004; Gilbert, 2014; Raval, 2018).

Young enthusiastic students from these remote areas should be exposed to the opportunities and reaches of biology in this changing world. They ought to be told about the contributions of current research in the fields of agriculture, health and industry and how they can be a part of such developments. And this can be facilitated if they have access to scientific literature in their regional languages as many of them are not well skilled in English. They must be taught (beyond the syllabus, if needed) how they can conserve and utilize their immense natural resources and biodiversity using the tools and techniques of modern biology. Then only they will be able to safeguard and also tap the huge potential of their own natural surroundings which may, in turn, lead to considerable economic growth of the region. There should be special schemes for rural colleges to arrange national level seminars to give their students a platform to learn from the best brains of their nation. Sadly, such scopes are wanting as of now.

### **Conclusion:**

India, today, is greatly relying on biological research for its scientific future. Western countries have an eye on India for possible collaborations in the field of biology. A few premier research institutes in frontier areas of modern biology are the National Center for Biological Sciences and Indian Institute of Science (both in Bangalore), the Indian Institutes for Science Education and Research (IISERs) and Indian Institutes of Technology (IITs), Centre for Cellular and Molecular Biology in Hyderabad, Institute of Genomics and Integrative Biology, International Centre for Genetic Engineering and Biotechnology and National Institute of Immunology (all three in New Delhi), Dept. of Biological Sciences at Tata Institute of Fundamental Research in Mumbai, National Center for Cell Science in Pune, etc. In Kolkata, prestigious institutes like the Indian Association for the Cultivation of Science, Bose Institute,

Indian Institute of Chemical Biology, and the Biophysics and Structural Genomics Division of Saha Institute of Nuclear Physics are all engaged in multi-disciplinary research on diseases of national importance, biological problems of global interest and hitherto unsolved mysteries of nature. They employ sophisticated state-of-the-art technology in keeping with the rapid and unprecedented momentum that life science research has gained globally over the last 50 years. Sprawling laboratories, latest equipments, generous funding ensure that faculty can solely focus in their research work, publications and grant applications. On the other hand, laboratory space, instrumentation, and other resources or facilities are very much limited within any university, compared to these institutes. The situation is far worse in undergraduate colleges. Also, the faculty members, in both, have other pressing priorities like teaching. So, the research output is adversely affected. But recent trend of collaboration between institutes, universities and colleges seems quite encouraging. Many institutes have outreach programs for this cause. They often invite college students for a free educational tour, demonstration and scientific lectures to promote research aspiration. They also set up academic linkages with college and university teachers and share their laboratory facilities with them. Industries often provide college students with opportunity for apprenticeship. The central and state governments have various schemes like biotech programs and packages for women scientists, biotech-based societal developmental schemes, educational funding under Backward Regions Grant Fund and Rashtriya Gram Swaraj Yojana, etc which all look very promising. All these will help to spread awareness even among rural people regarding the opportunities and reaches of biology in this changing world. The govt. has to ensure that both urban and rural student population become a major part of India's biological research initiatives and know about how modern biology is rewriting and revolutionizing our understanding of life. It needs to develop policies for further broadening its scope of educating, recruiting, and supporting budding biologists. This may take some time but slowly, yet surely, India's future biology enterprise shall gradually rise high, brick by brick, by making it an all-inclusive uniform endeavor in global perspective.

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**References:**

1. Dhawan, J., Gokhale, R. S. and Verma, I. M. Biosciences in India: times are changing. *Cell*. 2005; 123:743–745. DOI: 10.1016/j.cell.2005.11.018.
2. Vale R. D, Dell K. The biological sciences in India: aiming high for the future. *J Cell Biol*. 2009; 184 (3):342–353. doi:10.1083/jcb.200812123.
3. <https://www.embo.org/people/perspectives-on-the-life-sciences-in-india/>
4. VijayRaghavan, K. Knowledge and human resources: educational policies, systems, and institutions in a changing India. *Technol. Soc*. 2008, 30: 275–278.

5. [https://tavernarakislab.gr/news/EMBO\\_encounters\\_issue26.pdf](https://tavernarakislab.gr/news/EMBO_encounters_issue26.pdf)
6. Osman, K., Hiong, L. C., Vebrianto, R. 21<sup>st</sup> Century Biology: An Interdisciplinary Approach of Biology, Technology, Engineering and Mathematics Education. *Procedia - Social and Behavioral Sciences* 2013, 102: 188 – 194.
7. Sharma, S., & Sharma, P. Indian Higher Education System: Challenges and Suggestions. *Electronic Journal for Inclusive Education*. 2015, 3 (4).
8. Sheikh, Y. A. Higher Education in India: Challenges and Opportunities. *Journal of Education and Practice*. 2017, 8 (1) : 39-42.
9. Kumar, P. and Joshi, P. K. Status Study of Infrastructure Availability in Government Degree Colleges of Uttarakhand. *Educational Quest: An Int. J. of Education and Applied Social Science*. 2017, 8 (2) : 635-644. DOI: 10.5958/2230-7311.2017.00113.1
10. Raval, N. Challenges and Opportunities of doing research in Rural and Urban institutions in India. *IJRAR*. 2018, 5(3): 175-180.
11. Srivastva, D. and Rani, S. Overseas Education and Brain Drain: An Analysis of Indian Emigration to the United States. 2022. <https://www.hansshodhsudha.com/volume3issue1/Manuscript%204.pdf>
12. Reddy, A. K. N. Science and technology for rural India. *Current Science*. 2004, 87(7) : 889–898.
13. Gilbert, E. Chapter 10 – Maya, Ignorance and Prejudices. In *Indian Villages: Achievements and Alarm Bells, 1952–2012*. Graduate Institute Publications. 2014. doi:10.4000/books.iheid.4591.
14. Woese C. R. A new biology for a new century. *Microbiol Mol Biol Rev*. 2004, 68(2):173-86. doi: 10.1128/MMBR.68.2.173-186.2004.
15. McCarthy J. Tackling the challenges of interdisciplinary bioscience. *Nat Rev Mol Cell Biol*. 2004, 5(11):933-7. doi: 10.1038/nrm1501. PMID: 15520812.
16. Ueckert C, Adams A, Lock J. Redesigning a large-enrollment introductory biology course. *CBE Life Sci Educ*. 2011;10 (2):164–174. doi:10.1187/cbe.10-10-0129.
17. Bhatnagar N. New Trends and Techniques of 21st Century Education with Special Reference to Life Science: A Review. *International journal of scientific & technology research* 2019, 8 (9): 1826-29. ISSN 2277-8616.
18. Global Life Science Tools Market Size & Growth Report. <https://www.grandviewresearch.com/industry-analysis/life-science-tools-market>.
19. UGC LOCF. [https://www.ugc.gov.in/pdfnews/4598476\\_LOCF-UG.pdf](https://www.ugc.gov.in/pdfnews/4598476_LOCF-UG.pdf)
20. NEP 2020 (National education policy 2020. GOI.) [https://www.education.gov.in/sites/upload\\_files/mhrd/files/NEP\\_Final\\_English\\_0.pdf](https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf)
21. <https://www.usnews.com/education/best-global-universities/india/biology-biochemistry>

22. Turner, J. C. and Patrick, H. Motivational influences on student participation in classroom learning activities. *TC Rec.* 2004, 106, 1759–1785.
23. Driessen, E. P., Knight, J. K., Smith, M. K. and Ballen, C. J. Demystifying the Meaning of Active Learning in Postsecondary Biology Education. *CBE—Life Sciences Education.* 2020, 19:4. <https://doi.org/10.1187/cbe.20-04-0068>.
24. Williams, A. E., O'Dowd, D. K. Seven practical strategies to add active learning to a science lecture. *Neurosci Lett.* 2021, 743 : 135317. doi: 10.1016/j.neulet.2020.135317.
25. ICT Initiatives of MoE. <https://www.education.gov.in/ict-initiatives>
26. Hansen, A. K., Connors, P., Donnelly-Hermosillo, D., Full, R., Hove, A., Lanier, H., Lent, D., Nation, J., Tucker, K. P., Ward, J., Whitenack, L., & Zavaleta, E.. Biology Beyond the Classroom: Experiential Learning Through Authentic Research, Design, and Community Engagement. *Integrative and comparative biology.* 2021. 61(3): 926–933. <https://doi.org/10.1093/icb/icab155>.
27. Jeronen, E.; Palmberg, I.; Yli-Panula, E. Teaching Methods in Biology Education and Sustainability Education Including Outdoor Education for Promoting Sustainability—A Literature Review. *Educ. Sci.* 2017, 7, 1. <https://doi.org/10.3390/educsci7010001>
28. Standing Committee Report, PRS 2017. [https://prsindia.org/files/policy/policy\\_committee\\_reports/SCR\\_Higher%20education.pdf](https://prsindia.org/files/policy/policy_committee_reports/SCR_Higher%20education.pdf)
29. Ravi, S., Gupta, N. and Nagaraj, P. “Reviving Higher Education in India,” Brookings India Research Paper No. 112019-01. 2019. ISBN 978-81-941963-4-1.
30. Gandhi, M. M. Industry-academia collaboration in India: Recent initiatives, issues, challenges, opportunities and strategies. *The Business & Management Review.* 2014, 5 (2); 45-67.



## **FOCUSED ON EPILEPSY: A REVIEW**

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### **Abstract:**

Today, people face various types of stress in everyday fast life and most people in the world suffer from various neurological disorder. Epilepsies one of the most common neurological disorders of the brain, affecting about 50 million people around the world, and 90% of them are coming from developing countries. Genetic factors and brain infection, stroke, tumours and epilepsy cause high fever. It imposes a great economic burden on the health systems of countries associated with stigma and discrimination against the patient and also his family in the community, in the workplace, school and home. Many patients with epilepsy suffer from severe emotional stress, behavioural disorders and extreme social isolation. There are many different types of seizure and mechanisms by which the brain generates seizures. The two features of generating seizures are hyper excitability of neurons and a hyper synchronous neural circuit. A variety of mechanisms alters the balance between excitation and inhibition in predisposing brain local or generalized hyper excitability region and a hypersynchronous. Purpose of the review is to discuss the history, epidemiology, etiology, pathophysiology, classification of epilepsy, symptoms, diagnosis, management of epilepsy and future trends.

**Keywords:** Anti-epileptic drugs, pathophysiology, seizures, epidemiology, etiology

### **Introduction:**

Epilepsy affects 50 million people worldwide (WHO, 2006), with an estimated 2–3 million living in the United States (Epilepsy Foundation of America, Hirtz *et al.*, 2007), 6 million in Europe (WHO, 2010), and at least 40 million in the developing world (WHO, 2005). It is a collection of many different types of seizures that vary widely in severity, appearance, cause, consequence and management. The seizures are associated with characteristic signs and/or symptoms of abnormal, excessive or synchronous neuronal activity in the brain. Epileptic seizures often cause transient impairment of consciousness leaving the individual at risk of bodily harm and often interfering with education and employment. It is universal, with no age, sex, geographical, social class or racial boundaries. Epilepsy is more likely to occur in young children or people above 65 years of age; however, it can occur at any time. Epilepsy is not a single disorder but a syndrome with vastly divergent symptoms, involving episodic abnormal electrical activity in the brain. Moreover, a partial seizure can also be divided into two main groups: simple-partial and complex-partial. In the simple-partial, the person looks conscious and can generally communicate, while in the complex-partial, the patients behave abnormally, get

confused, and typically act by chewing and mumbling. A generalized seizure also has two main parts. Non conclusive seizure is diagnosed by obvious motor signs, while conclusive seizures are difficult to diagnose for having no motor signs. Person can only stare and not make additional motions or moments. In the epileptic seizure detection task, the neurologists analyse and diagnose the information reflected from EEG signals such as the waveform, frequency, and amplitude, since EEG signals in a seizure will manifest some special indications like spikes. However, realizing the efficient detection of epilepsy seizures is frequently a time-consuming and exhausting task with the high possibility of human error, relying on clinicians' visual inspection. Tant seizures, as well as for innovative therapies to prevent, stop or reverse the development of epilepsy and epilepsy-related comorbidities (White 2003, Smith *et al.*, 2007, Jacobs *et al.*, 2009, Loscher and Schmidt 2011). Such treatments may include not only individual pharmacological compounds or combination therapies but also devices and other novel therapeutic interventions. Here we will use the general term *anti-epilepsy treatment* (AET) to include all these types of treatments. Where appropriate, more specific terms will be used to indicate the treatment indication, adopting the following definitions modified from those recommended by Pitkanen (Pitkanen 2010).

### **History of epilepsy**

The word epilepsy derived from the Greek work 'epilepsia' which means 'to take hold of' which in turn was combined from 'epi' means upon and 'lambanein' means to take. In ancient time's epilepsy was connected with religions faint or ever a possession by a demon. In the past epilepsy was considered as the sacred disease in support of this view a large number of people believed that epilepsy affected people who to some extent taken hold of by demons or that the visions experienced by the epileptic people were sent by the Gods. Even among the animist Hmong generations, for instance, epilepsy was considered as an attack by a demonic spirit, but the affected person could become revered as a shaman through there explicit experiences.

### **Epidemiology**

Epilepsy is one of the most common of the serious neurological disorders.<sup>16</sup> It is estimated that there are 55 lacks persons with epilepsy in India, 20 lacks in USA and 3 lacks in UK.<sup>17</sup> Each year 120 per 100,000 people in the United States come to medical attention because of a newly recognized seizure. At least 8% of the general population will have at least one seizure and not have epilepsy. The rate of recurrence of a first unprovoked seizure within 5 years ranges between 23% and 80%. The age adjusted incidence of epilepsy is 44 per 100,000 people in a year. Each year about 125,000 new epilepsy cases occur; of these, 30 % are in people younger than age 18 at the time of diagnosis. The relatively high frequency of epilepsy in the elderly is now being recognized. At least 10 % of patients in long- term care facilities are taking at least one antiepileptic drug (AED).<sup>6</sup>The National Sentinel Audit of Epilepsy-Related Deaths

led by 'Epilepsy Bereaved' drew attention to this important problem. The Audit revealed; "1,000 deaths occur every year in the U.K. as a result of epilepsy" and most of them are associated with seizure and 42% of deaths were potentially avoidable.

### **Causes of epilepsy**

The cause of epilepsy is completely unknown. The word epilepsy does not indicate anything about the cause or severity of the person's seizures, some cases of epilepsy are induced by genetic factors, but it can also result from brain injuries caused by blows to the head, stroke, infections, high fever or tumors.<sup>19</sup> It has been observed that heredity (genetics) play an important role in many causes of epilepsy in very young children, but it can be a factor for people of any age. For instances, not everyone who has a serious head injury (a clear cause of seizures) will develop epilepsy.<sup>7</sup> Certain epilepsy syndromes termed as reflex epilepsy need specific precipitants or trigger for seizures to occur like reading, flashing lights and precipitants like emotional stress, sleep deprivation sleep itself, heat stress, alcohol and febrile illness are examples of precipitants cited by patients with epilepsy. Notably the influence of various precipitants varies with the epilepsy syndrome.

### **There are several causes of epilepsy are common to different age groups**

1. In the neonatal and early childhood period, most common causes are hypoxic-ischemic encephalopathy, infections of the central nervous system, trauma, congenital abnormalities of the central nervous system and metabolic disorder.
2. At the end of the first and second childhood, febrile convulsions most common infections can be caused by trauma and central nervous system.
3. Epileptic syndromes have been observed in the child hood in general.
4. In adolescence and adult Bell causes are more likely to be secondary to any lesions to the central nervous system
5. In the elderly, cerebrovascular disease is the most common cause, other causes, including CNS tumours, head trauma and other degenerative diseases such as dementia.

### **Pathophysiology of epilepsy**

Seizures are paroxysmal appearances of the cerebral cortex. A seizure happens when a sudden lop-sidedness happens between the excitatory and inhibitory strengths with the cortical neuron organize. The fundamental physiology of a convulsive scene is identified in an unsteady cell film or encompassing back / adjoining cells. seizure root in gray matter of any cortical or subcortical zone. Initially, a small number of neurons focus abnormally. normal membrane conductance and decomposition of inhibitory synaptic current and excessive diffusion excitability at the local level to produce a focal or more generally attack for the production of a generalized attack. This house is transmitted through physiological pathways to involve areas adjacent to remote areas.

During a seizure, the demand for blood flow to the brain increases to carry off CO<sub>2</sub> and to bring substrate for metabolic activity of the neurons, as the seizure prolongs, the brain suffers more from ischemia that may result in neuronal destruction and brain damage.<sup>6</sup> Mutation in several genes may be linked to some types of epilepsy. Genes that code for protein subunits of voltage-sensitive and ligand-activated ion channels have been associated with the generalized epilepsy and infantile seizure syndromes.

One speculated mechanism for some forms of inherited epilepsy are mutation of the genes which code for sodium channel proteins; these defective sodium channels remain open for long time and causing the neurons hyper excitable as a result glutamate an excitatory neurotransmitter may be released in large amount form the neurons which by binding with nearby glutamatergic neurons triggers excessive calcium (Ca<sup>2+</sup>) release in the post synaptic cells which may be neurotoxin to the affected cells.

### **Diagnosis**

A number of different tests have been developed to determine the epilepsy in an individual and its type.

### **EEG Monitoring**

Electron encephalogram is very useful in the diagnosis of various seizure disorders. The EEG may be normal in some patients who still have the clinical diagnosis of epilepsy even many people having no epilepsy show some unusual brain activity on EEG video monitoring is often used in conjunction with EEG to determine the nature of a person's seizures.

### **Brain Scan**

It is an important diagnostic tool, which is useful for identifying brain tumors, cysts, and other structural abnormalities in brain. The most commonly used brain scans include CT (computed tomography), PET (positron emission tomography) and MRImagnetic resonance imaging) SPECT (single photon emission computed tomography) MRS (magnetic resonancespectroscopy). CT & MRI scans reveal the structure of the brain. PET and MRI can be used to monitor brain's activity and detect abnormalities. SPECT used to locate seizure foci in the brain.MEG (magneto encephalogram) detects the magnetic signals generated by neurons. MRS can detect abnormalities in the brain's biochemical processes.

### **Medical History**

Medical history including symptoms and duration of the seizures helps in determining epilepsy and kind of seizures present in the person.

### **Blood Tests**

Seizures are occasionally causes by an acute underlining toxic or metabolic disorders in which case appropriate therapy should be directed the specific abnormality e.g. hypocalcaemia. Blood samples are often screened for metabolic or genetic disorders that may be associated with

the seizures. Blood samples are also tested for the problems such as infections, lead poisoning, anemia and diabetes that may be causing or triggering the seizure.

### **Management of Epilepsy**

The terms anticonvulsant and antiepileptic are used interchangeably. An anticonvulsant is an agent that blocks experimentally produced seizures in laboratory animals and antiepileptic drug is a drug used medically to control the epilepsies.

#### **Principles of management**

1. Any causative factors of epilepsy must be treated, e.g. cerebral neoplasm.
2. The patients should be educated about the disease, duration of treatment and need for compliance.
3. Precipitating factors should be avoided, e.g. alcohol, sleep deprivation, emotional stress.
4. Natural variation should be anticipated, e.g. fits may occur particularly or exclusively around periods in women.
5. Antiepileptic drug should be given only if seizure type and frequency require it, i.e. more than one fit every 6-12 months.

#### **Pregnancy and epilepsy**

The management of epilepsy during pregnancy may present problems for both the mother and foetus. The incidence of spontaneous abortion and still birth increases in women with epilepsy. Therefore, patients should have their seizure disorder properly investigated and treated before pregnancy with lowest dose of the developing foetus because of the possibility of anoxia and metabolic disorder. Minor seizures are probably harmless and therefore need not be eradicated; patients should be advised for taking folic acid supplement and vitamin K orally. Because some antiepileptic drugs affect folic acid metabolism and folic acid deficiency is a risk factor for neural tube defects. Hepatic enzyme inducing antiepileptic drugs lower the mother's concentration of vitamin K, which can aggravate any postpartum haemorrhage.

#### **Breast feeding**

Antiepileptics are generally distributed into breast milk, in low concentration and breast feeding is considered safe when given in usual doses, with the exception of the barbiturates and ethosuximide. Problems of neonatal sedation may occur with the benzodiazepine and barbiturate and ethosuximide is distributed in significant amounts into breast milk and therefore breast feeding should be avoided.

#### **Epilepsy in children**

Fits in children are treated as in adults, but children may respond differently and because irritable e.g. with sodium valproate or phenobarbitone. If febrile convulsions have occurred a drug used for major epilepsy may be given continuously (e.g. phenobarbitone 3-4 mg /kg /day) until the child is 5 years old. But prolonged drug therapy e.g. with phenytoin or phenobarbitone may interfere with cognitive development, the drug is withdrawn.

### **Discussion:**

Thus, the selection of an anticonvulsant agent is based primarily on its efficacy for specific types of seizures and epilepsy. Although seizure control is generally good in most patients, a significant proportion of patients with epilepsy suffer from intractable or drug resistant epilepsy, despite early treatment and an optimum daily dosage of an adequate anticonvulsant agent. Therefore, there is a need for new drugs with greater benefit in relation to side effects and tolerability, including at the expense of effectiveness in comparison with existing antiepileptic agents. Although there are many treatments available, it is engaging very dedicated to innovative approaches. Many of these approaches focus on elucidating genetic cellular and molecular mechanism of hyper excitability, ideas that promise to provide specific goals for novel therapy.

### **References:**

1. Carl E S. Epilepsy: a review of selected clinical syndromes and advances in basic science. *Journal of Cerebral Blood Flow & Metabolism* 2006; 26:983-04.
2. Epilepsy: aetiology (Sic), epidemiology and prognosis, World Health organization. 2001; Achieved from the original on 2007-05-18. Available at:<http://web.archive.org/web/20070518073641/http://www.who.int/mediacentre/factsheets/fs165/en/>Retrieved 2007-06-14.[4] G. Alarcon and A. Valentin,
3. Introduction to Epilepsy, Cambridge University Press, Cambridge, UK, 2012.[5] S. Kulaseharan, A. Aminpour, M. Ebrahimi, and E. Widjaja, "Identifying lesions in paediatric epilepsy using morphometric and textural analysis of magnetic resonance images," *NeuroImage: Clinica*, vol. 21, Article ID 101663, 2019.

## **A REVIEW ON BRAIN ABSCESS**

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### **Abstract:**

Brain abscess (BA) is defined as a focal infection within the brain parenchyma, which starts as a localized area of cerebritis, which is subsequently converted into a collection of pus within a well-vascularized capsule. BA must be differentiated from Para meningeal infections, including epidural abscess and subdural empyema. The BA is a challenge for the neurosurgeon because it is needed good clinical, pharmacological, and surgical skills for providing good clinical outcomes and prognosis to BA patients. Considered an infrequent brain infection, BA could be a devastator entity that easily left the patient into dead. The aim of this work is to review the current concepts regarding epidemiology, pathophysiology, etiology, clinical presentation, diagnosis, and management of Automatically.

**Keywords:** Brain abscess, neuro-infection, neurosurgery

### **Introduction:**

Central nervous system (CNS) infections and their sequelae still constitute a major source of morbidity. In the recent past, the introduction of newer broad-spectrum antibiotics, improved imaging technology, and intensive care facilities have significantly altered the natural history of CNS infections. Brain abscess (BA) is a universal health problem with a high morbidity and mortality rate; thus, the disease today presents a leading public health problem and a major burden on health care facilities all around the world. BA is a dynamic focal form of intracranial suppuration and a serious life-threatening emergency. They begin as a localized area of cerebritis and develop into an encapsulated collection of pustular materials presenting as a mass-like lesion, similar to the abscess in other sites. Currently, in high-income countries the original forms of intracranial suppurative disease (i.e., BA, empyema, and purulent ventriculitis) are so uncommon that most young neurosurgeons are unfamiliar with this form of pathology and recognizing the need at times for judicious, complex, and aggressive surgical management. The infectious origin of the BA causes significant damage to the CNS, because of its incapability of mounting a sufficient defense against the pyrogens, leading to pyogenic abscess. Advances in surgery, in neuroimaging diagnostic techniques and in antibiotics use during the 20th century, have drastically improved the outcomes of these infections, although mortality and morbidity remain high. Especially for the immune compromised patients such as those who have advanced HIV disease and transplant recipients who are experiencing an increasing incidence of BA notwithstanding those advances, probably due to a growing number of opportunistic infections; thus, BA can easily be fatal. For this reason, BA should be regarded as a serious infection and

efforts should be focused on continually optimizing diagnosis and management. The aim of this work is to review the current concepts regarding epidemiology, physiopathology, etiology, clinical presentation, diagnosis, and management of BA.

### **History**

Trepanation is known to be the first surgical procedure ever performed. Fortunately, the majority of paleopathological investigations focus on the study of the skull, because it is the most frequently preserved part of the human body recovered from archaeological excavations. Trephinations as ancient as in neolithic people have been described all over the world, but reasons for these procedures however are not always clear.

Researchers conclude that at least in some cases such operations have been performed for purely medical reasons. Strikingly, there is evidence that the patients survived months to years after the operations. Unlike structural findings such as skull bone deformity, fractures, and bone tumors, brain parenchymal lesions, like BA, cannot let evidences of its existence thousand years later. The fact those individuals survive months or years after procedure suggest a more benign motive. Nonetheless confirming the astonishing degree of technical skills reached those times without anesthetic, antiseptic, or technologic aids. From the Vesalius' and Amboise Para's writings, and from a biography of Henry II, Graham Martin, assembled the dead history of Henry II King of France, a dead predicted by Nostradamus 10 years earlier it happens. He died from an orbital wound, which was suffered in a joust, destroying his eye, and leaving behind many splinters.

The skull was not penetrated but infection spread intracranially. By autopsy was confirmed that the splinters in the orbit had not pierced the skull, but infection had spread to the brain along the orbital veins, forming an abscess under the cortex. Furthermore, overlying the BA was a subdural effusion of pus. However, as reviewed by Muzumdar et al., Sir Percival Pott was probably the first to recognize and document that infections elsewhere in the body could spread and cause BA. The French surgeon Morand in 1768 made the first report of successful surgical treatment of an otitic BA with good recovery. In 1891, Tousle operated on a BA that originated as a complication of a depression fracture of the cranial inner table; this case is highlighted because it was not only the first case of BA to be treated successfully with surgical intervention in the Ottoman Empire, but also one of the first cases of neurological surgery performed using contemporary anesthesiologic and surgical techniques, which reveals the importance of neurological examination and cerebral localization techniques in the era before x-rays.

In 1893, MacEwan published a monograph, "Pyogenic Infective Disease of the Brain and Spinal Cord," describing the results of a case series of 19 BA patients in which decalcified chicken bones had been used to drain the pus, with only a 5.3% of mortality. Remarkably, Oscar Wild died in 1900 of an orogenic cerebral abscess, highlighting that even under more favorable



circumstances, a successful treatment would not have been possible at that time. After the introduction of antibiotics, organism-isolation techniques, and

### **Epidemiology:**

BA is one of the most serious diseases of the CNS. This condition is more common among men –twice to three times, and morbidity rate is highest in fourth decade of the life BA is still associated with high morbidity, including seizures (up to 80%), persistent altered mental status, and focal motor deficits. BA still continues to be a significant problem in the developing world due to large scale poverty, illiteracy, and lack of hygiene.

As pyogenic BA is a kind of infectious disease, the disease is expected to be more common in a setting with poor sanitation and medical facilities and illiteracy. Infectious diseases are usually common in tropical countries. Interestingly, without dependence on the setting of study, the cases are usually elder or pediatric male patients However, the trends of decreasing incidents are reported due to the improvement in world sanitation at present. As has been stated previously, although there have been breakthrough advances in neuroimaging, neurosurgical techniques, neuroanesthesia, microbiological isolation techniques, and antibiotic therapy, bacterial BAs can be fatal. The incidence of BAs is approximately 8% of intracranial masses in developing countries and 1-2% in the western countries. At some centers, pediatric cases of BA account for almost 25% of all patients with BA. Mortality from a BA has recently decreased from about 50% to 20%, mostly as a result of introduction of CT scanning that resulted in earlier diagnosis and accurate localization Further advances in microorganism isolation and identification, superior antimicrobials with greater cerebrospinal fluid (CSF) penetration and stereotactic aspiration has resulted in a contemporary mortality of less than 10%.Mortality is mainly influenced by age and neurological condition at admission; delays in hospitalization, focal neurologic deficits at admission, impaired host immunity, uncontrolled diabetes mellitus, and Glasgow Coma Scale (GCS) and in the most populous province of South Africa, they found a mean age of  $24.36 \pm 15.1$  years and men were most afflicted ( $n = 722, 74.2\%$ ). Nearly 70% of the patient cohort was in the first three decades of life, and 42.7% were pediatric patients

### **Clinical presentation**

An abscess can primarily present in four basic syndromes viz. focal mass expansion, intra-cranial hypertension, diffuse destruction, focal neurological deficit. There are marked variation in clinical symptoms and signs. Headache, changes in level of consciousness, nausea and/or vomiting, and high fever are the most common manifestations. Seizure is also not uncommon as an initial symptom, occurring in 34% of patients.Brain abscesses may be unicentric or multifocal. Majority, about 90% result from pericranial infection (sinusitis, mastoiditis, otitis media) and many who are hematogenous-borne (those from bacterial endocarditis) are multifocal, especially from cyanotic congenital heart disease.

The clinical syndrome will be caused by the forces involved in the host organism interaction, number and size and distribution of abscess, specific brain structures involved and the neighborhoods anatomy disturbances involving cisterns, ventricles, and the dural venous sinuses. A pontine abscess may bulge posteriorly compressing the aqueduct of sylvius causing obstructive hydrocephalus or an occipital abscess may rupture into ventricle causing ventriculitis or ependymitis or it may cause septic thrombophlebitis of the transverse sinus causing venous hypertension, edema, seizures and raised intra-cranial pressure.

In our series of 715 cases of brain abscess treated at the Seth G.S. Medical College and King Edward VII Memorial hospital over past 7 years (1999 to 2006), 425(60%) were having tuberculosis and 289 (40%) were pyogenic suggesting that tuberculous abscess was more common (Table 1). 407 (57%) were males and 308 (43%) were females. Out of 407 males 204 (50%) had pyogenic abscess while 203 (50%) had tuberculous abscess and out of 308 females 86 (28%) had pyogenic abscess and 222 (62%) had tuberculous abscess. The age of presentation was common in the second and third decade.

Fever, headache and vomiting were common symptoms which is consistent with that observed in literature. Majority of the abscesses were in the frontal, temporal and posterior fossa region.

### **Etiology**

The primary source of infection or predisposing factors to brain abscess, the age of the patient, underlying disease or immune status and previous use of antibiotics determine the and previous use of antibiotics determine the ultimate outcome in a patient with brain abscess. The formation of cerebral abscess occurs in contiguous, hematogenous or metastatic manner. The paranasal sinuses are a common source of purulent spread occurring through the frontal sinus infection into the frontal lobe, sphenoid sinus infection extending to the cavernous sinus and middle ear/mastoid air sinus infection spreading into the temporal lobe and cerebellum. Bacteroides, Peptostreptococcus and Streptococcus are mostly identified in brain abscesses due to contiguous spread.

The risk of developing a brain abscess in an adult with active chronic otitis media is 1/10,000 per year. Peptostreptococcus and Streptococcus (esp. viridians and microaerophilics) are mostly identified in patient with cardiac origin (cyanotic heart disease) and right-to-left shunts. In CHD diminished arterial oxygen saturation and increased blood viscosity may cause focal cerebral ischemia, often in middle cerebral artery (MCA) distribution. CHD was a significant predisposing factor in children's, but there is a decline due to advances in cardiac surgery and usage of broad spectrum antibiotics.

Staphylococci, Streptococcus are identified in patients with prior neurosurgical procedures while Staphylococcus, Streptococcus, Clostridium and Enterobactericea are identified in patients with open head trauma. Recently, hematogenous or metastatic spread is more

common due to increase in immunosuppression, organ transplantation, and prolonged life expectation on HIV and chemotherapy usage in cancer. Fungal infections, Toxoplasma, Staphylococcus spp, Streptococcus spp and Pseudomonas are identified in immunocompromised patients with HIV infections, organ transplantation, chemotherapy or steroid usage. Branched hyphal-form fungal infections obstruct large and intermediate size vessel, causing cerebral arterial thrombosis and infarction. Sterile infarct may be converted to septic infarcts with associated formation of the abscess. The mortality rates due to fungal abscesses range from 75 to 100%, despite intensive treatment with amphotericin B

### **Pathogenesis**

Brain abscess development can be divided into four stages:

- 1) early cerebritis (1 - 4 days);
- 2) late cerebritis (4 - 10 days);
- 3) early capsule formation (11 - 14 days); and
- 4) late capsule formation (>14 days).

Staging of brain abscess in humans has been based on findings obtained during CT or MRI scans. The glial cell activation in brain abscesses is through parenchymal microglia and astrocytes.

Activated microglia has the potential to influence the type and extent of antibacterial adaptive immune response through upregulation of MHC class II and costimulatory molecule expression. The continued release of proinflammatory mediators could damage the surrounding brain parenchyma.<sup>41</sup> Cytokines IL-1 and TNF-alpha individually dictate essential functions for establishment of an effective antibacterial response in the CNS parenchyma. Recent studies support persistent immune activation associated with experimental brain abscesses with elevated levels of interleukin1beta (IL-1), tumor necrosis factor-alpha (TNF and macrophage inflammatory protein-2 (MIP-2)) detected from 14 to 21 days following Staphylococcus aureus exposure.

It suggests that intervention with anti-inflammatory compounds subsequent to sufficient bacterial neutralization may be an effective strategy to minimize damage to surrounding brain parenchyma during the course of brain abscess development, leading to improvements in cognition and neurological outcomes

### **Diagnosis**

CT facilitates early detection, exact localization, and accurate characterization, determination of number, size and staging of the abscess. It also detects hydrocephalus, raised ICP, edema and associated infections like subdural empyema, ventriculitis and thus helps in treatment planning. It is invaluable in assessment of adequacy of treatment and sequential follow up. Hematogenous abscesses, which can be seen in the setting of endocarditis, cardiac shunts, or pulmonary vascular malformations, are usually multiple, identified at the greywhite junction,

and located in the middle cerebral artery territory. In the earlier phases, a non-contrast CT may show only low-attenuation abnormalities with mass effect. In later phases, a complete peripheral ring may be seen.

On contrast CT, uniform ring enhancement is virtually always present in later phases. In early phases the capsule will be difficult to visualize via conventional techniques, and double contrast CT often is helpful in defining encapsulation of abscess. Positive labelling in radionuclide imaging with III-Indium labelled leukocytes, C-reactive protein, <sup>99m</sup>Tc-hexamethylpropylene amine oxime leukocyte scintigraphy, diffusion weighted MR imaging, Thallium-201 single photon emission computed tomography and proton magnetic resonance spectroscopy (MRS) help in differentiating abscess from tumor.

MRI features recognize pyogenic abscesses fairly accurately. A central area of liquefaction gives high signals while the surrounding edematous brain tissue gives low signals on T1 weighted images. On T2 weighted images, the necrosis shows higher signals similar to the grey matter. The maturity of the abscess is indicated by the rim, which is formed probably by the collagen and inflammation due to free radicals and micro hemorrhages in the abscess wall. The zone of inflammation is significantly thicker in tubercular as compared to pyogenic abscess in morphometric analysis of histologic sections.

MRI findings also depend on the stage of the infection. In the early phase, MRI can have low T1-weighted images (T1WI) signal and high T2-weighted images (T2WI) signal with patchy enhancement. In later phases, the low T1WI signal becomes better demarcated, with high T2WI signal both in the cavity and surrounding parenchyma. The abscess cavity shows a hyperintense rim on non-contrast T1-weighted images and a hypointense rim on T2WI. As on CT, MRI usually demonstrates a ring of enhancement surrounding the abscess. Abscesses tend to grow toward the white matter, away from the better-vascularized grey matter, with thinning of the medial wall. However, the enhancing-ring sign is nonspecific and must be evaluated in the context of the clinical history.

Thickness, irregularity, and nodularity of the enhancing ring are suggestive of tumor (majority of cases) or, possibly, fungal infection. Vascularity of the wall was not significantly different in abscesses of varied etiology. Differential diagnosis of abscesses on MR imaging is hematomas, metastases and granulomas since a similar low signal rim is obtained on the T2 images in such cases. Brain abscesses are life threatening and detection and identification of the causative pathogens is crucial to substantiate the diagnosis and select the optimal antibiotic regimen. It is known that in approximately 20% of the patient's microbiological cultures of abscess material remain sterile. The polymerase chain reaction (PCR) provides a new alternative, but data reporting the specific use of broad-spectrum PCR assays to detect the causative pathogens in brain abscesses are infrequent in literature. PCR is an excellent tool to detect hardy and obligate organisms that require stringent growth conditions like *Fusobacterium* species and

Aspergillus. PCR is rapid, sensitive, and does not depend on the viability of tubercle bacilli in the samples.

### **Advanced mr imaging for diagnosis of brain abscess**

Diffusion-weighted imaging (DWI) has a sensitivity and specificity of over 90% for distinguishing abscess (low ADC) from necrotic tumor (high ADC). DWI has a high sensitivity to detect early acute ischemic changes in cortical and deep white matter that can occur in the setting of infectious vasculitis. The viscous cellular pus in abscess produces a very low ADC that distinguishes these lesions from increased diffusivity in necrotic tumor and from normal or slightly low diffusivity in demyelinating plaque. On immediate postoperative MRI, ischemia at the margin pyogenic infection can produce a focally reduced ADC. DWI usually show restricted diffusion (bright signal) that helps to differentiate abscesses from necrotic neoplasms, which are not usually restricted,<sup>45,46</sup> although not all abscesses follow this rule. Fungal and tuberculous abscesses may have elevated diffusivity and low signal on DWI.<sup>44</sup> Several studies demonstrate the utility of DWI to differentiate between necrotic or cystic lesions and brain abscesses. The latter demonstrates increased signal on the trace images and reduced apparent diffusion coefficient (ADC), while necrotic neoplasms demonstrate decreased signal on the trace image and high ADC values. Brain abscess cavity shows regions of increased fractional anisotropy (FA) values with restricted mean diffusivity compared with other cystic intra-cranial lesions.

### **Magnetic resonance spectroscopy**

The distinction of abscess from rim-enhancing tumor is done by demonstrating amino acids within the contents of the cyst, a finding that is essentially diagnostic of the presence of activated polymorphonuclear leukocytes, and thus of bacterial or, less likely, parasitic infection.<sup>52</sup> Perfusion techniques (PMR) can aid in distinction of intra-cranial abscess from cystic glioma by demonstrating an rCBV lower than or equal to the surrounding white matter in abscess. Intracerebral abscesses are characterized by specific resonances on MRS that are not detected in normal or sterile pathologic human tissue. MRS has been shown to be specifically beneficial in differentiating between brain abscesses and other cystic lesions,<sup>49</sup> which can be used to expedite implementation of the appropriate antimicrobial therapy. Metabolic substances, such as succinate (2.4 ppm), acetate (1.9 ppm), alanine (1.5 ppm), amino acids (0.9 ppm), and lactate (1.3 ppm), can all be present in untreated bacterial abscesses or soon after the initiation of treatment. 1HMRS is a safe, non-invasive imaging modality and could accurately differentiate between necrotic/cystic tumor and cerebral abscesses. In combination with DWI, it can significantly increase the diagnostic accuracy of conventional MRI and provide valuable preoperative information regarding the nature of a space occupying, ring enhancing intra-cranial lesions. Moreover, 1HMRS can also provide valuable information regarding the etiology of an abscess, as well as, its response to any medical or surgical treatment. However, the promising role of 1HMRS in delineating the specific etiology of intra-cranial abscesses requires though

further clinical investigation and validation of the existing results. Three different spectroscopic patterns of pyogenic cerebral abscesses have been recognized. In pattern A, lactate, cytosolic amino acids, alanine, acetate, succinate, and lipids are associated with obligate anaerobes or a mixture of obligate and facultative anaerobes. Spectroscopic pattern B is characterized by the present of lactate, cytosolic amino acids, and the occasional presence of lipids was mostly associated with obligate aerobes facultative anaerobes. Pattern C is characterized by the presence of lactate and is associated with *Streptococcus* species. Abscesses due to *Staphylococcus* has characteristic peaks from lipids and lactate. This finding has apparent clinical impact in the early preselection of the appropriate antibiotic treatment for these patients. Tubercular cerebral abscesses show increased concentrations of lipids along with increased concentration of phosphoserine. The spectral characteristics of fungal abscesses are still ill defined. Cytosolic amino acids and lactate are detected in the majority of their fungal abscesses while lipids and lactate or lactate alone is found less consistently. Interestingly, a peak at 3.6 and 3.8 ppm representing trehalose is observed in the majority of the fungal abscesses (a component of the fungal wall). Spectroscopic analysis can also provide information regarding the exact histological stage of the studied abscess (early vs. late cerebritis and early vs. late capsular formation).<sup>56</sup> Lumbar puncture (LP) has been considered hazardous in patients with brain abscess.<sup>57,58</sup> It is usually performed under a strong suspicion of concomitant meningitis and/or ventriculitis in the absence of increased intra-cranial pressure. It yields only 10e30% positive cerebro-spinal fluid (CSF) cultures compatible with abscess cultures.

### **Surgery**

In our experience, pyogenic abscess required surgical intervention while most of the tuberculous abscesses were managed conservatively. The initial approach is to drain the abscess through a twist drill craniotomy. If the pus is thick or there is inadequate drainage of abscess suspected, the next procedure would be therapeutic burrhole drainage. Deep seated abscess like a thalamic abscess should be drained by a CT guided stereotactic procedure. Adequate drainage of the pus produces an immediate clinical improvement and helps the patient to stabilize hemodynamically.

It is our aim to drain the entire pus with a single attempt but to a large extent, the borehole drainage is seldom complete. This could be achieved with intraoperative radiography or using neuro navigation. However, the patient is kept under close neurological and radiological monitoring. The residual pus can evacuate if the patient does not exhibit significant improvement or serial radiography or CT imaging reveals moderate to large residue. About 90% of the supratentorial hemispheric abscesses resolve with burrhole drainage. We have seldom felt the need to perform a craniotomy.

The indications for craniotomy are multiloculated abscess and thick pus. In case of otogenic abscesses, urgent otolaryngological consultation is mandatory and mastoidectomy

should be performed at the earliest. The treatment of brain abscess has been a challenge. Small brain abscesses have been treated empirically with antibiotics. Patients presenting with rapidly progressive neurological deficits due to the mass effect of the neuroradiologically verified brain abscess are strict candidates for urgent decompression both for the neurosurgeons and internists. The choice of procedure is a matter of debate. Craniotomy was advocated in the pre CT era but is now rarely practiced as the first line of treatment. Aspiration repeated as necessary or with drainage, has widely replaced attempts at complete excision. However, open surgical procedure is still preferred by the treatment of the brain abscess with the combination of medical treatment, if there is evidence of increased intra-cranial pressure due to significantly mass effect of the brain abscess, if there are difficulties in diagnosis, if the abscess is traumatic and, if the lesion is located in the posterior fossa and if there is any presumption of fungal infection.

Excision is recommended for the multiloculated abscesses, posttraumatic abscesses containing foreign bodies or contaminated retained bone fragments, and abscesses due to fistulous communication. Several reports have advocated excision as the procedure of choice because it is often followed by a lower incidence of recurrence and shorter hospitalization. Even the decompression with the craniotomy or craniectomy will be helpful for the patients with poor neurological condition. As diagnosis based only on clinical and neuroradiological findings can be erroneous, nonsurgical therapeutic decisions should not be taken without positive pathological diagnosis. Xiao et al<sup>8</sup> reported that favorable outcome was not significantly different between the patients treated by excision or aspiration however, the mortality rate was significantly lower in the patients treated with excision than the patients treated with aspiration.

This is probably due to the better general condition and/or more favorable location of abscess that could be excised surgically in such patients. Stereotactic management of brain abscess, allowing both confirmation of the diagnosis and institution of therapy by aspiration of its contents and identification of the offending organism, has become widespread with the introduction of CT-guided stereotaxy. A review of the recent literature shows several series of brain abscesses primarily treated with stereotactic techniques. Stereotactic aspiration should be considered the treatment of choice in all but the most superficial and the largest cerebral abscesses. Kondziolka et al.<sup>63</sup> related the failure of stereotactic treatment of brain abscesses in a series of 29 cases, because of either inadequate aspiration, lack of catheter drainage, chronic immunosuppression, or insufficient antibiotic therapy. Neuroendoscopic technique with free hand stereotaxy has also been practiced. Both Hellwig and Kamikawa<sup>65,66</sup> reported their experiences with a flexible scope (free-hand or stereotactic-guided), while Fritsch<sup>67</sup> opted for a rigid one in a pediatric series.

Longatti et al. reported the usefulness of flexible endoscope in certain crucial surgical actions, such as aspirating and inspecting the abscess in all space directions or in firm and elastic membrane requires scissors or other instruments for its perforation. The use of drainage catheters

inside the abscess cavities is controversial. Longatti et al. reported that no significant difference could be obtained in the length of hospital stay, number of postoperative CT scans, and duration of the antibiotic therapy between traditional and endoscopic stereotactic aspiration. Intraoperative imprint- smear diagnosis of brain abscess is fraught with pitfalls viz. abscess related necrosis must be differentiated from tumor necrosis. In deep seated, multiloculated and periventricular abscesses, a reduction of 1 mm in the distance between the ventricle and brain abscesses will increase the rupture rate by 10%. Surgical therapy can be preferred for the patients with neurological deterioration and/or radiological unresolved lesions.

The surgical technique of choice for intra-cranial abscess should be specific to each patient. A combination of the surgical aspiration or removal of all abscesses larger than 2.5 cm in diameter, a six weeks or longer course of intravenous antibiotics, and weekly CT or MRI imaging should result in a cure rate of more than 90%. It is important to follow the patient carefully by CT or MR imaging until the abscess has completely resolved. If any abscess enlarges after two weeks of antibiotics or fails to resolve after three to four weeks of antibiotics, further surgical aspiration or excision should be performed.

### **Results:**

The average follow-up duration was 15 months (range 9 - 21 months). There were 204 male (71%) and 86 female (29%) patients, ranging in age from 18 months to 62 years (median 32 years) at the time of diagnosis. At the time of admission, 252 patients complained of headaches and 46 had nausea and vomiting. One hundred and forty-six patients had fever or signs of meningeal irritation, and neurological deficits were present in 142. Two hundred and thirty-three patients were alert, and fifty seven were somnolent or confused at admission. Sixty two patients presented with seizures. The mean duration of symptoms was 6 days (range 3 - 10 days). In our series, the initial neurological condition showed a strong correlation with the overall outcome.

Majority of the patients underwent aspiration as a primary modality of treatment. Craniotomy or craniectomy was performed in cerebellar, postoperative and posttraumatic abscesses as a primary form of treatment. Deep seated (thalamic, brain stem) and hemispheric eloquent area abscesses underwent frame based stereotactic or neuronavigation guided aspiration. 196 patients underwent aspiration via single burrhole. Repeated aspirations were required in forty-four patients. In spite of repeated aspirations and/or failure to respond to antibiotic therapy, nineteen patients required craniotomy for excision of the abscess. The interval of repeated aspirations ranged from 4 to 18 days. In our series, a significant number of patients treated with burr-hole aspiration had a favorable outcome.

In conclusion, pyogenic brain abscess should be treated on an emergent basis. Abscess diameter more than 2 cm need surgical intervention and most of them show an excellent clinical and radiological response to single burr-hole aspiration. Craniotomy is required in selected cases and is a primary procedure in cerebellar, postoperative and posttraumatic abscesses. Intravenous



broad spectrum antibiotic therapy should be administered for a period of minimum 6 weeks to prevent relapse. The long term outcome is gratifying if prompt treatment is instituted in appropriate time period.

**References:**

1. Loftus CM, Osenbach RK, Biller J. Diagnosis and management of brain abscess. In: Wilkins RH, Rengachary SS, editors. Neurosurgery. 2nd ed., vol 3. New York: McGraw-Hill; 1996. p. 3285-98.
2. Sharma BS, Gupta SK, Khosla VK. Current concepts in the management of pyogenic brain abscess. *Neurol India* 2000;48:105-11.
3. Lu CH, Chang WN, Lui CC. Strategies for the management of bacterial brain abscess. *J Clin Neurosci* 2006;13:979-85.
4. Takeshita M, Kagawa M, Izawa M, Takakura K. Current treatment strategies and factors influencing outcome in patients with bacterial brain abscess. *Acta Neurochir (Wien)* 1998;140:1263-70.
5. Tekkök IH, Erben A. Management of brain abscess in children. Review of 130 cases over a period of 21 years. *Childs Nerv Syst* 1992;8:411-6.
6. Yang SY. Brain abscess: a review of 400 cases. *J Neurosurg* 1981;55:794-9.
7. Kao PT, Tseng HK, Liu CP, Su SC, Lee CM. Brain abscess: clinical analysis of 53 cases. *J Microbiol Immunol Infect* 2003;36:129-36.
8. Xiao F, Tseng MY, Teng LJ, Tseng HM, Tsai JC. Brain abscess: clinical experience and analysis of prognostic factors. *Surg Neurol* 2005;63:442-50.
9. Osenbach RK, Loftus CM. Diagnosis and management of brain abscess. *Neurosurg Clin N Am* 1992;3:403-20.
10. Ciurea AV, Stoica F, Vasilescu G, Nuteanu L. Neurosurgical management of brain abscesses in children. *Childs Nerv Syst* 1999;15:309-17

## **A REVIEW ON RELATIONSHIP BETWEEN ISCHEMIC STROKE AND BRAIN TUMOR**

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### **Abstract:**

Patients with systemic cancer often develop acute ischemic stroke from unique mechanisms, including cancer-mediated hypercoagulability, and their risk of recurrence is high<sup>(4)</sup>. Glioma and cerebral ischemic stroke are two major events that lead to patient death worldwide. Although these conditions have different physiological incidences, ~10% of ischemic stroke patients develop cerebral cancer, especially glioma, in the post ischemic stages<sup>(1)</sup>. Currently, there is limited research to provide guidelines for AIS prevention and management in adult brain tumor survivors. For example, the National Comprehensive Cancer Network (NCCN) provides cancer survivorship guidelines for post-cancer therapy with the goal of preventing long-term morbidity and mortality, but does not discuss the prevention of AIS<sup>(3)</sup>. Brain and gastrointestinal cancer patients had the highest SMRs (>2-5) through the follow up period. Among those diagnosed at <40 years of age, the plurality of strokes occurs in patients treated for brain tumors and lymphomas; if >40, from cancers of the prostate, breast, and colorectal<sup>(8)</sup>. For almost all cancers survivors, the risk of stroke increases with time. Conversely, stroke mechanisms in patients with primary brain tumors are incompletely understood, and the risk of recurrent thromboembolism in these patients is uncertain.

**Keywords:** Ischemic Stroke, AIS (Acute Ischemic Stroke), Glioma and Brain Tumor.

### **Introduction**

Stroke is a leading cause of mortality and disability worldwide and the economic costs of treatment and post-stroke care are substantial. Every year, approximately 1.8 million people suffer from stroke, which is the second most common cause of death after coronary artery disease (CAD) globally. Stroke has become the 5th leading cause of death in 2016 from 12th cause in 1996 and claims 119-145 lives in every 100,000 populations.

India's stroke burden is enormous and every year, 1.8 million people suffer stroke in India, but we have only about 2000 neurologists. The guidelines for Prevention and Management of Stroke issued by the Government of India in 2019 recommends setting up a stroke unit which includes physicians trained in stroke care. Additionally, this team comprises of nursing, dieticians, physiotherapy, occupational therapy, speech therapy, and social workers.

In addition to the classic cerebrovascular risk factors (for example, hypertension, diabetes, hyperlipidemia, smoking, and atrial fibrillation), there are some unique processes, related to the diagnosis and complications of therapy that can be identified in primary brain

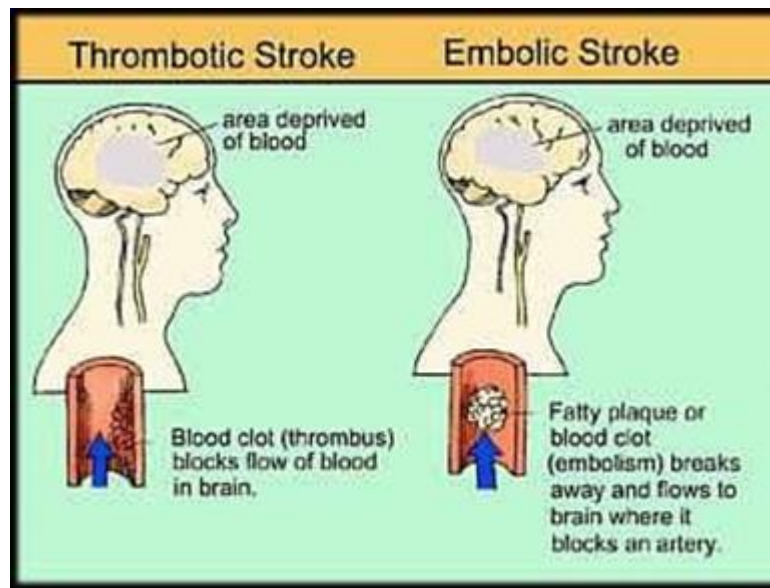
tumor patients. As a result, prevention of stroke in brain cancer patients requires a multidisciplinary approach that should be started at the time of brain tumor diagnosis and continued throughout the patient's lifetime. In this article, we review the most commonly occurring risk factors that lead to either ischemic or hemorrhagic strokes in patients with primary brain tumors. We discuss the presentation and differential diagnoses of stroke in this patient population. We briefly review the basics of imaging diagnosis as well as the literature data on the acute treatment of stroke in brain tumor patients. Lastly, we discuss primary and secondary prevention strategies.

### **Ischemic Stroke**

An ischemic stroke occurs when a blood vessel that supplies the brain becomes blocked or "clogged" and impairs blood flow to part of the brain. The brain cells and tissues begin to die within minutes from lack of oxygen and nutrients. Ischemic strokes are further divided into 2 groups:

#### **Thrombotic strokes**

These are caused by a blood clot that develops in the blood vessels inside the brain.



#### **Embolic strokes**

These are caused by a blood clot or plaque debris that develops elsewhere in the body and then travels to one of the blood vessels in the brain through the bloodstream.

#### **Brain Tumor leads to ischemic stroke and brain injuries**

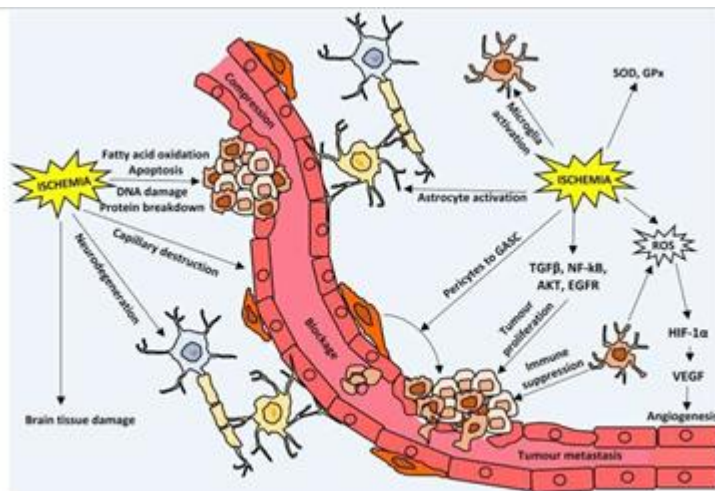
In glioma otherwise known as brain tumor the highly proliferating cell mass, metastasis, BBB breakdown and release of micro- and macro particles in circulation cause thrombosis and capillary blockade, resulting in the focal ischemic condition. Blood vessel compression due to brain tumor formation also results in cerebral ischemia, which leads to a limited supply of nutrients to the brain that is unable to meet the metabolic demands of the brain tissue. Tumors in the brain progress gradually with time, whereas stroke occurs due to a certain blockage of blood

in the brain. A recent patient cohort-based study on extracellular vesicles shows high correlation with D-dimer levels and cancer, which indicates increased risk of stroke in cancer patients. It is well established that glioma cells release factor X, mucins, podoplanin, and other procoagulant factors and cytokines that activate monocytes, endothelial cells, and platelets and also stimulate neutrophils to form neutrophil extracellular traps and inhibit protein C activation, leading to local inflammation and ischemic hypoxia. Several reports showed that glioma therapy, especially platinum-based drugs, angiogenesis inhibitors, monoclonal antibodies, and radiotherapy, increased the risk of thromboembolism. The characteristics of cancer-related stroke are completely different from those of conventional stroke. Hemorrhagic stroke can cause direct adverse effects on the tumor within the cranial vault. The intravascular coagulopathy that causes embolism is the main mechanism of cancer-related stroke. Direct effects either from tumor compression or from tumor embolism are another causal mechanism of stroke. Tumor bed edema leads to ischemia or infarction in the territory of the affected vessels and is clinically different from tumor progression. This mechanism is unique in that radiation treatment on the brain tumor might result in a stroke in certain cases.

#### **Interplay between cerebral ischemia and glioma: what do clinical reports reveal?**

The relationship between cerebral ischemia and glioma is still ambiguous based on molecular mechanisms, but several clinical reports and case studies have indicated that glioma and cerebral ischemia can facilitate each other with respect to occurrence. It has been reported that the location of the tumor inside the brain (insula, operculum, and temporal lobe) and repeated resection during glioma therapy can increase the risk of ischemic injuries and other neurological deficits. A recent report based on clinical cohort studies suggests that the chance of the diseases occurring together reaches 9% compared with 2.7% in the control population, and the risk of developing brain cancer (especially glioma) is also higher in stroke patients. Another clinical cohort-based study on 3680 noncancerous adults with no disabling cerebral infarction reported the development of brain cancer (glioblastoma) with a mortality rate that is threefold higher than that of the control cohort in the post ischemic period. Another case study of a 73-year-old woman with a history of atrial fibrillation and mechanical aortic valve replacement showed primary glioma development within the territory of a previous ischemic infarction. A similar result of the sudden onset of an acute ischemic lesion near the tumor area was reported in another case study of a 77-year-old woman suffering from an anterior temporal lobe tumor. A different report stated that two adult patients with supratentorial glioblastomas developed an ischemic stroke on the tumor site. A recent case study reported that the risk of neurodegeneration and ischemic lesions increases after resection of recurrent tumors. The case of an anaplastic astrocytoma patient showed acute onset ischemic stroke-like symptoms. In another interesting case, a 79-year-old woman with a history of atrial fibrillation and coronary heart disease developed glioblastoma multiform (GBM) at the site of a previous infarction 6 years after the

onset of right hemiplegia. Cerebral ischemia might occur due to embolus metastatic glioma cells, as reported recently. Another unusual case of acute ischemic infarction of the middle cerebral artery was caused by a proliferating glioma mass. In certain cases, it is notably difficult to distinguish the early symptoms of stroke and glioma, which might lead to improper therapy. Several reports worldwide present these pseudo-symptoms of glioma and cerebral ischemia. Another interesting case is a woman from India who was primarily diagnosed as a cerebral stroke patient but was later found to exhibit glioma development instead of stroke symptoms. The most widely accepted model that connects ischemia and glioma is based on the common hypoxic condition that occurs in both situations. Cerebral ischemia due to obstruction in the vasculature locally or globally causes low oxygen tension in the ischemic regions and results in hypoxia, whereas a highly proliferating glioma cell mass has poor vasculature inside its core, leading to a hypoxic core region that is deprived of oxygen. The exact mechanisms of this co-occurrence or interplay are still in the nebulous phase, but certain possible mechanisms, e.g., astrocyte activation, reactive gliosis, angiogenesis and changes in perivascular and perinecrotic niches due to cerebral ischemia, are reported as a consequence for glioma development. In this review, all of the possible methods of interplay are described in a sequential manner.



### **Diagnosis and assessment of acute stroke syndrome**

- Check ABCs (airway, breathing and circulation) first. In some patients with stroke, the level of consciousness is reduced, and intubation may be required. Rarely, there is circulatory instability due to arrhythmia or other concurrent cardiac disease.
- Perform a quick assessment of degree of disability:
- Speech and spatial perception: Aphasia or hemi spatial neglect?
- Vision: Hemianopia or quadrantanopia?
- Hemiparesis: Facial droop? Antigravity arm strength? Antigravity leg strength?
- Hemianesthesia: Check gross light touch on face, arm and leg.
- Coordination and walking: If possible, have the patient get out of bed and try to walk.

- Use the National Institutes of Health Stroke Scale (NIHSS) to guide assessment of disability:
- NIHSS = 0–5: transient ischemic attack (NIHSS = 0 and no signs on examination) or minor stroke (NIHSS 1–5)
- NIHSS = 6–10: moderate disabling stroke
- NIHSS = 11–20: moderate to severe disabling stroke
- NIHSS  $\geq$  20: severe, life-threatening stroke

**Risk factors:**

While there are few published manuscripts about stroke in primary brain tumor patients, the majority focus on identification of risk factors. The below table provides an overview of risk factors associated with comorbidities as well as the underlying primary brain tumor diagnosis and its treatment identified in this literature

Stroke risk factors in patients with primary brain

- Meoplasm
- Hypertension
- Patients' comorbidities
- Diabetes mellitusHyperlipidemia
- Obesity/abdominal fat Smoking history
- Lack of physical activity Cardiovascular diseasesGenetic risk factors
- Local vessel compression
- Tumor-related factors
- Vessel erosion by cancer
- Autocrine factors leading to coagulability
- Surgery-related factors
- Vessel injury during brain operation Anesthesia related cardiovascular changes
- Microvascular changes in small vessels
- Radiation treatment-related factors
- Microvascular changes in large vesselsAneurysm formation
- Chemotherapy-related factors
- TemozolomideCisplatin
- Bevacizumab-related coagulopathy
- Related to additional treatment
- Corticosteroid Antithrombotic agents

**Treatment of acute ischemic stroke for brain tumor survivors**

Research and recommendations of AIS treatment in brain tumor survivors off active treatment is limited. Some of the most frequently asked questions concerns the use of

antithrombotic and anticoagulation therapies. Limited research has been conducted evaluating intravenous thrombolysis [e.g. tissue plasminogen activator (tPA)] in patients with primary or metastatic brain tumors. Persons with malignant primary brain tumor associated

AIS are reported to have worse outcomes [e.g., higher hospital mortality rate, fewer persons with discharge disposition to home, and an increased risk of intracranial hemorrhage (ICH)] compared to persons with non-brain tumor associated AIS. Intravenous thrombolysis may be considered in AIS patients with benign brain tumors (e.g. meningioma), but may not be advisable in primary or metastatic brain neoplasms.

Mechanical thrombectomy is another treatment option for brain tumor patients with AIS. A case report suggests mechanical thrombectomy may be beneficial for patients with good pre-morbid functional status that develop large vessel occlusive strokes. Another study reported ICH rates after endovascular therapy are comparable between cancer and non-cancer patients. Unfortunately, there are no clinical trial data available evaluating endovascular therapy in brain tumor survivors with AIS. Antithrombotic agents are recommended as a first line treatment for cancer-associated AIS, especially low-molecular weight heparin for preventing recurrent thromboses. However, antithrombotic agents are reported to increase the risk of bleeding in cancer patients, which might outweigh any potential reductions in recurrent AIS risk.

Antiplatelet therapy may be prescribed to brain tumor patients, and is also commonly prescribed for AIS patients. When anticoagulation (low-molecular weight heparin) was compared to antiplatelet therapy (aspirin) in active cancer-related AIS patients, there was no difference between the groups in rates of recurrent thromboembolism or mortality.<sup>34</sup> Subsequently, when patients with active cancer-related AIS were randomized to either enoxaparin or aspirin groups, no differences were found in outcomes evaluated (e.g., major bleeding, thromboembolic events, and survival).<sup>35</sup> There is no published evidence that evaluates use of antithrombotics in brain tumor patients with AIS.

## **Prevention**

Knowing your stroke risk factors, following your health care provider's recommendations and adopting a healthy lifestyle are the best steps you can take to prevent a stroke. If you've had a stroke or a transient ischemic attack (TIA), these measures might help prevent another stroke. The follow-up care you receive in the hospital and afterward also may play a role. Many stroke prevention strategies are the same as strategies to prevent heart disease. In general, healthy lifestyle recommendations include:

- **Controlling high blood pressure (hypertension).** This is one of the most important things you can do to reduce your stroke risk. If you've had a stroke, lowering your blood pressure can help prevent a subsequent TIA or stroke. Healthy lifestyle changes and medications are often used to treat high blood pressure.
- **Lowering the amount of cholesterol and saturated fat in your diet.** Eating less

cholesterol and fat, especially saturated fat and trans fats, may reduce buildup in the arteries. If you can't control your cholesterol through dietary changes alone, your doctor may prescribe a cholesterol-lowering medication.

- **Quitting tobacco use.** Smoking raises the risk of stroke for smokers and nonsmokers exposed to secondhand smoke. Quitting tobacco use reduces the risk of stroke.
- **Managing diabetes.** Diet, exercise and losing weight can help you keep your blood sugar in a healthy range. If lifestyle factors don't seem to be enough to control your diabetes, your doctor may prescribe diabetes medication.
- **Maintaining a healthy weight.** Being overweight contributes to other stroke risk factors, such as high blood pressure, cardiovascular disease and diabetes.
- **Eating a diet rich in fruits and vegetables.** A diet containing five or more daily servings of fruits or vegetables may reduce the risk of stroke. The Mediterranean diet, which emphasizes olive oil, fruit, nuts, vegetables and whole grains, may be helpful.
- **Exercising regularly.** Aerobic exercise reduces the risk of stroke in many ways. Exercise can lower blood pressure, increase the levels of good cholesterol, and improve the overall health of the blood vessels and heart. It also helps you lose weight, control diabetes and reduce stress. Gradually work up to at least 30 minutes of moderate physical activity — such as walking, jogging, swimming or bicycling — on most, if not all, days of the week.
- **Drinking alcohol in moderation, if at all.** Heavy alcohol consumption increases the risk of high blood pressure, ischemic strokes and hemorrhagic strokes. Alcohol may also interact with other drugs you're taking. However, drinking small to moderate amounts of alcohol, such as one drink a day, may help prevent ischemic stroke and decrease the blood's clotting tendency. Talk to your doctor about what's appropriate for you.
- **Treating obstructive sleep apnea (OSA).** Your doctor may recommend a sleep study if you have symptoms of OSA — a sleep disorder that causes you to stop breathing for short periods repeatedly during sleep. Treatment for OSA includes a device that delivers positive airway pressure through a mask to keep the airway open while you sleep.
- **Avoiding illegal drugs:** Certain street drugs, such as cocaine and methamphetamine, are established risk factors for a TIA or a stroke

### **Vitamin D**

Low levels of vitamin D are associated with worse outcomes after ischemic stroke, which account for 87% of all strokes in America. Furthermore, vitamin D deficiency is associated with the stroke risk factors like hypertension, obesity, and diabetes. Fortunately, after supplementing with vitamin D, “there is a significant improvement in stroke outcomes after 3 months.” (Source: Journal of Clinical and Diagnostic Research). Getting enough vitamin D can also provide neuroprotective, neuromuscular, and osteoprotective benefits which can reduce cognitive and functional impairments in individuals after a stroke. (Source: Current Drug Targets). By getting



your daily dose of vitamin D, you can reduce your risk of another stroke while aiding your brain's recovery. Your body can produce Vitamin D, known as the sunshine vitamin, from daily amounts of sun exposure. As always, be cautious about your exposure during peak hours (generally 10am- 4pm) when the sun's rays are the strongest. If you can't get sun exposure due to medical restrictions (like heightened risk of skin cancer), then consume it through foods that are high in Vitamin D, like fatty fish, cheese, and egg yolks.

### **Probiotics**

Probiotics aren't a vitamin or mineral. Rather, probiotics are the "good" bacteria that comprise your microbiome, the 100 trillion microbes that live inside your gut. The bacteria living inside your body serve an important role – they even have a nervous system of their own called the *enteric nervous system*. Through this internal ecosystem, the bacteria in your gut communicate with your brain through the *gut-brain axis*. This connection is **bidirectional**, which means that it goes both ways. Since gut health plays a key role in brain health, probiotics make the list of top supplements for stroke recovery. Great dietary sources of probiotics include fermented foods like yogurt, kefir, tempeh, kimchi, and miso.

### **Vitamin B12**

Vitamin B12 deficiency is associated with a type of inflammation that damages the blood vessels. When blood vessels become damaged, excess deposits can develop and interrupt blood flow. If this happens to an artery in the brain, it can lead to a stroke. Supplementing with vitamin B12 can enhance stroke recovery by boosting the function and development of the brain and nerve cells. This encourages neuroplasticity, which is the brain's ability to reorganize itself, create new neural pathways, and rearrange existing ones. Vitamin B12 can be found in animal products like fish, meat, poultry, eggs, and milk. If you have a history of stroke risk factors like high cholesterol or atherosclerosis, consume lean sources of protein such as fish or poultry.

### **Vitamin B3 (Niacin)**

Vitamin B3, also known as niacin, can encourage recovery of brain function after stroke for two main reasons:

First, niacin directly affects neuroplasticity, which is the primary driver of recovery from stroke. Secondly, niacin has been proven to improve "good" cholesterol levels, which are statistically low in stroke survivors. Although experts have yet to link "good" cholesterol levels with stroke recovery, reducing one's risk of a second stroke is a significant accomplishment. You can find vitamin B3 in tuna, chicken, turkey, and salmon. For meatless options, you can find lesser quantities of niacin in peanuts and brown rice.

### **DHA (Docosahexaenoic acid)**

DHA is an omega-3 fatty acid that is critical for healthy brains. While omega-3s are not vitamins, they still made the list for their positive effects on stroke recovery. DHA is essential for brain growth in infants and maintenance of normal brain function in adults. Some studies

suggest that DHA can reduce stroke risk factors like hypertension and atherosclerosis. DHA is an essential fatty acid, meaning your body cannot produce it on its own – you must get it from your diet (or supplements). Fatty fish, like salmon, contain healthy amounts of DHA. If you are on a strict heart healthy diet, then consider taking fish oil supplements to obtain your daily amount of DHA.

### **Coenzyme Q10 (CoQ10)**

CoQ10 is most famous for improving heart health – but it holds incredible benefits for your brain. Therefore, CoQ10 made the list of top vitamins for stroke recovery, even though it's a nutrient and not a vitamin. CoQ10 is a powerful antioxidant that provides protection from free radicals, which are toxic molecules associated with disease. Free radicals are believed to play a role in cardiovascular disease, which is a precursor to stroke. By supplementing with CoQ10, you can improve your heart health and, therefore, reduce your risk of a second stroke.

Also, low CoQ10 levels have been associated with greater tissue damage to the brain during stroke. CoQ10 can be found in most liver organ meats like heart, liver, and kidney. However, these meats also contain high amounts of cholesterol and saturated fats that exacerbate cardiovascular disease. Small amounts of CoQ10 can be found in spinach, broccoli, and cauliflower. Due to this, supplementation may be more suitable for individuals recovering from a stroke.

### **Vitamin C**

Vitamin C deficiency may be a stroke risk factor, especially in individuals with a history of hemorrhagic strokes (the type of stroke caused by a burst artery in the brain). In a study from the American Academy of Neurology, 65 survivors of hemorrhagic stroke were compared to 65 healthy people. On average, those who suffered a stroke had depleted levels of vitamin C while healthy people did not. Study author Stephane Vannier, MD, concluded that “vitamin C deficiency should be considered a risk factor for this severe type of stroke.”

Although oranges are well-known for their nutritional benefits, other fruits and vegetables, like papaya, bell peppers, broccoli, and strawberries, contain higher amounts of vitamin C. Dr. Stephane Vannier, from Pontchaillou University Hospital in Rennes, does not recommend supplementing vitamin C if you are not deficient.

### **Conclusion:**

Stroke and brain tumor are significant public health problems that share various epidemiological risk factors. These conditions represent a huge cost for healthcare systems and increased population disability rate. Early glioma identification in stroke survivors and extensive cerebral risk factor control is advocated as primary points in order to mitigate the burden generated from both diseases. Recognizing a “truly” cryptogenic stroke group facilitates the correct selection of stroke patients to screen for occult malignancy. There is a need for establishing clinical guidelines that include proper biomarkers and follow up algorithms to

screen for tumor in stroke patients as well as for primary and secondary prevention of both diseases.

### **References**

1. Mrinal K. Ghosh, Dipankar Chakraborty, Sibani Sarkar, Arijit Bhowmik & Malini Basu - The interrelationship between cerebral ischemic stroke and glioma: a comprehensive study of recent reports.
2. Edina Komlodi-Pasztor, Mark R. Gilbert & Terri S. Armstrong - Diagnosis and Management of Stroke in Adults with Primary Brain Tumor
3. Karl Cristie F. Figuracion, MSN, ARNP, AOCNP, Wonkyung Jung, MSN, RN, & Sarah. R. Martha, PhD, RN - Ischemic Stroke Risk Among Adult Brain Tumor Survivors: Evidence to Guide Practice
4. Jaelyn E Burch, Neal S Parikh, Hooman Kamel, Lisa M DeAngelis & Babak B Navi - Ischemic Stroke in Patient with Primary Brain Tumors: Mechanisms and Risk of Recurrence.
5. Hiroki Ohata, Takehiro Uda, Tsuyoshi Sasaki, Masato Hattori, Toshiyuki Kanzaki, Kosuke Nakajo, David Prakasa, Misao Nishikawa, Kenji Ohata, Takeo Gato - Glioblastoma presented with acute ischemic stroke: A case report and literature review.
6. Musuka, T. D., Wilton, S. B., Traboulsi, M. & Hill, M. D. Diagnosis and management of acute ischemic stroke: speed is critical. *CMAJ* 187, 887–893 (2015).
7. O'Donnell MJ, *et al.*, Risk factors for ischaemic and intracerebral haemorrhagic stroke in 22 countries (the INTERSTROKE study): a case-control study. *Lancet*. 2010;376(9735):112–123. doi: 10.1016/S0140-6736(10)60834-3.
8. Nicholas G. Zaorsky, Ying Zhang, Leila T. Tchelebi, Heath B. Mackley, Vernon M. Chinchilli & Brad E. Zacharia – Stroke among Cancer Patients
9. Carney BJ, *et al.*, Anticoagulation after intracranial hemorrhage in brain tumors: risk of recurrent hemorrhage and venous thromboembolism. *Res Pract Thromb Haemost.* 2020.
10. Murthy SB, *et al.*, In-hospital outcomes of thrombolysis for acute ischemic stroke in patients with primary brain tumors.

## **A REVIEW ON PARKINSONS DISEASE ETIOLOGY RISK FACTORS AND TREATMENT**

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### **Abstract:**

Parkinson's Disease is the second most common progressive neurodegenerative disorder affecting older American adults and is predicted to increase in prevalence as the United States population ages. Resulting from a pathophysiology loss or degeneration of dopaminergic neurons in the substantia nigra of the midbrain and the development of neuronal Lewy Bodies, idiopathic Parkinson's Disease is associated with risk factors including aging, family history, pesticide exposure and environmental chemicals (e.g., synthetic heroin use). Its ultimate cause(s) is (are) unknown. Characterized by both motor and non-motor symptoms, PD patients classically display rest tremor, rigidity, bradykinesia, and stopping posture. PD can also be associated with neurobehavioral disorders (depression, anxiety), cognitive impairment (dementia), and autonomic dysfunction (e.g., orthostasis and hyperhidrosis). Recent decades have witnessed a proliferation of medical pharmacologic therapies and innovative surgical interventions like deep brain stimulation (DBS). However, definitive disease-modifying therapy is still lacking. Experimental therapies are being developed and tested with limited results.

Knowledge of strategies to promote optimal quality of life for PD patients is of paramount importance for caregivers, health providers and patients themselves.

**Keywords:** Parkinson's Disease, Risk factors. General symptoms, Parkinson's treatment.

### **Introduction:**

Parkinson's disease (PD) is a chronic progressive neurodegenerative disorder characterized by early prominent death of dopaminergic neurons in the substantia nigra pars compacta (SNpc) and the wide spread presence of alpha synuclein (sYn), an intracellular protein. Dopamine deficiency in the basal ganglia leads to classical Parkinsonian motor symptoms viz. bradykinesia, tremor, rigidity and later postural instability. PD is also associated with non-motor symptoms, which may precede motor symptoms by more than a decade. These non-motor symptoms become troublesome symptoms in the later stages of PD. Currently, the mainstay of PD management is pharmacological therapy. However, these symptomatic therapies have major limitations in advanced diseases. Many disabling features develop later in the course of the disease, including non-motor symptoms, dopamine resistant motor symptoms and motor complications of long-term dopamine therapy. Although there have been remarkable advances in the medical and surgical treatment for PD, definitive disease modifying therapy is lacking.

However, researchers are hopeful that they will be able to identify the potential target for disease modification in this review, we will be discussing the epidemiology, clinical features,

pathophysiology, diagnosis and management (medical and surgical) of PD. Experimental therapies have so far yielded only limited test results and will not be discussed here.

**General risk factors:**

Research studies have linked theories regarding the outbreak of PD to both environmental and genetic circumstances[6]. These theories propose associations between PD and chemical reactions, neurotoxins, and genetic susceptibility or predisposition[3,7-9]. Environmental determinants positively associated with PD include factors such as injuries to the head, rural living, pesticides, anxiety and/or depression, and intake of dairy products; whereas physical inactivity, smoking, consumption of coffee and/or alcohol, and serum uric acid concentration are reported as having an inverse relationship to PD[5]. Though it is undisputed that familial factors play a role in this disease, the extent of heritability is heavily debated. As of yet, 41 different genetic loci have been linked to PD pathogenesis through the completion of 6 large meta-analysis studies.

**General symptoms:**

A precedent for the clinical diagnosis of PD, according to the Movement Disorder Society, is centralized on a motor syndrome, Parkinsonism, and is based on three overriding motor symptoms (MS): bradykinesia, rigidity, and resting tremor. Onset of motor manifestations usually begins unilaterally with asymmetrical effects enduring on the side of commencement.

Symptoms include resting tremor, bradykinesia, gait, speech difficulties, hypophonia, muscle dystrophy, postural deformities and instability. Pain, stiffness or numbness in limbs, bradykinesia, tremors, a decline in facial expressions, and Hypotonia is motor symptoms seen in the early stages of this disease's onset. Late-stage motor features may include motor fluctuations, dyskinesia, gait freezing, and falling. Initial diagnosis may be made based on evaluation of clinical features of patient history and examination. Positive or negative responses to dopamine agents may also be used in the diagnosis of PD over time.

Since motor symptoms are the traditional primary identifiers of PD, common non-motor symptoms have been under-reported, often being overlooked or untreated. While non-motor symptoms are more heavily focused on during advanced stages, they occur during all stages of PD. They have the potential to be early biomarkers for PD, with symptoms such as olfactory dysfunction, sleep problems, constipation, and erectile dysfunction often predating the diagnosis of P by years. These symptoms can greatly compromise quality of life (VoL) and daily activities, so typical non-motor treatments are based on improving MoL, with new treatments being developed, but still needing more research because PD treatments heavily focus on motor symptoms.

**Parkinson's treatment:**

The American Academy of Neurology (AAN) recommends initiating one of the following available drug therapies once the patients develop functional disability. Medical therapies available for treatment of motor symptoms include levodopa / carbidopa, dopamine

agonists (both ergo and non-ergo types), monoamine oxidase-B (MAO-B) inhibitors, injectable dopamine agonist (apomorphine), catechol-O - methyltransferase (COMT) inhibitors. N-methyl - D-aspartate (NMDA) receptor inhibitors, and anti-cholinergics. In the later stages of PD, drug delivery can be supplemented via alternative routes (e.g. Intrajejunal infusions, subcutaneous injections or transdermal patches). Continued motor fluctuations and dyskinesias indicate the patient's candidacy for deep brain stimulation (DBS).

Dopaminergic therapy is highly effective in bradykinesia and rigidity, but monoamine MAO B inhibitors are only moderately effective. Dopamine agonists and levodopa help to reduce disease progression and disability. Tremor responds to anticholinergic drugs like trihexyphenidyl but has a poor and inconsistent response to dopamine replacement therapy.

### **Medical therapies:**

Medical therapies are the mainstay of treatment for PD. They include pharmacotherapy and non-pharmacological alternative approaches such as exercise, education, support groups, speech therapy and nutrition. Therapeutic approaches depend on the patient's age, disease stage troubling symptoms, and the benefit/risk ratios of treatments (34) Since pharmacotherapy for PD has increased substantially in its array of options, one pharmacological approach will be discussed first.

Patients with new onset PD may be frightened in the future affected by a chronic progressive disease of the nervous system. Focused education on symptoms and introduction to the current process over time can act to decrease fear and support adaptation. Education about how to cope with discovery can promote improved self-care in the long-term.

Non-pharmacological alternative therapies include exercise, education, support groups, speech therapy and nutrition. While not slowing the memorable course of PD, each offers benefit to some aspects of the disease and deals with its pathophysiology impact. A clear message pervades the literature about their use. Begin their usage early in the disease course. Regular exercise and physical therapy can really assist with some of the bodily effects of PD, such as joint rigidity and flexed posture. Exercises that target improved flexibility, strength, and balance should be emphasized. Patients may gain a sense of control over some components of the disease. Patient and family / caregiver education is important but critically needed in a chronic progressive neurologic disease. Key to success is balancing need to know versus readiness to bath potentially disturbing data. Some programs have been developed which delineate copies necessary for specific neurologic conditions like PD

Support groups are used very effectively for many chronic disease patients, and PD is no exception. Support groups can allow discussion of emotional and psychological concern for patients and their caregivers. Care has to be used in support group development. Some newly diagnosed patients may have difficulty in seeing others who have progressed further in terms of deterioration. Chaplin, Hazan, & Wilson suggest that support groups cannot be solely focused on problem management (negative issues) but should also be positive and emphasize a sense of control and social well-being.

Speech therapy may be very helpful in addressing dysfunctions of phonation associated with PD. Early testing by therapists and corporations of techniques maximizing phonation effort and loudness may significantly improve hypophonia. Speech therapy may also assist with swallowing difficulties. An interesting recent intervention is LSVT BIG and LOUD therapy. It emphasizes having patients make LOUD vocalizations and high intensity / amplitude (big) movements to retrain and recalibrate neural circuits to understand that LOUD, large movements (rather than soft and small) are normal. The author's personal exposure to physical therapy / speech therapy interventions based on big and loud therapy as part of a special educational program suggests an intriguing and effective therapy. While talking and walking, soft and small PD patients struggled to speak and walk. When walking with exaggerated movements and talking loudly, movements like walking and voice volume normalized. The contrast witnessed was a startling.

Nutritional consultation proactively can positively impact the progression of P-associated conditions. No specific diet is a PD diet or alters its course. However, dietary interventions can address specific bothersome issues such as constipation (including high fiber and good hydration) and slowed gastric emptying (avoidance of large high fat meals. Good nutrition counseling can help offset weight loss and lack of appetite.

While physical therapy and exercise and speech therapy have demonstrated some positive response to PD motor symptoms, no effects have been found for vitamin therapy, food additives, and chiropractic or massage therapy. Tai Chi is showing great promise with Parkinson's Disease patients. Fashion et al conducted a randomized controlled clinical trial (RCCT) of 195 PD patients assigned to Tai Chi, resistance training, or stretching therapies for 60-minute sessions twice weekly.

They found that Tai Chi training significantly reduced balance impairments, reduced falls, and improved functional capacity versus the other interventions. No sense adverse events were observed. Some medical school faculty members have introduced Tai Chi programs for the PL patient populations. Innovative treatments using traditional and other approaches are even more pressing than the need to create new motor therapies.

Pharmacological approaches to PD are around dopamine deficit or in inappropriate dopamine or other neurotransmitter imbalances. The American Academy of Neurology recommends initiating drug therapy once patients develop functional disability. Seven types of drugs are used to treat motor symptoms in PD patients. They include: Maricopa levodopa (Sinemet) dopamine agonists (both ergo and non-ergo types monoamine oxidase-B (MAO B) inhibitors, injectable dopamine agonist (apomorphine, or Spoken), N-methyl-1- Aspartate receptor inhibitors, and anti-cholinergics. For initial therapy, levodopa, ma-ergo dopamine agonists (pramipexole, or Mumpex; ropinirole, or Requip and MAO-B inhibitors (baseline, or Elderly, rasagiline or Salient) are commonly used.

The compensation for dopamine deficit or neurotransmitter balances can maintain functional independence for most patients using oral drug therapy. In later PD, oral medications

can be supplemented by drug delivery via alternative routes (eg, intrajejunal gels, subcutaneous injections and transdermal patches) Whatever the route, patients and caregivers must know that drugs need to be given on time to optimize dopamine levels and symptom control.

Notably, research is being conducted on the pharmacogenetics of and Parkinson's disease drug therapy. Investigations are being conducted to elucidate the gene / drug pairings relationships for better drug metabolism. Unfortunately, much more research must be conducted before prescriptions can be written with pharmacogenetic recommendations in mind.

An important troubling aspect of Parkinson's drug therapy is behavioral problems due to the medications. These include psychosis, hallucinations, perseveration (an intense fascination with repetitive handling of object) and impulse control problems (pathologic gambling, compulsive eating or shopping and hyper-sexuality) Clozapine and quetiapine can help with the psychotic behaviors but can have serious side effects. Conversely, lowering of dopamine dosing increases PD symptomatology.

A relatively recent practice parameter of the American Academy of Neurology found no effective neuroprotective treatment for PD despite the fact that new drug therapies have been introduced in recent years. Some interventions (vitamin therapy and management) have also proved to be ineffective neuroprotectors. No definitive disease-modifying therapy to slow or stop the disease exists. For improving the quality of life during ongoing progression, exercise and voice therapy show some good effects.

### **Diagnosis:**

The differential diagnosis of PD should include a comprehensive history and physical examination. Difficult or questionable cases should be referred to a movement-disorder specialist for further evaluation. There are no definitive tests to confirm the diagnosis of PD: therefore, a clinical diagnosis requires the clinician to review the patient's history, to assess symptoms, and to rule out alternative diagnoses, such as multiple-system atrophy, DB disease and essential tremor. The cardinal motor features of PD—described as the classical triad—include a 4-Hz to 6-Hz resting tremor, cogwheel rigidity, and bradykinesia. These cardinal features are often reported as the first clinical findings of the disease. A fourth feature, postural instability, occurs in approximately 50% of PD patients within five years of diagnosis. Although PD is considered to be a disease of the elderly, some genetic variants are present in younger patients. Clinically, younger individuals (under 60 years of age) may present with less rigidity and bradykinesia, and this may result in a delayed or missed diagnosis.

Identifying diseases that have presentations similar to those of PD is an important component of the diagnostic process. Lists some of the diseases and conditions that should be a part of the differential diagnosis and that may require additional diagnostic tests to rule out their involvement. Benign essential tremor, a common presentation, usually appears as an intention-type tremor (tremor with movement) and has greater head involvement. DB may present the features of PD, although patients with DB usually experience concurrent cognitive changes and



visual hallucinations. 78 Many other conditions mimic PD and may require evaluations by experts in movement disorders to confirm the diagnosis. In addition, laboratory studies may be necessary to rule out nutritional deficiencies and other abnormalities, including thyroid disease, along with toxin screening when the patient's history suggests possible exposure. The measurement of plasma levels of copper and ceruloplasmin may also be warranted to rule out Wilson's disease. Other diagnostic procedures include bedside dopaminergic challenge tests with levodopa or apomorphine, although their use is not supported by some neurology experts. Additional diagnostic aids may include neuropsychiatric testing, sleep studies, and vision exams secondary to visual changes reported in some PD patients, such as abnormal color vision due to changes in intraretinal dopaminergic transmission.

Drug-induced parkinsonism (DIP) should be considered in the differential diagnosis of PD because it is one of the few reversible causes of the disorder. Identifying DIP is important in order to avoid treating patients inappropriately and therefore necessitates a complete medication evaluation in all patients suspected of having PD. High-risk populations for DIP include elderly women, patients with multiple comorbidities, and patients taking multiple medications at high doses for extended periods.

The drugs most commonly associated with DIP include those with dopamine receptor-blocking properties, such as the antipsychotic agents haloperidol, thiothixene, and risperidone. If PD patients require antipsychotic agents, those with a lower risk for DIP, such as quetiapine and clozapine, are recommended. Antiemetics that contain a phenothiazine core (e.g., prochlorperazine or promethazine) and the gastrointestinal prokinetic agent metoclopramide are also associated with DIP. Many other medications may also cause DIP, including some antihypertensive agents such as methyldopa and calcium-channel blockers, along with antidepressants, lithium, and anticonvulsant drugs. The management of DIP involves identifying and discontinuing the contributing medication(s), which usually resolves the symptoms, although in some cases these may linger for a few months or up to a year or two.

A challenge in diagnosing PD is that the disorder's clinical motor features may not present until approximately 50% to 80% of dopaminergic neurons are lost. Unfortunately, at this point significant disease progression may already exist. Adding to this problem is the need to identify subtle motor features that can easily go unrecognized, such as the absence of arm swing or jerking motions. Further complicating an early diagnosis is the presence of nonmotor comorbidities, including depression, anxiety, fatigue, constipation, anomia, and sleep disorders which the clinician may not recognize as being associated with PD. Recognition of these features and their possible association with PD may facilitate an earlier diagnosis. Since the onset of motor features is the point at which PD is usually diagnosed and treatment is initiated. Investigators continue to search for biomarkers that may allow a more expeditious diagnosis. Once the diagnosis of PD has been confirmed, patients who receive appropriate treatment may have a life expectancy similar to that of unaffected individuals.

Olfactory screening may also be useful in diagnosing PD, although it should not be considered diagnostic by itself because of the multiple etiologies associated with olfactory abnormalities. In the future, protein markers obtained from biopsy or other procedures, including spinal fluid, salivary gland, rectal, and colonic samples, may be used as well. In the diagnosis of PD. Imaging techniques are primarily used to rule out other neurological disorders; for example, magnetic resonance imaging (MRI) may be used to identify normal pressure hydrocephalus. Evaluating the anatomy of the substantia nigra (SN) with 7-T MRI may provide a future diagnostic option for identifying patients with PD. Dopamine transporter scans (DaT scans) may be used to differentiate LB-type dementias (PD and MLB) from non-LB dementias, such as Alzheimer's disease. Currently, the usefulness of genetic testing in diagnosing PD is debatable because of the lack of clarity on which populations to test, the consequences of the test results, and cost issues.

**Conclusion:**

Parkinson's Disease represents a major clinical challenge since it is one of the most common neurodegenerative diseases, affects primarily a population of aging individuals, a group that is growing rapidly in the world, and lacks a therapeutic means to influence the inexorable loss of dopaminergic innervation Parkinson's Disease itself does not cause death but is associated with increased morbidity and mortality. Knowledge of the disease manifestations, treatments, and progressive long-term course is essential for optimal care and enhanced quality of life for people with Parkinson's disease.

**References:**

1. <https://www.nia.nih.gov/health/parkinsons-disease#:~:text=Parkinson's%20disease%20is%20a%20brain,have%20difficulty%20walking%20and%20talking>.
2. <https://www.mayoclinic.org/diseases-conditions/parkinsons-disease/symptoms-causes/syc-20376055>
3. <https://www.parkinson.org/understanding-parkinsons/what-is-parkinsons>
4. <https://www.healthline.com/health/parkinsons>
5. <https://medlineplus.gov/genetics/condition/parkinson-disease/>
6. <https://www.hopkinsmedicine.org/health/conditions-and-diseases/parkinsons-disease/parkinsons-disease-risk-factors-and-causes>

## **GREEN DENTISTRY- GREENING THE DENTAL INDUSTRY**

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### **Introduction:**

One of the major challenges of the twenty-first century has been global warming induced climate change, proven unequivocally because the cause of unprecedented drastic weather events across the globe, not observed over the past decades or millennia. Human activities are proven to be the most dominant cause of this warming [1]. Exponentially increasing energy demands are met by progressively burning greater amounts of fossil fuels, which release greenhouse gases in amounts greater than what are often neutralised by the natural eco-systems of earth. These are successively being depleted, consequent to excessive exploitation, within the process of creating products for human consumption and degraded by the toxic pollutants released in them, thus rendering them unable to arrest the vicious cycle of global warming [2,3]. Heightened environmental awareness or eco-consciousness in recent times, has translated into a gradual global movement to mitigate environmental damage, resulting in 'green' transformations, where 'green' is defined as 'having positive environmental attributes or objectives.

Green has healing powers and is thought to be the most restful and relaxing colour. Green can help improve vision, balance, and endurance. This colour is associated with renewal, growth, and hope, and it denotes safety in drug and medical product advertising [1].

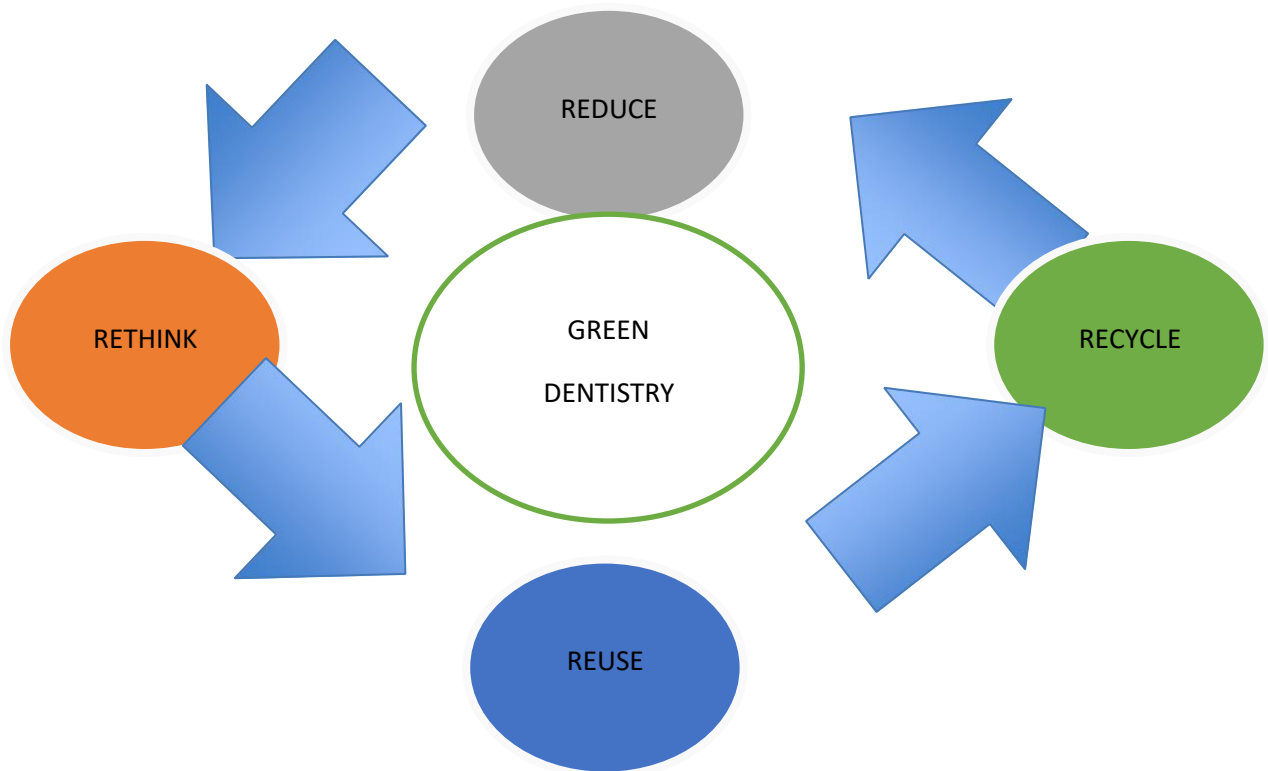
Green Dentistry is a dental approach that combines dental practises with environmental conservation. Green dentistry is also described as eco-friendly dentistry. 22 May is celebrated as Green Dentistry Day.

The practice of green dentistry, or eco-dentistry, can contribute to more sustainable resources and a healthier environment. Patients may seek dental professionals who share the same values of planetary wellness. Thus, by adopting environmentally friendly practices, dental offices can provide social value to the communities they are rooted in [3].

The key concepts of a green dental practice include water and energy conservation, utilization of non-toxic products, waste reduction, and the elimination of hazardous toxins that adversely impact patients and the environment, as well as the promotion of 'green' products [4]. Eco-Friendly dentistry is a newly developed dental practise that combines a commitment to sustainability, prevention, and a minimally invasive patient-centric as well as global-centric treatment philosophy [2].

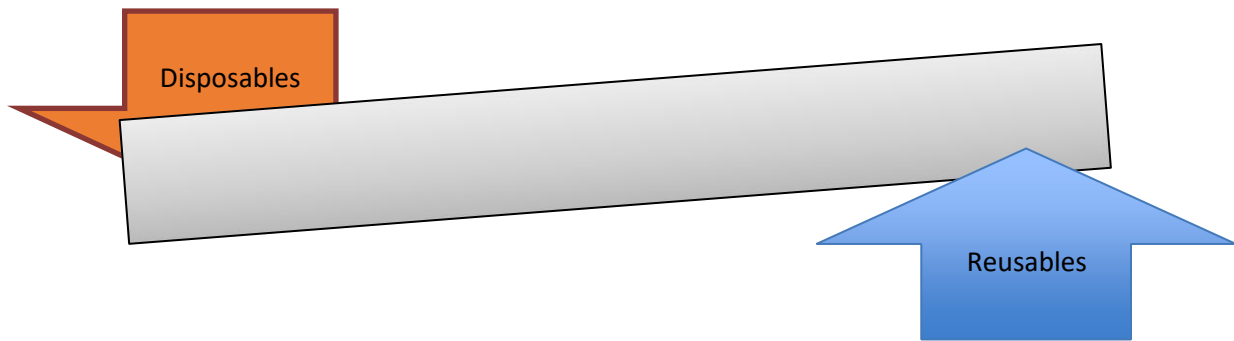
### The four R model

Green dentistry is a broad concept to tooth care that reduces the environmental impact of dentistry while also providing patients with a caring environment. It is based on the four R's model: Rethink, Reduce, Reuse, and Recycle as shown in Figure 1.



**Figure 1: The Four R Model**

The reduction component focuses on minimizing landfill waste and conserving energy and resources. One among the biggest sources of dental landfill waste involves disposable products. The use of biodegradable items can offset some of the reliance on disposables [10]. Biodegradation is that the breakdown of materials by microbes in an appropriate environment. Because plastic decomposes very slowly, dental teams might need to consider materials that are in better alignment with the goals of green dentistry. The next category focuses on reusable products rather than disposable items (Figure 2). Reusable products can reduce the necessity to create new products, thus reducing energy consumption. Much of the waste sent to landfills are often recycled; with this goal in mind, dental manufacturers should strive to develop innovative recyclable dental products [5].



**Figure 2: The increased use of reusable dental products can offset the negative effects of disposable waste**

At the practice level, there are some ways dental teams can rethink and incorporate sustainability into the delivery of care. Best practice management approaches are essential if the profession is to thrive in an environmentally conscious era (Table 1).

**Table 1: Opportunities to Go Green**



We can contribute to dentistry's clean, green, and profitable future by utilising cutting-edge technology and common sense. This can be accomplished by employing the following simple measures:

- Use energy sparingly - Dental procedures consume a large amount of electricity, which can be reduced by utilising cutting-edge technologies such as motion sensors, turning off lights, and using CFL in clinics.
- Use water judiciously - Water waste can be avoided by turning off the faucet while washing your hands.
- Reduce radiation - Using digital X-rays instead of traditional X-rays reduces the amount of radiation while also improving image quality.
- Reprocessing - Many materials found in a dentist's office can be reprocessed.

We can contribute to dentistry's clean, green, and profitable future by utilising cutting-edge technology and common sense. This can be accomplished by employing these simple techniques. The four processes responsible for the majority of dental waste and pollution are [4]:

- (1) Mercury-containing dental material placement and removal.
- (2) Standard X-ray systems.
- (3) Infection control methods, such as disposable barriers, sterilisation supplies, and toxic disinfectants.
- (4) Standard vacuum saliva ejector system.

For more than 150 years, mercury has been used as a dental amalgam restorative material [5]. The impact of heavy metal contamination of water systems by dentists through the production of dental amalgam waste has become a major concern in recent years. Dental amalgam contains 50% mercury, silver, tin, lead, and other minerals that can pollute the environment [6-9] depicts the various dental amalgam waste products. When mercury enters water or soil, bacteria convert it into methylmercury, a potent neurotoxin that can harm the brain, kidneys, and lungs in humans. As serious as the consequences of mercury poisoning are, it is incredibly easy for people to become exposed to high levels [5-10] depicts the solutions for preventing mercury pollution [11].

### **Greener self-care options**

Patients who are environmentally conscious may appreciate suggestions about ways they will lessen their environmental impact. For instance, besides traditional toothbrushes, patients can choose biodegradable bamboo toothbrushes and floss picks, also as products made from recycled plastics. Another option is to use tubeless toothpaste tablets [12].

Patients may additionally consider recycling toothbrushes and electric toothbrush heads, and using biodegradable floss with a refillable glass holder. It's important to advise patients not to flush dental floss, because it can entangle with other debris, like hair or baby wipes, and cause serious clogs within the sewer system [12].

### **Barriers to green dentistry**

Although, the research is very limited on eco-friendly products due to environmental impacts. But, the development of green dental products and technology can create a great hope in

future. While the cost of enforcing greener enterprise may be a prohibitive for some practices, a financial return from making sustainable changes may be seen in time [13].

In addition to cost constraints, lack of state and federal regulation means environmental responsibility is largely on a voluntary basis. Introducing environmental norms would produce a more centralized approach to environmental protection. At present, there's limited literature on the assessment of sustainability measures and quantification in social sustainability supply chains. Further more research is demanded to assess the sustainability of ecofriendly measures, and on the environmental impact of dental practice [14].

If a great support exists from the professionals' associations and important leaders, clinicians would be more influenced to adopt eco-friendly methods. Oral health goals related to sustainability are incorporated in The United Nations 2030 Agenda for Sustainable Development. Dental teams can collectively work to take a lead role in establishing sustainable practices [14].

**Conclusion:**

Green dentistry or eco-friendly dentistry, emerging as a replacement concept towards sustainability. Dentistry features a great impact on the environment due to the large amount of waste generated by various dental procedures along with excessive use of water and electricity, which emphasizes to maneuver towards 'Green dentistry'. Health care providers who aim for sustainability are getting more determined in their efforts to share best practices to ensure positive environmental and communal impacts. Expanding sustainability within the dental setting can be accomplished by adopting measures that support green dentistry. Hence, conserves money and time with the innovation of latest techniques and procedures and inculcating it in our daily practice. Eco-friendly dentistry if adopted will safeguard the environment and therefore the human race from the harmful risks of rapid urbanization in developing countries. Thus, there's a need to emphasize the practice of eco-friendly dentistry in a developing country like India, with an approach to conserve resources and curb environment pollution.

**References:**

1. Al-Qarni MA. Awareness of eco-friendly dentistry among dental faculty and students of King Khalid University, Saudi Arabia. *J Clin Diag Res.* 2016;10:75–78.
2. Arora, S., Mittal, S., & Dogra, V. (2017). Eco-friendly dentistry: Need of future. An overview. *Journal of Dental and Allied Sciences*, 6(1), 22.
3. Damle S. Eco-friendly green dentistry: the future of dentistry? *Contemp Clin Dent.* 2016;7:423.
4. 2016;7:423.
5. Damle, S. G. (2016). Eco-friendly green dentistry: The future of dentistry?. *Contemporary clinical dentistry*, 7(4), 423.
6. Environmental Protection Agency. How to Care for Your Septic System. Available at:
7. <https://www.epa.gov/septic/how-care-your-septic-system>. Accessed February 7, 2020.

8. Goddard, MC, Pavlik S, Kamodia S, *et al.*, Greening the Dental Clinic. Available at: [http://sustainability.umich.edu/media/files/dow/Sustainable\\_Dentistry\\_Dow-Masters2016.pdf](http://sustainability.umich.edu/media/files/dow/Sustainable_Dentistry_Dow-Masters2016.pdf). Accessed February 7, 2020.
9. Khanna, S. S., & Dhaimade, P. A. (2019). Green dentistry: a systematic review of ecological dental practices. *Environment, Development and Sustainability*, 21(6), 2599-2618.
10. Mulimani, P. (2017). Green dentistry: the art and science of sustainable practice. *British dental journal*, 222(12), 954-961.
11. Passi S, Bhalla S. Go green dentistry. *J Educ Ethics Dent*. 2012;2:10–12.
12. Pithon, M. M., Faria, L. C. M. D., Tanaka, O. M., Ruellas, A. C. D. O., & Primo, L. S. D. S. G. (2017). Sustainability in Orthodontics: what can we do to save our planet?. *Dental press journal of orthodontics*, 22, 113-117.
13. Popovic T, Kraslawski A, Barbosa-Póvoa A, Carvalho A. Quantitative indicators for social sustainability assessment of society and product responsibility aspects in supply chains. *J Int Studies*. 2017;10:9–36.
14. Rahman, H., Chandra, R., Tripathi, S., & Singh, S. (2014). Green dentistry-clean dentistry. *IJR*, 3(3), 56-61.
15. Rastogi, V., Sharma, R., Yadav, L., Satpute, P., & Sharma, V. (2014). Green dentistry, a metamorphosis towards an eco-friendly dentistry: a short communication. *Journal of clinical and diagnostic research: JCDR*, 8(7), ZM01.
16. Rathakrishnan, M., & Priyadarhini, A. (2017). Green dentistry: The future. *Journal of the International Clinical Dental Research Organization*, 9(2), 59.
17. Steffen, W., Persson, Å., Deutsch, L., Zalasiewicz, J., Williams, M., Richardson, K.,... &
18. Svedin, U. (2011). The Anthropocene: From global change to planetary stewardship. *Ambio*, 40(7), 739-761.



## **ALZHEIMER'S DISEASE: A REVIEW**

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### **Abstract:**

Alzheimer's disease is biologically defined by the presence of amyloid containing plaques and tau- containing neuro fibrillary tangles. Alzheimer's disease is genetic and sporadic neuro degenerative disease that cause an amnesic cognitive impairment in its proto typical presentation and non- amnesic cognitive impairment in its less common variants. Alzheimer's disease is considered a multifactorial disease two main hypotheses were proposed as a cause for AD, cholinergic and amyloid hypotheses. Additionally, several risk factors such as increasing age, genetic factors, head injuries, vascular disease, infections and environmental factors play a role in the disease. This activity reviews the evaluation and management of Alzheimer's disease and explains the role of the inter professional team in improving care of patients with this condition. Anti depressant's, antipsychotics, mood stabilizers, anxiolytics and hypnotics are used for the treatment of behavioural disturbance. Future directions in the research and treatment of patients with Alzheimer's disease include: applying diagnosis and evaluation of treatment efficacy.

**Keywords:** Alzheimer's disease, risk factors, antioxidant, anti- inflammatory agent, behavioural disturbance.

### **Intorduction:**

Alzheimer's disease (AD) (named after most common type of dementia and can be degenerative disease characterized by neuritic plaques and neurofibrillary tangles as accumulation in the medical temporal and neocortical structures. Alois Alzheimer's noticed a presence of amyloid plaques and a massive loss of neurons while examining the brain of his first patient that suffered from memory loss and change of personality before dying and described the condition as a serious disease of the cerebral cortex. Emil Kraepelin named this Medical condition Alzheimer's disease for the first time in his 8<sup>th</sup> edition handbook psychiatry according to the latest statistics, Alzheimer's disease/ dementia is amongst the top so causes of death in south Africa, ranking 27<sup>th</sup> with an age adjusted death rate of 7.67 per 100.000 and accounting for 2664 annual death (0.48./.) south Africa is ranked as the cause of death.

### **Alzheimer's disease diagnostic criteria**

A patient to have AD Should undergo several tests, including neurological examination, magnetic resonance imaging (MRI) for neurons, laboratory examination such as vitamin B12, and other tests besides the medical and family history of the patients vitamin B12 deficiency has been long known for its association with neurologic problems and increasing risks of AD,

According to some studies. A special marker of non cognitive changes include personality changes, decreased judgement ability, wandering, psychosis, mood disturbance, agitation and sleep abnormalities. Various patterns of defined are seen, with the most common being an insidious onset, with recent memory loss followed by the development of apraxia, and agnosia after several years. Some patients present with irritability and personality change in the early stages. In the later stages, patients usually develop gait and motor disturbances, eventually become mute and bed ridden, on average, AD patients live for 8 to 10 years after they are diagnosed, although the disease can last for up to 20 years

### **Alzheimer's disease neuro pathology**

There are two types of neuro pathological changes in AD which provide evidence about disease progress and symptoms and include: 1) positive (lesions due to accumulation, which are characterized by the accumulation of neurofibrillary tangles, amyloid plaques, dystrophic neurites, neuropil threads and other deposits found in the brains of AD patients. In addition to (2) negative lesions (due to losses). That are characterized by large atrophy due to a neural, neurophil and synaptic loss.

### **Senile Plaques (sp)**

The senile plaques are extracellular deposits of beta- amyloid protein (A $\beta$ ). With different morphological forms, including diffuse and compact type plaques. Proteolytic cleavage enzymes such as  $\beta$ -secretase and  $\gamma$ -secretase are responsible for the biosynthesis of A $\beta$  in patients, and its evolution can reflect NFTS morphological stages , 1) pre- tangle phase ,one type pf NFT where phosphorlyated tau proteins are accumulated in the somatodendritic compartment without the formation of PHE, 2) mature NFTS which are characterized by displacement of the nucleus to the periphery part of the soma, and 3) the extra cellular tangles, or the ghost NFT'S stage, that results from a neuronal loss due to large amounts of filamentous tau protein with partial resistance to proteolysis.

### **Causes and risk factors of alzheimer's disease**

AD has been considered a multifactorial disease associated with several risk factors such as increasing age, genetic factors, head injuries, vascular disease, infections and environmental factors (heavy metals) trace metals and others. The under lying cause of pathological changes in Alzheimer's disease A $\beta$  Deposits from the transmembrane amyloid precursor protein (APP). These enzymes cleave APP into several amino acid fragments. There are several types of A $\beta$  Monomers, including large and insoluble amyloid fibrils which can accumulate to form amyloid plaques and soluble oligomers that can spread throughout the brain. A $\beta$  plays a major role in neuro toxicity and neural function, therefore accumulation of denser plaques in the hippo campus, amyloid and cerebral cortex can cause stimulation of astrocytes and microglia, damage to axons, dendrites and loss of synapses, in addition to cognitive impairments.

### **Neurofibrillary tangles (NFTS)**

NFT are abnormal filaments of the hyper phosphorylated tau protein that in some stages can be twisted around each other to form paired helical filaments (PHF) and accumulate in neuralperikaryal cytoplasm, axons and dendrites which cause also cytoskeletal microtubules and tubulin associated proteins. The hyper phosphorylated tau proteins is the major constituent of NFTS in the brains of AD patients, and its evolution can of AD disease (A  $\square$  NFTS and synaptic loss) is still unknown. Several hypotheses were proposed as a cause for AD but two of them are believed to be the main causes some believe that an important impairment in the cholinergic function is a critical risk factors for AD, while others suggest that alteration in amyloid protein production and processing is the main initiating factor. However, at present, there is no accepted theory for explaining the AD pathogenesis.

#### **Risk factors.**

##### **i. Aging**

The most important risk factor in AD is aging. Younger individuals rarely have disease, and most AD cases have a late onset that series after 65 years of age. Aging is a complex and irreversible process that occurs through multiple organs and all systems with a loss of synapses and ventricular enlargement, in specific areas accompanied by deposition and NFT. Moreover several conditions might emerge during aging such as glucose hypometabolism. Cholesterol, dyshomeostasis, mitochondria, dysfunction, depression and cognitive decline. These changes also appear in normal aging, which makes it difficult to distinguish the causes in early AD.

##### **ii. Genetics**

Genetics factors were discovered over the years and were found to play a major role in the development of AD 70% of the AD cases were related to genetic factors most cases of AD are inherited in an autosomal dominant pattern and mutations in the dominant genes such as amyloid precursor protein (APP), presenilin -1 (psen-1), presenilin -2 (psen-2) and lipoprotein E(APOE) are associated with AD.

We discuss the strong genetic risk factors in AD.

- ❖ Amyloid precursor protein (AP)
- ❖ Presenilin -1 (PESN-1) and presenilin -2 (PSEN -2)
- ❖ Apolipoprotein E (APOE)
- ❖ ATP binding cassette transporter (ABCAI)
- ❖ Clusterin gene (CLU) And bridging intergrator (BINI)
- ❖ Evolutionary conserved signaling intermediate in toll pathway (ECSIT)
- ❖ Estrogen receptor gene (ESR)
- ❖ Other genes

### **iii. Environmental factors**

Environmental risk factors including air pollution, diet, metals, infections and many others may induce oxidative stress and inflammation and increase the risk for develop in AD.

#### **Air pollution**

The air pollution is characterized by modifying the nature of the atmosphere through the introduce of chemical, physical or biological pollutants. It I associated with respiratory and cardiovascular with AD was documented. Six air pollutants have been defined by national ambient air quality standards (NAAQSS) in the USA as a threat to human health, including ozone (O<sub>3</sub>), nitrogen oxide (NOX), carbon monoxide (co) particular matter and sulfur dioxide, lead studies on animals and cellular moles have shown that an exposure to high levels of air pollution can result in damage.

#### **Tereatment of congntive disturbance**

##### **Anti- inflammatory agents**

The hypothesis that anti- inflammatory therapy can slow the progression of AD has gained support from some retro spective epidemiologic studies. There are very few prospective double – blind clinical epidemiologic studies. There are very few prospective double -blind clinical trials of nano steroidal anti-inflammatory drugs (NSAIDS) in AD. Non randomized studies with NSAIDS (indomethacin, ibuprofen, neuprofen and other anti- inflammatory agents showed promising results in modulating the course of the disease. A major double blind place rofecoxib with naproxen and placebo has been completed and the results were negative.

##### **Antioxdient agent: selegiline**

Current theories suggest that an increase in free-radical formation may occur in AD and have a direct toxic effect. The brain may be vulnerable to the damaging affects of oxidative stress because of an abundance of catechol amins and a relatively low concentration of antioxidants enzymes (superoxide dismutase catalase, glutathione peroxides, glutathione reductase). Furthermore, A□□has been implicated increased free- radial formation.

Vitamin E in doses of 1000 orally twice daily and selegiline (a monoamine oxidase B inhibitor).in doses of 5 to10mg orally every morning. Seen to minimize free- radical damage by acting as free-radical scavengers. A recent major double- blind study comparing the effect of selegiline alone, vit E alone, selegiline and VIT-E with placebo in patient's with AD showed that both delayed nursing home placement and the loss of activities of daily living.

##### **Treatment of behavioural disturbance**

A wide range of dementia- associated behavioural disturbance afflict majority of patients with AD, with depression and psychosis being the most commonly studied from the point of view of treatment of depression in AD remains empirical and consists in starting an anti depressant at a low dose and increasing it slowly.

Current treatment approaches to dementia are based on variable degrees of scientific evidence, reflecting on incomplete understanding of the basic pathophysiology of AD. Treatment with anti-oxidants, anti-inflammatory agents and estrogen replacement therapy are still controversial, although clinical trials. Exploring their effectiveness are under way. several studies have shown that modifications in lifestyle habits like diet and exercise can improve brain health and reduce AD without medical intervention and is considered as a first like intervention for all AD patients.

**Conclusion:**

The main pathophysiological mechanisms of AD are amyloidosis and tau-related neurodegeneration, and have specific topographical and chronological pathways. For instance, brain amyloidosis starts in neocortical regions and then affects subcortical structure Cognitive and behavioral features of AD are significantly correlated to the topographical distribution of neurofibrillary tangles. The studies of genetic risk factors are important to better elucidate the pathophysiological processes in the development of AD. Since no current drug intervention can modify the pathophysiological mechanisms related to the development of this devastating disease, adoption of these measures constitutes an important strategy for clinical management in order to prevent or postpone cognitive decline.

**References:**

1. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3181599/>
2. <https://www.ncbi.nlm.nih.gov/books/NBK499922/>
3. <https://jbiomedsci.biomedcentral.com/articles/10.1186/s12929-019-0524-y>
4. <https://www.mdpi.com/1420-3049/25/24/5789>

## **ARBOREAL IDENTITIES IN A. K RAMANUJAN'S "ECOLOGY" AND ELISE PASCHEN'S "THE TREE AGREEMENT"**

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### **Abstract:**

This paper attempts a comparative analysis of the Indian origin Chicago poet A.K Ramanujan's "Ecology" (1986) and the native American Chicago resident Elise Paschen's "The Tree Agreement" (2016). The paper will highlight that apart from their diasporic intent, what brings together these apparently unconnected poets is their empathic ecopoetics and an explicit dependence upon trees, despite being urban citizens of Chicago. Published 30 years apart, "Ecology" and "The Tree Agreement" echo similar sentiments of conservation of trees, especially in urban landscapes. This ecological sentiment seems to reverberate across time and space, unites the Orient and the Occident, and fractured diasporic identities with a singular arboreal one. Timeless as trees, ecological sentiments seem to dissolve postmodern binaries and identity crises in the selected poems. With the tree standing as a timeless pillar of support in two different ecoregions, Chicago and Mysore, it ensures that the diasporic poets' dilemmas are dispelled and their identities are reassured. The roots of the trees metaphorically and literally save them from the anxiety of rootlessness confronted by the Chicago -born poet Paschen and Ramanujan, the Indian poet residing in Chicago. Such a deep relation between human beings and trees will be explored in this paper with ecocriticism and bioregionalism as its theoretical background. It will be understood in the context of dirt theory how human and arboreal thresholds are porous and harming one will eventually jeopardize the other. The paper will also throw light on how the anthropocentric generation has endangered their age old companions by branding them according to their utility index and relegating the ones that do not fall into such selfish categories, in the list of waste. The poems in consideration rebuff such anthropocentric approaches and replaces them with ecocentric ones.

**Keywords:** material ecocriticism, bioregionalism, anthropocentrism, dirt theory, diaspora

Trees are integral parts of ecosystems all over the world. So, it is not surprising that poets have ruminated on the tree-human bond and have expressed their gratitude to trees irrespective of which literary period they belong to. The Romantic poet William Wordsworth's "Yew Tree" poems, the 20th century American poet Elizabeth Bishop's "To a Tree", Indian English poet Toru Dutt's "Our Casuarina Tree", A. K Ramanujan's "Ecology", native American Elise Paschen's "The Tree Agreement", Taiwanese nativist poet Wu Sheng's "Tree Cemetery", Welsh Appalachian regional writer Robert Morgen's "Living Tree" and many more testify to the fact

that trees have stood with their firm roots over ages, unaffected by ravages of human intervention or natural calamities and have served as nurturers of the human ecosystems since eternity. Trees are timeless companions of human beings. The roots of trees have held civilisations together since centuries. But, in the age of the anthropocene, human beings have begun considering themselves higher than the rest of the species in the ecosystem and this aberrant thought has led to the degradation of ecoregions, jeopardizing both animal and human life. Man began to consider himself the owners, rather than stewards of trees.

An awareness of this man induced violence on the ecosystem existed ever since the industrial revolution spread its web across the world and exploitation of natural and human resources, in the form of capitalism and colonization began to maim the world. The paradigm shift from agrarian economy to the industrial economy severely affected human-human and human-nature bonds and the evidence of it was visible everywhere. Chemical poisoning of food and water, oil spills, toxic waste contamination, nuclear waste dumps, the Chernobyl disaster and predictions of global warming, acid rain, destruction of the tropical rainforest had begun to raise an alarm. Jonathan Bate's book, *The Song of the Earth* (2000) argues that colonization and deforestation have frequently gone together. He writes: "imperialism has always brought with it deforestation and the consuming of natural resources" (qtd. in Barry 242). Egocentric Ethics engendered in the laissez faire capitalism and the mechanistic worldview and is the ethics governing industrial capitalism in contemporary times. Carolyn Merchant, the author of *Radical Ecology* goes on to define it as an ethic which is "grounded in the self" and which focuses on individual good (Merchant 64).

The academic circles in the U.S. in the mid twentieth century had not taken seriously the ecological crisis the world was already facing. Gender, race, class and language were the fashionable critical categories and the only fields of scholarship as exemplified in the scholarly movements of new criticism, structuralism, poststructuralism, feminism, post-colonialism and so on. These were the broad areas of what was known as "theory" – literary and cultural theory, the advocates of which were mostly apolitical in their approach. Activism of any sort had become old fashioned in the university campuses in the 1980s. The awareness to protect the environment was yet not to be discerned in literary circles. The consciousness of greening had struck other disciplines like history, philosophy, law and sociology since the 1970s, but the literary studies were still far from its influence. The ecological consciousness found expression in scholarly literary studies a little later, in the mid-eighties as academics driven by environmental concerns began to collaborate in publishing articles, newsletters and journals. Some English departments in the U.S. started offering courses in environmental literature, while the category of nature writing began to be acknowledged in annual literary conferences in the late eighties. With the establishment of Association for the Study of Literature and the Environment (ASLE), articles pertaining to ecological theory, environmentalism, the nature/culture dichotomy, the cultural

implications of ecology and the exploration of the term 'human' in the context of environmental concerns. It also marked the genesis of the environment centric theory of Ecocriticism.

Cheryll Glotfelty is credited to be the first academic to usher in the age of ecocriticism by bringing, in the title of her research work the words 'literature' and 'environment' together. She defined ecocriticism as:

Simply put, ecocriticism is the study of the relationship between literature and the physical environment. Just as feminist criticism examines language and literature from a gender-conscious perspective, and Marxist criticism brings an awareness of modes of production and economic class to its reading of texts, ecocriticism takes an earth-centered approach to literary studies. (Glotfelty xviii).

Bioregionalism is an offshoot of Ecocriticism and as a movement, may be traced back to the writings of Gary Snyder, an environment activist and poet, and Peter Berg, a playwright and ecologist. they established the Planet Drum Foundation, a hub of bioregional activities, with the mission "to enhance the intimate connection with life-places by spreading the ideas and activities of 'living in place' through publications, workshops, formal curricula, and hands-on demonstration projects" while promoting "ecologically sustainable living founded on an understanding of one's bioregion". (planet-drum.org np). Bioregionalism was established as a social movement by Peter Berg and environmentalist and cultural historian from California, Raymond Dasmann who have jointly defined "bioregion" as a "geographical terrain and a terrain of consciousness" (Berg and Dasmann 34) in their article "Re-inhabiting California" published in *The Ecologist* in 1977. It is in this work that the basic principles of bioregionalism were laid down and concepts like "living-in-place" and "re-inhabitation" were given currency.

As a branch of the greater ecological movement, bioregionalism addresses matters of environmental concern through an awareness of a local sense of place – local food, local climate, culture and ecological factors supporting unique human communities. Contrary to Ecocriticism's universal appeal, bioregionalism has a narrower focus on specific bioregions marked by similar biotic and abiotic ecosystems and identifiable landforms and unique human cultures living sustainably. It is about finding ways to create and re-imagine nature and humanity's relation to it. According to this thought, human identity may be constituted by reconnecting to those places through a deeply personal sensory experience. Bioregionalism casts away tensions between the city and country dwellers and integrates them within a common and shared watershed or bioregion.

The two poems in consideration, "Ecology" and "The Tree Agreement" are significant landmarks in environmentally oriented literary studies in the 20th and 21st centuries. Interestingly, the poets are diasporic writers and their poems are marked with the themes of love, death, family relations, memories of the past and the diasporic longing for identity. While Paschen's poems are characterized by a juxtaposition of myth and domestic life, Ramanujan



reminisces on his familiar urban scenes of South India and writes about its trees and rivers and people. However, for both poets, nature seems to be perfect settings for playing out the human dramas of birth, families, love, longing for one's motherland, hybrid identities, despair and death. Interestingly, the selected poems showcase diasporic dilemmas faced by postmodern subjects but the poets ensure that the themes of complexities of human relationships, dislocation, cultural hybridity and identity crises surface as themes secondary to the ecological theme of the human-tree bond. The poems make an implicit statement that despite the social, familial, cultural and intellectual identities of human beings, what is of foremost importance is their arboreal ones.

This intimate relationship between human beings and trees in their postmodern, urban setting is the common theme that is interlaced in the two selected poems. In Elise Paschen's official website, critic XJ Kennedy writes of her poems: "Elise Paschen's themes are human and essential: love and gestation and birth, the decline of parents in old age — and in her skilled hands, these matters seem far from ordinary" (elisepaschen.com). These lines apply to "The Tree Agreement" as well. However, what has not been pointed out about the poetry of Paschen is her bioregional ethics which enables her to dedicate a whole poem to a tree in her neighborhood, that apparently does not matter. The tree in question is a Siberian Elm, an extremely hardy and fast-growing species. It is typically planted for windbreaks and lumber throughout the central US and for ornamental purposes in the Northern US. In one of her poetry reading sessions, for Indian Country, a platform for American poets writing on indigenous themes, Paschen mentions the context for the poem under scrutiny. She says that her poem is based on a real life incident. There is a beautiful elm tree outside her house in Chicago. It does not belong to her family and her "collar and tie" neighbor in whose yard the tree grew, wanted to hack it down. Her family signs a contract with the neighbor called "the tree agreement" and that is what the poem is about. In "The Tree Agreement" the speaker argues for the benefits of the Siberian Elm against a disagreeing neighbor who brands the tree as weed that is encroaching into his property:

The neighbor calls the *Siberian Elm*  
a "weed" tree, demands we hack  
it down, says the leaves overwhelm  
his property, the square backyard. (Paschen 1-4)

The poet constructs an intelligent binary of narratives and pits them against each other. She and her family represent the tree loving, ecocentric community while their neighbor, the capitalistic, egocentric one. She slams the neighbor for considering the tree as weed, hazardous, and in the ensuing lines, celebrates the benefits of the tree and clinches her argument for the tree lovers:

He's collar-and-tie. A weed tree?  
Branches screen buildings, subway tracks,  
his patch of yard. We disagree,  
claim back the sap, heartwood, wild bark.

He declares the tree “hazardous.”  
We shelter under leaf-hoard, crossway  
for squirrels, branch house for sparrows, jays.  
The balcony soaks up the shade. (Paschen 5-12)

The tree supports human civilization with its calming shade upon the buildings, subway tracks as well as the neighbor’s yard. In a tone of environmental activism, the plural poetic personas, “claim” the tree as their own companion despite the wilderness it unleashes in the neighborhood. Even the third stanza follows the same rhetoric of rebuttal of the anthropocene. It shows how the tree is home to many other species like squirrels, sparrows and jays, while their balcony is soaked in the cool shade it provides. The sap, heartwood and bark mentioned in the previous stanza calls to mind the tactile imagery employed which goes a long way in binding human sense memories to their ecoregion. Such are the memories which create rootedness to a place and nurture the longing of a diasporic writer who has migrated away from his or her home. In this poem, the tree seems to represent home for the poet from Osage, a native American indigenous community. Her sense memories get triggered with the tree and make her prevent the hacking of something(one) that binds her to her roots.

The last stanza further introduces the reader to the advantage of bird chatter, which blocks out the noise of cars below and peace prevails. Against all these benefits of the tree, the neighbor’s accusations hardly stand ground. He loses the battle and has to sign the argument which prevents the tree from being hacked.

Bioregionalism is not only a thought but a practice of green consciousness. The bioregional and ecocentric poetics of Paschen is evinced in her poem which records not only her ecological emotions but how she acted to save a tree. The title of the poem confirms that the deal has been sealed and no one can harm her dear friend, the Siberian Elm tree. The last line justifies why it was necessary: “Root deep through pavement, *Elm.*”(16). This line is a significant statement for ecocritics who harp upon the intersections of nature and culture. A pavement represents urban culture and the tree has its roots deep within it. It is only natural that hacking the tree will uproot the pavement, the very ground on which human civilization stands and walks! It is symbolic of hacking the very roots of mankind and toppling it over. Barry Commoner’s laws of ecology state that everything is connected to everything else. Going by that ecological argument, hacking a tree is equivalent to relentlessly sawing at the human ecosystem which is irreversibly dependent upon trees.

A.K Ramanujan’s “Ecology”, written in a totally different time and context, harps upon the same conservation ethics. The poet’s mother gets severe migraine pain because of the Red *Champak Tree’s* pollen. The poet wants to cut the tree but his mother stops him from doing so because of her religious and emotional sentiments for the tree. The poet builds a dichotomy between pollen as an allergen causing pain and pollen as an agent facilitating flowers.

This is also bioregional poem owing to the sights and sounds of home the tree holds:

The day after the first rain,  
for years, I would come home  
in a rage,  
for I could see from a mile away,  
our three red Champak trees  
had done it again,  
had burst into flower and given Mother  
her first blinding migraine of the season (1-8)

The images in “three red Champak trees”, “burst into flower” strongly appeal to our visual memory. The poem is flooded with more such visual, olfactory and tactile images like “yellow pollen fog of a fragrance no wind could sift”(11-12), “black pillared house(13-14)” which hark back memories attached to one’s homeland. The poet was writing the poem from Chicago, about a time when he used to return home from work to see the pollen create havoc with his mother’s migraine. These memories take him back to his homeland and keep him rooted there.

The mother refuses to let the trees be felled. The flowers constructed her identity, even though engendered in pain. The flowers filled her, her daughter’s and her granddaughter’s baskets so that they could offer them to God in prayer. They also filled the house with fragrance. The tree has served three generations, beginning with her. As much as she is attached to her daughters and granddaughters, she is attached to the trees which have always been by her side. Her identity of a mother and a religious soul is incomplete without these trees and the flowers they yield. How could she allow them to be cut? She would bear the pain of migraine, but would never part with her lifelong companions with whom she co-existed in her homeland.

Both the poems under analysis record the material turn in literary imagination. They are replete with images, metaphors and symbols pertaining to their respective ecoregion. The poets mobilize sensory details that have significant bearing on bioregion. Their imagination is not abstract but rather based on the material realities of their urban ecology. They celebrate the inorganic and organic materials that constitute their ecosystem.

The ‘linguistic turn’ which characterized the theoretical currents of Postmodernism and Post-structuralism, understood reality as constructed by language and various other semiotic and discursive practices. It established human identity as a linguistic and social construct and had denied the role of material nature in shaping human identity and meaning. The ‘material turn’ in Environmental Humanities dismissed the dualistic perceptions of modernism, post modernism and post structuralism and focused on a conceptual monism whereby, the human and the non-human ‘actants’ (Bruno Latour’s term for objects having agency) share horizontal relations in the

process of becoming. Jane Bennet in *Vibrant Matter*(2010) holds that when matter is considered lively, it minimizes the differences between subjects and objects.

The trees in both poems have material agency and they affect human lives. They wrap the human balconies in shade and invade their houses with their fast growing branches. (“The Tree Agreement”). In Ramanujan’s poem, they yield an annual flower to the poet’s mother and her family but at the same time causes her splitting headache. Both trees metaphorically provide the roots which the poets, living half a century apart are in quest of. The trees help them acquire an arboreal identity, which is so firm that no one can take it away from them even in an urban landscape. In a fractured postmodern world, where human beings are grappling with multiple identities, the arboreal entities extend not only their shadows but also offer a pool of referents to give meaning to people’s lives. They help them re-inhabit land that has ceased to be their own.

Stacy Alaimo posits in *Bodily Natures* (2010) that the “context for ethics becomes not merely social but material”. Coining the term “trans-corporeality” she sees it as a “movement across bodies” which “reveals the interchanges and interconnections between various bodily natures” (Alaimo 2). The concept of trans-corporeality necessitates an exchange across the dichotomous terrains of the material and the discursive, the natural and the cultural, the biological and the textual. All matter, it is said, is “storied matter” (Iovino 1). Such concepts of materialism appear in both the poems under consideration. The shade, fragrance and pollen enter human houses through porous membranes and impact them in various ways. It follows that exchanges between nature and culture are inevitable and man cannot segregate himself as higher up in the hierarchy of species. The poems rebuffs such egocentric ethics and proves it to be an illusion.

The aesthetics of dirt posits how civilized cultures ignore matter that is in excess, is no longer in use or has ceased to fit into changing significations of value. It maintains, however, that waste matter continues to exercise its agency even after its utility has expired. This is the chief premise of dirt theory and Waste Studies. In her seminal work, *The Literature of Waste: Material Ecopoetics and Ethical Matter* (2015), Susan Morrison defines waste as “whatever is not or no longer utilitarian, something squandered, empty or barren or lacking purpose” (Morrison 8).

In Paschen’s poem, one notices how the elm tree was proposed to be cut because it has apparently no utility for the poet’s neighbor. He gave the tree the status of ‘waste’ by describing it with words like ‘weed’ and ‘hazardous’. The tree was treated as rubbish because it did not bring the man any economic benefit. There was absolutely no purpose the tree served and hence he wanted to get rid of it. However, the more important benefits of the tree have been listed by the poet and she has conserved the tree forever with the tree agreement. By doing so she has reinstated the ethics of ecology and made even weeds matter.

Ramanujan and Paschen also ascribe metaphoric and emotional value to waste (Champak and elm trees) besides their material existence. The waste of civilizations or periods in history

metaphorically come to represent the liminal, the marginalized and the hybrid entities like the Jewish, the diasporic, the female, the coloured and the trans identities that have been culturally and historically subjugated. Relegated to the category of waste matter, trees in these poems too come to represent these marginalized and subjugated identities, which they confer easily upon the poets and their readers who have suffered any such politics of liminality. Arboreal identities salvage them from feeling marginalized as they are able to craft new green identities for themselves, which are insulated from human interventions. Arboreal identities also help them create counter-narratives to toxic, authoritative metanarratives which are the ones that are ascribed the status of waste in society by the two poets discussed above. The two poems analyzed are acts of recycling egocentric thought and replacing them with green consciousness.

**References:**

1. Alaimo, Stacy. *Bodily Natures*. Indiana U Press, 2010
2. Barry, Peter. "Ecocriticism". *Beginning Theory: An Introduction to Literary and Cultural Theory*. Manchester UP, 2009.
3. Berg, Peter and Raymond Dasmann. "Reinhabiting California." *The Ecologist* Vol7. Issue 10. 1977, pp 399-401
4. Glotfelty, Cheryl. *The Ecocriticism Reader: Landmarks in Literary Ecology*. Athens. U of Georgia press. 1996
5. Iovino, Serenella and Serpil Opperman. *Material Ecocriticism*. Bloomington, Indiana University Press, 2014
6. Iovino, Serenella and Serpil Opperman. "Material Ecocriticism: Materiality, Agency, and Models of Narrativity". *Ecozon@: European Journal of Literature, Culture and Environment*. Mar. 2012 Vol. 3, no. 1, ISSN 2171-9594
7. Merchant, Carolyn. *Radical Ecology: The Search for a Liveable World*. Routledge. 2005
8. <https://elisepaschen.com/book/bestiary/#:~:text=%E2%80%9CElise%20Paschen's%20the%20mes%20are%20human,matters%20seem%20far%20from%20ordinary>
9. Paschen, Elise. "The Tree Agreement"  
<https://www.poetryfoundation.org/poetrymagazine/poems/58635/the-tree-agreement>
10. Ramanujan, A.K. "Ecology"  
<https://www.poetryfoundation.org/poetrymagazine/browse?contentId=35016>
11. <https://www.facebook.com/IndianCountryToday/videos/the-treeagreement/1108401586330195>
12. [https://planetdrum.org/overview\\_2011.htm](https://planetdrum.org/overview_2011.htm)

## **MOBILE ONLINE TRANSACTION AND BANKING SYSTEM**

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### **Abstract:**

Today in world online transaction become top one in India because of largest online transaction taken in world in India. and day by day it is increasing in number as the literacy are increasing and banking system manual operation taking too much time and tedious for any activities people choosing online transaction method over its times consuming activities today most of the people of India becoming more busy with various activities as like agriculture to small work business and services no one has ample time to visit bank and remain in queue so they opt online and internet banking system that's why this is the reason to frame out more simple but complex banking system and online transaction system so that no one will cheat the poor and common man in the online transaction system with sophisticated KYC and biometric and DRS (DNA Recognition System) as well as TMOS (Two mobile OTP System) for those opting more security which may be husband wife or family members.

### **Introduction:**

Today online transaction and payment system become as economic booster in most of the country in the world as the fastest economic activity movers. It is not making the peoples tasks but making the economy helpful to uplift the economic development and growth in various sectors within microseconds which was very tedious and taking lot of hours to accomplish. The Telecommunication revolution brought much incarnation in society with social media, banking, Investment, Industries, Education, and governance. Observing the situation there is utter need of more security technique that must be applied Doubtful and sure transaction mode so that in doubtful mode the transfer would not take place until it is confirmed by payee till then it will show on another's account as red amount and it will go back within 10 minutes if is not confirmed by payee till the red amount would not be withdraw able.

### **Objectives:**

- 1. More Security methods & tricks application:** In various way fraud taking place picture of ATM pin internet password and Duplicate card and hacking and mobile theft etc. taking place The simple way of cheating the mobile theft which may retrieve OTP and it is easy to change the net banking password and other ATM pin also so it is very recommended to have it double mobile OTP of wife or relative (option ) those requiring extra security only so that in any incident no one will change their internet banking password and pin and

other data without second mobile OTP when one mobile hacked or theft by someone or lost in incidents.

2. **Securing with nominee details:** Nominee details should not use only for legal heir but it should be utilized and checked while taking online transaction so that person KYC will be confirm more strong not only nominee but nominee mobile aadhar pan and Epic or driving license which will be recognized with all details while taking the online transaction and such nominee details must be updated time to time or yearly or while requested in any incidents of change required.
3. **Digital transaction tax deduction:** For attracting the people toward the online transaction a tax rebate or deduction for certain limit online transaction may be declared by government so that more people will attract toward the online transaction than manual transaction as many prudent people make manual transaction for hiding black money or avoiding the tax system which is fraud with government. The tax deduction over a limit of online transaction will bring the peoples total earning into tax slab for total income and tax credibility.
4. **Without digital transaction tax charges:** With tax charges on offline transaction how it will be recognized then the whether business man or servant they must give details of money deposit or purchase details of earning so that it will be decided that this is the black marketing money even small business and servant also hide their money who are crore balances so tax charges on the offline charges may be applied on purchase or sale receipt which is must for both the people.
5. **Digital transaction GST less than cash transaction:** If a person is making digital transaction will get GST discount than the cash transaction GST rate it will be loss of government in GST but more people will be attracted for the online transaction than the offline transaction in attraction of discount in GST. Though we understand that there will not be so much effect of economy but still the population of small customer and future customers are huge and it may create lot of GST to the government economy due to population growth.
6. **Employment through online transaction system:** The online transaction system is increasing the employment in various sector as in mall , petrol pump, school college, restaurants, travelling, services and market and other entertainment platform , social media which may be more increased attracting more toward the online facilities and transaction and banking system at private so that more aspirant will contact the people for their banking transaction anywhere asking online facilities and that require the employee for such facilities which is high demanding today.
7. **Digital transaction for illiterate people:** The digital transaction must be more sophisticated with ability of simplicity for illiterate people willing to online transaction

because in India illiteracy rate is high largest population is away from banking account also no one has open even one bank account even they don't have some knowledge of bank so such huge people are expected to join the banking system and online system which may be done in private customer services center for low educated or illiterate people willing to online payment or online banking transaction.

8. **Without mobile online transaction:** Today some services branches are providing facilities of withdrawal from Aadhar card but they also biometric fraudulent some more complicated evidence of PAN & eye reading is required then without mobile these facilities can be given to various people with eye ball and dna recognition system which is more secured in banking services without mobile.
9. **Banking system and 7 security process:** Banking system must gone through the 7 security process for any transaction as like Aadhar, PAN, OTP, mobile no, Gmail, Nominee, Password, each transaction would check before completion these document none other than only KYC one time forever but it must be updated regularly and these 7 security process department would be separate than the banking system where only security task and monitor would take place on every happening with banking system.
10. **Onlinaholic and data security:** Today is the era of social media every one spend lot of time over the social media and it became essential for everyone because of social awareness and knowledge of day to day happening and knowhow of each other but sometime many people join apps , websites, Google form, and other payment system where they give permission to Gmail, mobile no, and other Aadhar and pan and other data like photos on insta and Facebook where such data may be dangerous for some people and some culprit may use such data system must check also in banking system the use of such all Gmail and other document use by various platform so that it will not hurt the banking system.

#### **Importance of mobile online transaction and banking system:**

1. In this fast age everyone is not alert of any danger and so anything may happen with documents or mobile or his financial data so sophisticated security system is needed.
2. Handsome money and money of whole life within a minute if lost it can frustrate anybody and he may take some fatal action to so such sweat money must be secured at any way.
3. Modern age is age of mobile age where social media contact and app takes data of people which is peeped by various culprits so from such culprit such data may be danger to banking system.
4. Mobile theft become easier today and most of the time for small thing the police also don't be serious for such phones but phones data may create problems to banking system.
5. Today black marketing, tax avoiding, and GST Theft losing the government income which is not good for development and social upliftment programs so it is essential.



**Conclusion:**

Modern society become more wise and prudent though there is not increase of higher education but such wisdom and prudence is convertible to frauds and deceives to each other the people are attracting toward short money quick money and it may be the online transaction and banking system seeing such many incidents there is utter need of more sophisticated banking system where nothing cheat would happen until the consumer will make mistake ,and though he mistake took still he will be secured in all online and digital transaction such banking system is needed for modern system only 7 security process is not enough but more critical and complex security system must be there then the online transaction system in India will be worlds example for other country in world as like largest democracy in world.

**References:**

1. Internet and world wide web by Ukhadkar Pimpalpure Prakashan
2. Indian economy by Rudra & Dewit S. Chand new delhi.
3. e-banking overview: concepts, challenges and solutions

## **COMPARISON OF LINUX AND WINDOWS AND THEIR SERVER CONFIGURATION**

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### **Abstract:**

This research paper provides a comprehensive comparison between Linux and Windows operating systems in terms of server configurations and virtual machines. The paper examines aspects of both operating systems, focusing on their strengths and weaknesses in different use cases. The paper first discusses the key features and capabilities of Linux and Windows operating systems for server configurations. It compares the performance, stability, security, ease of management and cost of these operating systems. Linux and Windows operating systems have their own unique set of strengths and weaknesses when it comes to server configurations and virtual machines. A careful evaluation of the specific requirements and constraints of a given use case is essential in order to make an informed decision about which operating system to use. The paper also identifies future trends in server configurations and virtualization, including the growing importance of containerization and automation technologies.

**Keywords:** Server's role, User Interface, Operating System, Windows Metrics, Versions, Virtual Machines, Compatibility, Open source, Administration.

### **Introduction:**

Linux is an open-source operating system on which anyone can make changes whereas Windows is not open source and the changes can be made by backend users. Windows is the most used operating system in the market because of its adequate looks of graphical user interface and compatibility. Linux has prospered in our nation for a few years and is now a growing nation. Linux also has a number of independently created features that do not need proprietary code. With good reason, Linux's superior power and adaptability have elevated it to the forefront of the Windows operating systems from Microsoft. System administrators recognize that this robust alternative has the potential to greatly improve the reliability of their operating system while simultaneously saving expenses. For the same reasons, enterprises, government organizations, schools, and a variety of other organizations are all researching Linux to take to the place of the Windows desktop. Linux in a Windows World gives the knowledge you need to make the switch to this ground-breaking open-source.

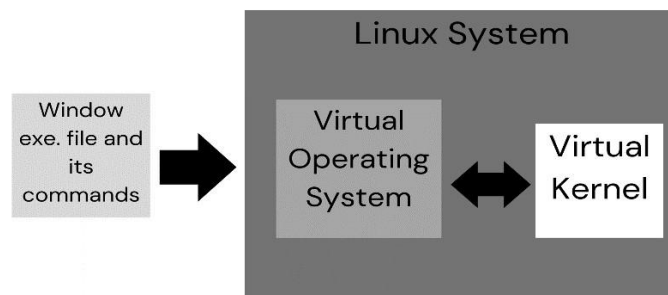
### **Linux's network interfaces**

Network interfaces may be named differently in various versions of Linux. Almost all systems running Linux are going to feature at least two network interfaces. They are as follows:

- Loopback. The IP address of the loopback function (lo) interface will be 127.0.0.1, indicating the host itself. Assume you wish to access a web page hosted on the same server running Linux as you. In your web browser, search http://127.0.0.1. That IP address will not be reachable via the network.
- Ethernet. The ethernet 0 interface is usually used to connect to the area network. Even if you run Linux in a machine that is virtual (VM), you will continue to have a connection that links to the host's actual network interface. Most frequently, you should verify that eth0 is turned on and has an internet protocol address in order that you may connect with the local network and, most likely, the Internet.

### **Linux as a server**

A server running the Linux kernel is a type of server based on the Linux freely available operating system. It gives businesses a low-cost way to distribute services, apps, and content to their customers. Because Linux is a freely available distribution, users benefit from a robust community of supporters and resources. Linux server is a high-end edition of the operating system Linux that is used to handle the intensive storage and practical needs of bigger organizations and their applications. Because of their versatility, security, and reliability, these servers are widely used today and are among the most popular. Another benefit of utilizing Linux atop closed-source software like Windows is that the latter is totally open-source. Linux supports a wide range of virtualization technologies, such as KVM, Xen, and VMware, which make it easy to set up and manage virtual servers. Overall, Linux provides a powerful, reliable, and cost-effective platform for server applications, making it a popular choice for businesses and organizations of all sizes. The system architecture for Linux is elaborated in Fig.1.



**Figure 1: System Architecture**

### **Windows server**

The Windows Server series is a Microsoft computer operating system (OS) family made up of incredibly powerful workstations. In April 2003, Microsoft released Windows Server for the first time. It is often placed on high-traffic servers that act as the backbone for the majority of IT organizations, applications, and services. On a network, the server manages administrative

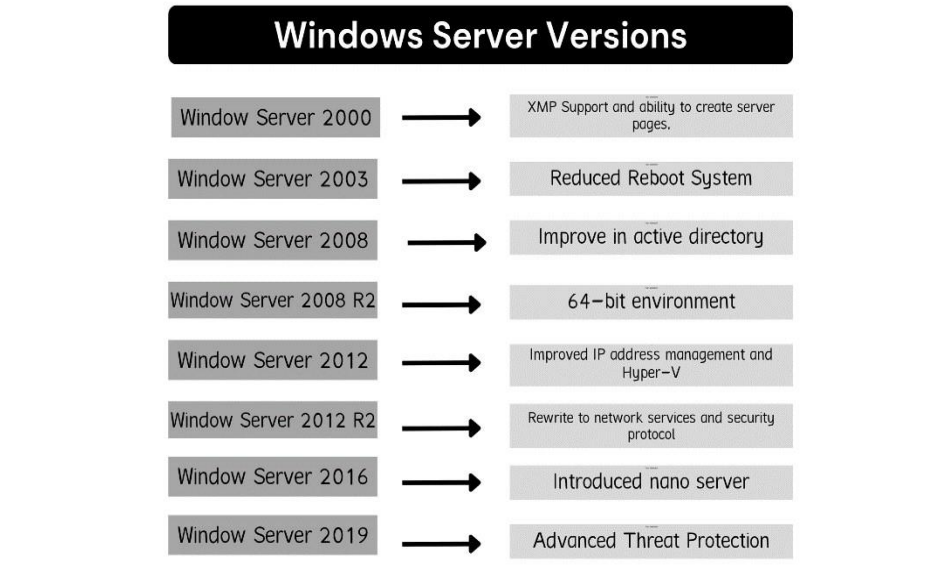
group-related tasks. It organizes, stores, transmits, and retrieves files from network-connected devices. The Windows server version and improvements are shown in Fig. 2

The top window server performance indicators which needs to be tracked are:

- **Memory Utilization:** Memory consumption monitoring identifies underutilized and overutilized servers, as well as server overloads, allowing for more effective load redistribution.
- **CPU Utilization:** Regular CPU monitoring is important for analysing CPU load and resolving performance issues. CPU use and monitoring data assist in identifying outages and other issues, allowing you to quickly dive down to the core reason for outages or CPU peaks to ensure good performance.
- **Top Process by CPU and Memory:** It is critical to examine CPU consumption to determine how much strain is put on the servers' processor at any one time. Based on this information, you may remedy performance issues by adding additional CPUs, upgrading hardware, or turning off superfluous services.

### **Virtual machine**

A VM, or virtual machine, is a component of software that allows numerous instances of an operating system to operate on the same physical computer. A virtual machine, in other terms, is a software emulation of a physical computer system that operates on top of a host operating system. The virtual machine's guest operating system is totally separated from the host operating system and other guest operating systems running on the same physical machine. The virtual machine has its own set of virtual hardware components, which includes a virtual CPU, memory, network adapter, and storage devices. The virtual machine software manages these virtual devices and presents them to the guest operating system as if they were actual devices. When running many processes on an operating system, we may create the illusion that each process is executing on a separate processor with its own virtual memory by using CPU scheduling and virtual-memory techniques. A file system and system calls are two instances of process capability that cannot be provided only by hardware. The virtual machine approach does not provide these additional functionalities, but rather an interface that is analogous to basic hardware. A virtual duplicate of the core computer system is assigned to each process. We can create a virtual machine for a wide range of reasons, all of which are essentially related to the ability to share the same basic hardware while simultaneously supporting several execution environments, i.e., different operating systems. The comparison between Virtual and Non-Virtual machines are shown in Fig. 3



**Figure 2: Windows Server Versions and Improvements**

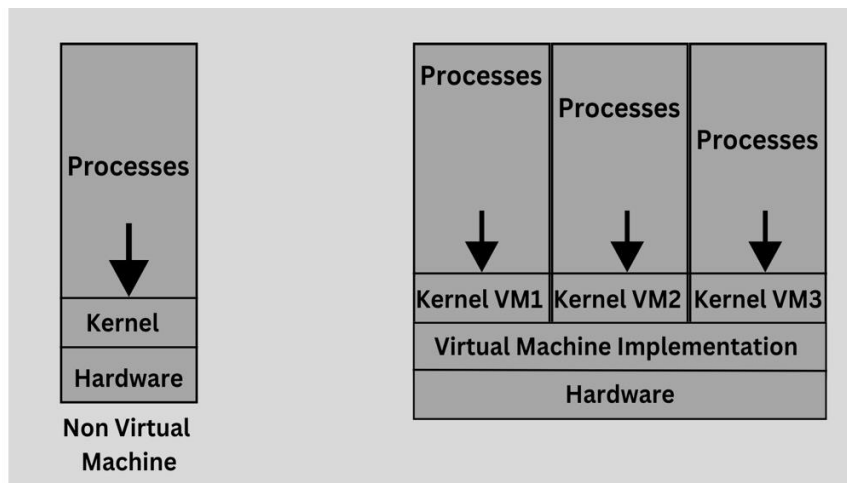
The various key features of Virtual Machines are as follows:

- Several operating system versions share hardware and allocate resources to virtual machines.
- Security and configuration identities should be kept separate.
- The ability to transport computer programs as comprehensively integrated files across real host machines.
- There are no security issues because each virtual machine is separated from the others. A virtual machine can provide an instruction set architecture that is distinct from that of a physical computer.
- Maintenance is simple, and recovery is quick.

Virtual machines offer several benefits for operating systems, making them an essential technology for businesses that are as follows:

1. **Resource utilization:** Virtual machines allow numerous operating systems to work together on a single physical computer, allowing for more effective use of hardware resources. This can assist to cut hardware expenses and boost computer resource utilization.
2. **Isolation:** Every virtual machine is separated from the rest of the virtual machines that function on the same physical computer, resulting in increased security and stability.
3. **Compatibility:** Virtual machines can run different operating systems and software applications simultaneously, which makes it possible to test software on multiple platforms without the need for additional hardware.

4. **Scalability:** Virtual machines can be easily cloned, resized, and migrated to different physical machines, which makes it easy to scale up or down as needed.
5. **Backup and recovery:** Virtual machines can be backed up and restored easily, which provides a more reliable and flexible approach to backup and recovery than traditional methods.
6. **Testing and development:** Virtual machines can be easily created and destroyed, making them ideal for testing and development. Developers can test software on different operating systems and configurations without having to install multiple physical machines.

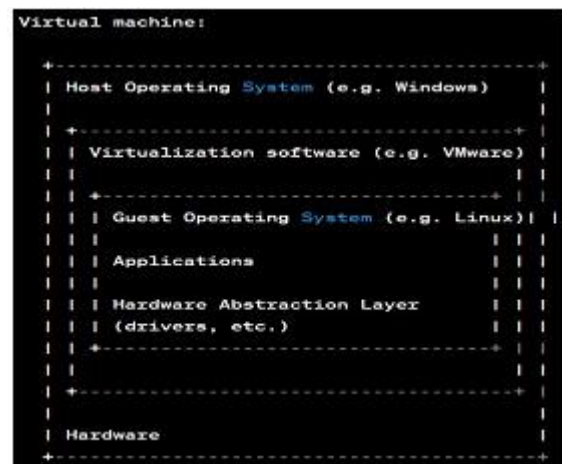


**Figure 3: Comparison of Non-Virtual and Virtual Machine**

Overall, virtual machines provide a powerful and flexible platform for running multiple operating systems and software applications on a single physical machine, which can help to increase efficiency, reduce costs, and improve security and stability. The layout of Virtual and Non-Virtual Machines are shown in Fig. 4(a) and Fig. 4(b). The comparison between Windows and Linux can be summarized in Table 1.



**Figure 4(a): Layout of Non Virtual Machine**



**Figure 4(b): Layout of Virtual Machine**

Table 1: Comparison between Linux and Windows

<b>Factors</b>	<b>Linux</b>	<b>Windows</b>
<b>Price and Licensing</b>	Paid variants of the Linux operating system with extra support are available on the market at a relatively low cost. Under the GNU General Public Licence, Linux allows users to alter and re-use it in a variety of systems, as well as sell their customized versions.	The operating system developed by Microsoft, Windows, is delivered under the Microsoft Licence. The Microsoft Licence for its regular editions is somewhat expensive, and it may be installed on the number of machines stated in the purchase agreement.
<b>Command Line</b>	The command line provides additional options for administration and everyday assignments, but not much for end users.	Users may utilize the command line, but not the Linux system's command line. To access the command line, users must first open the Run dialogue box, then type in the Run search box, and then press the Enter key.
<b>System Update</b>	The Linux operating system gives users complete control over when and what updates are installed. The update procedure is faster and does not need a system reboot.	For inexperienced users who are unfamiliar with update settings, the only alternative is to back down and let the computer download and set up the updates. After each update, the computer must be restarted.
<b>Ease of Use</b>	People with little or no technical experience may also quickly deploy the latest versions and undertake routine tasks like as email, music and video playback, and internet browsing.	Because of its market dominance, Windows is already installed on many devices. Typically, Windows comes pre-installed on new computers.
<b>Support</b>	Because Linux has a wide customer base throughout the globe, it offers extensive online help for Linux users.	Forums, inbuilt and internet-based help systems, and specialized websites all contribute to supporting the Windows operating system.

<b>Variety</b>	Because Linux is freely available and easy to alter, it offers a plethora of highly configurable distributions tailored to the demands of the user. Users with coding expertise can edit the code and the operating system.	The Windows operating system is difficult to customize, as it only allows for a few useful tweaks.
<b>Speed</b>	In terms of overall performance, Linux outperforms Windows. When numerous processes are active at the same time, Linux reduces 'bogging'. The extension Ext4 is an outstanding Linux file system for keeping the device efficient.	The operating system Windows must be correctly used; otherwise, even reasonable and limited use will not prevent the system from dropping down to unbearable and agonizing levels. Storage and disc hogging are typical while running several tasks.
<b>Privacy</b>	The operating system Linux considers its customers' privacy very seriously. Its built-in cutting-edge encryption technology ensures users of more security and reduced interference from third-party programs.	Windows has become reliant on advertisements. Users have the choice to optout, but Microsoft sees the advertisement. Many people like Microsoft tools, although they may be obtrusive at times.
<b>Run Level</b>	Linux can halt at various run levels.	Microsoft Windows restarts at run stage three to allow an administrator to resolve the issue.

**Conclusion:**

After analysing Linux and Windows operating systems in terms of server configurations and virtual machines, it can be concluded that both operating systems have their strengths and weaknesses. Linux operating system is preferred by many developers and IT professionals due to its robustness, flexibility, and security. Linux servers are widely used in web hosting, cloud computing, and high-performance computing applications. On the other hand, the Windows operating system is well-known for its user-friendly interface and compatibility with a wide range of software applications. Windows servers are widely used in enterprise environments, particularly in businesses that run Microsoft technologies such as Exchange Server and SharePoint. Both Linux and Windows have their own unique set of tools, technologies, and features that make them suitable for different types of server configurations and virtual machines. The choice between the two operating systems ultimately depends on the specific



needs and preferences of the user or organization. Overall, it can be concluded that Linux and Windows operating systems have their strengths and weaknesses in terms of server configurations and virtual machines.

**References:**

1. Muhammad Talha Awan, Kashaf Khan, "Linux Vs. Windows: A Comparison of Two Widely Used Platforms", *Journal of Computer Science and Technology Studies - JCSTS* 4(1): 41-54, 2022.
2. Akinlolu Solomon Adekotujo, Adedokun Ademola, Adedoyin Odumabo, Olukayode Aiyeniko, "A Comparative Study of Operating Systems, The Case of Windows, UNIX, Linux, Mac, Android, and iOS" *International Journal of Computer Applications* (0975 – 8887) – Volume 176 – No.39, July 2020.
3. Linux in a Windows World By Roderick W. Smith.
4. Smita Parale, "Comparison of Linux and Windows", *International Research Journal of Modernization in Engineering Technology and Science*, Volume:04/Issue:10/October2022.
5. Umaima Khan, "Comparative study of Linux and Windows", *International Journal of Academic Research in Business, Arts & Science (IJARBAS)* - Volume: 2, Issue: 2, Year: 2020, Page 53-70.
6. J G. Aryotejo, E.A. Sarwoko, A. Sugiharto, M.M. Hakim, Performance of virtual machine managers for computer network learning, in *2021 5th International Conference on Informatics and Computational Sciences (ICICoS)*, IEEE, 2021, November, pp. 155–159.
7. Matthew R. Yaswinski, Md Minhaz Chowdhury, Mike Jochen Matthew R. Yaswinski, Md Minhaz Chowdhury, Mike Jochen, "Linux Security: A Survey", *IEEE International Conference on Electronic Information Technology*, 2019.
8. [8 ] Rachael Shaw, Enda Howley, Enda Barrett, An energy efficient anti-correlated virtual machine placement algorithm using resource usage predictions, *Simulat. Model. Pract. Theor.* 93 (2019) 322–342.
9. Joachim Puls, Michael Wegner, "Linux Operating System", 2022.
10. K. Lin, W. Liu, K. Zhang, B. Tu, HyperPS: a virtual-machine memory protection approach through hypervisor's privilege separation, *IEEE Trans. Dependable Secure Computer.* (2022) 1–15.
11. J M. Huber, J. Horsch, J. Ali, S. Wessel, Freeze and Crypt: Linux kernel support for main memory encryption, *Comput. Secur.* 86 (2019) 420–436.
12. M. Pagani, E. Rossi, A. Biondi, M. Marinoni, G. Lipari, G. Buttazzo, A bandwidth reservation mechanism for AXI-based hardware accelerators on FPGAs, in S. Quinton (Ed.), *31st Euromicro Conference on Real-Time Systems, ECRTS 2019*, in *Leibniz International Proceedings in Informatics-ics (LIPIcs)*, vol. 133, Schloss Dagstuhl–LeibnizZentrum fuer Informatik, Dagstuhl, Germany, 2019, pp. 24:1–24:24.

15. Akalanka Mailewa Dissanayaka, Susan Mengel, Lisa Gittner, and Hafiz Khan. Vulnerability prioritization, root cause analysis, and mitigation of secure data analytic framework implemented with MongoDB on singularity Linux containers. In The 4th International Conference on Compute and Data Analysis -2020 (ICCCA-2020).
16. Marko Boras, Josiph Balen, Kresimir Vdovjak, "Performance Evaluation of Linux Operating Systems", International Conference on Smart Systems and Technologies (SST), October 2020.
17. Sini S. Nair, T. Santha, "High availability of kernel-based virtual machine using nested virtualization", an Information Technology Group, Department of Computer Science, Dr. G. R Damodaran College of Science, February 2023.

## **ETHICAL ISSUES IN MANAGEMENT**

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### **Abstract:**

Ethics are very essential in an organizational context. Ethics are the principles and values used by an individual to govern his or her actions and decisions. An organization forms when group of people work together in a structured way to achieve predefined goals and objectives. Business ethics refers to application of ethical principles in business. Now days, all types of organization are facing various types of ethical challenges and management should develop appropriate action to chalk out the ethical issues. The ethical issues in management are a crucial one with which managers of today must be informed. Beside this, Managers experience ethical issues at the personal, organizational, professional, societal and global levels. In this connection, the present study is an attempt to discuss the ethical issues involved in Business Management especially in the area of Human Resource Management, Marketing Management and Financial Management.

**Keywords:** Appropriate Action, Ethical Principles, Global Levels, Predefined Goals, Structured Way.

### **Introduction:**

Ethics is a branch of philosophy that involves systematizing, defending and recommending concepts of right and wrong conduct. The term 'Ethics' comes from the Greek word 'Ethicos' which means "custom or habit" and in Latin language it is called as 'Ethicus'. In fact, this word has originated from 'ethos', meaning character or manners. Ethoses are nothing but "the set of beliefs, ideas, etc. about social behavior and relationship of a person" as defined in Cambridge Advanced Learner's Dictionary. Similarly, Oxford Advanced Learner's Dictionary defines it as "the moral ideas and attitudes that belong to a particular group or society".

The Cambridge Dictionary of Philosophy states that the word ethics is "commonly used interchangeably with 'morality'. In the words of Richard William Paul and Linda Elder, "ethics is a set of concepts and principles that guide us in determining what behavior helps or harms sentient creatures". On the other hand, values are evaluative statements, are stable and long lasting beliefs about what is important. Values are general beliefs tinged with moral flavor containing an individual's judgmental ideas about what is good, right or desirable (Khanka, 2005). Values are nothing but, the answers to the questions-what is right or wrong and good or bad-are value laden. It is the basic convictions that give us a sense of right and wrong, good and bad. In this way, values form the basis for ethical behaviour According to Milton Rokeach

(1973), “value” as an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state existence.

Business ethics is nothing but application of ethical principles in business. It is concerned primarily with the relationship of business goals and techniques of specific human needs. It studies the impact of acts on the good of individual, the firm, the business community and the society as a whole. Rao (2012) said that, “Business ethics study the special obligations that a man and a citizen accept when he becomes a part of the world of commerce”. Business ethics are the norms and moral values of human behavior desired by the contemporary society exclusively and inclusively dealing with commercial transactions.

### **Review of Literature**

Allport, Vernon and Lindsay (1951) in a research study discussed the importance of values in our society and classified values into six broad categories.

- (a) Theoretical value: A human being accords high importance on the discovery of truth through a critical and rational approach.
- (b) Economic value: It is about usefulness and practicability in life.
- (c) Aesthetic value: Places the top most importance on form and harmony.
- (d) Social value: Love and affection of mankind.
- (e) Political value: Acquisition of power and influence.
- (f) Religious value: It is concerned with the unity of experience and understanding of the cosmos.

Milton Rokeach (1973) in his research work identified values as *terminal values* and *instrumental values*. According to the research findings, terminal values represent the desirable end-states of existence; the goals and individual would like to achieve during his/her life time. On the other hand *instrumental values* reflect the way to achieving goals. As per research findings, instrumental values represent preferable mode of behaviour or means of achieving one’s terminal values.

Hall (1998) in his study highlighted that the success of organization depend on value system (respect, listening and sharing with others). The successful organizations are capable of integrating traditional values, like efficiency, productivity and achievement. Researchers like Fernandez de Tejada, López, and Saavedra (2007), said that the values needed by an ethical leader include courage, restraint, generosity, magnificence, magnanimity, gentleness, kindness, sincerity, wit and distributive and corrective justice.

Research studies reveals that values have been an important part of business studies for a longer period of time. As we know that that, the third Davos Management Forum was formed in 1973, and it has proposed a code of ethics for business management. It includes tasks like helping consumers, workers, capital and society and harmonizing their antagonistic interests (Küng, 1999).

Barman (2009) in his study, “*Indian Ethos & Values in Modern Management*” discussed about Indian ethos and said that Indian ethos is all about what can be termed as “national ethos” and also mentioned the principles of ethos as follows:

- (a) Immense potential, energy and talents for perfection as human being has the spirit within his heart.
- (b) Holistic approach indicating unity between the Divine (The Divine means perfection in knowledge, wisdom and power), individual self and the universe.
- (c) Subtle, intangible subject and gross tangible objects are equally important. One must develop one’s Third Eye, Jnana Chaksu, the Eye of Wisdom, Vision, Insight and Foresight. Inner resources are much more powerful than outer resources. Divine virtues are inner resources. Capital, materials and plant & machinery are outer resources.
- (d) Karma Yoga (selfless work) offers double benefits, private benefit in the form of self purification and public benefit.
- (e) Yogah Karmasu Kaushalam-Excellence at work through self-motivation and self-development with devotion and without attachment.
- (f) Co-operation is a powerful instrument for team work and success in any enterprise involving collective work.

Murthy (2012) in his discussion emphasized the trends of business ethics and classified ethics into three categories as (a) *Meta ethics* is about the theoretical meaning and reference of moral propositions and how their truth values may be determined (b) Normative ethics is about the practical means of determining a moral course of action and (c) Applied ethics that draws upon ethical theory in order to ask what a person is obligated to do in some very specific situation, or within some particular domain of action.

Mercedes Ruiz-Lozano, Araceli de los Ríos-Bergillos, Pilar Tirado-Valencia, Salud Millán-Lara (2012) in a paper entitled, “Ethical and Social Values in Business Administration and Management Studies” analyzed the impact of values in learning process. Results of factor analysis highlighted that, students bring a value-oriented education and it also revealed that values can be classified as moral values and action-oriented vales and it is related to decisionmaking process.

### **Objectives of the study**

#### **The main objectives of the present study are:**

1. To know the ethical issues involved in Human Resource Management,
2. To know the ethical issues involved in Marketing Management,
3. To know the ethical issues involved in Financial Management.

### **Methodology of the study**

The present study is descriptive in nature and based on secondary sources of data. The data were collected from various sources like book, magazine, journal and web-resources. The collected data were complied as per the requirement of the study. In this present paper, ethical

issues involved in Human Resource Management, Marketing Management and Financial Management were discussed.

### **Ethics in Human Resource Management**

Human Resource Management is the strategic approach to nurturing and supporting employees and ensuring a positive environment. The primary objective of Human Resource Management is to ensure the availability of right people for right jobs so as the organizational goals are achieved effectively. Ethics in Human Resource Management generally means the affirmative moral obligations of the employer towards employees to maintain equality and justice at workplace. The various ethical issues involved in Human Resource Management are discussed below.

- a) **Human Resource Planning:** Ethics in Human Resource Planning (HRP) is to gauge the actual future HR needs. The main objective of human resource planning is to have an accurate number of employees required with matching skill requirements to accomplish organizational goals. It is a process by which the management of an organization ensures that it has the right number and kind of people at the right places and at the right times to successfully achieve its overall objectives (Khanka, 2010).
- b) **Recruitment and Selection:** Ethics in recruitment and selection is to select the best candidate for the job. Recruitment is the process of searching for and attracting applicants for the various job positions which arise from time to time in the organization. On the other hand, selection is the process of choosing the most suitable candidates from among the applications for jobs.
- c) **Performance Appraisal:** Ethics in performance appraisal means there should not be any type of errors or favoritism in appraisal of an employee. It is a systematic way of judging the relative importance of an employee in performing his or her task. Ethical performance appraisal demands that there should be an honest assessment of the performance and measures should be taken to improve the effectiveness of employees.
- d) **Training and Development:** Ethics in Training and Development means to plan and develop people as per organizational and individual needs. Training is the art of increasing the knowledge and skill of an employee doing a particular job. It is defined as the organized procedure by which people learn knowledge or skill for a particular purpose.
- e) **Wage and Salary Administration:** Ethics in wage and salary administration refers to pay the salary from the long-run benefit to the company and employee. The main objective of wage and salary administration is to establish and maintain an equitable wage and salary system to obtain retain and motivate people of required skill in an organization (Rao, 2012).
- f) **Discriminations:** A number of labour laws and regulations have been evolved in India, to minimize the discrimination at workplace on the basis of caste, sex, religion, disability, age and the like. Now a day, ethical challenge arises when there is pressure on the HR Manager

to protect the firm or an individual at the expense of someone belonging to the group which is being discriminated against.

### **Ethical issues in marketing management**

Ethical marketing refers to a marketer's obligation to ensure all marketing activities stick to core ethics principles, involving integrity, humility, and honesty-both internally and externally. Ethical issues in marketing arise from the conflicts, improper communication and lack of agreement on particular issues. It is noteworthy that, each marketing concept has its own ethical issues and the problem may be different from each other. The different forms of ethical issues in marketing are as follows:

- (a) **Ethical Problems in Market Research:** Ethical practices in market research are moral principles that guide the responsibility to conduct and analyze research without deception to ensure authenticity. Some issues regarding ethics in conducting market research include a lack of honesty, a lack of privacy, collecting information without consent and so on. The way a company conducts its market research these days can have serious ethical repercussions, affecting the lives of consumers in ways that have yet to be fully understood.
- (b) **Ethics in Advertising and Promotion:** Sexuality is a major point of discussion when ethical issues in advertising content are considered. Violence is also an important ethical issue in advertising, especially where children should not be affected by the content. Some select types of advertising may strongly offend some groups of people even when they are of strong interest to others. A negative advertising policy lets the advertiser highlight various disadvantages of the competitors' products rather than showing the inherent advantages of their own products or services (Ethical Issues in Marketing, 2021).
- (c) **Delivery Channels:** The most popular types of marketing channels are websites, email, targeted digital advertising, and events (digital or in-person) Direct marketing is one of the most controversial methods of advertising channels, especially when the approaches included are unsolicited. Some common examples include TV and Telephonic commercials and the direct mail.
- (d) **Deceptive Marketing Practices:** Deception may take the form of misrepresentation or omission of key facts or misleading practices. There may also be packaging deception which is mislabeling regarding the content, weight, size, or use of the information of the product. Selling potentially hazardous products without disclosing the dangers is also considered a deceptive and unethical marketing practice. (Ethical Issues in Marketing, 2022)
- (e) **Ethical Issues in International Marketing:** Due to the globalization of the markets and hence the marketing practices, the marketers have to deal with the ethical issues arising in the cross-cultural scenarios. Major ethical problems in international marketing are Small or large scale bribery, Gifts/Favors/Entertainment, Pricing, Products/Technology,

Questionable commissions to Channel partners , Involvement in political affairs , Cultural differences and so on.

### **Ethical issues in financial management**

Business ethics that are followed by financial institutions, financial services, or financial markets are the integral parts of ethics in finance. Ethics in Finance talks about financial behavior or activities that are ethically right or wrong. Some common areas of pitfalls when it comes to ethics in finance include the handling of material non-public information and reporting of unethical activities.

- (a) **Transparency:** Transparency is one of the main moral issues in finance. It is to be mentioned that, Investors must get accurate and concise information from financial institutions regarding the risks and rewards of making investments. Failing to do so may result in investment losses and harm the institution's reputation (Vashishtha, 2023).
- (b) **Ethics of accounting or financial information:** Creative accounting, earnings management, misleading financial analysis, Insider trading, securities fraud, bucket shops, forex scams: concerns (criminal), manipulation of the financial markets, Executive compensation: concerns excessive payments made to corporate CEO's and top, management, Bribery, kickbacks, facilitation payments: while these may be in the (short-term) interests of the company and its shareholders, these practices may be anticompetitive or offend against the values of society.
- (c) **Insider trading:** It is a term that most investors have heard and usually associate with illegal conduct. Illegal insider trading refers generally to buying or selling a security, in breach of a fiduciary duty or other relationship of trust and confidence, while in possession of material, non public information about the security (Parmer,2015).
- (d) **Conflicts of interest:** This is a significant ethical issue. Financial professionals need to steer clear of circumstances when their own interests conflict with those of their clients.

They must ensure that their choices are purely motivated by what is in their clients' best interests by disclosing any potential conflicts of interest (Vashishtha, 2023).

### **Conclusion:**

Ethics has become a most topical issue of concern in business. No company or business may get long term benefits in the absence of ethical principles. It is to be mentioned that, **ethical issues are concerned with what is right and wrong, what is good and what is bad, what is true and false, what should be and what should not be and so on.** Ethics generally create goodwill or reputation of a business that is the most important asset of a company. Actually, the ethical issues arise between managers and their conflict with stakeholder groups such as customers, suppliers, employees, competitors, wholesalers, retailers and so on. That's why, a business should therefore, possess all those qualities or characteristics which are necessary to satisfy the interests of various groups connected with the business. Hence, the ethics should be followed for marketing management, human resource management, finance and accounting and so on. Finally, it can be said that, the success of organization depend on ethical values.



**References:**

1. Allport, G.W., Vernon, P.E. and Lindzey, G. (1951). *Study of Values*, Houghton Mifflin, Boston.
2. Barman, H. (2009). *Excellence, Ethics and the World of Management*, Aalekh Publisher, PP. 100-11. Accessed from [https://www.researchgate.net/publication/327670537\\_Indian\\_Ethos\\_and\\_Values\\_in\\_Modern\\_Management](https://www.researchgate.net/publication/327670537_Indian_Ethos_and_Values_in_Modern_Management) on 10-05-2023.
3. *Ethical Issues in Marketing* (2022), accessed from <https://www.mbaknol.com/marketing-management/ethical-issues-in-marketing/> on 12-05-2023.
4. *Ethical Issues in Marketing* (2021), accessed from [https://www.tutorialspoint.com/business\\_ethics/ethical\\_issues\\_in\\_marketing.htm](https://www.tutorialspoint.com/business_ethics/ethical_issues_in_marketing.htm) on 12-05-2023.
5. Fernández de Tejada, V., López, M. D., & Saavedra, I. (2007). Ethical management in midsize businesses. In *The behavior of the company in dynamic environments: XIX annual congress and XV AEDEM French Spanish congress*. Accessed from <http://dialnet.unirioja.es/servlet/articulo?codigo=2476759> on 15-05-2023.
6. Hall, B. (1998). *Knowledge management and the values factor*. Knowledge Management Magazine. London.
7. Khamka, S.S. (2010). *Human Resource Management*, Sultan Chand & Sons, New Delhi.
8. Khanka, S.S. (2005). *Organizational Behaviour*, Sultan Chand & Sons, New Delhi, pp. 76-85.
9. Küng, H. (1999). *A global ethic for the economy and politics*. Madrid: Trotta.
10. Mercedes Ruiz-Lozano, Araceli de los Ríos-Bergillos, Pilar Tirado-Valencia, Salud Millán-Lara (2012). "Ethical and Social Values in Business Administration and Management Studies", *US-China Education Review B* 2, 187-201.
11. Milton Rokeach (1973). *The Nature of Human Values*, Free Press, New York, p.5.
12. Murthy, C.S.V. (2012). *Business Ethics: Text and Cases*, Himalaya Publishing House, New Delhi.
13. Parmer, Bhumiika (2015), *Ethical Issues in Accounting & Finance*, *Indian Journal of Research*, 4(5), accessed from [https://www.worldwidejournals.com/paripex/recent\\_issues\\_pdf/2015/May/May\\_2015\\_1431346984\\_98.pdf](https://www.worldwidejournals.com/paripex/recent_issues_pdf/2015/May/May_2015_1431346984_98.pdf) on 14-05-2023 on 18-05-2023.
14. Rao, P. S. (2012). *Essentials of Human Resource Management and Industrial Relations*, Himalaya Publishing House, New Delhi, 586-593.
15. Vashishtha, Chandra Raj (2023). *Ethics in finance*, accessed from <https://timesofindia.indiatimes.com/readersblog/talk-about-management/ethics-infinance-51964/> on 20-05-2023.

## **INTERDISCIPLINARY TRENDS IN HIGHER EDUCATION – NEED AND IMPORTANCE**

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### **Abstract:**

Interdisciplinary education has become increasingly popular in recent years as universities strive to prepare students for the challenges of a rapidly changing world. This research paper aims to examine the trends in interdisciplinary education by analysing recent literature and case studies. The paper explores the definition and characteristics of interdisciplinary education, its benefits and challenges, and the different approaches to implementing interdisciplinary programs. The research also examines the factors driving the growth of interdisciplinary education, including changes in the job market, technological advancements, and the need to address complex global challenges. Additionally, the paper analyzes the impact of interdisciplinary education on student outcomes, faculty development, and institutional culture. The findings suggest that interdisciplinary education has significant potential to prepare students for the complex challenges of the 21st century and can enhance the quality and relevance of higher education. The paper concludes by discussing the implications of these trends for future research and practice in interdisciplinary education.

### **Introduction:**

As we move further into the 21st century, it is becoming increasingly clear that many of the most pressing issues we face are complex and multifaceted. From climate change to poverty to healthcare, these issues require collaboration and integration between different fields of study. As a result, interdisciplinary trends in higher education are becoming more important than ever before. Interdisciplinary education refers to the integration of knowledge and methods from different disciplines in order to address complex problems. This approach recognizes that no single field of study has all the answers and that a collaborative and integrative approach is necessary to develop comprehensive solutions to today's challenges.

One of the primary benefits of interdisciplinary education is that it encourages creativity and innovation. By bringing together experts from different fields, interdisciplinary approaches can foster new ideas and perspectives that may not have been possible within a single discipline. This can lead to breakthroughs in research and development that may have significant implications for society.

Education can provide students with the diverse skill sets they need to succeed in a rapidly changing job market. For example, an interdisciplinary degree in environmental studies might combine courses in biology, chemistry, economics, and political science, providing students with a deep understanding of the complex issues related to environmental policy and sustainability. In addition to preparing students for the workforce, interdisciplinary education can also help bridge gaps between different fields of study. By exposing students to multiple disciplines, interdisciplinary approaches can help them develop a more comprehensive understanding of complex issues. This can lead to more effective collaboration between experts from different fields, as they are better able to communicate with one another and understand each other's perspectives.

### **Meaning of Interdisciplinary**

Interdisciplinary refers to an approach or method that involves the integration of knowledge, techniques, or perspectives from different academic disciplines or fields of study to address a complex problem or phenomenon. This approach recognizes that many real-world problems cannot be adequately addressed by a single discipline, and that solutions often require insights and methods from multiple disciplines. Interdisciplinary collaboration involves researchers, professionals, or practitioners from different disciplines working together to integrate their expertise and knowledge to develop innovative solutions to complex problems. This approach can be applied in a wide range of fields, including science, engineering, medicine, social sciences, and the humanities, among others. The interdisciplinary approach is becoming increasingly important as many of the most pressing global challenges require integrated solutions that bridge traditional disciplinary boundaries.

Interdisciplinary approaches have become increasingly popular in recent years as the complexity of many problems has grown and as the limits of single-discipline approaches have become more apparent. Interdisciplinary research can bring together diverse perspectives, data sources, and methods to develop more comprehensive and effective solutions. It can also help to identify new research questions, improve the quality of research, and enhance communication between different communities of researchers. Interdisciplinary education is also becoming more common, as educators recognize the value of exposing students to multiple perspectives and teaching them how to integrate knowledge from different fields. This can help students to develop critical thinking skills and to prepare for careers that require the ability to work across disciplinary boundaries.

### **Meaning of interdisciplinary studies**

Interdisciplinary studies refer to academic programs or research projects that combine knowledge and methods from different disciplines or fields of study to address a particular topic or issue. Interdisciplinary studies are characterized by an integration of knowledge from different perspectives, often blending methodologies and theories from various fields to develop a

comprehensive understanding of complex problems. It involves the exploration of connections and intersections between different disciplines and the application of different modes of inquiry, such as qualitative and quantitative methods.

Examples of interdisciplinary studies might include environmental science, which incorporates knowledge from biology, chemistry, and ecology to understand the natural world, or cognitive neuroscience, which combines psychology, biology, and computer science to study the brain and behaviour. Other examples include bioethics, women's studies, and urban studies.

### **Interdisciplinary studies in the area of education**

Interdisciplinary studies in the area of education involve combining knowledge and methods from various fields to understand the complexities of teaching and learning. One example of interdisciplinary studies in education is educational psychology, which combines knowledge from psychology, sociology, and neuroscience to understand how people learn, the factors that influence learning, and how to improve teaching methods. Another example is educational technology, which blends knowledge from computer science, cognitive psychology, and instructional design to develop innovative educational tools and methods.

Other interdisciplinary studies in education include curriculum studies, which combine insights from philosophy, history, and sociology to understand the development and implementation of educational programs, and language education, which draws on knowledge from linguistics, psychology, and education to develop effective language teaching methods. Interdisciplinary approaches to education can help to provide a more comprehensive understanding of the complex factors that influence learning and teaching, leading to more effective and innovative approaches to education.

Here are a few more examples of interdisciplinary studies in education:

**Multicultural education:** Multicultural education is an interdisciplinary field that combines insights from sociology, anthropology, history, and cultural studies to understand and address issues related to diversity, equity, and inclusion in education. This field aims to develop culturally responsive teaching practices that acknowledge and value the diversity of students' backgrounds and experiences.

**Educational leadership:** Educational leadership is an interdisciplinary field that draws on insights from business, management, psychology, and education to develop effective leadership practices in educational settings. This field aims to develop leaders who can create positive change and improve student outcomes in schools and other educational organizations.

**STEM education:** STEM education (Science, Technology, Engineering, and Mathematics) is an interdisciplinary field that combines knowledge from science, mathematics, engineering, and technology to develop effective teaching practices that encourage students to explore and engage with these subjects. This field aims to improve student outcomes in STEM fields and prepare students for careers in these areas.

Interdisciplinary studies in education can help to break down the silos between different fields and create a more holistic approach to teaching and learning. By combining insights from different disciplines, educators can develop more effective strategies for addressing complex educational challenges and improving student outcomes.

### **Importance of Interdisciplinary studies in higher education**

Interdisciplinary studies in higher education are becoming increasingly important as the world becomes more complex and interconnected. Here are a few reasons why:

**Addressing complex problems:** Many of the challenges facing society today are complex and multifaceted, requiring insights and expertise from multiple disciplines. Interdisciplinary studies can help students develop a more comprehensive understanding of these problems and the ability to work collaboratively to develop solutions.

**Enhancing creativity and innovation:** Interdisciplinary studies can foster creativity and innovation by encouraging students to think outside the box and explore new ideas and approaches. This can help students develop the skills they need to adapt to changing circumstances and contribute to the development of new ideas and technologies.

**Preparing for a changing job market:** As the job market becomes increasingly competitive and dynamic, employers are looking for candidates with a wide range of skills and knowledge. Interdisciplinary studies can help students develop a diverse set of skills and competencies that are highly valued by employers, including critical thinking, problem-solving, communication, and collaboration.

**Promoting diversity and inclusion:** Interdisciplinary studies can help to promote diversity and inclusion by encouraging students to explore different perspectives and experiences. This can help to develop a more inclusive and tolerant society, where people from different backgrounds can work together to address common challenges.

**Integrating knowledge from different fields:** Interdisciplinary studies can help to integrate knowledge from different fields, creating a more comprehensive understanding of complex issues. This can lead to new insights and discoveries that might not have been possible through a single-discipline approach.

**Encouraging cross-disciplinary collaboration:** Interdisciplinary studies can foster collaboration between students and faculty from different disciplines. This can lead to the development of innovative solutions to complex problems and a greater understanding of the connections between different fields.

**Preparing students for interdisciplinary careers:** Many careers today require interdisciplinary knowledge and skills, such as in fields like public health, environmental science, and social entrepreneurship. Interdisciplinary studies can help to prepare students for these careers by providing them with a broad range of knowledge and skills.

**Responding to global challenges:** Many of the most pressing challenges facing the world today, such as climate change, pandemics, and poverty, require interdisciplinary approaches. Interdisciplinary studies can help to prepare students to address these challenges by providing them with the tools they need to work collaboratively and creatively.

**Supporting lifelong learning:** Interdisciplinary studies can help students develop a lifelong love of learning by encouraging them to explore new fields and perspectives. This can lead to a greater sense of intellectual curiosity and a more fulfilling life.

**Conclusion:**

In conclusion, we can say interdisciplinary studies in higher education are becoming increasingly important as we face a rapidly changing and interconnected world. By breaking down the barriers between different disciplines, interdisciplinary studies can help to create a more holistic approach to education that prepares students for the challenges and opportunities of the 21<sup>st</sup> Century.

Overall, interdisciplinary studies in higher education can help students develop the skills, knowledge, and attitudes they need to succeed in an increasingly complex and interconnected world. By breaking down the barriers between different disciplines and encouraging collaboration and innovation, interdisciplinary studies can help to create a brighter future for all. Now we can conclude it by saying, interdisciplinary studies are an essential component of higher education that prepares students to navigate a complex and interconnected world. By breaking down the barriers between different disciplines, interdisciplinary studies help students develop a broader perspective, think critically, and work collaboratively to solve complex problems. The studies offer many benefits to students, including the ability to integrate knowledge from different fields, foster cross-disciplinary collaboration, prepare for interdisciplinary careers, respond to global challenges, and support lifelong learning. As we look to the future, it is clear that interdisciplinary studies will play an increasingly important role in higher education. By embracing an interdisciplinary approach, students can develop the skills and knowledge they need to succeed in a rapidly changing and complex world, and contribute to creating a more just and sustainable future for all.

**References:**

1. <https://www.nature.com/articles/palcomms20151#:~:text=This%20is%20defined%20as%20the,those%20from%20more%20similar%20disciplines.>
2. [https://www.researchgate.net/publication/273294632\\_Interdisciplinary\\_Trends\\_in\\_Higher\\_Education](https://www.researchgate.net/publication/273294632_Interdisciplinary_Trends_in_Higher_Education)
3. <https://ideas.repec.org/a/pal/palcom/v2015y2015ipalcomms20151p15001-.html>
4. <https://files.eric.ed.gov/fulltext/EJ1248670.pdf>

## **WHERE TO GO: FAKE NEWS, DEMOCRACY, SOCIAL MEDIA AND ARTIFICIAL INTELLIGENCE**

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### **Introductory remarks:**

The proliferation of fake news and misinformation through social media has become like wildfire on the social landscape, which has created misunderstandings in society, inaccuracy in the information available and distrust towards politics, the media, and similar institutions and organisations around the world. The existence of numerous hyper-partisan and bogus websites and pages on social media is the primary factor contributing to the proliferation of fake news, which can lead to negative political mobilisation. Even though advancements in technology like artificial intelligence (AI) have the potential to make matters worse, they can also be utilised to counteract the spread of false information.

Democracies require well-informed citizens, and social media has a role in implementing democracy. From newspapers to social media, the various forms of media that citizens use to learn about political events have mingled and intertwined over the course of history. Fake news is not something new, but the issue was pushed into the foreground by the spreading of COVID19. It became more prevalent after the Trump era, when the former U.S. president labelled news media from ABC, NBC, and other media companies as fake news. The open access of social media, including Meta, Twitter, TikTok and many others, is a main source for fake news. Social media has become an essential factor in the development of, and an increasingly important element in, political action, as it helps to form citizens' political culture, and shape positive political awareness, if it's well utilized. Thought and awareness grow with the variables of life, and shape them in a continuous and interactive movement, and have since human existence on this earth, and they continue to exist. Social media and its means have become one of the most prominent tools for spreading thought and awareness in this time, and it is distinguished by technological progress and the growing ability to disseminate diverse information, contradictory in its values and ideologies. This chapter deals with fake news on social media and its effect on democracy. It also deals with artificial intelligence and how it helps to generate fake news. The political awareness on social media platforms and its role in spreading awareness among members of society is also discussed, due to its apparent strength and tangible ability, and the real impact they make on attracting the public and satisfying its knowledge needs.

## **Social Media, democracy and fake news**

Mass media, or social media, in the end, is a media that is expected to inform, educate, encourage, create awareness, and inspire people. At the present time, social media sites are considered the backbone of modern media and the most powerful means in the media arena, due to the speed of their delivery of information, interaction with it, and its impact on the public. It was believed that social media would be the real public sphere that would foster public debate on how to build an open and democratic society: the best place to implement the concept of freedom of expression, democratic practice, the right to access information, and devote a culture of transparency and openness. Unfortunately, things do not always work out as planned. Social media, led by applications under the Meta umbrella, such as (Facebook, Instagram, Messenger, and WhatsApp), TikTok and Twitter generally, turned into a means to destroy the democratic experience and into a mechanism for waging symbolic and moral wars; a place of fake news and misleading news; and a place to spread the culture of violent extremism, bullying and hate speech. On the other hand, social media is still a weapon of the voiceless (Tucker *et al.*, 2017).

Social media has become ubiquitous in our daily lives, transforming the way we communicate, consume information and access news. However, the impact of social media on democracy is still a subject of great concern among experts. While social media has the potential to be a force for good by empowering citizens (Fatima *et al.*, 2015) and facilitating transparency and accountability, it also poses significant risks such as the proliferation of fake news.

How can the close relations between social media and democracy be judged? What are the mutual and missing roles between social media and democracy? What are the relations between fake news and social media? Media, in all forms, has the power to do what is not expected to be done, in addition to the significant influence and authority of it on government, individuals, organizations, etc. It is hard to ignore the enormous power of social media. Despite its hesitant beginnings as a “trivial way” to keep in touch with friends. Today, it has become a real force for societal change, highlighting previously unknown topics, deepening discussions and enable the citizens of the whole world to unite and activate change in multiple ways. Social media has two opposing factors to be judged: a propaganda tool, and an essential and effective tool to express an opinion and defend freedom and expression.

Social media is a digital propaganda tool (Astuti *et al.*, 2022) when it is used to spread fake news among people, which in turn leads to poisoning the atmosphere and fomenting hatred; instead of being used to promote political practice and a real implementation of democracy and fighting corruption, it promotes fanaticism and lies. There is no greater evidence of the misuse of social media than the excessive misuse of Twitter by Donald Trump, during his election campaigns, and during and after his presidency.

Fake news is not something new, but such an issue was pushed into the foreground by the spreading of COVID-19 when the World Health Organization (WHO) declared that time as an



"infodemic." Fake news became even more prevalent since Donald Trump began talking about the post-truth period and labelled news from ABC, NBC, and other media companies as fake news (Holan, 2017). The propensity of fake news generally on the internet and particularly on social media from time to time, comes from fake news promoters, who seem to be active users. These promoters might be any users, including officials, presidents, representatives, or even governments making official statements. The promoters have different goals and ideology to be achieved, which might be any of the following:

- Political goals include support for their political party or their government, or to root out hate speech; they could also be to undermine the confidence of citizens in their leaders. They might also be the opposition parties that aim to overthrow the ruling authority;
- Economic goals include destroying a brand reputation and raising doubts about a company's product or services for other competing companies. They might aim to destroy the company's stock price;
- Personal goals include smearing and defaming another person's credibility and reputation digitally through a deliberate process aimed at society's rejection of an organization, social group, person, or even a nation, which is known as "*character assassination*" (Davis, 1950). This respective also carries some political objectives as "political smear campaigns"; and lastly,
- Marketing goals can be achieved by presenting engaging phrasing, regardless of its veracity, in order to entice the users to read the button or click on to watch a video, hence boosting the number of viewers, followers, or subscribers on their social media accounts.

Another recent example that can be taken into consideration is an independent investigation conducted by News Guard (Cadier *et al.*, 2022), which concluded that "within 40 minutes of joining TikTok, fake news that is related to Russian invasion of Ukraine shows up," with different categories including fake livestreams, video games, and old videos. These kinds of contributions would result negatively in formulating a specific mental picture of goals, processes and outcomes and would direct public opinion to serve the hidden goals and ideology, as I argue. Social media in the Middle East, for example, especially after a revolutionary movement or an internal conflict with regional dimensions, has turned into a central mechanism used by the majority of actors, whether states, citizens, armed militias and even terrorist organizations, to express their vision, publicizing their ideas and promoting their goals. This behaviour leads to a deviation in the media from a framework of objectivity and professionalism to a context of polarization and politicization. This was seen during the Arab spring, which started in Tunisia in 2011.

Social media users are blamed for misusing the application and the platforms more than the platforms themselves, or their companies. Yet this 'misuse' has been an essential and effective means of defending freedom of opinion and expression and providing a platform for the

voice of the oppressed. An example of the effective use of social media was seen during the Israeli onslaught on Gaza City-Palestine in 2021 and in 2022. Social media platforms were wellutilized by the top influencers from all over the world. They invested their time and position to become the voice of the voiceless by posting the current events and talking more about the brutality of the aggression to educate people the world over about what was happing in Palestine. Furthermore, the excellent use of social media helped to create a global awareness of the Sheikh Jarrah neighbourhood cause in Jerusalem-Palestine, where Israel continues to attempt to expel 19 Palestinian families forcibly from the neighbourhood.

When we talk about democracy, we generally mean that everyone has a right to participate. Participation logically should be based on accurate information and it must not cause any harm to any individual. According to this point of view, the media in a democratic society are responsible for disseminating accurate information to the public. The advent of social media, however, has caused a shift in the manner in which people currently take part in democratic processes compared with how they did when they only had traditional media to rely on. Democracy and fake news are highly connected with and interlaced to social media. Fake news cannot be examined without social media within the context of democratic practice. The wide use of social media has facilitated the transmission and dissemination of fake news quickly, quantitatively and qualitatively. This shift in the media completely contradicts the principles and foundations of democracy. Therefore, this behaviour poses a direct danger to the foundations of the democratic system. The laws of democracy necessitate that individuals have the ability to obtain correct and accurate information in an environment free from any external influences.

Social media has an effective, essential and significant role to play in political reform and democratic transition; the media can make a difference. The media reflects the nature of the relationship between the elite and the masses, as well as the state and society. The value and practice of human rights would increase if a democratic atmosphere existed, as this would ensure the presence of independent media that enriches the human mind and promotes freedom of expression; as a result, both the theoretical and practical significance of human rights would increase. Free media is the harvest of a well-implemented democratic process. The democratic media is the institution that is responsible for the production of genuine democracy for our societies, one that both affects democracy and is influenced by it. The process of political reform and democratic transformation relies on elements such as the magnitude of freedoms, the diversity of viewpoints, trends and opinions within a country, organization, party or institution, as well as some factors that are inherent such as the nature of the political, social and cultural milieu. Any country's political decisions and strategies are associated with the ideology and philosophy of the ruling regime, the political operation system, and the political system, along with the level of independence in the context of the social structure.

Social media greatly aids the promotion of democracy in the following ways:

- Serves as a platform on a national level that allows many parts of society to express their opinions openly and respectfully, without any external threat from any power;
- Fosters a constructive and fruitful dialogue that takes into account all perspectives;
- Works as a mobilizing agent that facilitates and encourages civic engagement among all sectors of society;
- Increases more channels and avenues through which the public may participate, acting as a watchdog to prevent abuses of power and improving the transparency and openness of government, and holding public officials responsible for their conduct in the court of public opinion.

On the other hand, the high rate of dissemination of false information and fake news can affect the direction of human thought, political polarization, public opinion, decision making, and ultimately the democratic process. I argue that social media has the power to undermine democratic mechanisms and the democratic process worldwide by providing a competitive advantage to authoritarian regimes due to many reasons:

- First of all, social media does not have strict mechanisms to fight fake news or fragmented and incomplete opinions, except for the automated moderation systems and special content removal “algorithms.” This leads to an unjustified degree of censorship, which becomes a “digital dictator.”
- Second, social media platforms are evolving and developing at a pace that makes it difficult to challenge the substance of the content.
- Third, social media, and especially Meta, is highly criticized for being “echo chambers,” where people see only viewpoints that meet their desire or agree with their views. That is due to Facebook's algorithm, which is used to view the contents, which imprison people in closed, ideologically and politically harmonious spaces where there is no place for diversity.
- Fourth, political harassment, which is used by the governments against the users when their content does not agree with government policies.
- Fifth, it is possible for social media platforms to manipulate the public at will based on the decisions that platform operators make that are hidden from the general public. Their algorithms have the capacity to study and motivate populations to behave in ways that maximize the amount of money that can be made via advertising.
- Finally, social media has become a place for digital political mobilization to mobilize the public politically through exploiting the concepts of Identity and nationalism. This was seen in Arab Spring and Occupy movement.

Therefore, social media is no longer the place to become the “public domain” to implement democracy, because it does not turn societies into united, interconnected communities, due to the

false narratives that are so prevalent. As a result, the contrary occurs: social media contributes to intellectual isolationism and ideological and political polarization. Nor does it stimulate productive political dialogue with those who have beliefs that are different from one's own. People are segregated into politically cogent, intellectually consistent, and ideologically consistent groups that do not tolerate disagreement, debate, or the interchange of views. In its place, the construction of "information bubbles" that contribute to confirmation bias, occurs. Citizens grow more selfish, self-referential, and sure of their own rightness, becoming unwilling to listen to the perspectives of others in the process. Both the left and the right have become fertile breeding grounds for extremism. It is difficult to discover things that can be agreed on.

**Artificial Intelligence: generate or wipe out fake news.**

With the rise of digital media and social networking, fake news has become a pervasive issue in contemporary society. To combat this issue, there has been a growing interest in utilizing artificial intelligence to generate or wipe out fake news. While the use of AI to counter disinformation holds great promise, there are challenges and ethical concerns that must be addressed. One key advantage of utilizing AI in the fight against fake news is its efficiency and cost-effectiveness. AI-based solutions can detect false information and disinformation tactics used by bots and deepfakes with greater accuracy, thereby reducing the time and human resources required for detecting and removing false content. However, to effectively utilize AI in countering untruths online, large volumes of data and supervised learning are crucial. Without these essential components, the tools run the risk of erroneously identifying real news as fake, resulting in false positives and harm to legitimate sources.

There is no doubt that fake news has existed since time immemorial. It can be argued that it reached its peak when Joseph Goebbels was Germany's Minister of Political Propaganda during the Second World War. Following that war, it was commonly well-utilized during the Cold War. After the 2016 United States presidential election (Trump era), it became even more prevalent. Its forms and practices may indeed differ from one historical period and one spatial entity to another, but its presence and the efforts to employ it are not new.

We are living in a time period that is characterized by diverse technological advancements. These include the age of social media applications and platforms, the age of communications, the age of big information, the age of artificial intelligence (AI), and the age of fake news.

Nowadays, social media has become a source of information for most of its users. The availability of information and the open access to it on social media allows for a new wave of rumours and fake news. All of the aforementioned objectives of promoters can be achieved through the same psychologically-based strategies that are analogous to one another and are founded on the idea that people typically spread false news more than the truth, particularly when the false news is more exciting or when it agrees with their views or ideologies. However,

AI's identification of fake news remains unreliable. To begin, the present method of detection is predicated on the evaluation of text (content) and its social network in order to judge the reliability of the information. In spite of the fact that the origin of the sources and the pattern of dissemination of fake news have been identified, the basic problem resides inside the manner in which AI validates the true nature of the information.

What exactly is the relevance of artificial intelligence to the discussion at hand? AI has been around since the 1950s. The term was coined at a conference held at Dartmouth College in the summer of 1956 (Moor, 2006). According to Kaplan and Haenlein (2019), artificial intelligence is “a system’s ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation.” In other words, AI is a theory for developing machines to enable them to do things as intelligently as if done by a human. Doing things as a human requires a human mind's abilities, such as the ability to think, perceive, and solve problems, and to learn from mistakes and previous experiences. In this way, the mind gains new experiences and makes decisions through the method of collecting and analysing data; in this way, it can recognize speech and translate languages.

AI is based on Artificial Neural Networks and Computational Methods, with the help of Machine Learning and Natural Language Processing (Agatonovic-Kustrin & Beresford, 2000), to simulate the way some parts of the human brain work. AI's functions are supposed to validate individual claims; detect fake articles; pursue bigotry and hate mongers, and measure the reliability of news sources.

Will all the current social media platforms and internet websites, there will be much fake news. But AI is still the best resource to combat fake news in the arbitrary use of social media, but not much better than humans. Simply, AI works exactly like the human brain through the experiment of experience. Fake news nowadays is a “modern scourge” that is causing a big dilemma for companies, countries, governments and people worldwide. (The University of Queensland, 2020). The problem that faces AI is that AI is not dealing with fixed texts, photos, or videos. Therefore, this process will require more factors and inputs to identify fake news and determine the reasons behind it. AI is relying on the available data, which makes it difficult, but not impossible, for it to identify the fake news if:

- The fake news is mingled with accurate news;
- AI faces difficulty in reading or understanding the contents;
- The promoters use some techniques to avoid some AI checking by replacing some letters with some numbers. For example, replace the letter ‘H’ with the number ‘7’, or ‘q’ with the number ‘9’. Another technique that is used today in social media content is the use of "hypnone," ‘comma,’ or ‘space’ within one word. For example, America can be written like ‘Am-er-ica,’ ‘Am, er, ica,’ or ‘Am er ica’. This method is a positive use to avoid the

unjustified degree of censorship. Such a method is used by Palestinian supporters to avoid the arbitrary content removal that criticizes Israel; and

- Fake news is subject to different interpretations and manipulation among users. The future challenges associated with combating the spread of fake news technically remain, as an algorithm invented today may not be able to detect fake news in the future. The issues that are involved with preventing the spread of fake news will theoretically continue to exist in the future, especially when it's associated with action from other countries.

Artificial Intelligence Journalism for Research and Forecasting (AIJRF) published an article showing the ability of artificial intelligence to evolve to produce fake news (Ali, 2021). The article stated that AI would make matters worse when it is utilized in this way. At the same time, AI has produced techniques with the help of deep neural networks called deep fakes, which are artificial production that have the ability to adapt or replace videos, pictures, and audio to make a new video for people who have never done it. This kind of production takes a fake news or misinformation form. Recently, in August 2022, a video call between the 5th president of Iraq, Saddam Hussein and Trump spread on social media from TikTok in the Middle East. According to Agence France-Presse (AFP) fact-finding, the video was faked and composite.

On the other side of AI, the heavy censorship control of fake news can be viewed as a potential outcome of an assault on a person's right to free speech and expression if efforts are made to curb the circulation of fake news.

Sometimes it is difficult for humans to determine fake news even with double checking. As a result, the most important question may be the following: who or what decides what constitutes fake news? How can we be sure that artificial intelligence filters won't lead us into the false positive trap, in which information is wrongly labelled as phoney because of the data with which it is associated? AI can also be misused when it is used as an excuse for justification by authoritarian governments to remove any critical content or to prosecute people who do not support that government. So the application of AI systems will require transparent management with a third party to monitor it.

The issue of fake news is crucially significant due to the massive volume of daily digital content production. Fortunately, there is an increasing number of AI solutions available today that can help detect and counteract such fake news. Among them: The Factual, Logically, Full Fact, Grover, Sensity AI, Alto Analytics, etc. AI helps to fight news, but at the same time, it creates fake news. Such fake news will be used in a global cyber war with the help of electronic armies. In conclusion, I argue that critical thinking by humans is the most effective form of defence. In spite of the fact that devoting resources to the use of AI to counteract the spread of fake news is unquestionably worthwhile, exercising caution and being transparent about the process is essential. Unfortunately, new technical solutions might not be the panacea that everyone is hoping for.

### **The relationship between democracy and political awareness on social media**

Political awareness is one of the most important types of social awareness. It is represented in the individual's awareness of all the politically-oriented events surrounding him or her, whether it is local, regional or global. It requires the ability to link between various events to be able to understand the apparent and hidden intentions, goals and ideology of each scheme, policy or even a piece of news. Since democracy is based on the fact that the people are the source of all authority, individuals and groups must be educated and alerted to the need to assume their responsibilities towards their nation, whether in times of hardship or prosperity. Social media has a great role in shaping awareness through its daily follow-up, analyses and interpretations of events and data, so political reporting plays a major role in shaping the trends, opinions and ideas of members of society. It also contributes by providing the individuals with the knowledge of their culture, which is the process through which the individual becomes aware of the political system and its perceptions.

Political awareness has three dimensions: First, the cognitive affect dimension, which represents the gate upon which the upright behaviour of public opinion is built. If the information that is flowing at all levels is honest and expresses the truth, it contributes to the development of awareness. Conversely, if it is fake and/or misleading news it leads to dismantling societies and creating a false image. The role of social media emerges in disseminating accurate news so that the upright behaviour of political awareness is fostered. Social media has a great influence in this regard. Social media provide the necessary information to individuals related to the basic variables of the political environment, such as the political system, the political norms and values prevailing in society, how politics is practised in this system, and the important political institutions in society. The most important cognitive influences of social media are as follows:

- Informing citizens of their political rights as recognized by constitutions and laws;
- Familiarizing citizens with the prevailing electoral system and how to exercise the right to vote;
- Introducing citizens to the vocabulary of the surrounding political environment and all decision-making positions in the elected councils;
- Introducing citizens to the methods of democratic practice at the level of participation in decision-making, expressing a personal opinion, legitimate means of self-expression, a peaceful demonstration that does not harm the security and stability of society, expressing an opinion in the media, and how to address the concerned government agencies to solve problems;
- Familiarizing citizens with political developments at the local, regional and international levels by providing honest, accurate and comprehensive information that helps establish an informed opinion on these events, and

- Changing the traditional value system and replacing it with a modern and contemporary value system that helps effective participation.

Second is the emotional effect dimension. This means the extent of the influence of social media in determining and shaping the attitudes adopted by the individual towards issues related to the political environment. The stage of awareness and knowledge of political issues leads to another stage of influence, which is attention to and follow-up on these issues. This expression and transition from one stage to another affects and is affected by patterns of exposure to social media. The emotional effects are determined in the following points:

- Forming individuals' attitudes and opinions regarding the electoral system in force, as well as forming their attitudes regarding the electoral process and its management method;
- Shaping the attitudes and opinions of individuals towards political and other active political institutions in society;
- Shaping the attitudes and opinions of individuals regarding political participation at all levels and in all fields, and
- Shaping the attitudes and opinions of individuals about the dangers of individuals' reluctance to participate in politics and the negative economic, political and social consequences of that.

Third is the behavioural effect dimension. This is meant to indicate the relationship between exposure to the media and real participation in the activities of the political environment. The stage of behavioural influence is the most important stage of the media's influence on political awareness, as it is the true translation of all the knowledge and information acquired by the individual related to a political environment, and the attitudes and trends that this knowledge and information produced that help activate participation in the political process.

The current century is characterized as the era of social media and technology, and what it has become because of its capabilities, not only by the massive amount of information but also by how it affects conviction. Ideas are formed through positive or negative persuasion, which generally aims to spread knowledge and information, and particularly political culture. Social media has emerged as a crucial and increasingly important factor in political, economic, social, and cultural development, and this is a recent phenomenon. Social media applications are at hand all the time and are used by all people, among them political parties. So social media is often utilized as a propaganda weapon. The positive use of social media will lead to positive results, and vice versa. Social media is affecting politics; it could lead to disseminating awareness and lead to political mobilisation.

In light of the momentum of events on the political scene, social media plays a significant role in shaping the political awareness of a wide section of people who derive their information from social media, most of whom are specifically targeted. Such social media posts, photos or videos express only their owners' views, indicating the formation of the citizen's political



culture. It will be in accordance with the policy, opinions, and directions of the newspaper that produces it, whether on social media or not. The democratic media is among the aspects related to how the political awareness of the citizen is formed. The formation of political awareness does not take place overnight. Rather, it begins from the first moments of childhood through the stages of school, university, clubs, and all groups to which the individual belongs. The formation of awareness is a continuous process from birth to death. Political parties and social media have a role to play in this regard, but the role of social media is a major one, in addition to civil society organizations. The media has the right to have its own direction - it is challenging to be completely impartial - but at the same time, it must be highly professional. In this context, the most dangerous thing people are facing now is the wave of lack of political awareness, or misunderstanding of the truth of any given situation, because some social media outlets promote specific political trends that they want people to believe. There is a danger of believing rumours, especially negative ones. Social media must play its rightful role in maintaining truthfulness and integrity. Political awareness comes from several sources, the most important of which is the media institution, which bears the most crucial part in shaping awareness.

Furthermore, open political seminars and conferences on the use of social media are important in spreading citizens' awareness. The greatest danger that the absence of political awareness can cause is the loss of trust between citizens and rulers, and causing people to not differentiate between things that are important and the most important, and those which are not.

The absence of political awareness on social media might lead to promoting and activating the role of opposition parties, who aim to create confusion among the people by using misleading news and fake news. The spreading of confusion on social media leads to brainwashing by distorting and interpreting what was written or said to serve the intended purpose.

Social media alone will not solve all the world's problems. In conclusion, social media is a double-edged sword: It is the main source of fake news and the main source of getting news; it has a huge effect on democracy implementation, along with the potential to destroy it; It is a propaganda tool and an essential and effective tool to express an opinion; It shapes positive political awareness and makes negative political polarization and politicization. Finally, AI is still the best option to combat fake news, regardless of its negative use.

**References:**

1. Agatonovic-Kustrin, S., & Beresford, R. (2000). Basic concepts of artificial neural network (ANN) modeling and its application in pharmaceutical research. *Journal of pharmaceutical and biomedical analysis*, 22(5), 717-727.
2. Ali, S. M. (2021). *Does Artificial Intelligence Detect Fake News or Create it?* Artificial Intelligence Journalism for Research and Forecasting. <https://aijournalism.net/doesartificial-intelligence-detect-fake-news-or-create-it/>

3. Astuti, Y. D., Attaymini, R., & Dewi, M. S. R. (2022). Digital Media and War: social media as a Propaganda Tool for the Russia-Ukraine Conflict in the Post-truth Era. Annual International Conference on Social Science and Humanities (AICOSH 2022).
4. Cadier, A., Labbé, C., Padovese, V., Pozzi, G., Badilini, S., Schmid, R., Roache, M., & Brewster, J. (2022). *WarTok: TikTok is feeding war disinformation to new users within minutes — even if they don't search for Ukraine-related content*. News Guard.  
5. <https://www.newsguardtech.com/misinformation-monitor/march-2022/>.
6. Davis, J. (1950). *Character assassination*. Philosophical Library.
7. Fatima, S., Manzoor, U., Zafar, B., & Balubaid, M. A. (2015). Analyzing the Impact of social media on Users. *International Journal of Computer Science Issues (IJCSI)*, 12(3), 141.
8. Holan, A. (2017). The media's definition of fake news vs. Donald Trump's. *First Amend. L. Rev.*, 16, 121.
9. Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business horizons*, 62(1), 15-25.
10. Moor, J. (2006). The Dartmouth College artificial intelligence conference: The next fifty years. *Ai Magazine*, 27(4), 87-87.
11. Queensland, T. U. o. (2020). *How AI is being used to fight fake news*. The University of Queensland.  
<https://sponsored.chronicle.com/how-ai-is-being-used-to-fight-fakenews/index.html>.
12. Tucker, J. A., Theocharis, Y., Roberts, M. E., & Barberá, P. (2017). From liberation to turmoil: social media and democracy. *Journal of democracy*, 28(4), 46-59.

## **E-LEARNING: - TRENDS, USAGES, AND CHALLENGES**

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### **Abstract:**

Many students are currently using their mobile devices to access online resources while incorporating traditional communications. The research-based approach to online learning and the integration of massive data, however, is expanded by the new idea of "large data" in contemporary ICT talks. In terms of quality and growth in Indian LIS education, this study examines the significance of E-learning in higher education. This article also includes descriptions of some of India's most important programmes and the targeted demographics it serves. In order for future leaders to be better prepared for modern technology, it is important to stress the value of information and communication technology understanding. In India, where the demand for higher education is similar to that seen elsewhere, this study offers a vision for the future of online learning.

### **Introduction:**

Online education has been used for a while now. Education providers have increased the effectiveness and efficiency of their services by using online learning. The management of information and communication technology and information and communication (ICT) systems using online learning programmes, often known as e-learning or m-learning, has become a popular method of education for many providers across the globe.

The 'learning economy' has gotten a boost from the development of information and communication technologies (ICT), and a person's (or an institution's) real power depends on how well they can absorb and use new information. In both the formal and informal educational sectors, this has increased demand for electronic learning. The usage of information and communication technologies (ICT) is supported by e-learning. In order to improve the learning process, electronic learning is based on any reading material created at any moment using audio, video, text, and animation.

E-learning can be accessed via the Internet, intranet testing, CDs, DVDs, or a combination of those, as well as other media. For those who are interested in studying at any time and anyplace, it offers learning platforms. includes face-to-face instruction as well as online technological training. With the aid of particular technologies, such as (a) computers or portable computing devices like notebooks, tabs, or smart phones, (b) special multimedia equipment in the form of markers, speakers, video cameras, LCD projectors, CDROM / DVD, touch screens, pens with lights, smart boards, video-conferencing, etc., (C) and other communication tools are

used in addition to Local Area (LAN) or Wide Area Networks (WAN), training or learning courses are provided through e-learning. Along with these technical requirements, e-learning also needs a lot of help from some common applications. According to the east, a lot of software programmes are being created to assist e-based notions, and efforts are being made to bring back traditional education systems in emerging nations. Visual teachers are another idea that is introduced by e-learning. Despite the fact that some or all of these tools were once available in India, particularly in the North Indian subcontinent, the public use of these eLearning centres has not yet been made known.

The objectives listed below are what this book chapter aims to accomplish. To accomplish these research goals, both conventional and constrained methodologies have been used in this paper. 1. Recognise what e-learning is. 2. Encourage technology students to use learning resources more effectively. 3. Evaluation of how students responded to questions about the use of elearning in their studies. Responses from technical students using only traditional learning methods and those using e-learning in addition to traditional learning methods were included in the research data. The target population for this study consisted of students enrolled in the following programmes: a) Bachelor of Computer Applications (BCA); b) Master of Science in Information Technology, or M.Sc. (IT); and c) Post Graduate.

### **About e-learning**

Depending on the purpose for which it is used, e-learning is also known by a variety of other names, including Managed Learning Environment (MLE), Virtual Learning Environment (VLE), Learning Platform (LP), and Programme Courses Management (CMS). As opposed to this, the term "CMS" is used in the United States to refer to e-learning systems, while "VLE" and "LMS" are used in Europe and India, respectively, for virtual learning. The goal of elearning is to employ a computer programme that combines multiple software, hardware, and communications in order to provide a straightforward but effective interface that can easily accommodate the needs of participants at all levels. An effective e-learning system can also include a variety of teaching aids, including multimedia, including graphs, video, audio, text, moving graphics, and much more. The visual learning environment manages data management, file management, response management, content management, content distribution, financial transaction management, etc. in addition to providing a visual user interface. For teachers, teachers, trainers, and supervisors as well as students. A trade mode and a non-commercial mode that also supports open-source concepts are the two fundamental types seen in the visual analysis. Among online learners, Web CT, Intelligent Classroom, and Modular Object-Oriented Dynamic Learning Environment (MOODLE) are some of the most well-liked e-learning websites. As a result, there is a significant gap between access to the physical environment and typical classroom learning. Because the reader is expected to read, visual reading might occasionally have an impact on him. Despite the fact that students have access to any reading at any time, it is up to them to decide

how much money they want to spend. The focus of a virtual learning environment is less on the subject matter itself and more on overcoming challenges that may emerge for the student at various levels of autonomous education. Contrary to traditional classroom education, where the teacher has options to accommodate various student types, learning content remains the same for all sorts of pupils. Learning takes a long time in traditional learning. At the time, it was thought that e-learning only applied to traditional teaching techniques like lecturing and following rules. Ellis, however, claimed that it incorporated audio and visual instruction in 2004. Ellis dismissed the debate raised by authors like Nichols who never considered the web as a component of online learning and claimed that online reading is only conceivable with web-based tools since technological aspects are present in the actual sense of the term.

### **ICT and education**

The latest technology is incorporated into the learning processes, material delivery, administration, and curriculum by educational providers. Many different audiences can be connected through e-learning, and they all have the same level of access to excellent education. While using high-quality ICT can give institutions a competitive marketing strategy, the use of online education can help institutions by enabling them to increase their standing in society.

The Massachusetts Institute of Technology (MIT) employed an online flight announcement to train pilots, which marked the beginning of ICT in education. The first commercially available computer was then made available by IBM. Apple debuted the Apple II, sometimes referred to as a personal computer, in 1967. In the United States, 1 in 12 school children had access to a computer by 1996. Another significant turning point in the history of literacy occurred with the introduction of the Internet in the 1990s, when pupils began to read high school textbooks. Asynchronous education is a technique of content delivery in which users can access the material at their own pace and are not forced to do so simultaneously. This may be delivered via voicemail, email, or other audio. However, synchronisation technology necessitates simultaneous attendance for participants, like in the case of taking part in a video conference, Internet radio, live streaming, etc. Mode of asynchrony. Flexible learning is a different kind of online education technology that turns the presentation of unique student content into a visual response to student performance.

Students can easily see material thanks to ICT, and they can also work together on projects as part of the learning process. They should consider using technology to enhance their learning, though. Additionally, while social interaction enables students to participate, there are fewer emotional connections than with face-to-face communication. So how do institutions gauge community needs, academic success, and technology needs? The cloud is the most popular educational technology adoption strategy, to sum up. Learning Management Systems (LMS) assert that cloud computing has actually altered how higher education institutions are able to employ online learning resources. They can access the most recent online learning

programmes thanks to cloud computing without having to make significant investments in IT infrastructure.

### **Indian context of e-learning**

E-learning, although late in India, is widely accepted. India is probably looking to the western success in adopting e-learning and trying hard to apply it. Over the past few years, the Department of Labour has been working to achieve the goal of making education accessible to all parts of the country. However, there are many parts of the world, which are in the dark about e-learning. Thanks to India's growing economy, India has the potential to be at the heart of e-learning systems. There are many e-learning classes coming to India to build and develop e-learning infrastructure. E-learning does not seem to replace ordinary classes with black boards but seems to be in line with the existing system. The program instead promises to reach remote and rural areas of India where education is still in the dark. This goal can be achieved by providing PCs at low cost through a broadband connection. The power of e-learning to strengthen the education system in India is very high. In addition, Government has also introduced programs to improve the technical quality of graduates who encourage them to pursue research and teaching. E-learning is growing rapidly and seems to dominate the world because of its educational benefits (Mishra, 2009). The scope of e-learning is huge in India as many e-learning companies are moving forward in providing this service. While nothing could be further from the popularity of traditional classroom teaching, e-learning offers a great value to the process, independent of the grade. In India, the e-learning environment is still developing and is in the testing phase. Traditional minds are changing, business and business sectors are at the forefront of adopting technology-based learning networks. Many institutions have begun implementing teacher-led programs using e-learning learning modules. Government efforts are also not backing down. Guessing the continuous development of study marks in India is good. Many efforts are currently underway to provide a high level of literacy for many people in urban and rural areas, through the use of highly effective web resources and practices. A major obstacle to the adoption of e-learning may be due to Indian ideas that are more inclined to traditional classroom teaching (HANSEN, 2008). The visibility of e-learning is currently limited to IT and educational CDs, but with PC access and full internet access rising in the country, the future of e-learning looks promising, as long as the planning and delivery of content is well planned.

### **Outcome analyse of India's e-learning education**

India's education industry has expanded beyond the four walls of the classroom. The online learning market in India is expanding rapidly as a result of the introduction of new internet connectivity and high-end smartphones. India's e-learning business is thought to be worth \$3 billion. The sector benefits from central government initiatives to encourage pupils to attend school across the nation. Online education is currently equally focused on intermediate and advanced level courses in India. For all of India's engineering and medical entry exams, for

instance, Entrance India, situated in Bengaluru, provides practise exams. The organisation wants to prevent pupils from becoming lost in the sea of reading materials available from various sources and instead assist them concentrate on pertinent topics and substance. Studies predict that by 2020, India and China would produce four million and 8.1 million roles in project management, respectively, leading the world in job growth. The company so appears to be expanding going forward. Online training will also get better since skills need to be improved. For instance, around ten years ago, all a software professional needed to know was a few programming languages. These specialists now need to upgrade their knowledge of additional aspects like big data and cloud computing. People are enrolling in new courses for a variety of reasons, including better pay and promotions. Numerous stratus have already stepped foot on what they predict will surpass e-commerce as the next big thing in India. While some businesses, like Simply Learn, focus on creating information, particularly for middleclass professionals, others, like Funda Social, play more of an aggregator role. Additionally, these businesses provide self-study courses and integrated classes that combine online and offline learning. More than 200 project management courses, IT services management, Microsoft certification, quality management, and financial management are all offered by the Simply Learn company, which has its headquarters in Bengaluru. The organisation has more than 600 workers, offers more than 300 courses in 150 countries, and has trained more than 200,000 people globally. Since its launch in 2011, Intellipaat has provided online instruction for IT professionals, including corporate training, private courses, and more than 80 technical courses in a variety of subjects. Diwakar Chittora, the company's chief executive, claims that growth is increasing by roughly 1,000%. In addition to others, the organisation is in charge of Genpact, Nokia, Sony, CISCO, TCS, Wipro, and Tata Communications. Learnsocial, a sixmonth-old business with its headquarters in Hyderabad, using an aggregator business strategy. It strives to serve both students and professionals from the middle class. "Our goal is to become Amazon for online education. According to CEO Raju Vanapala, we plan to offer thousands of posts on learnsocial.com, including content from different experts, content companies, or colleges. Learn social has trained more than 1,100 students and has over 200,000 users. It is vital to create strategies that include the components and traits of excellent ICT practises, which were covered in the introduction, in order to meet these expectations.

By examining the diverse objectives of the participants, the study has been able to identify the major strengths and essential components of success that provide the direction and resources required to begin and realise the potential of online learning. Online learning will only be successful if these crucial success elements are recognised and managed. According to research, people's characteristics like age, education level, and online learning are important as aspects that benefit individuals in general online learning programmes. It's critical to comprehend how these facilitators influence consumers' preferences for the various kinds of

available online learning services. The study looked at a few of the materials used and gave information about their minimal influence on mobile learning and e-learning systems. The acceptance of programmes and people's capacity to use them are influenced by the quality of education. The likelihood of success increases with education level. Given that education in Brunei is free for all and that most respondents have completed high school, persons who are well-educated may comprehend how online learning methods work when they are used. In educational and professional environments, female students predominate over male students in terms of gender composition. Compared to male students, female students frequently have a greater understanding of the value of higher education. The majority of responses (ranging in age from 10 to 40) are young. This demonstrates that because they have greater access to ICT, young people are more inclined to accept online learning when it is offered.

In terms of Internet literacy, the majority of respondents have access to and regularly use the Internet. Additionally, online activities, such as online learning, are not significantly hindered by the amount of online learning among young people in Brunei. In light of the study's findings, it is anticipated that online learning will be generally embraced.

Similar to this, computer education in Brunei promotes an online learning programme because most respondents use their computer or smartphone on a regular basis. This demonstrates that the majority of people are computer literate and can access information using a PC and/or smartphone. As a result, it is anticipated that the general public will embrace and support online learning services. In addition, a sample of the research has shown good results. In conclusion, the majority of respondents are young adults with a high school diploma or equivalent, which explains why they prefer how these programmes are being implemented.

#### **Challenges and future directions:**

We receive a significant amount of data every day from several sources in the age of big data. The difficulty facing all educational institutions is how huge data may be used in the educational setting and how such data can be handled, examined, and optimally used to the teaching and learning process. Massive amounts of created organised and unstructured data can be utilised to collect large data, which can then be used to provide value in the form of patterns or relationships. Large data integration in online learning offers the potential to apply predictive information that is pertinent to each student. Institutions can provide services that comprehend contexts, forecast outcomes, and continuously learn from by integrating huge data analytics into online learning systems.

#### **Conclusion:**

This study provides crucial insights into online learning and activity-based Internet behaviours. According to our research, online learning is increasingly replacing traditional face-to-face instruction. Online education, according to the respondents, has advantages like shorter student commute times and more scheduling flexibility. Online learning is simple since it can be



completed at any time and from any location with just a few mouse or finger touches. Additionally, since online learning or apps just need access to a website, online learning systems function very well.

Information transmission and display have been significantly impacted by the growth of Internet organisations and structures. Everything from the information in this text to the streaming of audio and video files as well as simulation is supported by the wide band of today's internet. The Internet is incredibly important to e-learning since it provides a visual learning environment. Developed nations have long backed e-learning, and it has a promising future. Elearning is starting to pay off for developed nations like India. Only emails and search engines are the most popular of the six thought-provoking tools for students using e-learning, according to this thesis paper's data on numerous questionnaires from higher education students studying technical subjects in northern India. These online learners' opinions of several of the visual tools were mixed. The answers of these kids to eleven numbers were also examined. These findings demonstrate that students who use e-learning in addition to traditional learning have the same perceptions across all eleven difficulties. Additionally, this group of students' perspectives on all 11 of these topics are considerably different from those of students who exclusively employ conventional teaching techniques. Young Internet users who prefer to use online media make up the majority of participants, yet they are unsure of how online learning would affect their research performance. Online study programmes provide opportunities for both students who live distant from the study centre they wish to attend and students who may not be able to leave their jobs but can nonetheless enrol online.

**References:**

1. Mishra, Sanjaya. "E-learning in India." *International Journal on E-Learning*. Vol. 8. No. 4. Association for the Advancement of Computing in Education (AACE), 2009.
2. Hansen, Heidi Bakk. "INDIA: E-Learning has Potential to Manage Teacher Shortage, OWL Institute." *Retrieved April 24 (2008): 2010*.
3. <https://sde.uoc.ac.in/>
4. <https://www.ijser.org/paper/E-Learning-Usage-among-Indian-Students.html>

## वर्तमान युग में नारी का राष्ट्र निर्मिति में अवदान

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### सारांश:

नारी प्रकृति एवं ईश्वर प्रदत्त अब्दुत पवित्र साध्य है किसी भी राष्ट्र को सुदृढ़ सशक्त व आत्मनिर्भर बनाने के लक्ष्य उस राष्ट्र के प्रत्येक नागरिक को सशक्त बनाकर ही प्राप्त किया जा सकता है जिसके लिए महिलाओं व पुरुषों दोनों के सम्मिलित प्रयास आवश्यक है कहा भी जाता है | "यत्र नार्यस्तु पूज्यंते रमंते तत्र देवता"

दुनिया के विकसित तथा विकासशील देशों में सबसे बड़ा अंतर यह है कि विकसित देशों में महिलाओं को शिक्षा स्वास्थ्य एवं सुरक्षा पूर्ण रूपेण प्राप्त होता है, जबकि विकासशील देशों में महिलाओं को पूर्ण आजादी साक्षरता और स्वास्थ्य आंशिक रूप में ही प्राप्त हो पाता है। तथापि भारतीय नारी विभिन्न माध्यमों से राष्ट्र निर्मिति में अपनी भूमिका का सफल निर्वहन करती दृष्टिगोचर होती है।

**कुंजी शब्द:** भारत, महिला, राष्ट्र निर्माण, योगदान।

### प्रस्तावना:

वर्तमान युग में समय ने करवट ली है, जिसमें नारी राष्ट्र-निर्माण की भूमिका में उठ खड़ी हुई है। किसी भी राष्ट्र की प्रगति और विकास तभी सम्भव है, जब उस राष्ट्र की नारियां भी सक्रियता से राष्ट्रीय अवदान में क्रियाशील हों। राष्ट्र सामान्यतः समाज अथवा समाजों का एक सुसंगठित और प्रशासनिक रूप है, जो प्रत्येक देशवासी के लिए ईश्वरीय स्वरूप में स्थापित होता है। ईश्वरीय स्वरूप में स्थापित होने के कारण राष्ट्र निर्माण का कार्य ईश्वरीय कार्य करने के तुल्य है। इस ईश्वरीय कार्य को करने में जहाँ पुरुषों ने अपना जीवन न्योछावर किया है, वहीं नारियाँ भी इस कार्य में पीछे नहीं रहीं हैं। जब भारतीय ऋषियों ने अथर्ववेद में 'माता भूमिः पुत्रो अहं पृथिव्याः' (अर्थात् भूमि मेरी माता है और हम इस धरा के पुत्र हैं) की प्रतिष्ठा की तभी सम्पूर्ण विश्व में नारी-महिमा का उद्घोष हो गया था।<sup>1</sup> नेपोलियन बोनापार्ट ने नारी की महत्ता को बताते हुए कहा था कि - 'मुझे एक योग्य माता दे दो, मैं तुमको एक योग्य राष्ट्र दूंगा।' भारतीय जन-जीवन की मूल धुरी नारी (माता) है। यदि यह कहा जाय कि संस्कृति, परम्परा या धरोहर नारी के कारण ही पीढ़ी दर पीढ़ी हस्तान्तरित होती रही है, तो यह अतिशयोक्ति नहीं होगी। जब-जब समाज में जड़ता आयी है, नारी शक्ति ने ही उसे जगाने के लिए, उससे जूझने के लिए अपनी सन्तति को तैयार करके, आगे बढ़ने का संकल्प दिया है।

परिवार के केन्द्र में नारी है। परिवार के सारे घटक उसी के चतुर्दिक घूमते हैं, वहीं पोषण पाते हैं और विश्राम। वही सबको एक सूत्र में पिरोये रखने का प्रयास करती है। किसी भी समाज का स्वरूप वहां की नारी की स्थिति पर

निर्भर करता है। यदि उसकी स्थिति सुदृढ़ एवं सम्मानजनक है तो समाज भी सुदृढ़ एवं मजबूत होगा। भारतीय महिला सृष्टि के आरंभ से अनन्त गुणों की वाहिता रही है। धरा सी सहनशीलता, सूर्य सा तेज, समुद्र सी गम्भीरता, पुष्पों सा मोहक सौन्दर्य, कोमलता और चन्द्रमा सी शीतलता महिला में विद्यमान है। वह दया, करुणा, ममता, सहिष्णुता और प्रेम की पवित्र मूर्ति है। नारी का त्याग और बलिदान भारतीय संस्कृति की अमूल्य निधि है। बाल्यावस्था से लेकर मृत्युपर्यन्त वह हमारी संरक्षिका बनी रहती है। सीता, सावित्री, गार्गी, मैत्रेयी जैसी महान् नारियों ने इस देश को अलंकृत किया है। निश्चित ही महिला इस सृष्टि की सबसे सुन्दर कृति तो है ही, साथ ही एक समर्थ अस्तित्व भी है। वह जननी रूप में मातृत्व महिमा से, सहचरी रूप में अर्धांगिनी के सौभाग्य से, गृहस्वामिनी रूप में अन्नपूर्णा के ऐश्वर्य से एवं शिशु की प्रथम शिक्षिका रूप में गुरु की गरिमा से गौरवान्वित है। महिला घर, समाज और राष्ट्र का आदर्श है। कोई पुण्य कार्य, यज्ञ, अनुष्ठान, निर्माण आदि महिला के बिना पूर्ण नहीं होता है। सशक्त महिला सशक्त समाज की आधारशिला है।

यदि महिला को श्रद्धा की भावना अर्पित की जाए तो वह विश्व के कण-कण को स्वर्गिक भावनाओं से ओतप्रोत कर सकती है। महिला एक सनातन शक्ति है। वह आदिकाल से उन सामाजिक दायित्वों को अपने कंधों पर उठाए आ रही है, जिसे अगर पुरुषों के कंधे पर डाल दिया गया होता, तो वह कब का लड़खड़ा गया होता। पुरातन कालीन भारत में महिलाओं को उच्च स्थान प्राप्त था। पुरुषों के समान ही उन्हें सामाजिक, राजनैतिक एवं धार्मिक कृत्यों में भाग लेने का अधिकार था। वे रणक्षेत्र में भी पति को सहयोग देती थीं। देवासुर संग्राम में कैकेयी ने अपने अद्वितीय रणकौशल से महाराज दशरथ को चकित कर दिया था। याज्ञवल्क्य की सहधर्मिणी गार्गी ने आध्यात्मिक धन के समक्ष सांसारिक धन तुच्छ है, सिद्ध करके समाज में अपना आदरणीय स्थान प्राप्त किया था। विद्योत्तमा की भूमिका में कालिदास को संस्कृत का प्रकाण्ड पंडित बनाने में सफलता प्राप्त की। तुलसीदास जी के जीवन को आध्यात्मिक चेतना देने में उनकी पत्नी का ही बुद्धि चातुर्य था। मिथिला के महापंडित मंडनमिश्र की धर्मपत्नी विदुषी भारती ने शंकराचार्य जैसे महाज्ञानी व्यक्तित्व को भी शास्त्रार्थ में पराजित किया था।

ऐतिहासिक विकास क्रम पर दृष्टिपात करने से हमें राष्ट्र निर्माण में महिलाओं की भूमिका की एक समृद्ध परम्परा दिखायी देती है। उनकी भूमिका कभी राष्ट्र निर्माण में सहायक के रूप में तो कभी स्वयं राष्ट्र निर्माता के रूप में रही है। हड़प्पा संस्कृति व सातवाहन राजवंशों में स्त्रियों को सामाजिक व राजनीतिक व्यवस्था में विशेष स्थान प्राप्त था। मध्यकाल में रजिया सुल्तान ने दिल्ली सल्तनत की बागडोर को अपने हाथों में ले लिया। स्वतंत्रता संघर्ष के दौर में जब भारत ने ब्रिटिश शासन के विरुद्ध 1857 में विद्रोह किया तो इसमें भी महिलाओं ने अपने-अपने स्तर पर योगदान देकर राष्ट्र की संकल्पना को साकार करने का प्रयास किया। महारानी लक्ष्मी बाई, झलकारी बाई, बेगम हजरत महल का नाम इस संदर्भ में उल्लेखनीय है। स्वदेशी आंदोलन, असहयोग आंदोलन, सविनय अवज्ञा आंदोलन व भारत छोड़ो आंदोलन जैसे राष्ट्रव्यापी आंदोलनों में महिलाओं ने पुरुषों का बराबरी से साथ दिया और राष्ट्र की स्वतंत्रता के पावन कार्य में अपना अमूल्य योगदान दिया।

नारी के लिए यह कथन कि वह - "विविधता में एकता है" कोई अतिशयोक्ति नहीं है, क्योंकि महिलाओं के बाह्य स्वरूप, सौन्दर्य और पहनावे में विविधता तो होती है, लेकिन उनके मानस में एकाकार और केन्द्रीय शक्ति ईश्वर की तरह 'एक' ही होती है। इसी शक्ति के इर्द-गिर्द खगोलीय पिण्डों की भाँति अनेक प्रकार के सद्गुण निरन्तर गतिमान रहते हैं जैसे- विश्वास, प्रेम, करुणा, निष्ठा, दया, समर्पण, त्याग, बलिदान, ममता, शीतलता, स्नेह, कुशलता, कर्तव्यपरायणता, सहनशीलता, मर्यादा, समता, सृजनशीलता और सहिष्णुता इत्यादि। इन्हीं विविध शक्तियों के परिणाम स्वरूप महिलाओं का परिवार, समाज और राष्ट्र-निर्माण एवं विकास में अद्भुत और अतुलनीय योगदान है। मानव कल्याण की भावना, कर्तव्य, सृजनशीलता एवं ममता को सर्वोपरि मानते हुए महिलाओं ने इस जगत में माँ के रूप में अपनी सर्वोपरि भूमिका को निभाते हुए राष्ट्र-निर्माण और विकास में अपने विशेष दायित्वों का निर्वहन किया है। बच्चों को जन्म देकर उनका पालन-पोषण करते हुए उनमें संस्कार और सद्गुणों का उच्चतम विकास करके राष्ट्र के प्रति उनकी जिम्मेदारी को सुनिश्चित करती हैं ताकि राष्ट्र-निर्माण और विकास निर्बाध गति से होता रहे। माँ के पश्चात पत्नी का अवतार राष्ट्र-निर्माण और विकास में महत्ती भूमिका निभाता है। भारतीय समाज में महिलाएं परिवार की मुख्य "धुरी" है, जो कि "अन्नपूर्णा" के ऐश्वर्य से अलंकृत और सुशोभित है। भारतीय संदर्भ में देखा जाए तो लगभग 65 प्रतिशत महिलाएं कृषि एवं पशुपालन का कार्य करते हुए देश की अर्थव्यवस्था के विकास को बढ़ावा देती हैं। महिलाएं ही संस्कृति, संस्कार और परम्पराओं की वास्तविक संरक्षिका होती हैं। वे पीढ़ी दर पीढ़ी इनका संचारण और संरक्षण करती रहती हैं। कहा भी गया है कि- सशक्त महिला, सशक्त समाज की आधारशिला है। माता बच्चों की प्रथम शिक्षिका है, जो बच्चों के सर्वांगीण विकास के लिए उत्तरदायी है। आज भी नारी पुरुषों के समान ही सुशिक्षित, सक्षम और सफल है, चाहे वह क्षेत्र सामाजिक, आर्थिक, राजनैतिक, धार्मिक, खेल, कला, साहित्य, इतिहास, भूगोल, खगोल, चिकित्सा, सेवा, मीडिया या पत्रकारिता कोई भी हो। नारी की उपस्थिति, योगदान, योग्यता, उपलब्धियाँ, मार्मिकता और सृजनशीलता स्वयं एक प्रत्यक्ष परिचय देती हैं। परिवार और समाज संभालते हुए राष्ट्रीय और अंतर्राष्ट्रीय स्तर पर नारी ने हमेशा से ही विजय पताका लहराते हुए राष्ट्र-निर्माण और विकास में अपना विशेष और अभूतपूर्व योगदान दिया है। यह अलग बात है कि नारी ने अपने निज स्वरूप को अभी तक पूर्ण रूप से नहीं पहचाना है। "मुझे गर्व के साथ बेहद खुशी है कि मेरे पुत्र ने अपनी सोच और लेखनी के माध्यम से नारी के अन्नपूर्णा स्वरूप को पहचानकर महिलाओं को सशक्त बनाने और उनमें चेतना का स्वर जाग्रत करने का अथक प्रयास किया है। आशा है कि यह सृजना, अन्नपूर्णा, देवी, युग-दृष्टा, युग सृष्टा और स्वयं-सिद्धा अपने आपको को पहचानने की कोशिश करेंगी और अपने को सशक्त भी करेंगी।" 2

स्वास्थ्य सम्बन्धी जानकारीयों तथा सुविधाएँ पहुँचाए बिना संक्रामक रोगों अथवा आबादी पर अंकुश लगाना कतई नामुमकिन है। एक नागरिक और एक कामगार के रूप में स्त्रियाँ पाती हैं—कि स्त्रियों को कमजोर और पराधीन बनाने की कोशिशें पहले उनके ही घर—आँगनों से शुरू होती हैं। और दहलीज लाँघने के बाद कार्यक्षेत्र में वही कोशिशें उनके आगे ताकतवर और सामूहिक पुरुष—एकाधिकार की शक्ति धारण करती चली जाती हैं। विडम्बना यह कि एक ओर तो स्त्री में 'पराधीन और 'सहनशील' बनने की महत्ता का बीज बचपन से रोपा जाता है और दूसरी ओर उसकी

पराधीनता और सहनशीलता की मार्फत उसकी शक्ति का पूरा दोहन और नियोजन खुद उसी के और स्त्री-जाति के विरोध में किया जाता है। नतीजतन एक स्त्री हर क्षेत्र में दोगुने दर्जे में बैठने को बाध्य की जाती है कि तुम्हारी नियति यही है। यह भेदभाव सिर्फ निम्नवर्गीय स्त्रियों के साथ ही नहीं बरता जाता, इसकी चपेट में वे स्त्रियाँ भी हैं जो सरकारी गैरसरकारी विभागों में ऊँचे-ऊँचे पदों पर कार्यरत हैं। अमृता प्रीतम के शब्दों में- "मैं नहीं मानती कि यह सभ्यता का युग है, सभ्यता का युग तब आयेगा, जब औरत की मर्जी के बिना उसका नाम भी होठों पर नहीं आयेगा,!" 3

राष्ट्र के समग्र विकास तथा उसके निर्माण में महिलाओं का लेखा-जोखा और उनके योगदान का दायरा असीमित है तथापि देश के चहुंमुखी विकास तथा समाज में अपनी भागीदारी को उसने सशक्त ढंग से पूरा किया है। अपने अस्तित्व की स्वतंत्रता कायम रखते हुए वह पुरुषों से भी चार कदम आगे निकल गई हैं। संकीर्णता, जात-पात, धार्मिक कट्टरता, भेदभाव, मानसिक गुलामी की जंजीरों को तोड़कर महिलाओं ने देश को एक नई सोच, नया विचार प्रदान किया है। "महिलाओं के योगदान के बिना एक विकसित, समृद्ध और संस्कारवान समाज की कल्पना नहीं की जा सकती। नारी शक्ति की दृढ़ता और आत्मनिर्भरता में भारत की मजबूती निहित है।" 4 स्वतंत्रता प्राप्ति के बाद राष्ट्र-निर्माण में महिलाओं की भूमिका और सशक्त रूप से उभरकर सामने आयी। गणतंत्र बनने के कुछ वर्षों बाद ही इंदिरा गांधी ने भारतीय प्रधानमंत्री का पद संभाला तथा बैंकों का राष्ट्रीयकरण, परमाणु परीक्षण, गरीबी हटाओ का नारा आदि ऐसे कार्य किए, जिससे भारत न केवल आंतरिक रूप से मजबूत हुआ बल्कि उसे अन्तर्राष्ट्रीय स्तर पर भी सम्मान की दृष्टि से देखा जाने लगा। इंदिरा गांधी के अतिरिक्त वन्दना शिवा, जस्टिस फातिमा, मैरी कॉम पी.वी. सिंधू, मिताली राज, मेधा पाटकर, अरुणिमा सिन्हा, किरण बेदी, अरुन्धती रॉय इत्यादि महिलाओं ने विभिन्न क्षेत्रों में योगदान कर बेहतर राष्ट्र के निर्माण का मार्ग प्रशस्त किया। "पहले लोग या समाज सोचते थे कि केवल पुरुष ही राष्ट्र निर्माण में मदद या बढ़ावा दे सकते हैं लेकिन वास्तव में महिलाएं ही राष्ट्र निर्माण में मदद करती हैं। जैसे अगर हम एक पुरुष को शिक्षित करेंगे तो केवल एक व्यक्ति शिक्षित होगा लेकिन यदि हम एक महिला को शिक्षित करेंगे तो पीढ़ी शिक्षित होगी। ऐसी कई खामियां हैं जो महिलाओं को आत्म-निर्भर उद्यमी के रूप में विकसित करने के लिए पीछे खींचती हैं, जिनमें से एक कारक शिक्षा की कमी है, जो अब आधुनिकीकरण या सरकार के कारण बढ़ रही है।" 5

### **1. महिलाओं में जागरूकता**

20वीं सदी के प्रारम्भ में नारी शिक्षा का प्रसार हुआ, कुछ हद तक जीवन का अवरोध मिटा और नारी ने स्वतन्त्रता संग्राम में जमकर सहभाग किया, तभी यह अनुमान हो गया कि नारी भावी भारत की कमान संभालेगी। आज की स्थिति ऐसी है जहाँ नारी प्रतिक्षण बढ़ती जा रही है। स्त्री प्रश्न में प्रसिद्ध स्त्री विमर्श लेखिका नमिता सिंह इसी पर लिखती हैं- "यूरोप के देशों और फिर उत्तरी अमरीका के देशों में उद्योगों की स्थापना तथा पूँजीपति वर्ग के उदय और विस्तार के साथ स्त्रियों की जीवन पद्धति और भूमिका में भी बदलाव आया। श्रमिक स्त्री के रूप में यह उसकी नयी भूमिका थी जिसने सामाजिक संरचना को बदला। सामंती समाज की स्त्री के श्रमिक रूप में रूपांतरित होने के साथ-साथ मध्यवर्ग के उपभोक्तावादी समाज में परिवर्तित होने की प्रक्रिया ने नयी समस्याओं के साथ ही स्त्री रूपांतरण के

नये आयाम भी प्रस्तुत किये। पश्चिम की स्त्री चेतना और हलचल ने स्त्री आन्दोलन के विभिन्न चरणों को रेखांकित किया जो लगभग तीन शताब्दियों के कालखंड का लेखा-जोखा है।" 6

## 2. महिलाओं की वर्तमान स्थिति

आज महिलाओं ने धनोपार्जन में बड़ी भारी भूमिका अदा की है। सामान्य व्यवसाय से लेकर उच्च पदों पर भी वह पहुँची हैं। उद्यम के क्षेत्र में भी उतरी हैं। विज्ञान के क्षेत्र में, चिकित्सा के क्षेत्र में सैकड़ों नारियाँ कार्यरत हैं और उच्च सोपान पर खड़ी हैं। कार चलाना, हवाई जहाज उड़ाना, सैनिक अधिकारी बनना भी नारी ने स्वीकार कर लिया है। खेल जगत् में भी झण्डे गाड़े जा चुके हैं और अन्तरिक्ष क्षेत्र में कल्पना चावला और सुनीता विलियम्स भारतीय नारी का गौरव बढ़ा रही हैं। पुलिस की उच्चाधिकारी किर्न बेदी और न्यायाधीश की भूमिका में भी नारी दमक उठी है। छोटे-मोटे उद्योगों की तो बात ही छोड़ दी जाय ऐसा कौन सा काम है जो वे नहीं कर पा रही है। भारतीय महिलाओं की उपलब्धियों की चर्चा करते हुए श्री सचान लिखते हैं,- "अगर हम भारतीय समाज पर दृष्टिपात करें तो हम पायेंगे कि चन्द वर्षों में ही महिलाओं ने अपनी सफलता के ऐसे झंडे गाड़े हैं, जो भले ही उनके समक्ष नयी समस्याएँ पैदा करने वाले कारक बने हों, पर पुरानी रूढ़ियाँ हिल गयी हैं। आज भारत में महिलाएँ न्यायिक सेवा में हैं और करीब 20 महिला जजों का होना यह बताता है कि सिर्फ उदाहरण देने लायक ही स्थिति नहीं है। सेना में भी महिलाओं का प्रवेश हो चुका है, महिला थाने भी खुल चुके हैं और विमान भी महिलाओं के निर्देश पर आकाश नाप रहे हैं। चिकित्सा के अलावा इंजीनियरिंग के क्षेत्र में भी महिलाओं ने अपने पैर जमाने शुरू कर दिये हैं। कुल मिलाकर शायद ही कोई ऐसा क्षेत्र हो, जो महिलाओं की हलचल से अछूता हो। पिछले दल वर्षों में भारतीय महिलाओं ने अपनी स्थिति में अभूतपूर्व सुधार किया है और यह सुधार ऐसा नहीं है कि उसे अपवाद कहकर हाशिये पर ठेला जा सके। सच तो यह है कि अपवाद अब आसान राह बन रहे हैं और नारी के जुझारूपन का लोहा सबको मानना पड़ रहा है।" 7

## 3. राष्ट्र-निर्माण और नारी

नारी की राष्ट्र-निर्माण में बहुत अहम् भूमिका है। उसके कई रूप हैं, जिनमें से पत्नी और माता रूप बहुत अहम् है। पत्नी रूप में नारी पति की प्रेरणा है, उसकी उन्नति की आधारशिला है। अनेक व्यक्तित्व नारी का सहयोग पाकर ही उन्नति के शिखर पर पहुँचे। कवियों की बात छोड़ दी भी जाय तो भी हाड़ा रानी, कस्तूरबा हमारे सामने मिसाल हैं। कस्तूरबा ही वह व्यक्तित्व थीं जिन्होंने मोहनदास को महात्मा गांधी बनने में भरपूर सहायता की। भटके पति को सुमार्ग पर लाकर उसको उच्चादर्श की ओर प्रेरित करना नारी की ही भूमिका है। ऐसे अनेक उदाहरण हैं, जिनमें नारियों ने अपने पति से कहा है, 'मैं भूखी रह लूंगी, वस्त्रहीन भी जाड़े की रात बिता लूंगी, पर तुम रिश्तत का धन घर मत लाना। ऐसी नारियाँ राष्ट्र की लक्ष्मी होती हैं, दुर्गा होती हैं। उनका व्यक्तित्व चरित्र समाज की प्रेरणा बन जाता है।

माता मात्र जननी ही नहीं है, धात्री और निर्माता भी है। बच्चों का सारा जीवन उसकी प्रेरणा पर ही चलता है। शिवाजी, माता जीजाबाई की रचना थी। विद्यासागर पर उनकी माता का गहरा प्रभाव पड़ा था। गांधीजी की माता ने तीन प्रतिज्ञायें करायी थी, जिनके आधार पर ही मोहनदास गांधी बने डॉ. राधाकृष्णन् | ने कहा था 'Give me great mothers, I shall give you great Nation.' सामाजिक क्षेत्र में राष्ट्रीय क्षेत्र में नारी उतरती है, तो वह अधिक

ईमानदार, अधिक कर्तव्यपरायण और अधिक राष्ट्रभक्त होती हैं। उसके उत्तम व्यक्तित्व को छूकर जो किरणें फूटती हैं बड़ी प्रेरणादायक होती हैं। काव्य को भार्या सम्मति उपदेश की बात कही गयी है। यह पंक्ति यही घोषित करती है कि नारी में मानसिकता बदल कर प्रेरणा देने की सामर्थ्य होती है, कर्तव्यनिष्ठता होती है। अतः नारी यदि नारी हैं, कुलटा, वेश्या या चंचला नहीं है तो यदि वह ठान ले तो राष्ट्र निर्माण की भूमिका अदा कर सकती है, उसने यह भूमिका की है और कर भी रही है पर यह संख्या अभी अत्यल्प है।

### **निष्कर्ष:**

आज की नारी पूर्ण समर्थ है, उद्यमी है, क्रियाशील है, प्रगतिशील है। जीवन के प्रत्येक क्षेत्र पर छा जाने की उसकी क्षमता है। वह राष्ट्रोन्नति की वाहक बन सकती है, बस आवश्यकता है, ठान लेने की। राष्ट्र निर्माण के प्रारम्भ से लेकर आज तक पुरुषों का साथ देकर, उनकी जीवन-यात्रा सफल बनाकर उनके अभिशापों को स्वयं झेलकर और वरदान से राष्ट्रीय जीवन में अक्षय शक्ति का संचार कर नारी ने जो योगदान दिया है, वह उसकी अमर कीर्ति का परिचायक है। इसी पर प्रख्यात शिक्षाविद एवं साहित्यकार डॉ चम्पा श्रीवास्तव अपने निबंध संग्रह अँजुरी भर अभिव्यक्ति में नारी की गरिमा एवं महिमा की वंदना कर लिखती हैं-

उद्भव पालन और विकास

नारी हैं तेरे ही हाथ

सभी रूप तेरे प्रबल

जगत नवाता माथा।।" 8

### **संदर्भ ग्रंथ सूची:**

1. शर्मा, कुमार, सुशील, "राष्ट्र के निर्माण में महिलाओं का योगदान" रचनाकार ।
2. कुमार, प्रदीप, "राष्ट्र निर्माण और विकास में महिलाओं की भूमिका" साहित्य पीडिया, 2 अप्रैल 2017 ।
3. आरसु. "भारतीय भाषाओं के पुरस्कृत साहित्यकार" राजपाल एंड संस, 2010
4. पठानिया, "राष्ट्र निर्माण में महिलाओं का अतुलनीय योगदान" हिंदुस्तान समाचार, 23 अप्रैल 2013 ।
5. आलम, समीर, "राष्ट्र निर्माण में महिलाओं महिला उद्यमियों का योगदान" लीगल सर्विस बोर्ड।
6. एस, नमिता." स्त्री-प्रश्न" वाणी प्रकाशन, 2017 ।
7. मुखर्जी, आर. एन., अग्रवाल, बी. "समाजशास्त्र" एस बी पी डी प्रकाशन, 2021 ।
8. श्रीवास्तव, सी. "अँजुरी भर अभिव्यक्ति" अनुभव प्रकाशन 2007 ।

## **EXPLORING INTERDISCIPLINARY RESEARCH IN ACCOUNTING**

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### **Introduction:**

The interdisciplinary research in accounting is a fast-growing field that combines the expertise of various disciplines and offers a unique perspective on business practices and performance. This document provides an overview of the field, its benefits, challenges, examples, and future directions. Interdisciplinary research in accounting is a multidimensional field of research which seeks to combine insights from different disciplines with accounting research. It is accounting research which has incorporated other disciplinary angles via theory, methodology or topic.

### **Background on interdisciplinary research in accounting**

Early in the evolution of interdisciplinary accounting research, economics and finance were commonly utilised in conjunction with accounting. The Emergence of Interdisciplinary Research in Accounting Interdisciplinary research in accounting has gained popularity as a means of addressing complex business problems that involve various aspects of accounting, economics, and management. This approach brings together experts from different fields to work on a common problem and develop innovative solutions. Today, interdisciplinary accounting research embraces a wide array of subject areas and informing theories, escaping clear-cut categorisation; its main goal is “to investigate accounting and accountability in action, with related human characteristics and values intrinsically embedded in their sociocultural, psychological and institutional contexts: past, present and future” (Parker and Guthrie, 2014). To achieve this purpose, interdisciplinary accounting research needs to be relevant and innovative, avoid the risk of conservatism, and remain tightly linked with policy and practice (Hopwood, 2008, Parker, 2008, Jeacle and Carter, 2014).

### **Benefits of interdisciplinary research in accounting**

**Improved problem-solving:** The interdisciplinary approach brings diverse perspectives and expertise, leading to better problem-solving techniques.

**Increased innovation:** Interdisciplinary research fosters new approaches and leads to innovation in the field of accounting.

**Enhanced collaboration:** Collaboration among experts from various fields helps to build trust, encourage creativity, and improve communication.

### **Challenges of interdisciplinary research in accounting**

1. **Integration Difficulties** Integrating different approaches and concepts into a single framework can be challenging and lead to misunderstandings.



2. Time and resource constraints interdisciplinary research requires significant time and resources to overcome coordination and communication barriers.
3. Discipline goals: The need to balance disciplinary objectives with interdisciplinary goals can often be a source of conflict for researchers

### **Examples of successful interdisciplinary research in accounting**

One notable example of successful interdisciplinary research in accounting is the Total Quality Management (TQM) approach, which integrates quality management techniques from various fields such as engineering, psychology, and business. This approach has revolutionized manufacturing and service industries, leading to improvements in efficiency and profitability.

### **Collaboration opportunities in inter disciplinary research in accounting**

Academia and Industry: Collaboration between academia and industry can bring together diverse expertise and resources, leading to more relevant solutions to business problems.

Interdisciplinary teams: Interdisciplinary teams consisting of experts from various fields can lead to new and innovative solutions to business problems.

### **Impacts of interdisciplinary research in accounting**

**Improved financial performance:** Interdisciplinary research in accounting has led to improved financial performance of businesses due to the development of more effective accounting and management techniques.

**Enhanced decision-making:** The integration of diverse perspectives and expertise has led to the development of more rigorous and accurate decision-making frameworks

### **Conclusion and Future Directions:**

The future of interdisciplinary research: The growth of interdisciplinary research in accounting is expected to continue, and it is likely to become a norm for solving complex business problems.

- 1) The importance of collaboration: Collaboration and interdisciplinary engagement is the key to meeting the challenges of the future and developing new and innovative techniques.
- 2) The need for continuous learning: Continuous learning and training in interdisciplinary techniques is necessary to keep up with the everchanging business environment
- 3) Interdisciplinary accounting research is diverse, even in its representation

### **References:**

1. Hopwood Anthony G. (2008). Management Accounting Research in a Changing World, Journal of Management Accounting Research 20(1).
2. Jeacle Ingrid and Chris Carter, (2014). Creative spaces in interdisciplinary accounting research, Accounting, Auditing & Accountability Journal, Vol. 27 Issue: 8, pp.1233-1240
3. Parker, L. D. and Guthrie, J. (2014). Addressing directions in interdisciplinary accounting research, Accounting, Auditing & Accountability Journal, Vol. 27 No. 8, pp. 1218-1226.



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