In association with

19th Anniversary of India-Japan Fest in Pinkcity of India

BICON-2024

Biyani International Conference on

INNOVATING TOGETHER : INDIA-JAPAN COLLABORATIONS FOR A RESILIENT FUTURE

December 20-23, 2024
JAIPUR, RAJASTHAN, INDIA

Dec. 20-21

Revolutionizing Healthcare:
Collaborative Pathways to Advanced Therapeutics and Global Wellbeing

Discipline :
Science, Pharmacy & Nursing

Dec. 22

Innovating Business and Technology:
Empowering Global Exchange and Entrepreneurial Growth

Discipline :
Commerce, Management, IT and Engineering

Dec. 23

Shaping Tomorrow's World:
Education, Collaboration and Compliance across Borders

Discipline :
Education, Social Sciences and Law

ISBN : 978-93-83343-57-7

Department of Science, Pharmacy & Nursing
(Day 1 & 2)

Organised & Sponsored by :

BIYANI GROUP OF COLLEGES

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Sector No. 3, Vidhyadhar Nagar, Jaipur, Rajasthan (India)

राष्ट्रीय मूल्यांकन एवं प्रत्यायन परिषद
NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL

Certificate of Accreditation

The Executive Committee of the National Assessment and Accreditation Council on the recommendation of the duly appointed Peer Team is pleased to declare the Biyani Girls College Sector-5, Vidhyadhar Nagar, Jaipur, affiliated to University of Rajasthan, Rajasthan as Accredited with CGPA of 3.02 on four point scale at 'A' grade valid up to December 31, 2022

Date : December 04, 2014

Director

Skill India

Congratulations

Biyani Shikshan Samiti

for being empanelled as
Sending Organisation
for
Indo-Japan Technical Intern Training Programme
Felicitated by
Shri Dharmendra Pradhan
Hon'ble Minister for Petroleum & Natural Gas and Skill Development & Entrepreneurship, Government of India
28th March, 2018 | India Habitat Centre | New Delhi

Jayant Krishna
Executive Director & COO
National Skill Development Corporation

ALL INDIA COUNCIL FOR TECHNICAL EDUCATION
Nelson Mandela Marg, Vasant Kunj, New Delhi -110070

Certificate of Appreciation

Proudly Presented to

Team 'Biyani Institute of Science and Mangement' of
Biyani Institute of Science & Management (PID:1-10191041), Rajasthan

participated in

AICTE's Lilavati Award 2020

The team is hereby announced as "2nd Runner-up" in the sub-theme "Women Health" by presenting a unique intervention carried out under the overall theme "Women Empowerment"

Award presented on 11th April 2021

Dr. Amit Kumar Srivastava
Director (Student Development Cell)

Prof. Anil D. Sahasrabudhe
Chairman

This is a green initiative by AICTE, whereby a sapling has been planted in honour of the awardee. Scanning the QR Code will give a screenshot of the current status of the sapling.

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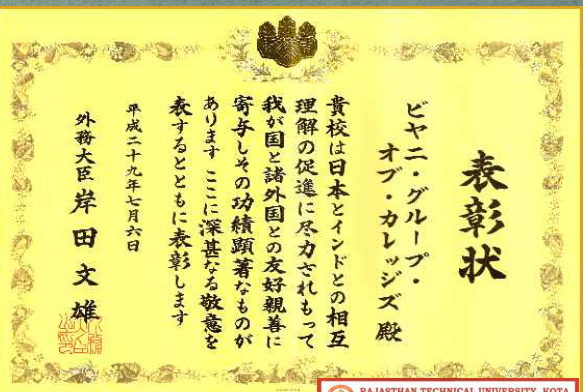


表彰状

ビヤニ・グループ・
オブ・カレッジズ 殿

貴校は日本とインドとの相互
理解の促進に尽力されもって
我が国と諸外国との友好親善に
寄与しその功績顕著なものが
あります ここに深甚なる敬意を
表するとともに表彰します

平成二十九年七月六日

外務大臣 岸田 文雄

RAJASTHAN TECHNICAL UNIVERSITY, KOTA
Rawatbhata Road, Kota-324010

CERTIFICATE OF EXCELLENCE

Rajasthan Technical University, Kota has awarded ranking to its affiliated institutes on the basis of Quality Index Value "QIV" score.

The University administration, on the auspicious occasion of the Independence Day Celebration on 15th August, 2019 is pleased to honour **Biyani Institute of Science & Management, Jaipur** with a **Certificate of Excellence**, for obtaining **Second Rank within Category A** for the academic session 2019-20 in **Computer Application Program (M.C.A.)**.

The University wishes continuous progress of the institute to improve technical education in Rajasthan.

(Prof. Vivek Pandey)
Hon. Academic Affairs

(Prof. R. A. Gupta)
Vice Chancellor

Minister for Foreign Affairs of Japan extends his deepest regards to

Biyani Group of Colleges

in recognition of its distinguished services in promoting mutual relationship between Japan and India.

— **Fumio Kishida,** Minister for Foreign Affairs of Japan

RAJASTHAN TECHNICAL UNIVERSITY, KOTA
Rawatbhata Road, Kota-324010

CERTIFICATE OF EXCELLENCE

Rajasthan Technical University, Kota has awarded ranking to its affiliated institutes on the basis of Quality Index Value "QIV" score.

The University administration, on the auspicious occasion of the Independence Day Celebration on 15th August, 2019 is pleased to honour **Biyani Institute of Science & Management, Jaipur** with a **Certificate of Excellence**, for obtaining **Third Rank** within Category A for the academic session 2019-20 in **Management Program (M.B.A.)**.

The University wishes continuous progress of the institute to improve technical education in Rajasthan.

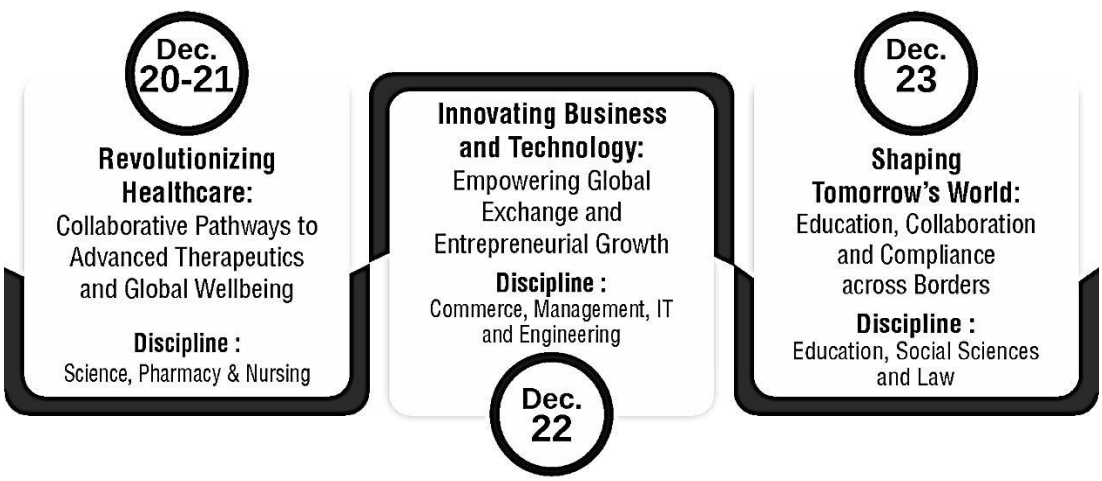
(Prof. Vivek Pandey)
Hon. Academic Affairs

(Prof. R. A. Gupta)
Vice Chancellor

The 19th Anniversary India-Japan Fest in Pinkcity of India

BICON-2024

INNOVATING TOGETHER: INDIA-JAPAN COLLABORATIONS FOR A RESILIENT FUTURE



Proceeding of the Conference

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Organized by:

BIYANI GROUP OF COLLEGES

Jaipur, India

ISBN: **978-93-83343-57-7**

Copies of this proceeding are available for purchase. Please contact BICON at acad@biyanicolleges.org, c/o R-4, Sector-3, Vidhyadhar Nagar, Jaipur-302039, Rajasthan (India) for ordering information.

Published by

Biyani Institute of Commerce & Management LLP

Jaipur (India)

All papers of the present proceeding were peer reviewed by no less than two independent reviewers. Acceptance was granted when both reviewers's recommendation were positive.

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- Dr. Pawan Kumar Patodiya

Designed by:

- Mr. Nilesh Sharma
- Mr. Surendra Mathur

Welcome to the India-Japan Fest in the Pink City of India!

We are proud to celebrate the 19th anniversary of BICON – Biyani International Conference - the Indo-Japan Fest at Biyani Group of Colleges, Jaipur. Since its inception in 2006, this annual conference has become a hallmark event, steadily growing in scale and significance. This year's conference, scheduled from **20th to 23rd December 2024**, reaffirms our commitment to fostering research, innovation, and strengthening academic ties between India and Japan. Each year, this event attracts an increasing number of participants from both nations, evolving into a vibrant platform for collaborative learning and development.

Adding further prestige to the event, the **Honourable Governor of Rajasthan, Shri Haribhau Kisanrao Bagde**, will grace the closing ceremony, marking a memorable conclusion to this remarkable conference.

The conference opens with a grand inaugural ceremony at the **Takshila Auditorium of Maheshwari Public School**, a prestigious institution in Jaipur. With a capacity of over 1,000 participants, the auditorium sets the stage for an inspiring beginning. Distinguished guests, including **Dr. Prem Chand Bairwa**, Deputy Chief Minister of Rajasthan; **Dr. O.P. Bairwa, IAS**, Commissioner of Higher Education; **Shri Harphool Panjaj, RAS**; and **Prof. Sudhi Rajeev**, Vice Chancellor of Rajasthan University, will honor the occasion and share their insights on fostering future collaborations.

Biyani Group of Colleges is organizing this mega event in collaboration with esteemed partner institutions from Japan, including **The University of Tokyo**, **Kwansei Gakuin University**, **Ritsumeikan University**, **Akita Prefectural University**, **Kanazawa University**, and **Shibaura Institute of Technology**.

The theme of **BICON 2024**, *"Innovating Together: India-Japan Collaboration for a Resilient Future"*, encapsulates the spirit of the event. It reflects a shared commitment to developing innovative solutions to global challenges and fostering sustainable growth. This multidisciplinary-to-interdisciplinary approach brings together all the departments including **Science, Pharmacy, Nursing, Commerce & Management, Information Technology, Social Sciences, Law, and Education**.

Event Highlights:

1. **Student Education Fair**: Leading universities from Japan will set up exclusive booths to guide Indian high school students, showcasing opportunities for higher education in Japan and inspiring young minds to explore new academic horizons.

2. **HR Conclave**: Industry leaders and HR professionals from Japan & across India will discuss evolving workforce dynamics and exchange innovative ideas.

3. **Academic Collaborations**: This year's conference holds special significance due to Biyani Group of Colleges' participation in **Rising Rajasthan**, an event held in Osaka,

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Japan, in September 2024. Multiple educational MoUs were signed in the presence of the **Honourable Chief Minister Bhajan Lal Sharma**, strengthening Indo-Japan partnerships.

Additionally, **BICON 2024** has expanded its scope through new partnerships with academic and industry leaders, including **Saitama University (Japan)**, **Toho International Inc**, **Fortis Hospitals**, **Ayushraj Pvt. Ltd.**, **SIDBI**, and **DOITC**, among others.

The **Call for Abstracts** has garnered a significant response, with accepted submissions to be published in conference proceedings with ISBNs. The event will feature **50+ invited talks** from distinguished speakers from India and Japan, along with presentations of **300+ abstracts and research papers**.

Months of meticulous planning and hard work by the organizing team have made this event possible. Special thanks to the **Organizing Committee**, including **Dr. Dhyan Singh Gothwal**, **Dr. Ekta Preek**, **CA Abhishek Biyani**, **Dr. Sumedha Bajpai**, **Dr. Smriti Tiwari**, **Dr. Shilpa Bhargava**, and **Dr. Vishnu Sharma**, as well as the conveners, session moderators, reviewers, and the entire **BICON team**.

We extend heartfelt gratitude to **Mr. Nilesh Sharma**, our graphic designer, for his exceptional work.

We also extend our gratitude to **The Education Committee of The Maheshwari Samaj** (ECMS) & **Maheshwari Public School** (MPS), for being our valued venue partner.

Lastly, we sincerely thank all invited speakers, participants, and contributors from India, Japan, and beyond. The vibrant backdrop of Jaipur, with its iconic architecture, lively bazaars, and warm hospitality, adds a unique charm to this international gathering.

Together, we are fostering stronger Indo-Japan partnerships, creating opportunities for growth, and paving the way for a resilient future.

Together, we innovate. Together, we inspire. Together, we succeed.

With warmest regards,

Dr. Manish Biyani
Organizing Chair
• Director (Reseach & Development), Biyani Group of Colleges, India
• Professor (Research), JAIST, Japan

Dr. Radhika Biyani
Conference Convener
Assistant Director,
Biyani Group of Colleges, Jaipur

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Dr. Prem Chand Bairwa
Deputy Chief Minister
Government of Rajasthan

सत्यमेव जयते

Technical Education, Higher Education, Ayurveda, Yoga & Naturopathy, Unani, Siddha & Homeopathy (Ayush), Transport & Road Safety Department

No: Dy.CM/2024/R/4010

07 Decmber, 2024

Message

I am delighted on invitation at 19th India-Japan International Conference organized by most prestigious and pioneer Biyani Group of Colleges, Jaipur on 20-23 December, 2024.

The theme of the conference is "Innovating Together India-Japan Collaboration for a Resilient Future". Rajasthan has been benefitted from the special relationship between India and Japan. I am optimistic that the conference will provide a platform for discussions on Education, Mental Health, Building Teacher Capacity, Partnership, Skills, Employability, Commercialization of Research, and Entrepreneurship. Academicians, Industrialists, Scientists, and research scholars will have the opportunity to exchange their expertise, build new strategies, and analyse recent advancements in their respective sectors at this four-day conference.

I extend my best wishes for the BICON-2024 success.

(Dr. P.C. BAIRWA)

Office : 4125, Main Building, Government Secretariat, Jaipur-302005
Resident: 384, Civil Lines, Jaipur-302006 (Raj.)
Ph. No. 0141-2227852, E-mail: dcm.drpcbairwa@rajasthan.gov.in

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Prof. Alpana Kateja
Vice-Chancellor
University of Rajasthan, Jaipur

December 09, 2024

Message

I am glad to know that Biyani Group of Colleges, Jaipur is organising **19th India-Japan Bilateral Conference BICON-2024 on "Innovating Together : India-Japan Collaborations for a Resilient Future"** from December 20-23, 2024. Rajasthan has been benefited from the special relationship between India and Japan. For a long time, Rajasthan and Japan have collaborated in both education and industry, and this relationship will continue to grow in the future years. I am sure that this conference would give an excellent forum for India and Japan to explore the Academia Industry Interface Model.

I wish the conference all success.

(Prof. Alpana Kateja)

जवाहरलाल नेहरू मार्ग, जयपुर 302 004 (राजस्थान) | Jawahar Lal Nehru Marg, Jaipur 302 004 (Rajasthan)
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बाबा आमटे दिव्यांग विश्वविद्यालय, जयपुर
Baba Amte Divyang University, Jaipur
(A State Funded University of Rajasthan)

आज़ादी का अमृत महोत्सव

Dr. Dev Swarup
Vice-Chancellor
Former Additional Secretary, University Grants Commission, New Delhi
Former Vice-Chancellor, University of Rajasthan, Jaipur
Former Vice-Chancellor, Dr. Bhimrao Ambedkar Law University, Jaipur

MESSAGE

I am honored to extend my best wishes to the 19th India-Japan International Conference, organized by the esteemed Biyani Group of Colleges, Jaipur, from 20th to 23rd December 2024.

This conference presents a valuable platform for fostering cross-cultural interactions under the theme "Innovating Together: India-Japan Collaboration for a Resilient Future." The deliberations and discussions on this theme, led by distinguished experts, hold immense significance in addressing critical issues and inspiring the youth toward building a brighter future for India.

I am confident that the insights shared during this event will contribute significantly to strengthening collaboration and resilience.

Wishing the conference immense success.

(Dr. Dev Swarup)

E-mail : devswarupugc@gmail.com | M - 09871490304

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Dr. Dhananjai Agarwal
Vice-Chancellor

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E-mail vc.sectt@ruhsraj.org
Website www.ruhsraj.org

RajasthanUniversity of Health Sciences
Sector-18, Pratap Nagar, Jaipur-302 033 (Rajasthan)

Message

I am pleased to acknowledge the 19th Biyani International Conference (BICON-2024) organized by the Biyani Group of Colleges, Jaipur, from December 20th to 23rd, 2024. The conference theme, "Innovating Together: India-Japan collaboration for a resilient future," is of significant importance.

I expect that the conference will provide a substantive platform for the discussions of crucial issues such as education, mental health, teacher competency enhancement, partnership initiatives, skill development, employability, research commercialization, and entrepreneurship. I sincerely hope the 19th Biyani International Conference will be highly successful in its endeavours.

5/12/24

(Dhananjai Agarwal)
Vice-Chancellor

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Prof. Sudhi Rajiv
Vice-Chancellor

हरिदेव जोशी
पत्रकारिता और जनसंचार
विश्वविद्यालय

HARIDEV JOSHI UNIVERSITY
OF JOURNALISM AND
MASS COMMUNICATION

MESSAGE

Date: 05.12.2024

The Principal
Biyani Girls' College
Jaipur

Dear Dr. Gothwal,

I am happy and delighted that Biyani Group of Colleges, Jaipur is organizing the XIX India – Japan International Conference from the 20th to the 23rd of December, 2024.

It shall provide an opportunity for interaction and collaboration between the two cultures of India and Japan to Innovate Together for a Resilient Future. The subjects for discussions and deliberations are of great importance and would be addressed by eminent experts. It would over all improve quality and inculcate virtues in the youth who are the future of India.

I wish the conference every success.

Sudhi Rajiv

(Prof. Sudhi Rajiv)

राजीव गांधी विद्याभवन
सर्वेपल्ली राधाकृष्णन शिक्षासंकुल, जवाहरलाल नेहरू मार्ग
जयपुर 302 017 (राजस्थान)

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DR. HARPHOOL PANKAJ ***(RAS)***
Registrar,
Rajasthan University of Health & Sciences
Jaipur, Rajasthan

Message

I am glad to know that the 19th Biyani International Conference (BICON-2024) is being organised on December 20-23, 2024 on the theme "Innovating Together : India-Japan Collaboration for a Resilient Future".

The theme of the conference will encourage collaboration between Industry and Academia by using futuristic pedagogies and practices in teaching, learning and assessment, as well as deeper engagement between higher education and the industrial ecosystem.

Academicians, industrialists, scientists, and research scholars will have the opportunity to exchange their expertise, build new strategies, and analyse recent advancements in their respective sectors at this four-day conference.

I extend my best wishes for the BICON-2024 success.

(HARPHOOL PANKAJ)
REGISTRAR,
RUHS, JAIPUR

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डॉ. ओम प्रकाश बैरवा, भा.प्र.से.
Dr. Om Prakash Bairwa, I.A.S.

सत्यमेव जयते

आयुक्त
कॉलेज शिक्षा विभाग
राजस्थान सरकार
Commissioner
College Education
Government of Rajasthan

MESSAGE

I am delighted on invitation at 19th India-Japan International Conference organized by most prestigious and pioneer Biyani Group of Colleges, Jaipur on 20-23 December, 2024, with the theme "Innovating Together : India-Japan Collaboration for a Resilient Future".

I am optimistic that the conference will provide a platform for discussions on Education, Mental Health, Building Teacher Capacity, Partnership, Skills, Employability, Commercialization of Research, and Entrepreneurship.

I extend my best wishes for the BICON- 2024 success.

(Dr. Om Prakash Bairwa)

Principal,
Biyani girls college,
Jaipur

ब्लॉक नं. 4, डॉ. आर. के. शिक्षा संकुल, जे.एल.एन. मार्ग, जयपुर-302017 (राज.)
Block No. 4, Dr. R.K. Siksha Sankul, J.L.N. Marg, Jaipur-302017 (Raj.)
Phone : 0141-2706847, E-mail : cce_raj@yahoo.com

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The Education Committee of The Maheshwari Samaj (Society), Jaipur
(Registered under the Societies Registration Act.,1860) (Registration No. 96/1956-57)
Regd. Off. : Maheshwari Bhawan, Sanghi ji Ka Rasta, Chaura Rasta, Jaipur - 302003 ✆ : 01412313072, 2314646
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Website : www.ecmsjaipur.com • E-mail : ecmsgs@hotmail.com

Kedar Mal Bhala
President
9314503259

Madhu Sudan Bihani
General Secretary Education
8890140000

MESSAGE

मुझे यह जानकर खुशी हुई कि बियानी अंतर्राष्ट्रीय सम्मेलन (BICON 2024) 20-21 दिसम्बर, 2024 को "एक्सपेंडिंग हॉरिजोन फॉर स्टडी एंड जॉब इन जापान" विषय पर आयोजित किया जा रहा है।

लंबे समय से राजस्थान और जापान के मध्य शिक्षा और उद्योग दोनों क्षेत्रों में सहयोग की जो परंपरा चली आ रही है यह सम्मेलन उसे मजबूती प्रदान करेगा।

मुझे आशा है कि यह सम्मेलन शिक्षा, मानसिक स्वास्थ्य, शिक्षक क्षमता निर्माण, भागीदारी, कौशल, रोजगार, अनुसंधान, व्यावसायीकरण और उद्यमिता पर चर्चा के लिए एक ऐसा मंच प्रदान करेगा जहाँ से कोई निराश नहीं लौटेगा।

मैं BICON:2024 की सफलता के लिए अपनी शुभकामनाएँ देता हूँ।

Kedar Bhala

(केदार मल भाला)
अध्यक्ष

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FROM THE CONVENER'S DESK

It gives me great pleasure to extend to you all a warm welcome on behalf of Department of Science and Nursing, Biyani Girls' College. We are grateful to all the speakers, delegates, organizers and guests, who have accepted our invitation to participate in the BICON 2024.

It is an opportune time for you to renew contacts and discuss opportunities of mutual interest with delegates from both Japan and India bilaterally.

It is gratifying to note that the agenda of the Seminar covers a wide range of very interesting items relating to higher education frontiers in India and Japan, and resulting opportunities for both countries.

No matter how much we can do by ourselves on the national level, whether it be research or development, it is never enough. In a spirit of true cooperation, we in Asia, and particularly in Japan and India, are proud of nurturing past and present civilizations and cultures. We must join in an action-oriented effort to recognize and capitalize on the bilateral opportunities in the higher education sector in both countries.

The utter sincerity and dedication of the management, the teaching faculty, non-teaching staff and the students at Biyani Girls' College have brought this event to fruition. It is an outcome of the hard work and persistent efforts of all our colleagues. We hope that their efforts shine through, and all the delegates and participants have a fulfilling and rewarding experience here, that carries forward long after the event itself is over. Once again, a very warm welcome to you all.

Dr. Rambir Singh
(Dept. of Pharmacy)
Convener, Day-1

Ms. Kanchan Sharma
(Dept. of Science)
Convener, Day-1

Ms. Jishu B. George
(Dept. of Nursing)
Convener, Day-2

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PROGRAMME AT A GLANCE

Date: December 20, 2024; Friday (Day-1)

Theme: Revolutionizing Healthcare - Collaborative Pathways to Advanced Therapeutics and Global Wellbeing

Standard Time	Schedule
08:00 AM-08:45 AM	Flag Hoisting Ceremony Venue: Biyani Girls College, VDN Campus, Jaipur
08:45 AM-09:30 AM	Depart for Takshila Auditorium, MPS, Jawahar Nagar for the event in progress
09:30 AM-10:30 AM	Registration & High-Tea Venue: Takshila Auditorium, MPS, Jawahar Nagar Jaipur
Inaugural Session (10:30 AM-12:15 PM) Chair: Dr. Smriti Tiwari Training Placement Head, Biyani Girls College, Jaipur, INDIA	
10:30 AM-10:35 AM	Floral Devotion to Lord Ganesha by Dignitaries
10:35 AM- 10:40 AM	Ganesh Vandana from BGC Student
10:40 AM-10:50 AM	Welcome of Guests and Japanese Delegates
10:50 AM-11:00 AM	Opening address by Organizing Chair- BICON-2024 **Dr. Manish Biyani** Director (R&D), Biyani Group of Colleges, INDIA
11:00 AM-11:10 AM	Inaugural Address by Chief Guest **Dr. Prem Chand Bairwa** Deputy Chief Minister – Rajasthan, INDIA
11:10 AM-11:20 AM	Address by Guest of Honor **Mr. Nakayama Yasuyuki** First Secretary, Embassy of Japan
11:20 AM-11:30 AM	Address by Special Guest **Dr. O.P. Bairwa, IAS** Commissioner, College Education, Rajasthan, INDIA
11:30 AM-11:40 AM	Address by Guest of Honor **Shri Harphool Pankaj, RAS** Registrar, Rajasthan University of Health Sciences, Jaipur, INDIA

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11:40 AM-11:45 AM	Guest of Honor **Ms. Anila Kothari** Sr. Vice Chairperson, Bhagwan Mahaveer Cancer Hospital & Research Centre, Jaipur, Rajasthan, India
11:45 AM-11:55 AM	Address by Guest of Honor **Shri Kedar Mal Bhala** President, Education Committee, Maheshwari Public School, Jaipur, INDIA
11:55 AM - 12:05 PM	Vote of Thanks **Dr. Sanjay Biyani** Director (Acad.), Biyani Group of Colleges, Jaipur, INDIA
12:05 PM - 12:15 PM	Inaugural Ceremony for Proceedings & Group Photo
Invited Technical Session (12:20 PM – 03:30 PM) **Chair: Ms. Kanchan Sharma** **Assistant Professor, Biyani Girls College, Jaipur, INDIA**	
12:20 PM -12:40 PM	IL-1, **Dr. Hirohisa Tanaka** Professor, School of Sci. & Tech. Dept. of Nanotech. for Sustainable Energy, Kwansei Gakuin University, JAPAN
12:40 PM-01:00 PM	IL-2, **Dr. Akihiko Fujiwara** Professor, School of Sci. & Tech. Dept. of Nanotech. for Sustainable Energy, Kwansei Gakuin University, JAPAN
01:00 PM–02:30 PM	Lunch Break, Poster Presentation & Japanese Universities Exhibition display
02:30 PM-02:50 PM	IL-3, **Dr. Avinash Sonawane** Professor, Department of Bioscience & Biomedical Engineering, IIT Indore, INDIA
02:50 PM-03:10 PM	IL-4, **Dr. Yuki Terata** Associate Professor, Department of Electronics and Information Systems, Akita Prefectural University, JAPAN
03:10 PM-03:25 PM	IL-5, **Dr. Richa Ray Nagori** Associate Professor, Department of Pharmacology NIIMS Medical College, Jaipur, INDIA
03:25 PM-03:30 PM	Vote of Thanks (Group Photo & Memento Distribution)

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Industrial Session & HR Conclave (03:30 PM – 04:45 PM) **Chair: Dr. Rachna Khandelwal** **Assistant Professor, Biyani Girls College, Jaipur, INDIA**	
03:30 PM-03:40 PM	Dr. Naveen Kumar Garg Technical Head & Assessor, R Classes Systems & Solutions Pvt. Ltd. (AYUSH Mark Scheme), Mumbai, INDIA
03:40 PM-03:50 PM	Mr. Jitendra Sharma Co-Founder at Nutrimed Metabolics Pvt Ltd, Jaipur, INDIA
03:50 PM- 04:00 PM	Mr. Pulkit Bhardwaj Co-Founder at Bee Coffee, Jaipur, INDIA
04:00 PM- 04:40 PM	Human Resource (HR) Conclave and Panel Discussion Panellist(s): Toho International; Ayushraj, Naitei Bridge.
04:40 PM – 04:45 PM	Vote of Thanks, Group Photo & Memento Distribution
04:45 PM – 05:00 PM	High-Tea
Young Oral Presentations, 05:00 PM – 06:00 PM **Judge: Dr. Vishnu Sharma**	
06:00 PM – 06:10 PM	Award Ceremony, Memento Distribution and Group Photo
06:10 PM – 06:15 PM	Closing Remarks

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DAY-1 : (20 December, 2024)

Invited Lecture 1

For your future: 100-year vision

Hirohisa Tanaka

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Kwansei Gakuin University

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Research Interest:

Catalyst, Fuel Cell, Ayurveda

Education & Professional Career:

1998	Ph.D. University of Tokyo (Catalyst)
1989-2016	Executive Scientist, Daihatsu Motor Co., Ltd.
2016-Present	Professor of Kwansei Gakuin University

Major Publications:

- Self-regeneration of a Pd-perovskite catalyst for automotive emissions control, Nature, 418, p.164-167 (2002). DOI: 10.1038/nature00893
- Self-regenerating Rh- and Pt-based perovskite catalysts for automotive-emissions control, Angew. Chem. Int. Ed., 45, p.5998-6002 (2006). DOI: 10.1002/anie.200503938
- A Platinum-Free Zero-Carbon-Emission Easy Fuelling Direct Hydrazine Fuel Cell for Vehicles, Angew. Chem. Int. Ed., 46, p.8024-8027 (2007), DOI: 10.1002/anie.200701334

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- Investigation of hydrogen superoxide adsorption during ORR on Pt/C catalyst in acidic solution for PEFC by in-situ high energy resolution XAFS, Journal of Power Sources, 557 (2023) 232508, DOI: 10.1016/j.jpowsour.2022.232508
- Development of hydrogen oxidation reaction catalysts to overcome CO poisoning and elucidation of reaction mechanism, J. Phys. Chem. C, 127, p. 11542−11549 (2023). DOI: 10.1021/acs.jpcc.3c02237

Awards:

1. Fellow: Japan Society of Automotive Engineers
2. The Minister Commendation from the Ministry of Education, Culture, Sports, Science and Technology (MEXT), [Research Achievement Award] 2003
3. Society of Automotive Engineers: Environmental Excellence in Transportation Awards
4. Catalysis Society Award [Technology Division], 2003

He was selected in both 'the Single Recent Year' and 'Career-Long' categories of "the Top 2% of the World's Most Influential Researchers in 2024", announced by Stanford University and Elsevier in September 2024.

Abstract

For your future: 100-year vision

Hirohisa Tanaka

Kwansei Gakuin University, School of Engineering, Japan

Abstract

Question 1: What does happiness mean to you?
Is it to become rich, to live a long and healthy life, or to meet a wonderful person?

Question 2: What do you study at university?
What is the difference between science and technology?

Question 3: What does the future of cars look like?
Are they all electric? Are cars with internal combustion engines in the future?

The scenery you want to see, the world you want to live in, will surely become a reality. Technology will bring it to you. So how do we create that technology? It starts with being impressed by the gifts of God, the universe, and nature. And why does it develop into science and technology?

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I will talk about why we are doing research and what kind of future we are trying to create 100 years from now.

I believe that in the future of this planet, the sky will be much bluer than it is now, the seas will be much clearer, and there will be no wars or conflicts at all. I look forward to sharing my vision with you.

Keywords: nature, science, technology, fuel cell, vehicle, future

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Invited Lecture 2

Devices for Sustainable Energy Concerted by Chemistry and Physics

Prof. Akihiko Fujiwara

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Research Interest:

Materials Science, Energy Related Materials, Synchrotron Radiation Analysis

Education & Professional Career:

1990-1995	M.S. and Ph.D. Tohoku University (Applied Physics)
1995-2001	Res. Asso. in the University of Tokyo
2001-2010	Asso. Prof in Japan Advanced Institute of Science and Technology
2010-2015	Chief Scientist in Japan Synchrotron Radiation Research Institute (JASRI/SPring-8)
2015-	Prof in Kwansei Gakuin University

Major Publications:

- H. Hoang, Y. Ueta, K. Tsukagoshi, T. Nabatame, Bui N. Q. Trinh, A. Fujiwara: "Solution processed In-Si-O thin film transistors on hydrophilic and hydrophobic substrates", Thin Solid Films 698 (2020) 137860.
- H. Hoang, T. Hori, T. Yasuda, T. Kizu, K. Tsukagoshi, T. Nabatame, Bui N. Q. Trinh, and A. Fujiwara: "Si-doping effect on solution-processed In-O thin-film transistors", Mater. Res. Express 6 (2019) 026410.

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- H. Uemachi, Y. Tamenori, T. Itono, T. Masuda, T. Shimoda, A. Fujiwara: "X-ray absorption near edge structure analysis of the charge-discharge mechanisms of dithiobiuret polymer used as a high-capacity cathode material for lithium-ion batteries", Electrochimica Acta 281 (2018) 99 – 108.
- K. Sugimoto, H. Uemachi, M. Maekawa and A. Fujiwara: "Air-Stable Cyclohexasulfur as Cocrystal", Cryst. Growth Des. 13 (2013) 433 – 436.
- A. Fujiwara, K. Sugimoto, C. H. Shih, H. Tanaka, J. Tang, Y. Tanabe, J. Xu, S. Heguri, K. Tanigaki, M. Takata: "Quantitative relation between structure and thermal conductivity in type-I clathrates $X_8Ga_{16}Ge_{30}$ (X = Sr, Ba) based on electrostatic-potential analysis", Phys. Rev. B 85 (2012) 144305.

Abstract

Devices for Sustainable Energy Concerted by Chemistry and Physics

Akihiko Fujiwara

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Department of Nanotechnology for Sustainable Energy, Graduate School of Science and Technology, Kwansei Gakuin University, Japan

Abstract

Sustainable development aims for a society where living conditions and resources meet human needs without undermining planetary integrity. Science and technology have improved the efficiency of 1) power generation using renewable energy, 2) energy storage, 3) energy transmission, and 4) energy utilization by electronic devices. This trend has encouraged mission-oriented research in addition to the conventional curiosity-driven research in the universities. The mission-oriented research needs multidisciplinary researchers with a wide variety of knowledge. In accordance with this, the Department of Nanotechnology for Sustainable

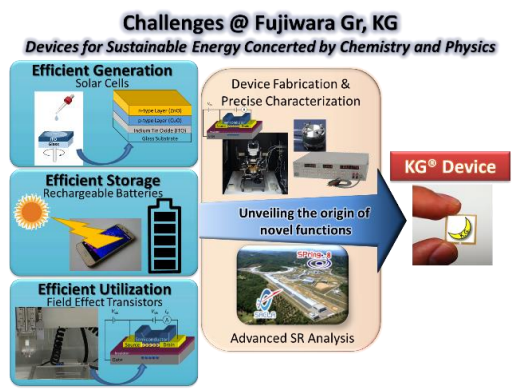

Figure 1. Devices for sustainable energy being developed by Fujiwara Gr. @ KGU.

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Energy, Graduate School of Science and Technology at Kwansei Gakuin University forms a mission-oriented research organization. We are developing materials and devices relating to the above-mentioned four processes.

The targets of our group are three kinds of devices from the four processes, namely, solar cells as power generators using renewable energy, functional rechargeable batteries as energy storage devices, and field-effect transistors as utilization devices as shown in Figure 1.Two kinds of physical devices, solar cells and field-effect transistors, are fabricated by chemical technology such as solution processing to realize environmentally-friendly manufacturing. We are trying to realize full-printed electronics for solar cells and field-effect transistors. It is a typical example of the cross-cutting of chemistry and physics for sustainable development.

Keywords: Solar cell, Transistor, Physical device, Chemical process

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Invited Lecture 3

Construction of VR Teaching Materials in the Field of "Electric Current and Magnetic Fields" and Evaluation its Materials

Yuki Terata

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Research Interest:
Virtual Reality, Cybernetics, Human Interface

Education & Professional Career:

1998-2002	M.S. and Ph.D. Akita University
2002-2022	Asst. Prof in Akita Prefectural University
2022-	Asso. Prof in Akita Prefectural University

Major Publications:

Rena Wakabayashi1, Kimio Saito, Toshiki Matsunaga, Satoaki Chida, Kai Kagami, Takehiro Iwami, Satoru Kizawa, Yuki Terata, Masumi Ogasawara, Yoichi Shimada, Naohisa Miyakoshi, Examination of the Effect of Rehabili-Mouse, a Desktop Rehabilitation Robot for Upper Limb Paresis after Stroke, Open Journal of Orthopedics, Vol.11, No.12, pp.371-382 (2021)

Yuki Terata, Ko Gonoi, Kazuki Saruta, Guoyue Chen, Kazutaka Mitobe, Evaluation of the Ability to Discriminate the Speed of the Vehicle for Elderly People using 3D Animation Movie, Journal of the Japanese Council of Traffic Science, Vol.20, No.1, pp.32-41 (2020)

Shinya Aoyama, Yuki Terata, Kazuki Saruta, Guoyue Chen, Development of Test system for Ability to Cross Roadway using AR and Evaluating its Ability, TVRST Vol.22, No.3, pp.395-404 (2017).

 ISBN: **978-93-83343-57-7**

Abstract

Construction of VR Teaching Materials in the Field of "Electric Current and Magnetic Fields" and Evaluation its Materials

Yuki Terata

Department of Information and Computer Science, Akita Prefectural University

Abstract:

Teaching materials using virtual reality (VR) technology are expected to further improve learners' understanding. However, it is assumed that the instructor's engineering knowledge may be insufficient to introduce these materials in the classroom, and that it will take time to educate the instructors. Therefore, we improved VR science teaching materials that visualize electric currents and magnetic fields for self-study at home, and reviewed their self-study use. Experiments were conducted with university students, and we found that our modifications improved usability and VR sickness.

Keywords: VR

Introduction:

The use of VR technology is expected to help achieve these goals and improve learners' comprehension. In particular, in the field of science, there is research on teaching materials for learning electromagnetism using AR[]. However, to date there are not many examples of the implementation of VR educational systems targeting elementary and secondary education in japan, nor of research on such systems. This is thought to be due to the problem that, when introducing the system in school education, a lack of engineering knowledge on the part of instructors is assumed in the construction of instructional curriculum knowledge and discussion and trainings must therefore be provided[Sho19]. It will take time to educate instructors to improve their engineering knowledge. In the past, we constructed VR science teaching materials that allowed students to experience experiments visualizing electric currents and magnetic fields, and compared self-study using the VR science teaching materials with self-study using a textbook [MYKG23]. Due to the shorter self-study time, the results of the post-study test were lower on average in the VR science materials group than in the textbook group. In addition, System Usability Scale (SUS) scores were lower and Simulator Sickness Questionnaire (SSQ) scores were higher. In this paper, we report on the results of an experiment conducted on university students using a modified version of these VR science teaching materials, in which the self-study time was extended to twelve minutes.

VR Science Teaching materials and evaluation metrics:

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The content that can be studied with these VR science teaching materials is the unit of "electric current and magnetic field" studied in the second year of junior high school in Japan. Until now, it was possible to move within the virtual space by operating the controller, but this movement caused a difference from the body in real space, resulting in VR sickness. Therefore, we redesigned the system so that movement by controller operation is not possible. In addition, to suppress VR sickness, we changed the rotation method of the viewpoint using the controller from guardian-centered to player-centered.

For the purposes of the present experiment, we fixed the self-study time. We added a clock-type object that displays the self-study time for the learner, and we also added a graphical user interface (GUI) to show the progress of the study.

The SUS [Joh96] was used to determine the user's feelings about operating VR science materials, and the SSQ [RNKM93] was used to measure the degree of VR sickness.

Experimental Methods:

Our subjects were twelve university students two groups of six students each.

First, a five-minute pre-study test was administered and the students were assigned to the textbook group or the VR group such that the difference between the groups in average scores on the pre-study test was small. The textbook group carried out a twelve-minute self-study session using a textbook. This was followed by the seven-minute post-study test and the test-related questionnaire.

The VR group carried out a twelve-minute self-study session using the VR science teaching materials. After that, they completed the seven-minute post-study test, the test-related questionnaire.

Results and Discussion:

Table 1 shows the results of the SUS and SSQ questionnaires. Prior to the use of our improved VR materials, the mean SUS score was 60.6, and the mean SSQ score was 47.69, indicating that usability was improved, and VR sickness was reduced by our modifications.

Table 1: *Results of the SUS and SSQ questionnaire.*

	SUS	SSQ
Mean	72.50	8.73

Conclusion:

The VR science teaching materials were as effective for learning as self-study using a textbook. Usability was improved and VR sickness was reduced. It is necessary to conduct experiments to see if effects of self-study using the improved VR materials can be obtained by junior high school students.

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Invited Lecture 4

Elucidation of the Effect of Catalyst Constituent Elements on Oxygen Storage Capacity

Hidetaka Tanabe

Hirohisa Tanaka Laboratory, School of Engineering, Kwansei Gakuin University

Abstract:

The Euro 7 regulation, which is scheduled to take effect in July 2025, will set stricter standards for On-Board Diagnostics (OBD), which monitor the degradation of a vehicle's exhaust gas purification system. The objective is to improve the detection accuracy in detecting the degradation of exhaust gas purification performance at the catalyst. This study focused on Oxygen Storage Capacity (OSC), an indicator of catalyst performance, with the aim of developing a highly accurate automotive catalyst degradation detection technology to much the above regulations. The results of analyzing catalysts with Ce as the main component, with or without precious metals loading, and with or without other elements combined, clarified the influence of the elements constituting the catalyst on OSC performance. The results contribute to the design and development of high-performance OBD systems compliant with Euro 7 regulations and provide valuable insights for further advances in catalyst technology.

Keywords: Euro7, On-Board Diagnostics (OBD), three-way catalyst, Oxygen Storage Capacity (OSC), cerium oxide,

Introduction:

Three-way catalyst that purify automobile exhaust gases are under study. Automobile exhaust gases contain harmful substances such as carbon monoxide (CO), hydrocarbons (HC), and nitrogen oxides (NOx). The catalyst that converts these three harmful gases into harmless gases through chemical reactions is the three-way catalyst. The three-way catalyst functions efficiently when the air/fuel (A/F) ratio is near the theoretical A/F ratio (stoichiometry), allowing the oxidation reactions of CO and HC and the reduction reaction of NOx to occur simultaneously. This equation shows the chemical reactions actually occurring in the catalyst (Fig. 1).

Oxidation reaction	· $2CO + O_2 \rightarrow 2CO_2$
	· $4C_xH_y + (4_x + {}_y)O_2 \rightarrow 4_xCO_2 + 2_yH_2O$
Reduction reaction	· $2NOx \rightarrow xO2 + N2$

Fig. 1. Redox reactions

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The redox reaction is due to the action of precious metals in the catalyst, but CO oxidation, HC oxidation, and NOx reduction can occur simultaneously only in a very limited A/F range (Fig. 2). When CeO_2 is added to the catalyst, Ce changes its valence from Ce^{4+} to Ce^{3+} in an oxygen-deficient atmosphere, releasing oxygen from the CeO_2 crystal structure and providing oxygen to the catalyst to assist CO and HC oxidation reactions, and is called an Cocatalyst. Conversely, in an oxygen-rich atmosphere, it assists in the reduction of NOx by incorporating oxygen from the gas phase into the crystal. This function is called OSC.

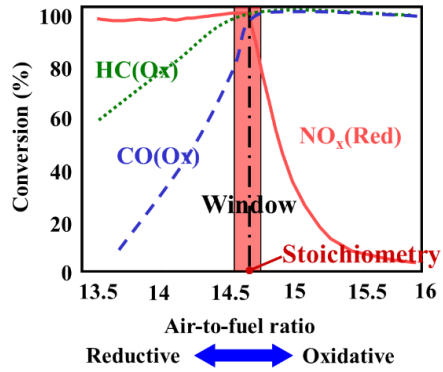

Fig. 2 Air/fuel ratio (A/F) and catalyst window

This feature expands the window (the range in which the catalyst functions at a high conversion ratio), thereby increasing the efficiency of exhaust gas purification for all driving modes [1][2].

Under the Euro7 regulations, the OBD detection criteria have been more rigorous and the narrowing of the window is an important indicator when detecting the aging degradation of the catalyst's OSC.

Focusing on OSC as an indicator of catalyst performance, this study aimed to improve OBD detectability by increasing the intensity of OSC signals from the front and rear sensors before and after the catalyst. The development of a high-precision OBD that complies with Euro7 regulations will enable early detection of catalyst degradation and contribute to improved performance of exhaust gas purification systems.

Experimental:

Measurement of the mass change by μ-TG reflects the amount of oxygen absorbed and released during the valence change of Ce, allowing a quantitative evaluation of the redox behavior of Ce.

Table 1. Four types of ceria-based complex oxides

Sample	CeO_2
	$CeZrYO_{2-\delta}$
	$Pd(0.5\ wt\%)/CeO_2$
	$Pd(0.5\ wt\%)/CeZrYO_{2-\delta}$

In this study, μ-TG was used to measure the mass change of the samples and to investigate the oxidation and reduction reaction behavior. The samples used in this study were based on Ce, which has oxygen storage capacity, and four types of complex oxides were prepared (Table 1). First, each sample was weighed in the range of 18-19 mg and subjected to oxidation pretreatment. For the oxidation pretreatment, the sample temperature was raised to 400 °C and O_2 (5%) was poured into the sample for 10 minutes, after which the main measurement was started. The measurement method was to maintain the pretreated sample at 400 °C and repeat the cycle of alternately flowing the reducing gas H_2 (5%) and the oxidizing gas O_2 (5%) for 100 seconds each, five times. This measurement enables a determination of the effect of Ce and other constituent elements on OSC.

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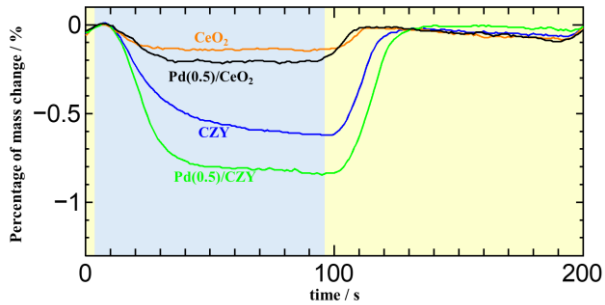
Result and Discussion:



Comparison of CeO_2 and CZY (Cerium zirconium yttrium oxide) without precious metals support reveals that CZY is significantly superior in terms of redox capacity and reaction rate (Fig. 3). Notably, while a higher percentage of Ce involved in the absorption and release of oxygen is expected to improve OSC, this study confirmed that catalysts containing Zr, Y, and even precious metals can dramatically improve the performance of Ce. The addition of Zr and Y to Ce is thought to improve the thermal stability of the catalyst at high temperatures and more effectively utilize the oxygen storage and release capacity of Ce [3]. These results indicate that the factor responsible for improved OSC performance is not merely Ce content, but is highly dependent on its interaction with other elements. Comparison of CeO_2 and Pd(0.5 wt%)/CeO_2 showed that the amount of oxidation and reduction as well as the reaction rate were improved by loading precious metals [4]. These results indicate that CZY mixed with Zr and Y contributes to improved OSC performance compared to Ce only, and furthermore, the combination of precious metals further improves the OSC performance due to their interaction.

Conclusion:

In this study, Ce-based catalysts supported with precious metals were combined with other elements to elucidate the impact of varying constituent elements on OSC performance. This approach enabled the quantitative assessment of the role of each constituent element on OSC properties, confirming the observed differences in these properties. These findings contribute to the design and development of high-performance OBD systems compliant with Euro7 regulations and provide valuable insights for the further advancement of catalyst technology.

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Invited Lecture 5

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Introduction of TOHO International Inc.

Katsuya Tobinaga

Toho International Inc. Japan

Toho International Inc. is a Japanese trading company specializing in the cable and wire industry, exporting and selling Japan's world-class materials to the world, established in 1988.

Our strength is that we can support Japan's manufacturing through both import and export, from equipment supply to production and sales expansion, and at the same time, we can contribute to the development of emerging countries with the technology of developed countries.

In particular, we focused on India from an early stage and have been exporting metal materials used in important safety parts for automobiles. We plan to continue developing the semiconductor, electric wire and robotics industry markets and aim to expand our market in India for next decade.

By leveraging the power of "Global" and "Digital" and a variety of know-how and knowledge specialized in wires and cables, we aim to become a "Niche top" company that solves the industrial issues.

We aim to foster an organizational culture that encourages employees to take on new challenges, with the three keywords "Challenge," "Creativity," and "Curiosity"

We are looking for people who are eager to learn and want to take on new challenges as we are currently exploring new business development such as semiconductor and IoT.

Mechanical engineering and software knowledge preferred, but the most sought-after skills are "Communication skill". In international business, it is most important to understand and respect the culture of others, and to have good manners and consideration. Age, gender, and length of employment are not important.

We have been doing business in India for about 40 years, but we are aiming to expand further in the future and are considering establishing a company in India and finding a partner. We think the potential of this country is limitless. We are looking forward to meeting passionate and motivated students.

Keywords: agmatine, arginine decarboxylase, *Aspergillus oryzae*, polyamine

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Invited Lecture 6

Our efforts and future possibilities

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- "Toward Seamless Career Development of Foreign Human Resources: For Further Success of Vietnamese Human Resources"（Bulletin of the International Symposium "Japanese Language Education and Research: Business Japanese Human Resource Development in the VUCA Era"/Foreign Trade University, Hanoi, Vietnam/Labor Press/2023.12）
- "Evaluation of Japanese Language and Business Japanese Proficiency for Work: A Comparison of Foreign and Japanese Employees"（Journal of Japanese language education method/2023.03）
- "Japanese language skills required of foreign employees by Japanese employees in companies that hire foreign personnel in the sciences: Focusing on contact experience with foreign employees"（Society for Teaching Japanese as a Foreign Language/2020.05）
- Co-authored research paper "Measures to Improve Japanese Language Proficiency Awareness of Japanese Employees in Communication with Non-Japanese Employees"（Society for Business Japanese Research/2020.01）

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Abstract

NAITEIBRIDGE: Bridging India-Japan beyond the cultural gap

Ichiro Asami

Naitei Bridge Co., Ltd.

Naitei Bridge Co., Ltd. was founded in 2010 and established in 2017. Business Japanese language education for foreign employees working for Japanese companies is our main business, and we offer various Japanese language training programs funded by the Japanese government, local governments, universities, and corporations. We are also passionate about Japanese language education for university students living abroad who have received job offers from Japanese companies. In India, we have been running a Japanese language education program for IT personnel at the Indian Institute of Technology for the past three years. On the other hand, we provide cross-cultural communication training and cross-cultural management training to 3,000 people a year throughout Japan, not only to foreigners but also to Japanese employees of the companies that employ them. Our mission is to improve the efficiency and productivity of the entire company's operations, based on the premise that both sides learn from each other. With this same idea in mind, company president Asami has served as a member of task forces at the Ministry of Economy, Trade and Industry, the Ministry of Health, Labor and Welfare, and the Agency for Cultural Affairs to study foreign employment policies, and from 2018 to the present, has been providing consulting services to Japanese companies employing foreigners at METI's agency, JETRO. He is likewise now assisting 14 Japanese local governments and is passionate about building relationships between foreign autonomous states and Japanese local governments.

We can offer the following three suggestions to you. First, we can establish a Japanese language study program within your university. In addition to providing the program, we can also provide online training and support for Indian Japanese language teachers at the same time. Secondly, we can provide career guidance and job hunting assistance to help students find employment in Japanese companies on campus. Finally, we can assist in building relationships between Japanese local governments and universities. By creating a comprehensive scheme that actively involves universities, we believe that Indian students will be able to realize richer and more fulfilling careers in Japan.

Keywords: Teaching Japanese as a foreign language, Business in Japan, Cross culture, Career support in Japan.

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Invited Lecture 7

How to contribute to the Life Sciences from Undergraduate Student

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- 2023-(2025) M.S. in Akita Prefectural University Graduate School
- (2025-) Ph.D. Candidate in Akita Prefectural University Graduate School

Major Publications:

1. S. Ochiai, I. Onozaki, A. Taguchi, T.K. Saito, "Development of Cell Membrane Perforator for Large-Scale Application of Photochemical Cell Membrane Perforation by Continuous Processing", Proceedings of the 35th 2024 International Symposium on Micro-NanoMechatronics and Human Science (MHS 2024), SaA2-1-6, 2024.
2. S. Ochiai, K. Kobayashi, R. Akamatsu, A. Taguchi, T.K. Saito, "Multicolor Printing like Multi-patterning Material Introduction for Cell Population by Photochemical Cell Membrane Perforation", Proceedings of the 2023 JSME Conference on Robotics and Mechatronics, pp.2P1-F10, 2023.

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3. Patent Application JP,2024-114023,A, “EXPANSION DEVICE”, Takashi SAITO, Kosei SEKINO, Shunsuke OMURA, Sota OCHIAI, Yasushi SAITO, Takuya ARAKAWA, Filing Date:2023/02/10

4. S. Ochiai, K. Takemasa, K. Kobayashi, S. Katagiri, S. Nix, T.K. Saito, “Simultaneous introduction of various materials into cells based on cell membrane perforation system like infusion bag”, Proceedings of the 2022 JSME Conference on Robotics and Mechatronics, pp.2P2-O03, 2022.

Abstract

How to contribute to the Life Sciences from Undergraduate Student

Sota Ochiai

Department of Integrated System Engineering, Akita Prefectural University Graduate School of Systems Science and Technology

I am conducting research on the development and evaluation of robotic systems designed for large-scale, highly efficient cell modification. This research integrates engineering techniques such as 3D CAD design and metal fabrication to create devices capable of performing complex cell modifications. By overcoming the limitations of scalability and adaptability of conventional methods, the project will promote applications in life science fields such as gene editing, regenerative medicine, and drug discovery.

Through an iterative process of design, prototyping, and evaluation, this research will demonstrate the potential of innovative systems to increase the efficiency of biological research by providing reliable and flexible solutions. The results of this research are expected to contribute to diverse fields, including advanced organ regeneration and more efficient drug discovery processes for cell-based therapies.

Furthermore, the technical skills developed through this research are also of great use in undergraduate education. As a teaching assistant (TA), I am applying the drafting and manufacturing techniques I learned in this project to create educational materials for students. These materials provide students with the opportunity to learn practical engineering skills and gain insight into the role of engineering in addressing real-world challenges.

This presentation will highlight specific technologies and innovative solutions for robotic system development and their application to education. It will also explore the broader implications of integrating engineering and life sciences, highlighting how such interdisciplinary collaborations can advance bioengineering, train the next generation of engineers, and drive technological innovation.

Keywords: Digital Manufacturing, Cell Therapy, Life Science, Teaching Assistant

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CONTRIBUTED PAPERS

Abstract

Research and Development of Iron-based Catalysts for Fuel Cells Superior to Platinum Catalysts

Kaito Matsuo

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Abstract:

In this research, we are developing non-precious metal catalysts for application in fuel cell vehicles without the use of precious metals, with the aim of reducing global warming and realizing a sustainable energy society.

To improve the performance of oxygen reduction reaction (ORR), an iron-based complex catalyst was prepared in the laboratory, and its preparation process was improved.

As a result, it showed that the ORR activity exceeded that of precious metal platinum catalysts, indicating the possibility of a sustainable catalyst without using platinum.

Keywords: global warming, platinum catalysts, iron-based catalysts, oxidation-reduction reaction (ORR), fuel cell vehicles

Introduction:

In recent years, fuel cell vehicles have been expected to contribute to the decarbonization of the world, and they have been put into practical use. To further spread the use of fuel cell vehicles, it is desirable to realize platinum-free fuel cell vehicles that run on easy-to-use liquid fuel. My dream is to create a future where people can live happy and prosperous lives by developing my own fuel cell vehicle and spreading it in India and around the world.

To realize my dream, I am engaged in research on fuel cell vehicles with the aim of further technological innovation.

One example is the Daihatsu Motor Co. concept car “FC Show CASE” fuel cell vehicle, which is equipped with an anion exchange membrane direct hydrazine fuel cell. (Figure 1)

Toyota–Mirai, for example, is equipped with a proton exchange membrane fuel cell and uses a platinum catalyst. Since platinum is expensive at INR 4200 per gram, the resource problem can be solved by realizing anion exchange membrane fuel cells that use abundant resources such as iron and nickel, which are inexpensive at INR 0.018 per gram. Furthermore, hydrazine fuel is liquid,

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easy to handle, and has a higher energy density than hydrogen, making it easily adaptable to small vehicles and refueling with gasoline infrastructure.

Further development of this technology can provide fuel cell vehicles that can support happy and prosperous lives for people in India and around the world.

Figure 1. FC Show CASE (Anion Exchange Membrane Direct Hydrazine Fuel Cell Vehicle)

Experimental:

The iron complex catalysts were prepared in the laboratory using a hydrothermal synthesis method. Note that the amount of iron in the complexes is 2% (standard) and 0.05% (improved), which is a very small amount compared to the 40% platinum content of commercial platinum/carbon catalysts. Specific process improvements will be discussed in the poster.

To investigate the spherical particles of the Fe-N-C catalyst, we conducted observations using an ultra-high-performance SEM at Osaka University.

Result and Discussion:

As a result, the iron catalyst successfully outperformed the platinum catalyst. Figure 1 shows a comparison of the improved product and each catalyst (left) and a magnified view (right).

Focus on!

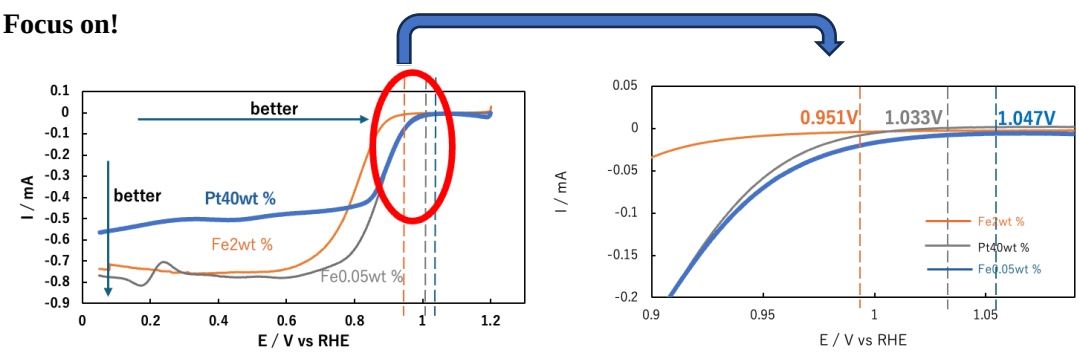

Figure 2. Comparison of improved product and each catalyst (left), Magnified view + ORR starting potential values (right)

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Figure 2 shows a comparison of the oxygen reduction reaction performance of our developed catalyst and commercially available platinum.

The horizontal axis shows the potential (E vs. RHE) and the vertical axis shows the current density (J/mA). The results in Figure 2 clearly demonstrate that our developed Fe-N-C catalyst is superior to Pt.

Only 0.05 wt% of iron was used while 40 wt% of platinum catalyst was used. Iron is used only about 1/800 of the amount of platinum. A detailed explanation of the reason for this large difference will be provided in the poster. Furthermore, spherical particles were identified in the developed catalyst by SEM observation.

Figure 3 shows a secondary electron image of iron spherical particles (left) and an elemental mapping of iron (right).

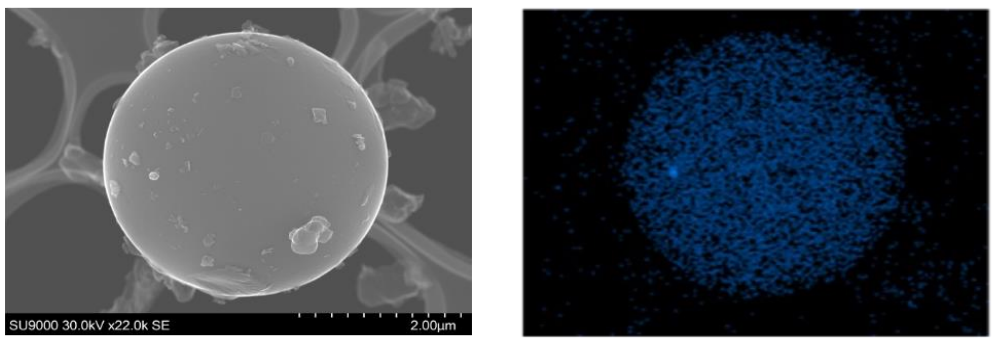

Figure 3: Secondary electron image (left) and elemental mapping of Fe (right)

Conclusion:

In this research, we have improved the synthesis process of iron-based Fe-N-C catalysts for anion-exchange fuel cells to achieve performance superior to that of platinum catalysts.

This process demonstrates the potential of environmentally friendly catalysts that are not dependent on platinum and represents an important step forward in expanding the potential of anion-exchange fuel cells to date.

Furthermore, we are convinced that we can develop fuel cell vehicle that will enable people in India and around the world to live happy and prosperous lives.

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The author thanks Assistant Professor Sung Hon Cho and Professor Tohru Sekino of SANKEN, Osaka University, for conducting the SEM observations.

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Oxygen Reduction Reaction (ORR) Mechanism in Fuel Cell Deployment

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Abstract:

This paper discusses the potential of fuel cells, which are attracting attention in the world where global warming is getting worse. We focus on anion-exchange fuel cells, which generate electricity from liquid fuel, and present an environmentally clean fuel cell vehicle. We succeeded in elucidating the mechanism of the oxygen reduction reaction of a conventional catalyst using platinum, which is used in fuel cells, using SPring-8, one of the world's most outstanding synchrotron radiation facilities.

Keywords: carbon neutral, environmental issues, fuel cell, non-precious metal catalyst, XAFS

Introduction : Japan, like the entire world, aims to be carbon neutral. The transportation sector is the second largest emitter of CO2 after the industrial sector. It accounts for as much as 18.5% of the total. Among these, 86% are from automobiles, which must be addressed. Fuel cell vehicles have been the focus of much attention in carbon neutrality.

Currently available fuel cell vehicles with proton-exchange fuel cells that use a large amount of platinum. These fuel cells use hydrogen gas as fuel, which has the disadvantage of making it

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difficult to develop infrastructure. Another disadvantage is the large size of the cylinders used to store hydrogen gas, which makes it difficult to install them in small vehicles. This is why we are focusing our attention on anion-exchange fuel cells. Unlike the proton-exchange fuel cell, this type of fuel cell can use inexpensive and abundant metals such as iron and nickel to make catalysts, thus reducing the cost of fuel cell vehicles.

The goal of this study is to create a non-platinum fuel cell vehicle. As a method to achieve this goal, we conducted measurements using synchrotron radiation. This synchrotron radiation experiment will reveal the adsorption of oxygen at the nano-level, which determines the superiority or inferiority of fuel cell performance. We used SPring-8, which is one of the best synchrotron radiation facilities, to elucidate the mechanism of oxygen adsorption. The results will greatly advance the solution of environmental problems.

Experiments: In this study, we attempted to elucidate the oxygen reduction reaction mechanism using platinum by synchrotron radiation XAFS at BL11XU in SPring-8. (Figure 1). In this experiment, we first investigated the mechanism of an oxygen reduction reaction of platinum. As a baseline, nitrogen gas flowed into the cell and the measurement potential was changed. Then, we switched to oxygen gas and observed the oxygen reduction reaction at the same potential and observed the difference in the reaction from nitrogen.

Figure 1: SPring-8 Aerial view

The measurement method of SPring-8 is to irradiate synchrotron radiation X-rays to a material to determine its electronic and chemical state. The energy at which X-rays are absorbed differs from one element to another, and by changing the energy in the vicinity of the absorption, it is possible to determine the state of the materials. In this experiment, measurements were conducted to examine the state of functionality and reaction while the sample was still in the container. This measurement allows us to observe the reaction of oxygen and hydrogen adsorbed on platinum in various forms.

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Results and Discussion:

Observations of oxygen reduction reactions on a platinum catalyst at SPring-8 have revealed a new reactant in addition to the previously known reactants. While the existence of peroxide ions with an oxygen valence of 1 has been well known in the past, the results of this measurement confirmed the visible existence of superoxide anions with an oxygen valence of 0.5. This result was selected as the best research result in the Research frontiers in 2023 BL11XU. The results are shown in Figure 2.

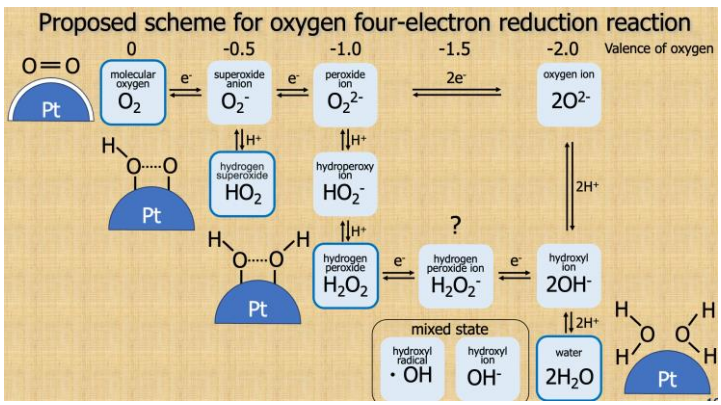

Figure 2: Newly observed superoxide ions and ORR scheme

Conclusion:

In this experiment, the process of the ORR was elucidated step by step. The results provide a clue to solving the problem of durability on non-precious metal catalysts. We will then create a precious metal-free catalyst in the laboratory that exceeds the catalytic performance of precious metals.

References

1. Naoki Yamamoto, Daiju Matsumura, Yuto Hagihara, Kei Tanaka, Yuta Hasegawa, Kenji Ishii, Hirohisa Tanaka "Investigation of hydrogen superoxide adsorption during ORR on Pt/C catalyst in acidic solution for PEFC by in-situ high energy resolution XAFS", *Journal of power sources,* 557, (2023)232508

2. S. Kusano, D. Matsumura, K. Asazawa, H. Kishi, T. Sakamoto, S. Yamaguchi, H. Tanaka, J. Mizuki, "Study of Catalytic Reaction at Electrode–Electrolyte Interfaces by a CV-XAFS Method", *J. Electronic Materials,* 46 (6) p. 3634-3628 (2017).

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Raising Fluoride Levels, Lowering Water Quality

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Abstract:

Jaipur is one in all the biggest cities of Rajasthan, wherever majority of population within the town depends on piped water provides for drinking and different domestic purposes. Water that's freed from unhealthful chemicals and pathogens is important, however, finding enough clean water for drinking to satisfy growing demand is turning into troublesome attributable due to restricted water resources, fast industrial enterprise and urbanization. As a result, the drinking water is now less fit for human consumption. Fluoride has shown to cause severe effects in drinking water on excessive exposure. The water supplies have not been regulated beneath the Federal Safe drink Act. High fluoride concentration causes a range of disorders which can be acute or chronic, as well as dental, neurological and skeletal fluorosis. In a recent survey, the foremost common reasons the suppliers gave for not testing the drinking water were it's acceptable style and appearance and the use of in home water treatment system. This case puts many of us at the danger of acute and chronic diseases. Therefore, the purpose of this investigation was to determine the health risks associated with elevated halide levels in water and to determine whether it was acceptable for consumption.

Keywords: Pathogens, fluorosis, Acute disease, Chronic disease, halide levels

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The Role of Spin-Coated Sol-Gel Method for Thin Films in Advanced Solar Cells

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Abstract:

This study investigates the development and analysis of thin film solar cells employing the sol-gel method to create heterostructure with zinc oxide/copper oxide (ZnO/CuO) thin films through spin coating. The research seeks to fabricate high-performance solar cells by refining the characteristics of the thin films. Analysis, such as optical microscopy and X-ray diffraction (XRD), were utilized to examine the structural and morphological properties of the fabricated thin films. The results indicate that a method used to prepare sol-gel exhibits favorable crystallinity and morphology conducive to photovoltaic applications. This research significantly contributes to the development of affordable and efficient solar energy technologies, highlighting the promise of ZnO/CuO thin films within the renewable energy sector.

Keywords: Thin-film solar cells, Sol-gel method, Zinc oxide/copper oxide (ZnO/CuO), Structural properties, Morphological properties

Introduction:

Thin-film solar cells based on ZnO and CuO offer significant potential for sustainable energy applications, but their performance is heavily influenced by key fabrication methods. Achieving uniform and homogeneous thin-film deposition during spin coating is critical, as variations in spin rate or precursor viscosity can result in non-uniform thickness, leading to poor charge transport and reduced device efficiency. The quality of ZnO and CuO layers is another crucial factor, as improper precursor mixing or poorly controlled deposition conditions—such as temperature, spin rate, and drying time—can introduce defects like pinholes, cracks, and non-stoichiometric phases, thereby compromising carrier mobility and increasing recombination rates. Additionally, the compatibility of ZnO and CuO at their interface requires careful engineering to prevent the formation of undesirable phases, such as pure Cu or Zn, which degrade electrical contact and charge separation efficiency. Finally, proper annealing of ZnO and CuO thin films is essential to enhance crystallinity, electrical properties, and interlayer adhesion; however, mismatched annealing conditions can lead to phase separation, film degradation, or amorphous phases, further reducing device performance. Addressing these challenges is vital to advancing ZnO/CuO thin-film solar cell technology and unlocking its full potential.

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How can spin-coating parameters, such as spin rate and solution viscosity, be optimized to achieve uniform film thickness and high surface quality in ZnO and CuO layers? What are the ideal deposition and drying conditions needed to minimize defects, such as pinholes and cracks, while maintaining stoichiometry in these films? Additionally, what specific annealing conditions—such as temperature, duration, and atmosphere—are required to enhance crystallinity and phase stability in ZnO and CuO layers without introducing unwanted phases at their interface? Finally, how does the interface quality between ZnO and CuO layers affect charge separation efficiency, and what process adjustments can improve material compatibility and electrical contact to maximize device performance?

Experimental:

0.5M of zinc acetate dihydrate solution was prepared by dissolving in 1 mL of ethanol and stirring it for 15 minutes. 1 mL of monoethanolamine (MEA) was added as a stabilizer and stirred again for 15 minutes. And then heated on a hot plate at 75 degrees Celsius for about 90 minutes and then kept at room temperature overnight.

0.3M of copper acetate monohydrate solution was prepared by dissolving in 1 mL of ethanol and stirring it for 15 minutes. 2 mL of monoethanolamine (MEA) was added as a stabilizer and stirred again for 15 minutes. And then heated on a hot plate at 75 degrees Celsius for about 90 minutes and then kept at room temperature overnight.

The substrate was washed with water, acetone, and ethanol in an ultrasonic cleaner for 10 minutes each. The substrate surface was then plasma etched before spin coating. The solution was then spin-coated on the substrate at 2000 rpm for 40 seconds and then heated on a hot plate at 100 degrees Celsius for 10 minutes. The process was repeated until the desired thickness was attained. Later it was annealed at 500 degrees Celsius for 90 minutes and then aluminum was deposited using the thermal evaporator. The samples were then characterized by optical microscopy and XRD.

Result and Discussion:

The optimization of spin-coating parameters, including spin rate and precursor viscosity, resulted in the formation of uniform thin films with minimal thickness variations. This uniformity plays a critical role in enhancing charge transport and overall device performance. Additionally, the precise control of deposition conditions, such as temperature, spin rate, and drying time, significantly reduced defects like pinholes, cracks, and non-stoichiometric phases in ZnO and CuO layers. These high-quality layers exhibited improved carrier mobility and reduced recombination rates, directly contributing to the enhancement of solar cell efficiency. Figure 1 shows a typical example of the improvement the film morphology by changing the viscosity of precursor solutions.

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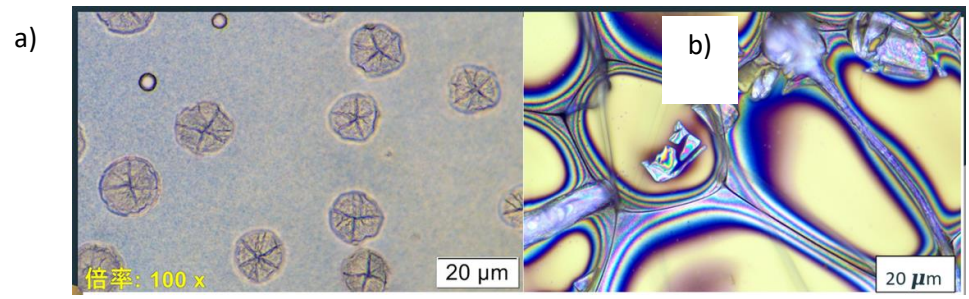

Figure 1. Microscope images of ZnO/CuO thin films fabricated by a) low viscous solution with 36 μL MEA, b) high viscous solution with 2 mL MEA. Many cracks were formed in thin films using low viscous solution, whereas no cracks were formed in thin films using high viscous solution.

Interfacial control between ZnO and CuO layers proved crucial in preventing the formation of undesired phases, such as pure Cu or Zn. A stable ZnO/CuO junction was achieved, ensuring better electrical contact and improved charge separation efficiency. Furthermore, tailoring the annealing conditions—focusing on parameters such as temperature, time, and atmosphere—enhanced the crystallinity and phase stability of the layers while improving interlayer adhesion. The reduction in amorphous phases and undesired separations further elevated the stability and performance of the devices. The XRD profile of the heterostructure of ITO/ZnO/CuO film consists of referenced XRD profiles of CuO, ZnO and ITO, showing the expected ZnO and CuO phases were formed in the heterostructure without impurity phases of pure Zn nor Cu, as shown in Figure 2.

Overall, the combination of these optimized processes led to a significant improvement in solar cell efficiency and stability, highlighting the importance of precise material and process control in the fabrication of high-performance thin-film solar cells.

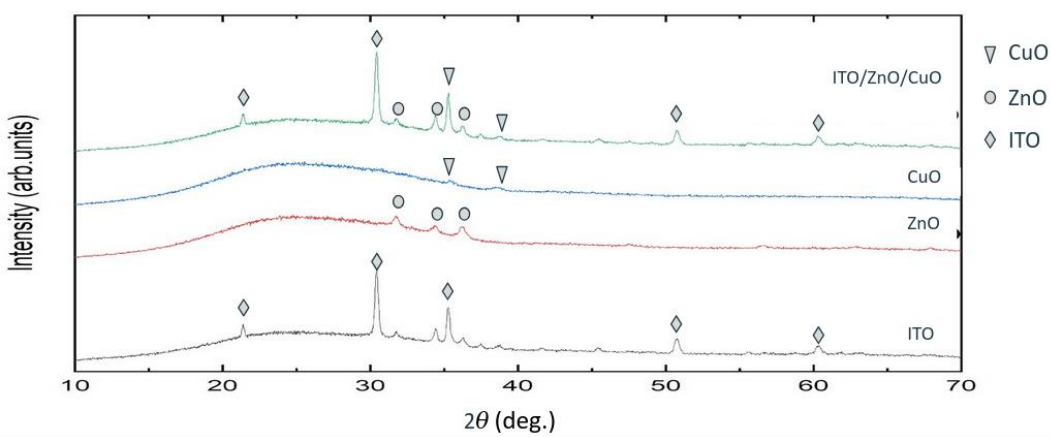

Figure 2. X-ray diffraction patterns of ITO/ZnO/CuO, CuO, ZnO, ITO thin films.

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Conclusion:

In conclusion, using high-viscosity solutions has been proven to be an effective approach for forming uniform thin films with well-defined crystal structures. The controlled viscosity facilitates uniform spreading during deposition, reducing defects and promoting the formation of consistent crystallographic patterns. This method is particularly advantageous in applications requiring precise film morphology and structural integrity, such as in optoelectronics, photovoltaics, and advanced coating technologies.

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Nano Based Drug Delivery systems : Challenges and future directions

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Abstract:

Advances in molecular pharmacology and an improved understanding of the mechanism of most diseases have created the need to specifically target the cells involved in the initiation and progression of diseases. This is especially true for most life-threatening diseases requiring therapeutic agents which have numerous side effects, thus requiring accurate tissue targeting to minimize systemic exposure. Recent drug delivery systems (DDS) are formulated using advanced technology to accelerate systemic drug delivery to the specific target site, maximizing therapeutic efficacy and minimizing off-target accumulation in the body. As a result, they play an important role in disease management and treatment. Recent DDS offer greater advantages when compared to conventional drug delivery systems due to their enhanced performance, automation, precision, and efficacy. They are made of nanomaterials or miniaturized devices with multifunctional components that are biocompatible, biodegradable, and have high viscoelasticity with an extended circulating half-life. This review, therefore, provides a comprehensive insight into the history and technological advancement of drug delivery systems. It updates the most recent drug delivery systems, their therapeutic applications, challenges associated with their use, and future directions for improved performance and use.

Keywords: Drug delivery system, Nanoparticles, Nanocarriers, Nanosheet, Tumour, Pharmacokinetics, Chemotherapy

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The Impact of Environmental Carcinogens and Mirnas on Cancer Development: Processes, Identification, and Significance for Early Detection

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Abstract:

Carcinogenesis is the complex process by which normal cells evolve into cancerous cells, influenced by a combination of genetic predispositions and environmental factors. A key environmental contributor to this transformation is exposure to carcinogens—substances that can initiate cancer development. These carcinogens are prevalent in various settings, including air, food, water, and everyday life, manifesting through pollutants, tobacco smoke, alcohol, pesticides, and ultraviolet (UV) radiation. They can lead to genetic mutations and epigenetic changes that disrupt standard cellular functions. Carcinogens are generally categorized into two groups: mutagens, which alter DNA sequences, and non-mutagenic carcinogens, which may affect cancer development through hormonal imbalances, inflammation, or immune system interference. The ongoing presence of these agents in the environment heightens the risk of developing different types of cancer, such as skin, lung, liver, and gastrointestinal cancers.

The primary way carcinogens facilitate cancer development is through mutagenesis, which causes genetic changes that can activate oncogenes or deactivate tumor suppressor genes. These mutations accumulate over time, often requiring multiple genetic alterations before a normal cell exhibits all the traits associated with malignancy, such as unchecked growth, evasion of apoptosis, and enhanced potential for metastasis. Beyond direct DNA damage, environmental carcinogens can also trigger metabolic changes, shifting the energy production of cells from oxidative phosphorylation to anaerobic glycolysis, a characteristic feature of many cancerous cells. This metabolic reprogramming, commonly known as the Warburg effect, grants cancer cells a survival advantage in low-oxygen environments. Recent developments in cancer research have underscored the essential function of small non-coding RNA molecules, known as microRNAs (miRNAs), in the regulation of gene expression and various cellular activities, including cell growth, differentiation, and programmed cell death. Due to their capacity to modulate a wide array of genes that govern the cell cycle, apoptosis, and DNA repair mechanisms, miRNAs play a crucial role in the progression of cancer. They can act as oncogenes, facilitating tumor development by suppressing tumor suppressor genes, or as tumor suppressors, where they inhibit cancer by downregulating oncogenes. This dual functionality of miRNAs in cancer biology presents an intriguing research avenue, with important implications for deciphering the intricate molecular pathways involved in cancer formation.

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One of the most promising uses of miRNAs in cancer research lies in their potential as biomarkers for early detection and diagnosis. Given their stability in bodily fluids such as blood, saliva, and urine, miRNAs can act as non-invasive indicators for cancer detection or for identifying individuals at increased risk due to exposure to environmental carcinogens. Recent studies have demonstrated that specific miRNA expression patterns change in response to environmental carcinogen exposure, offering an early molecular signature of carcinogenic damage prior to the onset of clinical symptoms. For instance, exposure to tobacco smoke, ultraviolet radiation, and certain pesticides has been associated with the upregulation or downregulation of specific miRNAs, which can be identified in bodily fluids and may serve as early markers of carcinogen-induced cellular alterations. Such biomarkers are vital for the timely detection of cancer.

The connection between exposure to environmental carcinogens and the dysregulation of microRNAs (miRNAs) is further reinforced by evidence that factors such as diet, smoking, alcohol intake, and chemical exposure can directly affect miRNA expression. For instance, certain dietary elements, including polyphenols and vitamins, have been found to influence miRNA expression profiles, thereby impacting cancer risk. Moreover, harmful substances like alcohol and tobacco not only cause genetic mutations but also lead to epigenetic changes that modify the expression of miRNAs involved in essential cancer pathways. These alterations often result in the activation of oncogenic miRNAs, which support cancer cell survival, or the suppression of tumor-suppressive miRNAs, allowing malignant cells to grow uncontrollably. Consequently, miRNAs can act as biomarkers for the early detection of cancers, monitoring disease progression, and evaluating the effectiveness of cancer treatments.

Additionally, gaining insight into the role of miRNAs in environmental carcinogenesis presents new avenues for therapeutic intervention. By focusing on specific miRNAs that are disrupted due to environmental factors, researchers are investigating strategies to reverse these alterations and restore normal cellular functions. For example, therapies based on miRNAs, such as miRNA mimics, are being explored to either reinstate the function of tumor-suppressive miRNAs or reduce the expression of oncogenic miRNAs. These methods show promise in preventing cancer or treating it in its early stages by reprogramming the molecular networks that contribute to tumor development. Furthermore, by pinpointing the miRNAs most closely linked to environmental carcinogens, it may be feasible to create personalized medicine approaches tailored to an individual's specific circumstances.

MicroRNAs (miRNAs) not only present opportunities as therapeutic targets but also have the potential to identify individuals at heightened risk of cancer due to environmental influences. These exposures can differ significantly based on factors such as geographic location, occupation, lifestyle, and dietary choices. Consequently, employing miRNA expression profiles as a diagnostic tool could empower healthcare professionals to evaluate a person's cancer risk linked to carcinogenic exposures and provide tailored preventive recommendations. This approach is particularly crucial for communities disproportionately impacted by environmental toxins or

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occupational hazards, as miRNA-based biomarkers could facilitate early detection and intervention to avert cancer onset.

The interplay between environmental carcinogens and cancer development is intricate, involving genetic mutations and metabolic alterations that disturb normal cellular functions. MicroRNAs play a pivotal role in regulating gene expression and have emerged as significant contributors to the molecular pathways of carcinogenesis. Their dual function as oncogenes and tumor suppressors positions them as promising for cancer diagnosis and treatment. Furthermore, identifying specific miRNA expression patterns related to environmental carcinogen exposure opens new avenues for early cancer detection, personalized prevention strategies, and the creation of miRNA-targeted therapies. As research progresses in understanding the complex dynamics between environmental carcinogens and miRNA dysregulation, miRNAs are poised to become vital biomarkers and therapeutic targets in the battle against cancer.

Keywords: Carcinogenesis, MicroRNAs (miRNAs), Environmental Carcinogens, Biomarkers, Mutagenesis.

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An Overview of Interferons in Cancer Therapy: Current Status and Future Perspectives

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Abstract:

Interferons are a type of signaling protein produced by white blood cell and other cell in the body and it is a group of cytokines. That help the body immune system fight against the cancer cells, autoimmune disease and infection. In 1986 scientists generate the first lab- made interferons for certain kind of cancer treatment. Interferons play an important role in cancer treatment by enhancing the immune system's power to fight cancer cells. In present, IFNs are used for the treatment of various types of cancer melanoma, myeloid leukemia, renal cell carcinoma, hairy cell leukemia. IFN∝, IFNβ and IFNγ are currently use for cancer treatment. IFNs work as they produce the T-cells, it is a WBC's that fight the disease. And also causing cancer cells to release chemicals that attract immune system cells that kill cancer. IFN alpha can trigger apoptosis in tumor cells by various stimuli and induce differentiation. And beta or gamma interferons produced apoptosis in tumor cell beta component important for cancer immunoediting process. Future prospects of interferons in cancer treatment are developing IFNs capacity to regulate the immune system and promote anti-

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tumor immune responses. Exploring the potential of IFNs in combination with gene editing technologies like CRISPR/Cas9. Biomarker testing watch the genes, proteins, and other substances that provide information about cancer and also predict patient response to IFN based therapies. Examination synergistic effects of IFNs with checkpoint inhibitors, targeted therapies, and chemotherapy. IFNs enhanced anti-tumor effects, increased patient survival, enhanced immune memory. IFNs can cause depression, IFN therapy may not be effective for all types of cancer. IFNs have shown promise in cancer treatment by immunotherapy. They fight against cancer inhibit cancer cell growth, modulate the immune system and induce apoptosis makes them a valuable tool.

Keywords: Interferons, melanoma, cancer treatment

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Evaluating the Effects of Subclinical Mastitis on Milk Quality and Processing Characteristics in Dairy Cows: An *in vitro* Analysis

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Abstract:

Subclinical mastitis is a pervasive and economically significant issue in dairy farming worldwide. Unlike clinical mastitis, which is characterized by visible symptoms such as inflammation of the udder, subclinical mastitis often goes undetected due to its asymptomatic nature. Bovine subclinical mastitis usually occurs as an immune response to an invasion of microorganisms, such as bacteria, yeasts, algae and viruses from the environment and/or transmitted from cow to cow (contagious transmission). However, the most common causes of subclinical mastitis are bacteria such as Staphylococcus aureus, Streptococcus agalactiae and coliform bacteria, such as Escherichia coli. Staphylococci are the bacteria most commonly isolated from BM and Staphylococcus aureus is a common cause of this disease. Despite its lack of overt clinical signs, it profoundly impacts milk quality, herd productivity, and the overall profitability of dairy operations. This condition is typically diagnosed through increased somatic cell counts (SCC) or the presence of specific pathogens in milk samples. The quality of milk is a critical factor for both consumer health and the dairy industry's ability to produce high-quality dairy products. Subclinical mastitis affects several milk parameters, including its composition, microbial quality, and physical properties. The condition often leads to a reduction in milk yield and alters its biochemical profile by decreasing lactose and casein content while increasing sodium, chloride, and whey proteins. These changes not only compromise milk's nutritional value but also its suitability for processing into cheese, yogurt, and other dairy products. From a technological perspective, the altered composition of milk due to

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subclinical mastitis affects its processing characteristics. High SCC and elevated levels of proteolytic and lipolytic enzymes can lead to reduced cheese yield, impaired coagulation properties, and spoilage of milk during storage. These enzymes, primarily secreted by leukocytes and mastitis-causing pathogens, degrade milk proteins and lipids, significantly affecting the flavor, texture, and shelf life of processed dairy products. Moreover, the increased microbial load in milk from cows with subclinical mastitis poses challenges for achieving stringent quality standards and food safety requirements in the dairy industry.

Methodology: Milk samples were collected from dairy cows diagnosed with subclinical mastitis based on microbial culture tests. These samples were analyzing to determine their composition, including fat content using the Rose-Gottlieb method, acidity levels, lactose content via Fehling's test, Protein content, Adulteration test and pH. Additionally, microbial analysis and biochemical characterization tests were performed to identify and study the bacteria present.

Results: Subclinical mastitis caused significant deviations in milk composition. A reduction in lactose and protein content was observed, accompanied by increased pH and reduced milk yield. Technological parameters such as coagulation properties were adversely affected. Variability in milk quality depended on the type of pathogens involved.

Conclusion: Subclinical mastitis negatively impacts milk composition and technological properties, reducing its commercial and processing value. Early detection and management strategies are essential to mitigate these effects, ensuring both milk quality and economic sustainability in dairy production.

Keywords: Subclinical mastitis, milk quality, milk composition, dairy cows, inflammation, bacterial count.

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Isolation and Estimation of Lipolytic Bacteria from Milk

Deepa Chaudhary and Anita Mishra

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Abstract:

Bacterial lipases (lipolytic enzymes) hydrolyze milk fat and release small molecular volatile fatty acids (butyric acid, cuprioic and cuprioic acid), thus they referred as lypolytic bacteria. The fat-splitting or lipolytic enzymes, all of which cleave a fatty acid residue from the glycerol residue in a natural fat or a phospholipid. Lipases are one of the important groups of biocatalysts used in biotechnological applications. Lipases extracted from microorganisms are used in various industries such as dairy, food, detergents, textile, pharmaceutical, cosmetic and biodiesel industries. It is also used for synthesis of fine chemicals, agrochemicals and new polymeric materials. Research on microbial lipases, has increased due to their great commercial potential. Following proteases and carbohydrases, lipases are considered to be third largest group based on total sales volume. The dairy industry uses lipases to modify the fatty acid chain lengths, to enhance the flavours of various cheeses. Current applications also include the acceleration of cheese ripening and the lipolysis of butter, fat and cream. The free fatty acids generated by the action of lipases on milk fat endow many dairy products, particularly soft cheeses with their specific flavor characteristics. The concentration of fat 10 times higher in enzyme modified cheese to that of normal cheese.

Methodology: Milk samples were collected from the local market and was processed on nutrient agar and tributyrin agar plates respectively. To isolate lypolytic bacteria, various sterile dilutions were prepared and spread over nutrient agar plates. The inoculated plates were incubated at 37°C for 2 days. The isolated microbes were characterized on the basis of gram staining.

Results and Discussion: lypolytic bacteria were identified based on a clear zone made by itself on culture plate. The most prevalent bacteria were characterized as *Pseudomonas sp*. in gram staining.

Conclusion: The milk is a reservoir a huge and diverse microbial population, which is considered a rich source of many types of microbial strains. Hence the milk sample may be used to isolate the noval strains that can be used as a part of the microbial collection for the production of lipase at research labs and industries.

Keywords: Lipolytic bacteria, lipases, dairy, food

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Cytotoxic Effect of Phyto-Synthesised Silver Nanoparticles against Human Lung Adenocarcinoma A549 Cancer Cell Line

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Abstract:

Biosynthesis of silver nanoparticles (AgNPs) using plant extract is a cheap, easily accessible and natural process in which the phyto-constituents of the plants act as capping, stabilising and reducing agent. The present study explored the biosynthesis of AgNPs using aqueous leaf extract of Xanthium strumerium L. and characterised via various techniques such as Fourier transform infrared, scanning electron microscopy, transmission electron microscopy (TEM), energy dispersive X-ray analysis and X-ray diffraction. Here, TEM confirmed the spherical morphology with 25–50 nm size of synthesised AgNPs. Further, anticancer efficiency of AgNPs synthesised using Xanthium strumerium L. leaves were evaluated against human lung adenocarcinoma cancer cell line A549 by MTT, trypan blue assay, apoptotic morphological changes using Annexin V-FITC and Propidium iodide (PI), nuclear morphological changes by DAPI (4, 6-diamidino-2-phenylindole dihydrochloride) staining, reactive oxygen species generation and mitochondrial membrane potential determination. Results confirmed the AgNPs synthesised using Xanthium strumerium L. leaves are found to be highly toxic against human lung adenocarcinoma cancer cell line A549.

Keywords: Silver nanoparticles, adenocarcinoma, Phyto-synthesis, MTT

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A Review Article on the Effect of Thyroid Disease on Brain Function

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Abstract: The endocrine system and the central nervous system are thought to be connected, and the hormones produced by the thyroid play a significant role in the growth and maturity of the mammalian brain. Evidence suggests that TSH (thyroid stimulating hormone) can influence all body systems through body-brain communication. The hormones produced by the thyroid are necessary for the adult brain's metabolic functions, and thyroid disease's neuropsychiatric symptoms have

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long been recognized. TSH is a pituitary hormone that stimulates the thyroid gland to produce and release thyroid hormones, mainly thyroxin and triiodothyronine. These hormones are important players in body-brain communication, and the rising incidence of abnormal lipid metabolism has highlighted the connection between thyroid function and lipid metabolism. The overall conclusion is that some transporters may allow T4 and T3 to enter the brain. TH (Thyroid hormone) plays an important part in the development of the central nervous system (CNS) during embryogenesis, and it is easy to identify TH-responsive genes in developing brains that stop responding to TH in adulthood. The blood-brain barrier (BBB) and the blood-CSF barrier will be described in relation to fetal and adult TH transmembrane transporters (THTT), like monocarboxylate transporter 8 (MCT8), which are important for both the uptake of TH across the BBB and for transport between cells within the brain, such as astrocytes and neurons. The symptoms of hypothyroidism, including mood swings, hyperactivity, anxiety, and even panic attacks, are alleviated with levothyroxine. The two areas most commonly impacted by TH insufficiency after birth are language and memory. If THS changes during development are not addressed soon after birth, they may cause brain damage.

Keywords: CNS, endocrine system, thyroid, brain

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The Isothermal Amplification: Future of Point-of-Care Diagnosis

Anu Samota and Vishnu Sharma

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Abstract : Point-of-care diagnostics benefit greatly from isothermal amplification, a versatile technique that amplifies nucleotide chains under constant temperature conditions. Unlike polymerase chain reaction (PCR), it does not rely on cyclic temperature changes. Instead, its unique chemical composition and enzyme configurations enhance robustness and enable efficient amplification.

Thermostativity, a key feature of isothermal amplification enzymes, enables the amplification of specific nucleic acid sequences at a fixed temperature. Stability of these enzymes are important for aspects of amplification, like moving strands, being able to process information, and not being affected by biological contaminants. Efficient strand displacement enables the polymerase to quickly synthesise new DNA strands while displacing the existing strand. High processivity ensures the polymerase can continuously replicate nucleotides without detaching from the DNA template. Additionally, greater tolerance to salts and biological matrices reduces or eliminates the need for complex sample preparation steps.

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One innovative application of isothermal amplification is the RICCA (RNA Isothermal Co-assisted and Coupled Amplification) method. This assay employs a streamlined one-pot "sample-in, result-out" format, focusing on detecting low levels of nucleic acids directly from specimens without requiring laboratory processing. RICCA combines RNA-specific and DNA-specific amplification processes, utilizing a recombinase enzyme, a single-stranded DNA-binding protein (SSB), and a strand-displacing polymerase. This synergy facilitates rapid, homogeneous, and highly sensitive amplification at a constant temperature.

Compared to existing isothermal methods like RPA, LAMP, HAD, and RCA, RICCA demonstrates superior sensitivity and speed, making it a powerful tool for detecting RNA targets. Its simplicity and cost-effectiveness position isothermal amplification as a transformative technology for on-site molecular diagnostics of infectious diseases, particularly in resource-limited settings.

Keywords: Diagnosis; POC; PCR; Isothermal Amplification; Thermostativity

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Effects of Light Pollution on the Anatomical and Biochemical Properties of Plants: Implications for Therapeutic Efficacy

Jahanvi Singh and Shobha Mehra

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Abstract : Light Pollution (LP), defined as the alteration of natural light-dark patterns in ecosystems, is a concerning environmental issue predominantly caused by artificial light at night (ALAN). LP disrupts plant growth, development, and phenological events by interfering with circadian rhythms, photoperiodic cues, and metabolic processes. The study investigates how the intensity of ALAN affects the anatomical, physiological, phytochemical, and therapeutic properties of the plants. The experiments analyze a common urban plant, Ficus religiosa (Peepal). It is a widely available plant in India, well-known for its high therapeutic value and notable potential in medicinal applications. However, prolonged exposure to high-intensity artificial lights leads to a reduction in these therapeutic qualities over time. Samples from the mentioned plant were collected to investigate the stomatal index and identify structural abnormalities. The stomatal density (stomata per mm^2) is calculated based on the counted stomata within the observed area. The comparison was then made with the stomatal index of a normal plant. The stomatal density and structural abnormalities were analyzed to understand the impact of light pollution on gas exchange and photosynthesis. The initial study observed a reduction in stomatal index by ~ 50% in the sample compared to a control plant. The stomatal index of light-polluted plant samples showed a notable reduction compared to healthy plants, coupled with structural deformities in stomatal openings and

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guard cells. This suggests impaired stomatal functionality, which can adversely affect the plant's ability to acquire CO_2 and perform photosynthesis efficiently. Further, it is also reported in the literature that phenol content is increased when plants are exposed to light pollution. Experiments will be done on the quantitative estimation of total phenol and flavonoid content to check the effects of light on this plant. As medicinal plants are an integral source of natural remedies, the negative impact of light pollution on their therapeutic capabilities calls for urgent attention. This study highlights the need for further research to understand the long-term consequences of artificial light exposure on the quality and efficacy of medicinal plants, which could have broader implications for herbal medicine and sustainable plant-based therapies.

Keywords: Artificial light at night, phytochemical, physiological, stomatal index, circadian rhythms.

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Seedling Anatomy in Ipomoea Purpurea of Convolvulaceae

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Abstract: Primary tissue differentiation in two days old seedling was studied in I. purpurea of Convolvulaceae family. In the seedling of I. purpurea protophloem groups differentiate at alternate position to protoxylem groups and protophloem is first to differentiate followed by protoxylem group. There are four protoxylem groups alternating with the protophloem groups and differentiate at four different radii. Thus the root is tetrarch type with 4 exarch xylem and alternating phloem groups. In I.purpurea hypocotyls region is represented by four collateral vascular bundles. The cotyledonary node is unilacunar three trace type with split laterals.

Keywords: I.purpurea, tetrarch, Unilacunar three trace, hypocotyls

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Bridging the Gap: Comprehensive Strategies for Universal Health Equity

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Abstract : Health is a fundamental right and product of social determinants. Ageing populations, unhealthy habits and an increase in non-communicable diseases means decline in health. The extent of decline in health varies and depends on geography and demographics. As the population becomes more diverse, it is important to recognize the possibilities of new and emerging disparities. Health and health equity are determined by the conditions in which people are born, grow, live, work, play and age, as well as biological determinants.

In order to achieve health equity globally, we must break down the obstacles such as poverty, discrimination, and stigma, race, gender, and ethnicity. Major hurdle in making health equityaccess to all is various type of social, economic, demographic, structural restraints. By cross industry collaboration,by providing internet infrastructure, digitalization, patient empowerment, and by using innovative funding models, we have tried to analyse of data of public and private sector.This paper focus on the strategies outline in which developing standardized race measurements across health systems and by implementing effective interventions improving workforce diversity, utilizing technological advances, and adopting practices such as personalized medicine may serve as appropriate starting points for moving towards health equity globally.

Keywords: health equity, demographics, biological restraints, health disparity.

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Current Advances in Stem Cell Therapy for Retinal Diseases: A Review

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Abstract : The human retina is a complex and delicate tissue responsible for detecting light and transmitting visual signals to the brain. However, retinal diseases such as age-related macular degeneration (AMD), diabetic retinopathy, and retinitis pigmentosa can lead to irreversible vision loss, affecting millions of people worldwide. Despite advances in medical treatment, many retinal diseases remain incurable, and current therapies often only slow disease progression. In recent

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years, stem cell research has emerged as a promising avenue for the treatment of retinal diseases. Stem cells, with their unique ability to differentiate into various cell types, hold the potential to repair or replace damaged retinal cells, restoring vision and improving quality of life. This introduction will explore the current state of stem cell research in retinal disease, highlighting the latest advances, challenges, and future directions in this rapidly evolving field.

Stem cell therapies aim to replace photoreceptors and retinal pigment epithelium in the retina. Animal models have successfully transplanted these cells, and human embryonic stem cells (hESCs) have shown the capacity to differentiate into RPE. Clinical trials include subretinal injection of human ESC-derived RPE post-vitrectomy and use of an hESC-derived RPE monolayer. Other stem cell sources, such as human umbilical tissue-derived stem cells (hUTSCs), bone marrow-derived hematopoietic stem cells (BMHSCs), and bone marrow-derived mesenchymal stem cells (BMMSCs), show promise in treating retinal diseases. Stem cells can be delivered intravitreal or subretinally, with a recent report showing a 10-fold increase in surviving cells compared to conventional techniques.Retinal diseases such as age-related macular degeneration (AMD), glaucoma, and diabetic retinopathy are the most common causes of visual impairment and legal blindness in developed countries. These conditions are characterized by progressive loss of neural cells and essential supporting cells like the RPE. Retinal dystrophies, such as retinitis pigmentosa (RP), Stargardt's disease, Best disease, and Leber congenital amaurosis, all evolve with early loss of photoreceptors and subsequent loss of RGC.Age-related macular degeneration (AMD) is caused by inflammation in the outer retina, causing degeneration of the retinal pigment epithelium (RPE) and Bruch membrane. Retinitis Pigmentosa (RP) results from destruction of light-sensing photoreceptors in the retina, with multiple genetic mutations leading to RP. Glaucoma causes irreversible damage to retinal ganglion cells, while diabetic retinopathy is a neurovascular degenerative disease with a neurodegenerative and vasodegenerative component. Current treatment options focus on slowing retina degeneration rather than addressing underlying causes.

Stem cell therapy has potential for treating retinal degenerative diseases, but challenges remain, such as a well-defined technique and a sustainable donor cell source. Alternative strategies include cell transplantation and gene therapy. Clinical translation of RPE transplantation could improve photoreceptor function and stop AMD progression, glaucoma, and diabetic retinopathy progression.Stem cell therapies are being developed for corneal, lens, and retinal dysfunctions leading to blindness. These therapies require reproducible protocols, long-term experiments, improved surgical methods, and a combination of stem cell products with bioengineering approaches. Advancements are nearing standard protocol.

Keywords: mesenchymal, subretinal, photoreceptor, hematopoietic, intravitreal

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Biology-Driven Drug Development: Unlocking Innovative Approaches for Health

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Abstract: The pharmaceutical industry is undergoing a transformative era, driven by advances in biological sciences. Traditional drug development has often been limited by its reliance on serendipitous discoveries or chemical screening methods, which can lack specificity and efficacy. With the integration of biology-driven approaches, there is now a greater emphasis on understanding disease mechanisms at a molecular and cellular level. This research explores how these innovative methodologies, leveraging insights from genomics, proteomics, and systems biology, are reshaping the landscape of drug discovery and development. Key questions addressed include: How do biological insights improve target identification? What technologies are enabling this shift? And how can challenges such as cost and scalability be overcome.

The transition to biology-driven drug development aligns with the broader movement toward precision medicine. By focusing on the interplay between genes, proteins, and cellular networks, researchers are now able to design therapies that target diseases with greater specificity. This approach not only enhances the efficacy of treatments but also minimizes adverse effects, offering hope for complex conditions like cancer, neurodegenerative diseases, and rare genetic disorders.

Methodology: This research adopts a multidisciplinary framework to explore biology-driven drug development. The methodology is structured across three key phases: computational analysis, experimental validation, and clinical integration.

Computational Analysis: Advanced bioinformatics tools are utilized to analyze large-scale genomic, transcriptomic, and proteomic datasets. Machine learning algorithms identify potential therapeutic targets by mapping disease pathways and interactions at a molecular level. For instance, CRISPR-based functional genomics screens are employed to validate the relevance of identified targets.

Experimental Validation: Once targets are identified, in vitro and in vivo models are used to assess their therapeutic potential. Techniques such as high-throughput screening of biologics (e.g., monoclonal antibodies, RNA-based therapies) and the use of patient-derived organoids enable precise evaluation of candidate drugs.

Clinical Integration: To translate findings into clinical practice, this research emphasizes adaptive trial designs and biomarker-driven patient selection. Collaboration with industry partners ensures scalability and regulatory compliance.

Results and Discussion: Preliminary findings underscore the transformative potential of biology-driven approaches in addressing unmet medical needs. A key case study focuses on oncology, where

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systems biology has been instrumental in unraveling the complexities of tumor microenvironments. By targeting specific genetic mutations or signaling pathways, therapies such as checkpoint inhibitors and CAR-T cells have demonstrated remarkable success. Similarly, in rare genetic disorders, gene-editing technologies like CRISPR-Cas9 have shown promise in correcting pathogenic mutations.

The discussion highlights three critical dimensions of biology-driven drug development:

1. **Precision and Personalization:** The integration of omics data allows for the stratification of patient populations based on genetic and molecular profiles. This approach facilitates the design of personalized treatment regimens, ensuring higher efficacy and reduced toxicity. For example, targeted therapies for HER2-positive breast cancer have significantly improved patient outcomes compared to traditional chemotherapies.
2. **Technological Innovations:** Advances in single-cell sequencing, spatial transcriptomics, and proteomics are driving discoveries at an unprecedented pace. Artificial intelligence (AI) is playing a pivotal role in predicting drug-target interactions and optimizing lead compounds. Furthermore, the convergence of synthetic biology and bioengineering is enabling the development of novel biologics, such as synthetic vaccines and, bispecificantibodies.
3. **Challenges and Opportunities:** Despite its promise, biology-driven drug development faces several challenges. High costs associated with omics technologies and biologic manufacturing remain a barrier. Additionally, the regulatory landscape is still evolving to accommodate innovative therapies, necessitating harmonization across global jurisdictions. Ethical considerations, particularly in the context of gene editing and data privacy, also warrant attention. Collaborative efforts among academia, industry, and policymakers are essential to address these hurdles.

Conclusion: Biology-driven drug development is poised to revolutionize the pharmaceutical landscape by offering innovative solutions to complex health challenges. By leveraging molecular insights, this approach enables the design of therapies that are not only effective but also tailored to individual patient needs. The integration of cutting-edge technologies, from CRISPR-based gene editing to AI-driven analytics, underscores the interdisciplinary nature of this field. While challenges related to cost, scalability, and regulation persist, the potential benefits far outweigh these obstacles.

Future directions include expanding the application of biology-driven approaches to neglected diseases and resource-limited settings. Additionally, fostering open data-sharing initiatives and public-private partnerships can accelerate the translation of research into clinical outcomes. Ultimately, biology-driven drug development represents a paradigm shift that holds the promise of transforming healthcare and improving global health outcomes.

Keywords: Biology-Driven, Drug Development, Innovative Therapies, Precision Medicine, Omics Technologies

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Mushroom Drink: The Future of the Health

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Abstract : Tea (Camellia sinesis) is second most consumed beverages in the world after water. Originating from china, tea has become an integral part of many cultures worldwide.

While tea offers numerous health benefits, excessive consumptions or sensitivity to certain compounds can lead to health issues caffine related problems like insomnia, anxiety, increase heart rate, high blood pressure etc. But herbal tea is caffine free beverages made from the leaves, flowers, roots or fruits of the plant other than Camellia sinensis (tea plant) like peppermint tea, hibiscus tea and mushroom tea etc. Mushroom tea is also a type of herbal tea. Many types of mushrooms are used to make such beverages like Reishi, Chaga, Cordyceps, Lion's mane. The market of mushroom for mushroom based product including mushroom tea, beverage, coffee is growing rapidly.

Mushroom beverage helps in controlling diabetes, reduce cholesterol, boost energy, Anti-oxidant properties etc. Cordyceps militaris is a fascinating fungus known for its potential health benefits, often used in traditional medicines and modern supplements. When combined with herbs in beverages, it can create a nutritious drink that may support energy levels, immune function, and overall wellness. Herbs increase its therapeutic potential. Herbs like Ginger, Ashwagandha, Tulsi, Arjuna, Curry Leaves, Bay Leaves, Cinnamon, Gooseberry etc added to enhance its potential. This beverage not only offers refreshing taste but also support health and wellness.

Cordyceps contains various bioactive compounds such as cordycepins, polysaccharides and sterols etc. Cordycepins is known for various therapeutic potential such as anti-diabetic, anti-fungal and anti-inflammatory, cardiovascular disease etc. which makes it most valuable medicinal mushroom for helping in maintaining good health.

Keywords: Cordyceps, Therapeutic, Camellia sinensis, Cordycepins, Polysaccharides

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A Review Article on Genetic Mapping in Crop Plant

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Abstract :

Crop plants are cultivated for a specific purpose such as food, fibre or fuel. For example, cereals, Legumes, root or tuber, vegetables. These plants play an important role in our life so, for improvement of crop plants genetic mapping is considered as powerful tool. Genetic mapping is also known as linkage mapping, in this method determination of location of genes on chromosome occur and used as enhance disease resistance. It improves crop yields, increase drought tolerance, support precision agriculture. Genetic mapping enabling researches to identify and manipulate key genes controlling desirable traits. This study presents recent advances in genetic mapping techniques for crop plants, focusing on (specific crops like wheat, rice, maize). By integrating cutting edge genomic, phenomic and bionformatics approaches, we constructed high-resolution genetic maps, revealing novel quantitative traits loci (QTLs) associated with enhanced yields, disease resistance and climate resilience. Our findings demonstrate the potential of genetic mapping to accelerate crop breeding programs, enhance food security and mitigate the impact of climate change. This research contribute to the development of mare efficient, sustainable and resilient crop varieties, ultimately benefits farmers, consumers and the environment.

Keywords: genetic mapping, crop improvement, genomic, phenomics, bionformatics, QTLs, crop breeding.

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A Review: Ai in Drug Discovery and Development

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Abstract:

Drug discovery and development represent crucial translational science processes that significantly contribute to human health and well-being. Artificial intelligence (AI) has emerged as a transformative force in the pharmaceutical industry, expediting drug discovery and development

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through the analysis of vast datasets, identification of potential drug targets, and optimization of drug design. AI's role in drug safety began in the early 2000s, with initial applications focusing on bacterial mutagenicity predictions and the hERG potassium channel. In clinical trials, AI enhances patient recruitment, data analysis, and trial design by identifying suitable participants, predicting treatment responses, and optimizing trial endpoints. AI-powered tools enable the extraction of valuable insights from extensive clinical trial data, leading to faster and more accurate decision-making in drug development.

Digital twins (DTs), virtual models of human systems, offer a means to simulate drug responses and clinical trial outcomes. By enabling in-silico testing, DTs facilitate the optimization of drug development strategies, encompassing virtual representations from cellular to human scales. These models enhance the efficiency of drug discovery by streamlining processes with high economic, ethical, or social burdens. The multifaceted impact of DTs includes deepening disease understanding, aiding biomarker identification, and accelerating precision medicine. Generative AI, a cutting-edge technology, supports the creation of novel, complex datasets with desired attributes, making it a key enabler of DTs in pharmaceutical innovation.

Machine learning (ML) and deep learning (DL) techniques have become integral to novel drug discovery, target design, and optimization. The integration of classified big data, enhanced computational power, and cloud storage has energized computer-assisted drug discovery. Technologies like high-throughput screening and computational database analysis have significantly improved the reliability of ML and DL methods in identifying lead compounds and developing synthesis pathways. The broader adoption of ML and DL across scientific domains, coupled with advancements in hardware and software, has fueled progress in pharmaceutical research.

Deep learning techniques, particularly artificial neural networks (ANNs) with multiple processing layers, have gained renewed attention due to their ability to automatically extract relevant features from input data and model nonlinear relationships. These methods complement traditional ML approaches, which often rely on manually curated molecular descriptors. The initial skepticism surrounding AI in pharmaceutical research has diminished, paving the way for innovative advancements in medicinal chemistry. The integration of AI with experimental techniques is expected to accelerate the development of effective, economical, and novel therapies.

AI-based models have revolutionized conventional drug discovery, offering cost-effective and time-saving alternatives to wet-lab experiments. Over recent decades, these models have been applied across various stages of drug discovery, supplementing traditional experiments and expediting the overall process. AI techniques hold immense potential to refine drug release modeling, optimize therapies for personalized medicine, and minimize adverse effects. By leveraging AI algorithms, researchers can predict drug release profiles, incorporate patient-specific factors, and design tailored dosage regimens to enhance therapeutic efficacy.

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Additionally, the integration of multimodal imaging techniques—which combine multiple imaging modalities—provides a wealth of anatomical, functional, and molecular information, further accelerating drug discovery and development. Imaging technologies play a pivotal role in elucidating disease mechanisms, identifying pharmacological targets, and evaluating the efficacy of drug candidates. Techniques such as macromolecular X-ray crystallography and cryo-electron microscopy (cryo-EM) remain vital for determining the three-dimensional structures of biomolecules. Incorporating AI into these structural methods has streamlined and enhanced the analysis of complex datasets, improving both the efficiency and accuracy of structure determination.

The integration of AI into drug discovery heralds a new era of innovation, driving the development of safe and effective treatments for a wide range of diseases and ultimately advancing global health outcomes.

Keywords: Machine Learning, Digital Twins, hERG, Novel Drug, Multimodal Imaging

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A Review on Stem Cell: The Future of Regenerative Life

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Abstract:

Stem cell is an undifferentiated cell that has the potential of self-renewal and may differentiate into a range of specialised cell types. These cells are essential for growth, development, and the repair of body tissues. Stem cells own the distinguishing abilities to repair and regenerate damaged tissues, supplying large possibilities for addressing severe illnesses and injuries. This capability for regeneration has led to advancements in fields like neurology, cardiology, orthopedics, and immunology, offering new hope for patients with conditions like spinal cord injuries, coronary heart problems, diabetes, and osteoarthritis. Organ damage and degenerative diseases are caused by cell death through ageing or loss of function. Examples of such conditions include degenerative diseases like Parkinson's disease, Alzheimer's disease, cirrhosis of the liver, and hearing loss, as well as injurious diseases such as myocardial infarction and skin burns.

Organs like liver with high regenerative capacity and can easily regenerate to maintain functional stability under certain conditions. Whereas most tissues and organs do not have such capacity and cannot repair themselves after injury, eventually that leads to loss of function. Later, to regain the function, current treatments focuses on organ transplantation, artificial organ substitution and

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regeneration of organ. Patients with artificially organ replaced can develop infections or immune rejection after transplantation. Few inflammatory reactions, such as infectious endocarditis, can develop. Therefore, there is a need for a treatment that can effectively repair damaged tissues and organs in patients, aiming to minimize the occurrence of adverse events.

Stem cells have great potential to differentiate into various cells and can proliferate indefinitely. Stem cells can be induced to differentiate into specific cell or tissue types in vitro before transplanting into the patient to replace degenerated or necrotic cells.

In addition, Stem cells secrete anti-inflammatory factors, cytokines, and exosomes to suppress the inflammatory response and improve the microenvironment of the damaged area, ultimately regulating cell proliferation and differentiation.

Recent studies are focusing on comprehending the molecular mechanisms that underlie stem cell differentiation, tissue integration, and migration. Researchers are also exploring the application of induced pluripotent stem cells (iPSCs), which can be derived from adult tissues and reprogrammed into any cell type, enabling personalized treatment. Cultivating stem cells in vivo remains a challenge due to the need to assure the long-term safety and functionality of regenerated tissues at the same time as preventing immune rejection. Stem cell regeneration holds potential for radical innovation in the field of medicine while offering personalized and long lasting solutions to a wide range of chronic and degenerative conditions.

Keywords: Self-renewal, Regeneration, Induced Pluripotent stem cells, Reprogrammed, Radical innovation

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A Review: Disease Caused by Rhizopus in Postharvest Fruits, Symptoms and Control Strategies

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Abstract:

Rhizopus stolonifer (saprophytic fungus) is one of the main pathogen in postharvest storage logistics of more than 100 kinds of fruits, such as cherry, grapes and tomatoes. In this abstract, pathogenicity and infection mechanism of fruit disease caused by *Rhizopus stolonifer* i.e; soft rot, black mold and Rhizopus Rot are reviewed. The main symptoms appear when the fruit is infected, the infection area is first soaked, and then becomes soft and rotten with abundant mycelium are observed on the fruit

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surface producing clusters of fibrous grey sporangia. The infected fruit slowly decays and release juice with fermented or acidic odor. The control methods of *Rhizopus stolonifer* in recent years was summarized from three dimensions of physics, chemistry and biology, including the nanomaterials, biological metabolites, light control bacteria, fungicides, calcium chloride, salicylic acid, peracetic acid and nanomaterials. Future direction of postharvest *Rhizopus stolonifer* infection control was analyzed from two aspects of pathogenic mechanism research and new composite technology.

KEYWORDS: Pathogenicity, Control strategies Nanomatrials, Infection mechanism

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Developing Cultural Competence in Healthcare Professionals: Bridging the Care Delivery Gap

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Abstract:

Global healthcare systems face challenges in addressing the needs of a diverse patient demographic. Cultural competence training for healthcare providers has emerged as a significant method for bridging care delivery gaps and assuring fair treatment, irrespective of cultural or linguistic barriers. This study aims at how structured cultural competence training programs influence healthcare outcomes, minimize inequities, and improve communication between patients and healthcare professionals.

The essential elements of successful training are underlined, including increasing empathy, identifying unconscious biases, and developing culturally sensitive communication skills. The research also looks into the importance of case-based learning, simulation scenarios, and multilingual resources in improving these skills. The findings show that trained healthcare providers are more capable of overcoming cultural barriers, resulting in increased patient satisfaction, improved treatment adherence, and better overall health outcomes.

This research emphasizes the importance of implementing cultural competency training into medical education and ongoing professional development in order to build inclusive and equitable healthcare environments.

Methodology: This study used a combination of methods to evaluate the effectiveness of cultural competence training for healthcare providers. A pre- and post-training examination evaluated cultural competency, communication skills, and implicit bias levels. Participants comprised healthcare professionals from multiple disciplines as well as patients from different cultures. The

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intervention comprised awareness sessions, skill-building workshops, and the introduction of multilingual resources. The gathering of information methodologies comprised surveys, patient comments, and observation of provider-patient interactions, along with focus group discussions and interviews. Quantitative data were assessed using paired t-tests and ANOVA, while qualitative data were thematically analyzed to provide a comprehensive review of the training.

Result: This study emphasizes how training in cultural competence improves the provision of healthcare. Following training, physicians demonstrated enhanced communication, empathy, and cultural competency, which led to better patient interactions. Reduced biased decision-making and equal care were the results of greater knowledge of unconscious biases. Culturally sensitive communication and multilingual resources were cited by patients as major factors in their increased level of satisfaction. Respecting cultural choices improved health outcomes and treatment compliance. Simulations and case-based learning were successful training strategies for developing skills, while multilingual resources helped with language obstacles. Even Nevertheless, obstacles like time restraints and the requirement for consistent work highlight the significance of continuing assistance.

Conclusion: Implementing fair healthcare systems that fulfill the requirements of many communities requires cultural competence training. This study emphasizes how it might enhance communication, minimize unintentional prejudice, and provide patient-centered treatment. Significant strategies including skill-building training sessions, awareness campaigns, and bilingual documents significantly enhance providers' cultural sensitivity. Enhancing patient satisfaction, promoting inclusivity, and improving health outcomes are all accomplished through implementing such training into medical education and professional development. In order to achieve health justice, it is both morally required and possible to address cultural and linguistic diversity. By expanding these programs and removing obstacles to participation, healthcare systems will be competent to efficiently serve all populations.

Keywords: Cultural competence, healthcare training, equity, implicit bias, inclusive care

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Photocatalytic Degradation of Textile Dyes Using Biogenically Synthesized Ag/Cu/Fe Trimetallic Nanoparticles

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Abstract :

With the increase in industrialization coupled with population growth and climate change has led to global challenges in water contamination. The major water pollutants include the use of pharmaceutical drug, insecticide, pesticide, discharge from industries. According to the statistical report, the textile industry contributes to the release of 2% of all dyes into water bodies, posing both health and environment risks. Different approaches have been practiced for the removal of pollutants such as microbial degradation, flocculation, activated carbon sorption, and treatment by redox reaction, electro-coagulation and others. However, these available methods are associated with limitation pertaining to less effectiveness, time consuming, expensive and also results in the production of toxic byproducts. Nanotechnology based dye degradation approach facilitates us to degrade chemicals in a sustainable, eco-friendly and cost effective manner. Therefore, the practice of the utilization of biosynthesized nanoparticles from numerous biological systems has been reported in literature, out of which plant based nanoparticles are considered to be the most appropriate method. *Moringa oleifera* is one of the popular functional foods that have been tremendously exploited for synthesis of a vast majority of metal nanoparticles (NPs). The diverse secondary metabolites present in this plant turn it into a green tool for synthesis of different NPs with various biological activities. The NPs synthesized were explored for their photocatalytic degradation potential.

Methodology: First plant extract was prepared by dissolving 5 g of high-quality *M. oleifera* powder with 100 ml of distilled water. The mixture was kept on magnetic stirrer for 1 hour and then was filtered using Whatman's filter paper No. 1. Further, it was stored in an airtight container for future use. For the synthesis of nanoparticles, 10 mM stock solution of the metal salts was prepared. 0.151 g of $FeSO_4$, 0.249 g of $CuSO_4 \cdot 5H_2O$, and 0.169 g of $AgNO_3$ were dissolved in distilled water at room temperature to form 100 ml of solution. The stock solution was stored at 4°C for later use. To prepare trimetallic NPs, equal volumes of salt solutions containing Ag, Cu, and Fe were mixed together, and 20 ml of *M. oleifera* leaf extract was added to the mixture of the metal precursors at a ratio of 1:1:1:1. The final mixture was then kept on a shaker overnight at 50°C to produce a homogeneous combination. As a result, a dark greenish tint developed, indicating the synthesis of trimetallic NPs. After this, the mixture was centrifuged at 10000 rpm for 20 minutes. The pellet obtained was washed off with distilled water and centrifuged again. The obtained pellet of trimetallic NPs was further suspended in distilled water and their absorbance was determined spectrophotometrically. The photocatalytic activity of the biosynthesized NPs was evaluated by monitoring the degradation of dye at regular intervals. The dye degradation reaction was monitored on a spectrophotometer and the difference was noted.

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Results: The prepared trimetallic NPs were detected through UV–Vis absorbance spectra using 200 to 330 nm wavelength during which maximum absorbance was observed. Phytochemical screening of plant extract and NPs pellet was done to analyse the effect of phytochemical on the degradation of dye. Presence of phenol, protein and carbohydrate was detected in plant extract while presence of carbohydrate and protein was detected in NPs pellet. Degradation of dye was noted at different intervals. The effect of pH, temperature and dye concentration was determined and the dye degradation kinetics was calculated. Antimicrobial study of plant extract and NPs was also done against clinical pathogens.

Keywords: Nanotechnology, trimetallic NPs, kinetics, photocatalytic degradation, *Moringa oleifera*

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Medicinal Properties and Healthcare Applications of Plant Species of Family Euphorbiaceae: A Review

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Abstract:

The Euphorbiaceae family, comprising over 300 genera and 7,000 species, is a rich source of medicinal plants. It is one of the largest and most diverse plant families, with species found in tropical, subtropical, and temperate regions around the world. This review aims to summarize the current state of knowledge on the medicinal properties and healthcare applications of Euphorbiaceae family plants. This review also aims to provide an overview of the medicinal properties and healthcare applications of Euphorbiaceae family plants. Many plants in this family have been used in traditional medicine for centuries, and modern research has confirmed their medicinal properties. We have highlighted specific plant of the family, such as *Euphorbia tirucalli, Ricinus communis, Phyllanthus niruri,* and *Jatropha curcas,* and their traditional uses in medicine and identified areas for future research, including the isolation and characterization of bioactive compounds, clinical trials, and conservation efforts. Plants like *Euphorbia tirucalli* and *Euphorbia peplus* have shown anticancer activity against various types of cancer, including breast, lung, and skin cancer. Anti-inflammatory and analgesic properties: Plants like *Ricinus communis* and *Jatropha curcas* have been used to treat inflammatory conditions, pain, and fever. Antimicrobial and antiviral properties: Plants like *Phyllanthus niruri* and *Euphorbia hirta* have shown antimicrobial and antiviral activity against various pathogens, including bacteria, viruses, and fungi. Plants like *Phyllanthus amarus* and *Euphorbia neriifolia* have been used to treat liver disorders and protect against liver damage.

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Dermatological applications: Plants like *Euphorbia peplus* and *Ricinus communis* have been used to treat skin conditions like eczema, acne, and psoriasis.

Numerous studies have investigated the medicinal properties of Euphorbiaceae family plants. For example, a study by Kumar et al. (2013) found that *Euphorbia tirucalli* exhibited anticancer activity against human breast cancer cells. Another study by Rao et al. (2015) found that *Ricinus communis* had anti-inflammatory and antimicrobial properties. *Phyllanthus niruri* has been found to have hepato-protective properties, protecting against liver damage caused by toxins. *Jatropha curcas* has been found to have antimicrobial and antifungal properties, making it effective against a range of microorganisms. A review of the literature also highlights the traditional uses of Euphorbiaceae family plants in medicine. For example, *Euphorbia tirucalli* has been used in traditional medicine to treat various conditions, including cancer, HIV, and skin disorders. *Ricinus communis* has been used to treat inflammatory conditions, pain, and fever. *Phyllanthus niruri* has been used to treat liver disorders and kidney stones. *Jatropha curcas* has been used to treat skin conditions, wounds, and inflammatory disorders.

Euphorbia tirucalli (Fire Sticks) has been used in traditional medicine to treat various conditions, including cancer, HIV, and skin disorders. *Ricinus communis* (Castor Oil Plantseeds of this plant are a rich source of ricinoleic acid, which has anti-inflammatory and antimicrobial properties. *Phyllanthus niruri* (Chanca Piedra) has been used to treat various conditions, including kidney stones, liver disorders, and viral infections. *Jatropha curcas* (Barbados Nut) seeds are a rich source of oil, which has been used to treat skin conditions, wounds, and inflammatory disorders.

Methodology: This review was conducted using a comprehensive literature search of major databases, including PubMed, Scopus, and Web of Science. The search terms used included "Euphorbiaceae", "medicinal plants", "anticancer", "anti-inflammatory", "antimicrobial", "hepato-protective" and "dermatological". The search was limited to studies published in English between 2000 and 2022. The studies included in this review were selected based on their relevance to the topic and the quality of the research.

Conclusion: The Euphorbiaceae family is a rich source of medicinal plants with a wide range of healthcare applications. Further research is needed to fully explore the medicinal properties of these plants and to ensure their safe and sustainable use. This review highlights the potential of Euphorbiaceae family plants as a source of novel therapeutics and encourages further research in this area. Further research is needed to isolate and characterize the bioactive compounds present in Euphorbiaceae family plants. Clinical trials and toxicity studies are necessary to evaluate the safety and efficacy of Euphorbiaceae family plants for various medical applications. Efforts are also needed to conserve and sustainably use Euphorbiaceae family plants, which are facing threats from habitat destruction, over-exploitation, and climate change.

Keywords: Euphorbiaceae; Phytochemistry; Ethnobotany; Medicinal plants

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Role of Earthworm in Soil Fertility and Its Impact on Agriculture: A Review

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Abstract:

Earthworms, scientifically classified under the name Lumbricina, encompass approximately 3,627 species worldwide. These organisms consume organic waste such as leaves and leftover food, breaking it down into smaller, nutrient-rich fragments. Additionally, they secrete enzymes that facilitate decomposition and the formation of humus.

As key decomposers of organic material, earthworms contribute significantly to soil structure and fertility. Beyond their role in nutrient cycling, they are instrumental in pest and disease control by reducing the accumulation of plant debris that can harbor harmful pathogens. Earthworms act as catalysts in soil formation and nutrient recycling, further influencing climate regulation, flood control, water purification, and environmental remediation.

By enhancing soil fertility, earthworms improve nutrient availability, accelerate organic matter mineralization, and stabilize soil organic matter. Their diet also includes insect larvae and other pests, effectively lowering pest populations and mitigating crop damage. Through their burrowing activity, earthworms create channels within the soil, promoting deeper penetration of air, water, and nutrients.

Keywords: earthworm, soil fertility, agriculture, nutrients.

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Using the QM Window to Improve and Control Performance in Queuing Models in Healthcare Sector

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Abstract: In many service industries, the phenomenon of queuing is regarded among the most commonly observed phenomena. Economic growth and population expansion have caused it to sustain a tremendous transformation in recent years. The past difficulties and factors pertaining to

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the service industry have made it necessary to look for a scientific method that may help improve performance and get past difficulties and roadblocks in the service delivery process. One of the most important scientific methods for addressing a variety of waiting phenomena connected to real service delivery is considered to be a queueing model. Particularly in India, where waiting in line is the biggest issue facing practically all major hospitals providing healthcare services. It might be necessary to wait a while before addressing the ineptitude of hospital administration. Utilizing the QM-Window program, one of the specialized data science programs that makes it easier to obtain indicators of performance and identify. They provide the service's representational model and acceptability and propose an alternative model this study offered an overview of queuing models, highlighting its importance and function in tracking and enhancing performance.

Keywords: Performance metrics, QM-window, arrival rate, service rate, and queue models

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Effect of Chitosan-Based Nanoparticles on Seeds Germination

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Abstract:

This research focuses on preparing chitosan-based nanoparticles from the extract. Chitosan is a biodegradable polymer and can be produced from molds, macro-mushrooms, exoskeleton of honeybees, ants etc and is used in the medical and food industry due to its non-toxic and biocompatible nature. Seeds were treated with different concentrations of Chitosan nanoparticles (CSNPs) and their physiological and biochemical responses were evaluated. CSNPs have a significant role in sustainable bio-stimulants in agriculture due to their biocompatibility, biodegradability, and potential to enhancethe plant growth.This study investigates the effect of chitosan nanoparticles on the germination and early seedling development of wheat (Triticum aestivum). Results indicated that low concentrations of CSNPs significantly improved germination percentage, root and shoot lengths, and overall seedling as compared to untreated controls. Consequently, higher concentrationsshowed a neutral effect on germination and growth. Optimal concentrations may be attributed to CSNPs' ability to improve water uptake, stimulate phytohormone activity, and promote antioxidant defense mechanisms in seeds. CSNPs act as a potential candidate to improve wheat productivity, with implications for sustainable agricultural practices.

Methodology: ***Preparation of lemon grass extract:*** 10g of powdered soaked in 150ml of distil water and left them it on shaker for 24 hours. After 24 hrs the mixture was filtered out by using filter paper.

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Preparation of chitosan-based nanoparticles: Firstly, chitosan was dissolved in an aqueous solution of 1% glacial acetic acid at a concentration of 0.002g/ml with continuous stirring at 60°C using a magnetic stirrer. Following stirring, 7ml of extract was added drop-wise to 20 ml of chitosan solution. The addition of extract to the chitosan solution was done under constant stirring at 60°C for 1 hour. The nanoparticle-containing solution obtained was subjected to centrifugation at 13000 rpm for 20 minutes to remove all the unreacted chitosan impurities. The purified pellets of CSNPs were collected and washed with distilled water.

Wheat culture and Treatment: Wheat (*Triticum aestivum*) firstly, in each treatment each treatment consisting 30 seeds. Secondly, the surfaces of seeds were sterilized by 75% ethanol for 5 min and washed four times with sterile distilled water. Thirdly, seeds were soaked in CSNPs and CS aqueous solution (1, 5, 10, 50 and 100 µg/mL). And then, seeds were transferred to a petri dish (10 cm in diameter) containing two sheets of water-soaked filter paper and in 5 mL of water and were grown in a growth incubator under with a day/night cycle of 12 h/12 h, at 25 ± 2 ℃/20 ± 2 ℃ respectively, with 60% relative humidity. Add the appropriate water per day. The seed germination was checked when the germ length reached half of the seed length. After 7 days, the percentages of germinated seeds were calculated and the lengths of the seedlings were measured using a millimetre scale.

Results and Discussion: This study deals with the new approach of green synthesis of CSNPs for the germination of wheat seeds. Nanoparticles are prepared using methods that involve chemical, physical and biological approaches. The chemical method of synthesizing nanoparticles is cheaper and efficient because it requires only a short time to synthesize large quantities of nanoparticles. However, the chemicals used in the process are hazardous to the environment and lead to toxic by-products. Therefore, there is a considerable demand for non-toxic synthetic methods to prepare nanoparticles leading to the development of interest in biological approaches under green nanotechnology. Seeds treated with chitosan-based nanoparticles showed a significant improvement in germination rates compared to untreated seeds. Treated seeds exhibited enhanced seedling vigor, characterized by increased root and shoot lengths, as well as improved biomass. Increased activity of enzymes like amylase and protease in treated seeds indicates improved mobilization of stored nutrients during germination.

Conclusion : Chitosan-based nanoparticles significantly enhance seed germination, seedling vigor, and stress tolerance, offering a sustainable and effective solution for improving agricultural productivity.

Keywords: Chitosan, nanoparticles, plant growth, seed germination

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The mRNA Vaccines: A New Era in Immunization Technology

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Abstract:

Messenger RNA (mRNA) vaccines are a viable substitute for traditional vaccination methods due to their high potency, ability to evolve quickly, possibility for low manufacturing costs, and safe delivery. Over the past ten years, a tremendous amount of research and development on mRNA vaccines has been done worldwide. This work has been fuelled by the pressing need to develop vaccines quickly in response to an emerging disease, like the COVID-19 pandemic. The developments in nanotechnology for creating mRNA vaccine delivery systems are extremely important. The concentrated work on mRNA vaccines over the past year has elevated this technology to the forefront of public awareness and subsequent research endeavours, opening up new possibilities for the application of bio-nanotechnology principles to support mRNA innovation. Globally, mRNA may offer long-term remedies for illnesses brought on by viruses like influenza and AIDS. Tethered adjuvants or co-delivery of nacked mRNA with an adjuvant-tethered RNA helped to somewhat alleviate the difficulties faced by in-vitro transcribed RNA. The ongoing development of tissue engineering and nanotechnology offers new mRNA vaccine carriers, such as scaffolds made of polymeric nanoparticles. Adopting mRNA vaccines for cancer and viral infections in people and animals has been found to offer several benefits. Self-amplifying mRNA is currently thought to be the mRNA vaccine of the future. Currently, the only approved or authorised mRNA vaccines are those for COVID-19, a disease caused by the SARS-CoV-2 coronavirus. The "spike protein" is a protein found on the exterior of the coronavirus that is produced in response to mRNA, which is used in these vaccines. More research is being done on it right now.

Keywords: mRNA vaccine, nanotechnology, adjuvants, self-amplifying mRNA

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Study on the Qualitative Analysis on Leaves of *Moringa oleifera* (Drumstick Tree)

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Abstract: Plants are the part of life for animals, human beings and microorganisms as well. Plants are categorized into different classes in which some of them are for medical and some for general use. A medicinal plant is one, which is one or further of its organs, contains dynamic ingredients which can be used for healing purposes or which contain basis compounds that can be used for the synthesis of constructive drug. There are hundreds of medicinal plants that have an extensive account of healing properties against a range of ailments and diseases. In India, medicinal plants are widely used by primordial people as folk, but in this recent year these herbal drugs are being extensively used in pharmaceutical preparations of contemporary medicines. The plant kingdom is a momentous basis of herbal drugs. *Moringa oleifera*, commonly known as the drumstick tree, has gained significant attention due to its rich phytochemical composition and therapeutic potential. This study aims to analyze the primary and secondary metabolites present in leaf parts of *Moringa oleifera*. Using phytochemical screening test on the aqueous extract (distilled water and ethanolic extract) prepared by decoction method, of plant leaf, the presence of alkaloids, flavonoids, carbohydrates, saponins, tannins, and phenolic compounds was confirmed. These phytochemicals exhibit potent antioxidant, anti-inflammatory, and antimicrobial activities, underlining the plant's applications in traditional medicine and modern pharmacology. This analysis highlights the potential of *Moringa oleifera* as a source of natural bioactive compounds for developing nutraceuticals and therapeutic agents.

Keywords: *Moringa oleifera*, therapeutic potential, plant extracts, secondary metabolites, Phytochemicals.

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Classification and Properties of Alkaloids

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Abstract: Phytochemicals belonging to the group of alkaloids are signature specialized metabolites endowed with countless biological activities. Plants are armored with these naturally produced nitrogenous compounds to combat numerous challenging environmental stress conditions.

The chemistry of alkaloids is one of the most interesting and important topics of bioorganic chemistry. The term “alkaloid” was initially applied to N-containing compounds of plant origin that had a distinctly basic nature. Now this term is used much more broadly. Alkaloids form an expansive group of natural N-containing organic compounds produced by plants, micro- and marine organisms, and fungi. In contrast with other classes of natural compounds, alkaloids have practically unlimited structural frameworks and contain an N atom in their molecules, for this reason, the alkaloids are highly variable. They are classified using various signatures such as natural sources or chemical nature. The most correct and common classification of alkaloids is their distribution according to principal structure, the principal C-N skeleton. According to the last signature, alkaloids are divided into the following large groups, including; pyrrolidine, pyridine, quinoline, isoquinoline, indole, quinazoline, steroidal, diterpenoid, and other alkaloids. Each of these groups is subdivided into several subgroups depending on the structural features of its representatives.

Probably the only single character that distinguishes all alkaloids is that they have nitrogen. In general, this nitrogen comes from amino acid, is incorporated into a heterocyclic ring, and is basic. Pelletier (1983) defined an alkaloid as a cyclic compound containing nitrogen in a negative oxidation state, which is of limited distribution among living organisms. Alkaloids almost always have physiological activity in animals, although some have limited effects. Most alkaloids are well-defined crystalline substances which unite with acids to form salts. In the plant they may exist in the free state, as salts or as N-oxides. In addition to the elements carbon, hydrogen and nitrogen, most alkaloids contain oxygen. A few, such as coniine from hemlock and nicotine from tobacco, are oxygen-free and are liquids. Although colored alkaloids are relatively rare, they are not unknown; berberine, for example, is yellow and the salts of sanguinarine are copper-red.

Keywords: Phytochemical, Alkaloids, Classification, Properties.

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Nature's Laboratory: A Path to Sustainable Drug Discovery

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Abstract:

Nature has long served as a profound source of medicinal compounds, with plants, microorganisms, and marine organisms playing pivotal roles in drug discovery. This paper highlights the potential of nature's laboratory in addressing present day healthcare challenges through sustainable drug development practices. Natural products, with their structural diversity and bioactivity, continue to inspire novel therapeutic agents for diseases ranging from cancer to infectious disorders. Advances in biotechnology, such as metabolomics, synthetic biology, and bioinformatics, have revolutionized the identification, optimization, and production of these bioactive compounds. Furthermore, strategies for sustainable sourcing, including cultivation, tissue culture, and bioprospecting in unexplored ecosystems, are emphasized to minimize environmental impact. The paper also discusses challenges like overharvesting, habitat degradation, and the need for ethical bioprospecting frameworks. By integrating traditional knowledge with modern technologies, the pharmaceutical industry can utilize nature's potential while preserving biodiversity. This approach not only ensures the discovery of new drugs but also promotes environmental sustainability and equitable sharing of benefits. Nature's laboratory continues to hold the key to innovative, effective, and eco-friendly therapeutic solutions for the future.

Keywords: Drug discovery, Sustainable development, Biodiversity, Bioactive compounds, Bioprospecting, Synthetic biology.

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Assessment of Phytochemicals, Antioxidant, and Antibacterial Action of Natural Waste

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Abstract :

Mostly the by-products of fruits and vegetables such as Peels and seeds are used for livestock feed or thrown in the waste. The peels obtained constitute about 40%-45% of the total weight and if they are not processed in a proper manner, it results in serious environmental pollution. Hence

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reutilization of plant by-products involves the process of converting them into commercially novel sources that are useful to the community with the additional benefit of decreasing environmental pollution Fruit waste can be used for the treatment of different diseases. The main advantages of fruit waste include low cost, high availability and capacity of good absorption. In developing countries, about 80% of the population uses traditional medicine in primary medical care. The medicinal plant extract has biologically active compounds that can retard microbial growth. Fruit and vegetables are the major functional foods as these are the main source of nutraceuticals such as phenol compounds, vitamins and minerals.

Methodology: The study involved collecting fresh samples of *Daucus carota* (carrot), *Beta vulgaris* (beetroot), *Citrus reticulata* (mandarin), *Citrus limetta* (sweet lime), and *Punica granatum* (pomegranate)from local markets. The plants were washed, air-dried, ground into fine powder, and extracted using soxhlet extraction method for 48hr in distilled water. The aqueous extracts were then analyzed for phytochemicals (qualitative) , including alkaloids, flavonoids, tannins, saponins, phenolic compounds, and terpenoids and steroids. The antioxidant activity of the plant extracts was evaluated using the DPPH free radical scavenging assay. Column chromatography was performed to isolate and purify individual compounds from the extracts. The antibacterial activity of the extracts was assessed against *Bacillus subtilis* and *Escherichia coli* using the well diffusion method. The study aimed to determine the potential of these plant extracts in various health conditions.

Result and discussion: This study investigates the phytochemical composition, antibacterial activity, and antioxidant properties of aqueous extracts from the peels of *Daucus carota* (carrot), *Beta vulgaris* (beetroot), *Citrus reticulata* (mandarin), *Citrus limetta* (sweet lime), and *Punica granatum* (pomegranate). Phytochemical analysis revealed the presence of several bioactive compounds, including alkaloids, flavonoids, terpenoids, phenolics, and cardiac glycosides, which are known for their medicinal and pharmacological values. Column chromatography was employed to separate the bioactive compounds, and antioxidant activity was evaluated using the DPPH assay (1,1-diphenyl-2-picryl-hydrazyl). Among the extracts, *Punica granatum* and *Citrus limetta* exhibited the strongest antibacterial activity against *Bacillus subtilis* and *Escherichia coli*.

Conclusion: The findings underscore the potential of utilizing fruit and vegetable waste, particularly peels, as valuable sources of bioactive compounds with significant health benefits. This highlights the importance of promoting sustainable practices in utilizing agricultural by-products for medicinal and commercial purposes.

Keywords: Fruits and vegetable peels, phytochemical analysis, Antibacterial activity, Antioxidant activity, chromatography

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A Review on the Impact of Bacillus on Food Spoilage and Safety

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Abstract :

Bacillus is a genus of gram positive and rod shaped bacteria. Bacillus bacteria have thick peptidoglycan cell wall that retains the crystal violet stain during gram staining. They require oxygen to grow. It is bacteria that cause spoilage of food borne disease such as emetic (vomiting) syndrome and the diarrhoeal syndrome. Bacillus subtilis is commonly found in raw pasteurized milk and dairy products. Bacillus cereus is a food borne pathogen that can cause food poisoning, human health issues. Some species of bacillus include in food spoilage are Bacillus cereus, Bacillus subtilis, Bacillus pumilus, Bacillus licheni forms. Bacillus cereus is a prominent species associated with both spoilage and producing a range of toxins that leads to gastrointestinal distribution. Bacillus subtilis are dominant in soil but they have been identified in water, air, human and animal gut, vegetables, fermented foods bacillus are promoting to plant growth by nitrogen fixation and producing phyto-hormones. Bacillus anthraxes used to produce antibiotic and used in alternative medicines. These are used in food fermentation in Japan, India, France and Germany. The impact the quality of food through the production of enzymes like lipase, protease, amylase which are used in food, textile and pharmaceutical industries. It is used as biological parasite to control insect pests. A pH required is 4.6 or lower to prevent growth of its spores. It inhibits the growth of pathogen bacteria such as Salmonella and *E. coli* thereby reduce the risk of food borne illness. This paper examines the pathway by which Bacillus impact food spoilage and safety including their resistance of preservation techniques antibiotic therapy with vancomycin or clindamycin.

Keywords: toxin production, food born, food safety, bacillus bacteria, disease

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Habitat and Morphometric Studies of Gram Pod Borer (*Helicoverpa armigera*) in Beawar Region

Shriya Sharma and Deepali Lall

Abstract: The gram pod borer, *Helicoverpa armigera*, is a major pest affecting a variety of crops, especially legumes like gram (chickpea), pigeon pea, and other pulses, along with a range of other crops like cotton, tomato, and maize. This study investigates the habitats and morphometric characteristics of *H. armigera* in this region, aiming to enhance pest management strategies for sustainable crop protection. Field survey were conducted across multiple locations in Beawar to identify the preferred habitats of *H. armigera*, including the prevalence in different soil types, climatic conditions, and crop stages. Additionally,

Morphometric analyses of the insect's life stages (egg, larva, pupa, and adult) were carried out to assess variations in size, shape, and developmental patterns. The suitable climate conditions for *Helicoverpa armigera* in Rajasthan is mainly "December to march".

Collection of caterpillar from field are nearby the Beawar region (jawaja, jaitaran, bar, sendra). For studying the habitate of *H. armigera* larva of moth was being collected from chick pea and pisum field area, reared in separate petri-dishes and fed on fresh legume of chick pea. The biology of *H. armigera* moth life cycle was observed under laboratory conditions.

Methodology: Studying its habitats and morphometry helps in understanding its ecology, behaviour, and management of this pest. Particularly chickpea is a significant threat to agricultural productivity in the Beawar region of Rajasthan. Conduct regular survey of the crops, inspecting flowers, pods, and leaves for eggs, larvae, pupae, and adults. Record infestation levels across different plant growth stages. Morphometric Variations: Compare morphological traits across different life stages and regions to detect size variations or potential resistance patterns.

Result and Discussion: The eggs of *Helicoverpa armigera* are round to oval, with a flattened base and smooth surface. They are typically pale yellow when laid and turn darker as they mature. Egg size ranges from 0.5 mm to 1 mm in diameter. The larvae of *Helicoverpa armigera* are known for their color variation, ranging from green to brown, and they often have distinctive dark stripes running longitudinally along their body. They can grow up to 40-50 mm in length. The number of instars (growth stages) is typically 5, with the last instar being the most destructive. The pupae are typically brown and cylindrical in shape. Pupation occurs in the soil or plant debris, and the pupal stage lasts around 7 to 14 days, depending on environmental conditions.

The adult moth has a characteristic wingspan of about 30-40 mm. Forewings are pale brown with distinct darker markings and a distinctive pattern of light and dark bands. The hindwings are white with a dark edge. Moth are typically nocturnal, and they can fly long distances, making them difficult to control once they disperse.

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Observation of development was recorded daily. Results indicated that the pest predominantly thrives in well-irrigated fields with moderate temperatures, where host plants such as chickpeas and other legumes are cultivated. Morphometric data revealed significant variations in the size and weight of larvae and pupae across different environmental conditions, suggesting the influence of local ecological factors on the growth and development of the pest. This research highlights the importance of habitat-specific management strategies and provides critical baseline data for integrated pest management (IPM) programs aimed at controlling *H. armigera* in the Beawar region.

Keywords: *Helicoverpa armigera*, Gram Pod Borer, Beawar region, Morphometrics, Pest Management, Integrated Pest Management (IPM)

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Role of World Bank Projects in Modernizing Health Care among Indian Masses: From Tradition to Transformation

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Abstract: India's healthcare landscape has undergone significant transformation over the past few decades, transitioning from a predominantly traditional system to a modern, evidence-based infrastructure. The World Bank has played a pivotal role in this transition, financing and supporting projects that address systemic gaps, promote equitable access, and enhance healthcare outcomes. This paper explores the contributions of World Bank-funded initiatives in modernizing India's healthcare system and assesses their impact on health indicators, infrastructure, and accessibility among the Indian population. It also examines the shift from traditional practices to modernized healthcare, with a focus on sustainability, inclusivity, and the integration of both systems.

Introduction: India has historically relied on traditional healthcare systems such as Ayurveda, Unani, and Siddha. While these systems retain cultural and therapeutic significance, rapid population growth, urbanization, and an increasing disease burden have necessitated the modernization of healthcare infrastructure. The World Bank has been a key partner in India's health sector development, providing financial resources, technical expertise, and strategic guidance to strengthen healthcare systems.

This transformation, facilitated by World Bank projects, has been instrumental in improving access, equity, and quality of healthcare services across rural and urban populations. This paper analyzes the World Bank's critical role in modernizing India's healthcare system and its impact on health outcomes.

Historical Context: From Tradition to Modernization

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- Traditional Healthcare Systems: Before independence, India relied heavily on traditional medicine systems such as Ayurveda, Siddha, and Unani, which were deeply embedded in the culture but lacked the infrastructure to meet growing healthcare demands.
- Post-Independence Challenges: Rising mortality rates, poor maternal and child health, and limited access to basic healthcare highlighted the urgent need for modernization.
- World Bank Engagement: Starting in the 1970s, the World Bank became a development partner, addressing critical gaps in infrastructure, financing, and disease control.

World Bank's Contribution to Healthcare Modernization in India

Strengthening Healthcare Infrastructure

- Primary Health Centers (PHCs): Funding to upgrade rural health facilities, diagnostic centers, and hospital infrastructure.
- Urban Health Services: Support for secondary and tertiary hospitals to address urban healthcare demands.
- Technology Integration: Introduction of modern equipment and health management systems to enhance service efficiency.

Tackling Communicable Diseases

- Polio Eradication: Financial and logistical support for immunization campaigns, culminating in India’s polio-free status in 2014.
- Tuberculosis Control: Strengthening the Revised National TB Control Program (RNTCP) to improve diagnostics, treatment, and outreach.
- HIV/AIDS Prevention: Collaboration with NACO to improve awareness, prevention, and access to antiretroviral therapy.

Maternal and Child Health

- Reproductive and Child Health Programs: Enhancements in prenatal, postnatal, and immunization services, reducing maternal and infant mortality rates.
- Institutional Deliveries: Training healthcare workers and developing infrastructure to ensure safer deliveries, particularly in rural areas.

Health Financing and Insurance

- Rashtriya Swasthya Bima Yojana (RSBY): Health insurance for families below the poverty line to promote equitable access.

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- Public-Private Partnerships (PPPs): Encouraging private sector involvement to improve service quality.

Building Human Capital and Governance

- Training programs for healthcare professionals, nurses, and administrators.
- Strengthening Health Management Information Systems (HMIS) for better planning and service delivery.

Impact of World Bank Projects on Indian Healthcare

- Improved Health Indicators: Significant declines in maternal mortality rate (MMR), infant mortality rate (IMR), and incidence of communicable diseases.
- Expanded Access to Modern Healthcare: Reduction in urban-rural disparities through infrastructure development.
- Economic Growth: Healthier populations contributing to productivity and economic advancement.
- Notable Achievements: Successes such as polio eradication and improved TB control.

Transition from Tradition to Transformation

- Preserving Tradition: Integration of traditional medicine systems with modern healthcare practices.
- Emphasis on Technology: Adoption of telemedicine, digital health records, and AI-driven solutions to bridge accessibility gaps.
- Community Participation: Local involvement in healthcare delivery through awareness programs and capacity building.

Challenges and Future Directions

- Persisting Inequities: Addressing rural-urban and regional disparities.
- Financial Sustainability: Reducing dependency on international funding.
- Workforce Shortages: Increasing the availability of trained healthcare professionals in underserved areas.

Future Focus:

- Strengthening primary healthcare for preventive care.
- Leveraging technology for universal health coverage.
- Promoting public-private partnerships to enhance service quality and sustainability.
- Integrating traditional and modern systems for holistic healthcare solutions.

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Conclusion : The World Bank has played a transformative role in India's healthcare modernization, addressing critical gaps, improving health outcomes, and promoting equitable access. Moving forward, India's healthcare system must build on these foundations by embracing technology, ensuring financial sustainability, and integrating traditional knowledge to achieve universal health coverage.

Keywords: World Bank, Healthcare Modernization, India, Traditional Medicine, Disease Control, Health Infrastructure, Maternal and Child Health, Universal Health Coverage.

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A Study Biological Formulation of Zinc Oxide Nanoparticles

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Abstract:

In the advancement of science and technology, contribution and importance of nanotechnology cannot be ignored. It enables us to alter the material at nanoscale level ranging from 1 to 100 nm. Nanotechnology has many applications including drug delivery, catalysis, environmental sensors, increasing the shelf life of perishable fruits and vegetables. Transition metal oxide and semiconductor such as Fe2O3, Ag2O, TiO2 and ZnO semiconductor with nanostructure have attracted interest in the field of nanotechnology. In recent years, zinc oxide (ZnO) have gained popularity among the researchers because of its properties such as wide band energy gap, antibacterial activity, antifungal activity, antioxidant activity, high catalytic, photochemical activity. Green synthesis of nanoparticles is widely preferred because of cost effectiveness, eco-friendliness, rapid rate of synthesis, biodegradability, nontoxic as compared to chemical and physical methods. Some zinc molecules such as zinc nitrate, zinc sulphate, zinc carbonate used as a precursor for synthesis of ZnO NP. Different plant extract used to synthesise ZnO NP from analytical grade zinc molecules precursor. Plant extract are rich in phytochemicals such as flavonoids, terpenoids, organic acids, tannins, ketones, etc. essential for the reduction of Zn metal ions. Some plant extract includes *Hibiscus rosa sinesis*, Neem (*Azadirachta indica*), Tomato (*Solanum lycopersicum*) etc. rich in all the phytochemical mentioned above. Confirmation of synthesized ZnO nanoparticles can be done by UV-Visible spectroscopy. Characterisation for the size and morphology of nanoparticles can be done by particle size analyser, scanning electron microscopy.

Keywords: Nanotechnology, ZnO nanoparticles, eco-freindly, Transition metal oxide, Semiconductor, UV-Visible spectroscopy

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Effect of Phosphorus Fertilization on Zn and Cd Contents in Soil and Chickpea, Tomato, Fenugreek and Coriander Plant

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Abstract :

Heavy metals are toxic and inimical elements for living organisms mainly humans and plants. Because of the risk to enter into the food chain, the increasing concentration of Cd in the soil is of great concern. Heavy metals are defined as metallic elements with relatively high densities, atomic weights, or atomic number for e.g.- Cd, Zn, As, Hg, Pb. Heavy metal contaminates the soil by affecting key microbial processes, decreasing the number of soil microorganisms and posse's risks and hazards to the ecosystem through direct consumption or exposure with contaminated soil. These noxious elements flux through the food chain (soil-plant-animal-human or soil-plant-human). In plants, metal toxicity reduces the uptake and translocation of nutrients and water, and enhances oxidative damage thus inhibiting plant growth. Plants with heavy metal toxicity have impeded stem and root length and chlorosis in younger leaves that can extend to older leaves after prolonged exposure. Fertilization of phosphorus can disturb their content availability in soil however uptake of these metals by plants can be hindered by increasing or decreasing the amount of phosphorus (P) fertilizer in soil. Phosphorus fertilizer is often added to cropping system to increase yield. Phosphorus fertilizers are considered a major anthropogenic source of soil pollution with Cd and also cause surface water pollution. Phosphorus is considered as major macronutrient for plants and it is essential for cell division and development of the growing tip of the plant. NPK (nitrogen, phosphorus, potassium) fertilizer is used for growth and development of plants. Cd concentrations increase with increasing rates of Phosphorus fertilization. Phosphorus fertilizer may also influence Cd availability through its effect on soil pH, ionic strength, Zn concentration and plant growth. The interaction between P and Zn has been studied and well researched. According to studies done by researcher's negative interaction occurs between P and Zn and its cause is formation of insoluble Zn-Phosphate complexes and reduced mycorrhizae-dependent Zn uptake. Deficiency of microelement in the soil can affect agricultural production. Zinc is essential micronutrient for plant growth and yield but due to increasing the phosphorus fertilization in soil deficiency of zinc occurs in plants. Due to increasing p rates availability of zinc reduces in soil which is responsible for 1) slower rate of translocation of Zn from the roots to stem and leaves 2) a metabolic disorder within plant cells related to an imbalance between P and Zn, or an excessive concentration of P interferes with the metabolic function of zinc at certain sites in the cell. High levels of phosphorus can also affect soil properties such as 1) a shift in pH due to dissolution of the fertilizer in soil solution or due to reaction of both the phosphate and the associated cation with soil components 2) changes in surface charge due to adsorption of phosphate on the soil colloids. Accumulation of these toxic

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metals in soil is risky for human health. Cadmium is an undesirable contaminant in phosphate fertilizer, and may represent a threat to food safety given its tendency to be taken up by plants and translocated into the edible parts. High P fertilization can lead to cadmium poisoning in soil which not only cause damage to plants but also indirectly affect human health and studies by scientist have a proven that Cd is highly toxic even at very low concentration. Zinc applications have been reported to increase or decrease Cd accumulation in plants. Zinc and Cadmium are chemically similar and may compete for binding sites in the soil system and for uptake sites in the plants. Increasing soil solutions concentrations of zinc increased cd desorption from soil and increased the concentration of cadmium in the soil. This process could increase phytoavailablility of Cd. Zn acted as a competitive inhibitor of Cd and both elements appeared to employ a common transport site. Numerous studies have shown that addition of Zn with phosphorus fertilizer decreased Cd concentration in seed/grain. Zinc alleviates Cd toxicity by restricting its uptake in wheat. Although Cd toxicity can be removed by adding compost or organic matter, adding agricultural lime to raise pH of soil to limit cd uptake by plants. Competition between Zn and Cd for uptake and translocation by the plant may reduce accumulation of Cd and higher concentration of zinc affect the uptake and distribution of Cd in the root or shoot. At moderate concentrations, zinc appeared to interfere with the translocation of cadmium, from roots to young leaves by preferring cd retention in roots. However, when zinc concentration in the solution was higher, zinc might have also interfered with cd uptake by the roots. Intensive application of nitrogen and phosphorus fertilizer can lead to negative consequences, such as a decrease in Zinc content, as well as an increase of cd in plants which is highly toxic for humans. Increasing doses of phosphorus significantly decreased the pH reaction of the soil, but did not affect the amount of total and potentially available zinc in the soil. Zinc also interfered with distribution of cd in lettuce and spinach, but the mechanism involved was not apparent. Adequate zinc is needed with increasing rates of phosphorus fertilizer. Applying Zinc containing phosphorus fertilizer not only improved shoot growth, but demonstrated root growth improvements a well.

Keywords: Heavy Metals, Phosphorus fertilization, Bioaccumulation, Soil contamination, Zn availability.

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Phtochemical Screening of Bark Extract of Prosopis Cineraria Carried Out by Methanol and Alcoholic Solvent

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Abstract :

The Phytochemical Analysis of plants are done to identify the chemical compounds present in the plants. Phytochemicals are the chemical compounds that occur naturally in plants and are responsible for color and organoleptic properties, such as the deep purple of blue berries and smell of garlic. These phytochemical have potential for use as drugs, and the content and known pharmacological activity of these substances in medicinal plants is the scientific basis for their use in modern medicine. There are several phytochemical found in several medicinal plants. Some of them are tannins, terpenes, glycosides, polyphenols, alkaloids, flavonoids etc. Other than phytochemical screening we are also doing antibacterial tests of the samples by making agar plates and then inoculating the extract in the agar plate by swabbing using cotton swabs, inoculating using inoculating loop or spreading using spreader. The samples are prepared by taking different measures of the powdered samples in ethanol and methanol as solvents. These samples are then first gone under alkaloid tests. Then these extracts are poured in sterile petriplates. Then the sample from the petriplates were taken in test tubes and done test for alkaloids. After the alkaloid test the sample is done for antimicrobial test.

Phytochemical Screening of Bark Extract of *Prosopis cineraria* carried out by Methanol and Alkoholic Solvent. Phytochemical Screening revealed the presence of Phenols, Flavonoids, Alkaloids, Sapponins, Glycosides, Carbohydrates, Proteins and Tannins. The High level of primary metabolites in the sample reveals its nutrient values. This present study the qualitative phytochemical analysis of Plant Extract. These could be seen as a good source for developing good drugs.

Keywords: Alkaloid, Flavonoid, Phytochemical, Antioxidant, nootropic, analgesic

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A Review: The Extraction and Quantification of Caffeine from Beverages

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Abstract:

Caffeine, an organic compound belonging to the methylxanthine class, is a widely consumed psychoactive substance present in beverages such as coffee, tea, energy drinks, and soft drinks. Known for its stimulant properties on the central nervous system, caffeine is a subject of significant interest in food and pharmaceutical industries, as well as in scientific research. Understanding its content in beverages is essential for various reasons, including regulatory compliance, health assessments, and product standardization. Furthermore, excessive caffeine consumption has been linked to health concerns, emphasizing the need for accurate and reliable methods for its quantification. It is particularly suitable for analyzing caffeine due to its strong absorbance in the UV region, primarily around 272 nm. This technique offers high sensitivity, reproducibility, and the ability to process a large number of samples in a relatively short time. The findings will contribute to the broader understanding of caffeine quantification techniques, offering practical applications in food quality control, health assessments, and academic research. This dual approach highlights the significance of employing complementary methods for a more accurate and comprehensive analysis of bioactive compounds likes caffeine. The findings contribute to quality control efforts and provide insights into caffeine content in commonly consumed beverages, aiding regulatory and consumer awareness.

Keywords: Caffeine, UV Spectroscopy, Thin-Layer Chromatography, Beverage Analysis, Liquid-Liquid Extraction, Quality Control.

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Advancing Insights and Strategies for Lymphatic Filariasis

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Abstract:

Lymphatic filariasis (LF) is a mosquito-borne disease. It is a neglected tropical disease (NTD). It can manifest as severe fluid accumulation in the limbs (lymphedema) or scrotal sac (hydrocele) or as acute adenolymphangitis (ADL). To eradicate lymphatic filariasis, a program was started in 2000. The Global Programme to Eliminate Lymphatic Filariasis (GPELF) was the inaugural name of this initiative. By 2020, GPELF aimed to eradicate LF as a clinical condition and a public health concern.

GPELF proposed two strategies for to eliminate lymphatic filariasis:- Interrupting transmission through mass drug administration (MDA) and Morbidity management and disability prevention.

MDA (Mass Drug Administration) is conducted on a large scale to eliminate LF through drug donations from pharmaceutical companies, thus, providing over 7.1 billion treatments in endemic areas since 2000. By 2018, fourteen countries out of seventy two endemic countries had been validated by the World Health Organization (WHO) to have eliminated LF, with 7 conducting post-MDA surveillance. The global programme is completed around 40% and now there is a need for continued investment to ensure that global LF elimination is successfully achieved by 2030. In order to achieve the 2020 roadmap and the 2030 sustainable development goal (SDG) targets, the third WHO NTD report established domestic investment targets for NTD control. These ought to be established so that initiatives don't rely unduly on outside funding. In nations with low and intermediate incomes, these goals represent less than 0.1 percent of total domestic health spending. To support the need for more domestic health care funding for LF control, economic analyses are crucial. The precontrol health and economic consequences of lymphatic filariasis have not been systematically estimated globally. Before MDA efforts begin, it attempts to quantify the economic and health impacts of LF in GPELF locations.

Keywords: Lymphedema, hydrocele, adenolymphangitis, morbidity, MDA

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A Review on Ovarian Cancer: Symptoms, Causes, Diagnosis and Treatment

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Abstract:

In recent years' ovarian cancer has become a major health problem in women. According to reports, it is considered as genetic disease and is caused by external factors. The lifetime risk of a women getting ovarian cancer is about 1 in 78, while her risk of dying from it is 1 in 108. According to the report of World Health Organization, United States, approximately 140,000 women die globally per year due to ovarian cancer. Ovarian cancer accounts for 4% of all cancers in women and is the leading cause of death from gynecologic malignancies. It is generally asymptomatic, approximately 75% of women present with advanced disease at diagnosis. Moreover, it is a malignant tumor that seriously endangers health. It has been observed that due to this cancer, the cyst develops in the ovary and women face problems during menstruations. Ovarian cancer is not a single disease and can be subdivided into at least five different identifiable risk factors on the basis of cells of origin, molecular compositions, clinical features and treatments. Signs and symptoms generally includes back pain, weight loss, abdominal bloating or swelling, fatigue, pelvic or abdominal pain, heavy bleeding during menstruation and in the menopause phase. Some of the factors responsible for this disease are genetics, endometriosis, obesity, being over the age of 60. Many researchers have proposed that PCOD (polycystic ovary disease) and PCOS (polycystic ovary syndrome) results in ovarian cancer in later stages. Still much more research has to be done regarding connection between PCOD /PCOS and ovarian cancer. Currently practiced diagnostic approaches for detecting cancer are pelvic ultrasound, CT scan, blood tests, surgical evaluation, MRI etc. Generally, ovarian cancers have 4 stages and the 4th stage is most dangerous stage. From ovary, it can also metastasize to other organs like pelvis, stomach. Ovary cancer is diagnosed only when its spreads to pelvis and stomach. Common therapies for the cancer treatment include surgery, chemotherapy, radiation therapy, T cells therapy and hormonal therapy. It is a gynecological malignancy that can be challenging to diagnose and treat in early stage. It can convert into high grade serous ovarian cancer (HGSOC).

Keywords: Ovarian cancer, PCOD, Chemotherapy, Asymptomatic

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Isolation of Rhizobium from Some Leguminous Plants (Fenugreek & Glycine Max)

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Abstract:

Nitrogen is essential element for plant growth and development which is supplied by rhizobia in leguminous plants. Plants take nitrogen form the atmosphere in ionic form as either ammonium [NH4+] or nitrate [NO3-] then convert it into its usable forms. The maximum amount of nitrogen fixation is done by leguminous plants. These plants have symbiotic relationship with Rhizobium. It converts atmospheric nitrogen into soluble nitrites and nitrates and supply them to plant for fixing atmospheric nitrogen and enhancing plant growth. Effective isolation and characterization of these bacteria are crucial for understanding their ecology, physiology, and potential agricultural applications. Rhizobium bacteria are gram-negative, rod-shaped bacteria that form symbiotic relationships with legume plants. Fenugreek is an annual plant in the family Fabaceae, with leaves consisting of three small obovate to oblong leaflets. It is cultivated worldwide as a semiarid crop. Its leaves and seeds are common ingredients in dishes from the Indian subcontinent, and have been used as a culinary ingredient since ancient times.

These bacteria are capable of fixing atmospheric nitrogen into a form that can be utilized by plants, thereby reducing the need for synthetic fertilizers. Rhizobium bacteria are found in the nodules of legume roots, where they live in a symbiotic relationship with the plant. The ammonia is shared with the host plant in the form of organic nitrogenous compounds such as glutamine or ureides. The plant, in turn, provides the bacteria with organic compounds made by photosynthesis.

Methodology: Sample collection- Rhizobia is a gram negative, rod shaped, soil bacteria and is found in leguminous plants. Two different types of Velvet beans [Mucuna pruriens] and Soybean [Glycine max] plants were grown in the area near the house and their nodules and soil samples were collected from the area where the plants were situated. Each sample were kept in clean and sterile containers in the laboratory. Surface sterilization of Nodules-The nodules were detached from the plant and then wash under running tap water to remove the soil particles from the nodule surface. Nodules were dipped in 0.1% Mercuric Chloride [HgCl2] solution for 30 seconds and then again wash with ethanol and distilled water to remove the traces of toxic HgCl2, then the sterilized nodules were crushed with the help of sterilized rod to obtain milky suspension of bacteriods and then these were streaked with the help of inoculation loop on Yeast Extract Mannitol Agar media [YEMA] with Congo red and then further identified by gram's staining method.

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Morphological characterization- The colony characteristics like their shape, size, color, margin of bacterial colony and their growth rate were determined by observing the colonies under microscope. Microscopic observations of the isolates were done by using Gram staining technique.

Result and Discussion : Colony morphology of the isolates were observed. The Rhizobium strains were found to produce creamy white or pink colony with round shape characteristics. The colonies were characterized as circular and regular margin. Motile and rod shaped cells were observed under microscope with 100 X magnification. We can study its effect for crop improvement. Enhancing crop productivity by using Rhizobium to improve soil health and reduce nitrogen-related pollution in agricultural ecosystems.

Conclusion : This study successfully isolated and characterized Rhizobium bacteria from legume roots, highlighting their potential for sustainable agriculture. Further research will explore their application in legume crop improvement and soil fertility enhancement.

Keywords: Rhizobium isolation, symbiosis, plant growth, sustainable agriculture.

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Cultural Competence in Healthcare Fostering Equity through Communication

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Abstract:

Applying cultural competency in healthcare should be viewed as a goal strategy for promoting equity and enhancing patient outcomes. The article discusses language, cultural, and social barriers that prevent people from receiving appropriate and high-quality healthcare services, emphasizing the need of good communication in providing culturally relevant treatment. Gaps in knowledge are filled, trust is established, and patient care is provided via education on the importance of culture, comprehension, and context-specific communication. Such a position aims to bridge the gaps in the integration of varied communities into society and improves the interaction between the provider and the patient as well as education.

Methodology: This study examined cultural competency and communication in healthcare using a mixed methods approach. Surveys, literature studies, and interviews with patients and healthcare professionals from various backgrounds were used to gather data. To evaluate results, case studies of healthcare systems' cultural competency initiatives were examined. Survey quantitative data was analyzed to find patterns in health inequities and patient satisfaction.

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Result: The results showed that effective communication that is culturally sensitive improves healthcare outcomes. When clinicians used language assistance services and respected their cultural beliefs, patients felt satisfied and trusted. Programs for cultural competency in healthcare systems have been shown to enhance patient outcomes and lessen health inequities. Aside from that, healthcare workers who received training in cultural competency reported feeling more confident when it came to meeting linguistic and cultural demands, which led to better care delivery.

Conclusion: Developing cultural competency in healthcare relies on effective communication and is one strategy to achieve healthcare access equity. The objective should be to engage patients by observing them and utilizing appropriate terminology; cultural training should be a top emphasis. Engaging in such activities empowers patients, ensures that justice is accessible to all, and improves people's health, which in turn leads to the development of a unique healthcare system.

Keywords: Cultural competence, Healthcare equity, Communication, Patient-centered care, Cultural awareness

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Green Medicine and Phytopharmaceuticals: Bridging Tradition and Innovation in Drug Research

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Abstract:

Plant-based drug development has emerged as a crucial area of research, blending traditional medicinal knowledge with scientific advancements. The vast diversity of metabolites found in plants offers a rich reservoir of bioactive compounds, providing novel opportunities for drug discovery and development. This review explores the dual aspects of traditional ethnobotanical practices and modern phyto-pharmaceutical innovations in representing global healthcare challenges. The transition from natural remedies to scientifically validated therapies involves a systematic approach, including the identification, extraction, and structural characterization of active compounds, followed by rigorous preclinical and clinical evaluations. In addition, advancements in scientific technologies, computational biology, and green chemistry have accelerated the integration of plant-derived compounds into pharmaceutical pipelines. Challenges such as sustainable harvesting, standardization, and intellectual property rights are also considered. By bridging tradition with innovation, plant-based drug research not only maintains the therapeutic potential of nature but also paves the way for sustainable and affordable healthcare solutions. This

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synergy underscores the relevance of phyto-pharmaceuticals in combating emerging diseases and drug-resistant pathogens.

Keywords: Phyto-pharmaceuticals, Drug discovery, bioactive compounds, Green medicine, Sustainable healthcare

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A Review on Antibiotic Resistance: Mechanisms and Consequences

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Abstract:

Antibiotic resistance is a serious global health issue that makes antibiotics less effective. It happens when bacteria change in different ways that allow them to survive treatments, making infections harder to cure. Acquired antibiotic resistance in bacteria occurs when they develop the ability to survive drugs that would normally kill them. This can happen through two main processes: chromosomal mutations, which cause changes in the bacterial genes that lead to resistance against multiple drugs (cross-resistance), and gene transfer, where bacteria share resistance genes with each other by plasmids, transposons, or bacteriophages. Once bacteria become resistant, they can use several strategies to defend themselves. These include modifying the target of the antibiotic (such as altering the sites where drugs like macrolides or fluoroquinolones normally act), changing their outer membrane to prevent drugs from entering (affecting drugs like aminoglycosides), producing enzymes that breakdown antibiotics (like beta-lactams), or finding alternative pathways to bypass the antibiotic's action (as seen with drugs like trimethoprim-sulfamethoxazole). These mechanisms make it difficult to treat infections effectively. Overuse of antibiotics in medicine, agriculture, and animal husbandry increases resistance. Incorrect prescription practices and self-medication trigger this problem by supporting the growth of extensively drug-resistant (XDR) and multidrug-resistant (MDR) bacterial strains. Antibiotic resistance has serious consequences. It leads to longer illnesses, higher death rates, and greater healthcare costs as it requires more expensive and stronger treatments. Common procedures like surgeries and cancer treatments become riskier because of the threat of infections that can't be treated. Additionally, resistant infections make it more challenging to control disease outbreaks and protect public health. Addressing antibiotic resistance requires a combined approach. This includes using antibiotics wisely, improving infection control, advancing

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diagnostic tools, and researching new treatments. It's essential for governments, healthcare providers, and the public to work together to slow this growing problem and ensure antibiotics remain effective for future generations.

Keywords: Resistance, Antibiotics, Infections, Bacteria

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A Review on Green Ear Disease of Bajra: Symptoms, Causes, Diagnosis and Treatment

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Abstract:

Green ear disease, also known as downy mildew, is a significant disease impacting bajra (pearl millet) and is caused by the fungus *Sclerospora graminicola*. The resting spores of this pathogen, which persist in the soil, serve as the primary source of infection.

Symptoms of this disease are primarily systemic and prominently appear on the leaves and inflorescence. Early signs are noticeable in seedlings at the three to four-leaf stage. Infected leaves display patches of light green to yellow coloration on their upper surfaces, while the corresponding lower surfaces exhibit white, downy fungal growth made up of sporangiophores and sporangia.

The pathogen's mycelium is systemic, non-septate, and intercellular. Short, stout, and hyaline sporangiophores emerge through stomata, branching irregularly and bearing sporangia on their stalks. Environmental conditions play a crucial role in the proliferation of this disease. Extremely high humidity levels of around 90%, the presence of water on leaf surfaces, and cool temperatures ranging from 15–25°C create an ideal environment for the formation of sporangiophores and sporangia.

The disease cycle begins with oospores in the soil, which can remain viable for over five years, initiating primary infections in seedlings. Secondary spread occurs through sporangia that are produced during the rainy season. Additionally, the dormant mycelium of the fungus resides in the embryos of infected seeds, further perpetuating the disease.

Management of green ear disease involves a combination of cultural practices, resistant varieties, and chemical control. Deep ploughing helps to bury oospores, while roguing infected plants and practicing crop rotation reduce pathogen buildup in the field. Cultivating resistant bajra varieties

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such as WCC-75, Co_7, and Co (Cu) $_9$ has proven to be an effective strategy. Chemical treatment of seeds with Metalaxyl at a concentration of 6 g/kg is also recommended to prevent infection and ensure healthy crop growth.

Keywords: Sporangia, leaves, sporangiophores, infection, bajra

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A Review of Article Crispr-Cas9 Genome Editing Technology and Plant Stress Management

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Abstract:

CRISPR-Cas9 has emerged as transformative genome editing tool, offering precise and efficient modifications to DNA sequences. In the field of plant biotechnology, it holds immense potential for addressing abiotic and biotic stress challenges that affect and reduce crop productivity. This review focuses on recent advancements in using CRISPR-Cas9 for plant stress management, with a particular emphasis on improving tolerance to drought, salinity, pests and microbial diseases. By targeting specific genes associated with stress response pathways, researchers have been able to enhance the resilience of major crops like rice, wheat and maize. Gene editing technology can regulate stomata movements and osmolyte biosynthesis which improve plant drought management while modifying genes linked to ion transport has enhanced salinity resistance. Similarly, silencing susceptibility genes or boosting the expression of resistance genes has fortified plants against pathogen attacks. The simplicity of designing guide RNAs and the versatility of the CRISPR system have accelerated its application in creating stress-tolerant crops. Moreover, recent advancements such as base editing have further refined the accuracy of this tool, minimizing off-target effects. These innovations are paving the way for more robust applications in agriculture biotechnology. Despite its promise, challenges remain including regulatory hurdles, public acceptance, and the need for better delivery system in diverse plant species. Nevertheless, with ongoing research and technological improvements, CRISPR-Cas9 has potential to revolutionize sustainable agriculture by reducing reliance on chemical input and ensuring food security climate conditions of integrating CRISPR-Cas9 with conventional breeding techniques and other biotechnological approaches to create resilient crops, making it a cornerstone of modern plant stress management strategy.

Keywords: DNA sequence, gene editing, agriculture, CRISPR-Cas9, plant stress.

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ZPrediction of Protein Secondary Structure Using Artificial Intelligence and Machine Learning Algorithms

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Abstract:

In the biological system, proteins play a fundamental role, and their structures primarily dictate how they work and their function. Secondary structure prediction is an essential first step in comprehending the folding mechanisms and functions of the protein, such as in the context of disorders like Alzheimer's and Parkinson's that are linked to the misfolded proteins. In order to predict secondary structures, this study investigates the use of three fundamental supervised machine learning algorithms: Decision Tree, Support Vector Machine, and k-Nearest Neighbors (KNN).

Methodology: Using a curated dataset, the sequences were analyzed along with the associated secondary structure annotations to train and evaluate the models. The model was trained and tested using a protein dataset that was obtained from Kaggle. Kaggle is a platform that enables users to find datasets, explore and build models in a web-based data science environment. The dataset comprised of amino acid sequences and secondary structure classifications. Normalizing sequence data, removing non-standard amino acids, and fixing missing values were all part of the preprocessing steps. The chosen models were assessed using overall metrics, accuracy, and precision. An Intel Core i3-1115G4 11^{th} Gen processor with 8GB of RAM was used for the analysis. For data pre-processing, model training, and performance assessment, Python tools including scikit-learn, pandas, and matplotlib were used.

Result and Discussion: Only 1% of the total data was used for the study due to system constraints. Because of its ability to accurately represent non-linear interactions, SVM performed better overall than the other algorithms examined, with an accuracy of 3.23%. However, issues including dataset restrictions and computational limitations impacted the overall accuracy and scalability.

Conclusion: This study demonstrates how machine learning could potentially be used to predict protein structures and offers fundamental knowledge for incorporating more sophisticated AI methods, such as deep learning, to provide predictions that are more accurate. The study emphasizes how crucial top-notch datasets and computing power are to enhance model reliability. In the future, this method will be expanded to investigate neurodegenerative illnesses by concentrating on misfolded proteins and investigating deep learning structures for improved precision.

Keywords: Protein Secondary Structure Prediction, AI in Healthcare, Machine Learning (ML), Supervised Learning Algorithms, Kaggle

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AI-Driven Innovations in Cardiovascular Drug Development

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Abstract: Cardiovascular disease (CVD) is a major global health problem that contributes significantly to morbidity, mortality and economic burden. Despite medical advances, the development of effective cardiovascular drugs remains challenging due to the complexity of these disorders and the high failure rate in clinical trials. Traditional drug discovery methods, dependent on empirical testing, are often slow and inefficient.

Artificial intelligence has shown significant promise in revolutionizing cardiovascular drug discovery. When analyzing large biomedical data, artificial intelligence enables the identification of new patterns and insights that traditional methods may miss. This facilitates more efficient target identification, drug design, and prediction of drug efficacy and safety.

Keywords: Cardiovascular disease (CVD), Global health, Morbidity, Mortality

Introduction: Cardiovascular disease (CVD) is still widespread as one of the most common diseases with high morbidity and mortality rates worldwide, significantly affecting health services and national economies. Although there have been advances in the medical field, finding the right cardiovascular drugs remains a challenge. CVD contributes more than any other cause of death, millions of people are alive today to suffer the consequences of heart disease and stroke. CVD is increasingly reported in low- and middle-income countries where access to care and preventive care is scarce, reinforcing a stronger link between CVD and global disparities.

Challenges in current cardiovascular drug development processes

The process of developing cardiovascular drugs is slow and quite challenging – it faces several major obstacles. cardiovascular disease is often treated with ongoing therapy, which can also raise concerns about treatment safety and efficacy. The development of cardiovascular drugs is subject to strict safety standards and high clinical trials that last up to 10 years, contributing to the long development time. In addition, the high failure rate in late-stage clinical trials represents a significant financial risk, as many seemingly promising molecules have little efficacy or are shown to be toxic or have adverse effects in the wider population only when tested in large samples. This is due to the increased global prevalence and high costs and low yields that have characterized the development of cardiovascular drugs.

The landscape of cardiovascular drug development

The drug discovery process begins with target discovery, in which scientists identify potential molecules or signaling that are involved in heart disease. Subsequently, targets for drug molecules are determined by screening huge chemical databases using high-throughput techniques. Lead

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compounds are obtained by lead optimization, in which they are structurally altered to increase their effectiveness and reduce their toxicity. These optimized leads then go into preclinical studies that test the efficacy and safety of the compound in chemical (in vitro) and biological (in vivo) systems, e.g. on animals. If so, the drug will move on to the clinical trial phase, in which it is administered to humans to determine effects such as safety, efficacy and side effects.

Traditional approaches to drug discovery and development

The process of drug identification and development is usually systematic, with rigid procedures that form the framework of pharmacological evolution over many years. This approach is usually done in the following process, which involves selecting a target; in this phase, scientists work to define very narrow targets, such as investigating certain proteins, enzymes or receptors that play a major role in the pathogenesis of the disease. In the case of cardiovascular disease (CVD), these targets may include molecules that are essential for heart or blood vessel function.

The next stage after identifying what can be described as "hits" is lead optimization. During this phase, medicinal chemists optimize these compounds to increase their binding properties; and selectivity along with pharmacokinetic properties such as absorption, distribution, metabolism and excretion (ADME).

If the test results of preclinical studies are effective, the drug is taken to clinical trials, which are carried out in three phases. Phase I studies examine the drug's toxicity and ideal dosage in volunteers, who are mostly healthy individuals. Our current knowledge of the drug is based on its effectiveness and the potential harm it can cause to patients or side effects as determined in phase I studies, but phase II studies involve using the drug in a larger population of patients with the disease. Phase III studies involve large groups of people to test the drug's effectiveness and see if it has side effects in different groups of people.

Methodology: The article reviews the applications of artificial intelligence throughout the drug discovery process, from target identification to clinical trials. It integrates case studies, expert opinion, and real-world examples to illustrate the impact of artificial intelligence on improving drug design, predictive accuracy, and therapeutic outcomes.

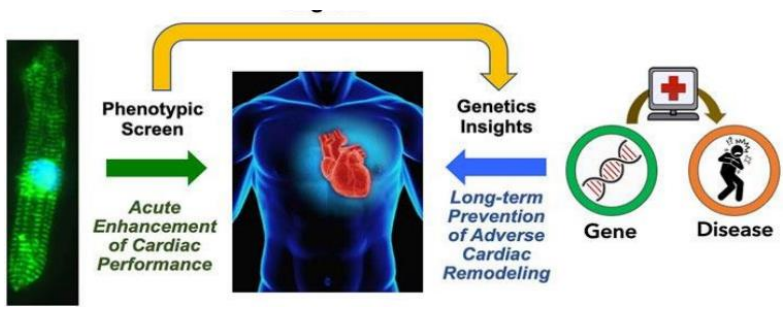

Fig 1 Cardiovascular Drug development: Target ID

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Results: AI has shown significant promise in revolutionary cardiovascular drug discovery. When analyzing large biomedical data, artificial intelligence enables the identification of new patterns and insights that traditional methods may miss. This facilitates more efficient target identification, drug design, and prediction of drug efficacy and safety.

Conclusion: Integrating AI into cardiovascular drug discovery offers considerable potential to overcome existing limitations, streamline the development process, and improve patient outcomes. The article highlights the role of artificial intelligence in reshaping cardiovascular healthcare and addressing the global burden of CVD.

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Comparison of Biochemical and Anthropometric Parameters in Complicated and Uncomplicated Severe Acute Malnutrition among Children Aged 6 to 59 Months: A Cross-Sectional Study

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Abstract:

Aim: The frequency of severe acute malnutrition (SAM) is the highest in India. Although it should receive more attention, severe anemia is one of the comorbidities that increases mortality in children who are severely undernourished. In SAM children, the liver function test (LFT), kidney function test (KFT), and complete blood count (CBC) are deranged, but their correlation with the prognosis is not well defined. The aim was to describe the anthropometric assessment and biochemical profile of children with SAM.

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Methods: This cross-sectional cohort study was performed at the Departments of Paediatrics and Biochemistry at G.S.V.M. Medical College, Kanpur, and at the Department of Biotechnology at Amity University Rajasthan, Jaipur. One hundred and six patients with SAM were enrolled; 53 were grouped as complicated SAM (Group 1) (dehydration and severe dehydration) and 53 were diagnosed as non-complicated SAM (Group 2).

Results: Group II had significantly higher mean values for height, weight, mid-upper arm circumference (MUAC), head circumference, and body mass index (BMI) for age percentile compared to Group I, with *P*-values of 0.001. Group I had a significantly lower level of hemoglobin (8.86 g/dL ± 2.21 g/dL) compared to Group II (10.0 g/dL ± 1.83 g/dL) with a *P*-value of 0.003. The difference in the frequency of anemia between the groups was statistically significant, with a *P*-value of 0.026. Anemia significantly increased the risk of complicated SAM with an odds ratio of 2.60 [95% confidence interval (CI), 1.07–6.31, $P = 0.001$].

Conclusions: This study suggests that there may be a significant relationship between anemia and the development of complications in high-risk children with SAM.

Keywords: Severe acute malnutrition, anemia, hemoglobin, anthropometry

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Emerging Trends of Ai in Wastewater Treatment, Management and Environmental Sustainability

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Abstract: The worldwide difficulties in sustainable development, ecological safeguarding, and environmental change relief requires innovative solutions. With the possibility to address water shortage, to improve energy creation productivity, AI addresses a promising blend for a cleaner and more supportable future and to the worldwide quest for sustainable development and ecological conservation. AI gives sustainable solutions by effectively eliminating pollutants from water sources. The significance of these digital innovations encourage a more proficient, economical, and innovative future in chemical sciences.

Introduction: Man-made intelligence can possibly reform science, from drug revelation to materials science. By utilizing man-made intelligence, scientists can investigate huge measures of information, streamline compound cycles, and design new particles and materials quicker and more precisely than any time in recent memory. Artificial intelligence is revolutionizing wastewater treatment processes, reducing waste and promoting clean energy. It offers cost-effective, error-free

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methods for water quality assurance, sterilization, and monitoring BOD and COD levels. Machine language (ML) is used for process reproduction, requiring estimated information and showing better accuracy than traditional models.

Methodology: In this segment, we will investigate a portion of AI most thrilling and promising applications in science.

Sanitization/Disinfection: The arrangement of trihalomethanes (THMs) in chlorinated waters poses a significant risk to individuals. The control of THMs in water requires pre-information, making the assurance process in research centres extremely time-consuming, costly, and labour-intensive. Thus, the improvement of new prescient models like Artificial Neural Network (ANN), support vector machine (SVM), and Global entry program (GEP) displaying ways to deal with estimate the THM arrangement because of chlorination. These models are equipped for catching the complex nonlinear connection between the water sterilization conditions and the relating THM development in the chlorinated water.

Adsorption: Adsorption strategies are commonly used to treat water and wastewater, using an exothermic mass-move response to move an adsorbate from liquid to a strong surface. AI is used to study adsorption processes using pollutants and water temperature, pH, adsorbent measurements, contact time, and the start of adsorbate fixation to illustrate adsorption processes.

Film filtration processes: Layer techniques in water and wastewater treatment partition pollutants based on filtration or obstruction. Film methods are used for expensive or difficult toxins or contaminants that cannot be removed otherwise. The layer techniques most frequently used incorporate reverse osmosis, ultrafiltration, Nano filtration and microfiltration .ML is used to predict, mimic, and enhance film filtration processes, with ANNs being the most commonly used model in water/wastewater treatment applications compared to fluffy rationale, SVM, ANFIS etc. AI can analyse large datasets and make guesses about fundamental film characteristics, such selectivity and porosity, thereby identifying materials with remarkable promise.

In essence, recycling and waste management are revolutionized, reducing landfill waste and increasing asset efficiency. Eventually, efforts to create a more sustainable and greener future are led by innovations in man-made reasoning.

Results and Discussion: Man-made intelligence innovation upholds supportability as follow:

Environment displaying and forecast: Through Environment demonstrating and expectation man-made intelligence to comprehend the mind boggling elements of environmental change. AI calculations investigate huge datasets to distinguish designs and give more exact environment models. It can draw upon various data of interest, including temperature, ozone harming substance outflows, and sea flows. As a result, this helps us better understand the implications of environmental change and make necessary plans for them.

Environmentally friendly power: Environmentally friendly power sources are upgraded by artificial intelligence-driven frameworks, which increase energy efficiency and maintainability. In order to

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enable sustainable power offices to similarly anticipate and plan for periods of high energy creation, climate-driven energy creation necessitates precise weather pattern prediction. Frameworks for artificial intelligence play a key role in coordinating executives and modifying the natural market for renewable power, to predict variations in energy requests and adjust the inventory accordingly.

Energy effectiveness in structures: AI optimizes energy use in buildings by adjusting heating, cooling, and lighting based on environmental conditions, reducing costs and ozone depletion, while ensuring optimal resource utilization. Constant transformation diminishes energy utilization, reducing functional expenses and ozone depleting substance discharges.

Accuracy horticulture: Accurate farming uses sensors and AI models to increase crop yields and save resources by continuously changing heating, cooling, and lighting. This information is then managed by AI models, enabling early disease detection, reduced synthetic pesticide use, and improved crop health. Ranchers can increase crop yield by early detecting diseases and bugs, reducing synthetic pesticide use and enhancing crop health through man-made intelligence.

Untamed life protection and checking: In untamed life preservation, man-made intelligence can screen endangered species and save environments through the arrangement of man-made intelligence empowered cameras and sensors. These devices are intended to screen, track, and shield jeopardized species by giving priceless information on untamed life populaces and their ways of behaving.

Air and water quality checking: Sensor networks are being utilized to monitor and enhance air and water quality, promoting environmental sustainability and safeguarding biological systems. They enable timely alerts and swift response to pollution incidents.In amphibian environments, they monitor pH, oxygen, and impurities, protecting marine ecosystems and ensuring safe drinking water. Early detection of pollution incidents allows for swift response.

Waste management and recycling: Artificial intelligence is revolutionizing waste management by improving waste collection processes, saving resources, reducing fuel usage, and reducing harmful substance outflows from collection vehicles. Artificial intelligence can reduce landfill waste by identifying reusing opportunities and treating soil. It can also improve reusing processes by efficiently organizing materials, enhancing the quality and value of reused materials, and compared to physical labour.

Marine environment security: AI-powered autonomous underwater vehicles are being used to monitor sea health and potential threats like heat waves and biodiversity loss, while also detecting changes in coral reefs and promoting conservation efforts.

Catastrophe Readiness: Artificial intelligence is revolutionizing disaster preparedness and response by providing early warning systems. It can analyse data, current conditions, and continuous streams to provide early alerts and prompt, educated responses. This is crucial in reducing natural harm and protecting lives. AI-driven systems can screen natural conditions, allocate resources effectively, and identify potential hazards.

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Carbon catch and sequestration (CCS): Artificial intelligence (AI) can enhance carbon capture processes by improving materials and conditions, reducing fossil fuel by-products, and improving natural manageability. AI models analyse various factors to determine the best approach for each situation. AI can also improve the efficiency of carbon capture by enhancing dissolvable materials and predicting potential issues.

Conclusion: Ecological science and supportability, upheld by computerized instruments, exemplifies the creative utilization of innovation to break down natural cycles, upgrade contamination control measures, and encourage the advancement of green science practices. This approach incorporates computational models, information investigation, remote detecting advancements, and data frameworks to acquire experiences into natural peculiarities, evaluate the effect of poisons, and plan substance processes that are harmless to the climate.

Computerized devices continuously monitor ecological boundaries, analysing air, water, soil, and hazardous substances. They process large amounts of ecological data from satellite imagery, sensors, and real data sets to predict future conditions.

Keywords: AI, Environmental sustainability, waste water management, adsorption

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Ethical Issues for Ai in Sustainable Digitalization

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Abstract:

The paper contends that the greening of limited man-made intelligence should be attempted by the business area to improve organizations' supportability endeavours and address the recent concerns encompassing artificial intelligence. Significant and ongoing advances in artificial intelligence (AI) are increasingly helping the business sector implement new sustainability initiatives, even though AI brings with it a range of currently unresolved issues, ranging from the exploitative labour practices used to create AI to the discrimination generated by flawed AI algorithms. The ecological harm brought about by man-made intelligence is likewise a central issue, as the innovation depends on the extraction of scant assets and huge measures of power. To review the hidden ecological costs related with the elaboration, execution and development of artificial intelligence technologies, in order to ensure their sustainable and harmonious integration with various economic sectors by identifying optimal moral-ethical and political-legal strategies. The coordination of man-made intelligence in advancing maintainable clean energy arrangements holds huge potential for tending to worldwide natural difficulties.

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Introduction: Algor-ethics, a review concerning the assessment of a moral applied to innovation, to Calculations and to AI. Simultaneously, when the idea of maintainability was presented, the conversation on this issue has become progressively exuberant and has now spread to each everyday issue. Man-made brainpower, including profound and AI, is profoundly implanted in the actual world and presents administration issues connected with natural effect, administration designs, straightforwardness and responsibility, and training and mindfulness raising. The reconciliation of man-made reasoning in advancing supportable clean energy arrangements holds critical potential for tending to worldwide ecological difficulties. The audit researches the moral ramifications of artificial intelligence sending in the spotless energy area, zeroing in on information protection, algorithmic predisposition, responsibility, straightforwardness, and occupation removal.

The study depicts growing impact of Artificial intelligence on the climate and morals, both the advantages and dangers related with simulated intelligence in improving energy effectiveness and supportability as well as the proposes counter measures. Man-made consciousness can and ought to assist with building a greener, more supportable world and to manage environmental change. In this way, man-made intelligence's future improvement suggests expanding requests for energy and uncommon earth metals and different assets. Expanding energy requests will overwhelm the green change and sustainable power supplies. The mining and handling of the important unrefined components can harm the climate. As such, Sustainable AI is focused on more than AI applications; rather, it addresses the whole sociotechnical system of AI Sustainable AI is not about how to sustain the development of AI per say but it is about how to develop AI that is compatible with sustaining environmental resources for current and future generations; economic models for societies; and societal values that are fundamental to a given society.

Troubles of artificial intelligence and maintainability: Formation of e-waste: The mining and creation of the metals utilized in AI equipment lead to contamination. Unexpected reuse of hardware leads to electronic waste, contamination, and environmental harm. Misuse of simulated intelligence mechanical gadgets, such as robots, further exacerbates the issue. Inappropriate removal of computerized reasoning hardware intensifies the issue of e-waste, poisonous materials and contamination of the planet, further harming the climate. Artificial intelligence systems require high energy utilization and should be practical for long-term human development while supporting the capacity of existing systems to provide essential resources and environmental services.

High carbon footprints of man-made intelligence models: Artificial intelligence models have a significant carbon footprint due to their large amount of information and energy consumption. The carbon footprint of a Transformer model is multiple times that of a typical vehicle.

High asset usage: The rise of artificial intelligence will increase the demand for natural resources like earth metals, leading to increased mining conditions and environmental harm. AI can also reduce landfill waste by identifying potential reuse opportunities and dividing recyclables from non-recyclables, ultimately reducing waste volume.

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The issue of predisposition: Victimization people and gatherings can emerge from predispositions in artificial intelligence frameworks. Prejudicial examination can add to unavoidable outcomes and derision in designated gatherings, sabotaging their independence and support in the public arena. Blunders in man-made brainpower calculations and dynamic cycles lead to ecological bad form and disparity.

Absence of straightforwardness: Transparency is a moral principle in computer-based intelligence, as it ensures transparency about the workings of the system. The "black-box" structure of AI makes computations confusing to both clients and experts, leading to issues in human verification and computerized reasoning. Transparency is a widely discussed drawback of AI.

Social effect: As more and more factory workers are being replaced by automated systems and robots, AI will disrupt and transform a large part of current human labour in the near future. Thus, many individuals stress over mechanization and occupation replacement. The openness or accessibility of arising innovations, man-made intelligence, will straightforwardly affect human prosperity. Man-made intelligence can stifle trust and public support, affecting majority rule systems due to a lack of educated and confiding networks. Government utilize facial acknowledgment innovation to screen its residents, and ML can be utilized to manufacture photographs or recordings so practical that people can't see that they are fake. This achieves the worry the maltreatment of simulated intelligence advances. Computer-based intelligence poses significant security and information assurance risks, as it often requires large amounts of confidential information for effective execution.

Conclusion: In order to create a more sustainable and prosperous future, the paper conclusion emphasizes the need for a balanced strategy that optimizes AI's benefits while guaranteeing moral and egalitarian outcomes. Going ahead, the report makes the case that artificial intelligence and sustainable materials will play a pivotal role in moulding a manufacturing landscape that is both efficient and environmentally beneficiaries. Man-made intelligence innovation should meet the necessities of guaranteeing the proceeded with thriving of humankind and protecting a decent climate for future generations.AI frameworks vow to help handling probably the most squeezing cultural worries, however it should be guaranteed that this occurs in the most potential harmless to the ecosystem way. This paper highlights the limitations of man-made intelligence in ecosystem-friendly power sources and energy-capable knowledge systems, suggesting that through coordinated efforts, it can facilitate reliable creation processes.

Keywords: AI, ML, Environment sustainability

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Cyber Security and Its Vulnerability

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Abstract:

The level of protection of high voltage power substations depends on the considerations of the electricity company, the level of threats and the value of their assets. On the other hand, the level of countermeasures or defences for an acceptable level of risk depends on the number of defence equipment at the substation level. Therefore, the number of these countermeasures should be estimated according to the status of each substation and the rate of investment and its importance. In addition, appropriate defence methods depending on their type and condition, as well as how the design and position of the substation can identify system security vulnerabilities. The aim of this paper is to investigate and determine the importance of protecting high voltage power substations against cyber-attacks. For this purpose, power substations are examined in four different groups: geostrategic, industrial strategy, automation and control systems, and vulnerable. According to the decision-making method of Fuzzy Analytical Hierarchy Process (FAHP), the defence cost function is presented in each substation, which includes hardware and software equipment and optimal routing of data transmission cables and cable shield. In addition, decisions are made simultaneously between the defender and the attacker. It was found that, from the proposed defence methods, the optimal path for communication cables and hardware equipment used in the power substations was more important than other cases. In addition, by shifting the weights of the criteria of substations 2 and 4, the strategy 3 ranks first in the need for defence budgets among other strategies, accounting for about 49.5% of the total defence budget, and it needs 11.2% more defence budget than the strategy S4. Furthermore, sensitivity analysis is provided to examine the impact of various factors as well as to confirm the accuracy of the results.

Keywords: Information technology, Cyber-attacks, Cyber security, Emerging trends, Key management

Introduction : Globalisation, digitalisation and smart technologies have escalated the propensity and severity of cybercrime. Whilst it is an emerging field of research and industry, the importance of robust cybersecurity defence systems has been highlighted at the corporate, national and supranational levels. The impacts of inadequate cybersecurity are estimated to have cost the global economy USD 945 billion in 2020. Cyber vulnerabilities pose significant corporate risks, including business interruption, breach of privacy and financial losses. Despite the increasing relevance for the international economy, the availability of data on cyber risks remains limited. The reasons for this are many. Firstly, it is an emerging and evolving risk; therefore, historical data sources are limited. It could also be due to the fact that, in general, institutions that have been hacked do not

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publish the incidents. The lack of data poses challenges for many areas, such as research, risk management and cybersecurity. The importance of this topic is demonstrated by the announcement of the European Council in April 2021 that a centre of excellence for cybersecurity will be established to pool investments in research, technology and industrial development. The goal of this centre is to increase the security of the internet and other critical network and information systems.

This research takes a risk management perspective, focusing on cyber risk and considering the role of cybersecurity and cyber insurance in risk mitigation and risk transfer. The study reviews the existing literature and open data sources related to cybersecurity and cyber risk. This is the first systematic review of data availability in the general context of cyber risk and cybersecurity. By identifying and critically analysing the available datasets, this paper supports the research community by aggregating, summarising and categorising all available open datasets. In addition, further information on datasets is attached to provide deeper insights and support stakeholders engaged in cyber risk control and cybersecurity. Finally, this research paper highlights the need for open access to cyber-specific data, without price or permission barriers.

The identified open data can support cyber insurers in their efforts on sustainable product development. To date, traditional risk assessment methods have been untenable for insurance companies due to the absence of historical claims data. These high levels of uncertainty mean that cyber insurers are more inclined to overprice cyber risk cover. Combining external data with insurance portfolio data therefore seems to be essential to improve the evaluation of the risk and thus lead to risk-adjusted pricing. This argument is also supported by the fact that some re/insurers reported that they are working to improve their cyber pricing models (e.g. by creating or purchasing databases from external providers).[6]

Fundamental Concepts : Cyber-attacks fall into a broader context than what is traditionally called information operations. Information operations integrated use of the main capabilities of electronic warfare, psychological, computer network, military trickery and security operations in coordination with special support and relevant abilities and to penetration, stop, destroy or hijack human decisions and it is one of the decision-making processes of national institutions. Fig. 1 describes the anatomy of a cyber-attack. From the USNM Strategy for cyberspace operations, computer network operation is composed of the attack, defense, and utilization enabling. The latter is different from network attacks and network defense, because this type of operation focuses more on collection and analyzing information than interrupting networks, and may itself be the prelude to an attack. These operations can be carried out of disseminating information and propaganda purposes. Computer network exploitation enabling operations can also be carried out with the aim of stealing important computers data. In such a context, Trap Sniffers and Doors are beneficial tools for cyber espial. Trap Doors permit an external user to accessibility software at any time without the knowledge of the computer user. Sniffers are a tool to steal usernames and passwords. The consequences of cyber warfare can include the following :

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- The overthrow of the system of government or the catastrophic threat to national security; a simultaneous initiation of physical warfare or groundwork and facilitate the start of physical warfare in the near future;
- Catastrophic destruction or damage to the political and economic relations of the country;
- Extensive human casualties or danger to public health and safety;
- Internal chaos;
- Widespread disruption in the administration of the country;
- Destroying public confidence or religious, national and ethnic beliefs;
- Severe damage to the national economy;
- Extensive destruction or disruption of the performance of national cyber assets.

In addition, five scenarios can be considered for cyber warfare: (1) Government-sponsored cyber espionage to gather information to plan future cyber-attacks, (2) a cyber-attack aimed at laying the groundwork for any unrest and popular uprising, (3) Cyber-attack aimed at disabling equipment and facilitating physical aggression, (4) Cyber-attack as a complement to physical aggression, and (5) Cyber-attack with the aim of widespread destruction or disruption as the ultimate goal (cyber warfare). One type of cyber-attack is encryption. Encryption is a reversible method of encrypting data that requires a key to decrypt. Encryption can be used in conjunction with encryption, which provides another level of confidentiality. Encryption is the implementation and study of data encryption and decryption thus that it can only be decrypted by specific individuals. The system for encrypting and decrypting data is the encryption system. Encryption is a powerful tool for protecting important and private information when exposed to threats from strangers and criminals, as well as for hiding unauthorized activities from law enforcement. As computers grow faster and failure methods become more secure, cryptographic algorithms require sustained consolidation to prevent insecurity. Note that, in general, a distinction can be made between cyber-crime, cyber-warfare, and cyber-attacks. [5]

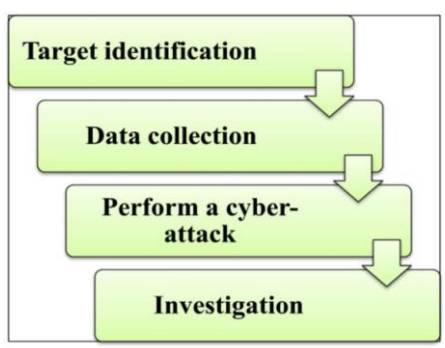

Fig: Anatomy of a cyber- attack

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Cyber Security: Privacy and security of the data will always be top security measures that any organization takes care. We are presently living in a world where all the information is maintained in a digital or a cyber form. Social networking sites provide a space where users feel safe as they interact with friends and family. In the case of home users, cyber-criminals would continue to target social media sites to steal personal data. Not only social networking but also during bank transactions a person must take all the required security measures.

Incidents	Jan-June 2012	Jan-June 2013	% Increase/Decrease
Fraud	2439	2490	2
Intrusion	2203	1726	(22)
Spam	291	614	111
Malicious Code	353	442	25
Cyber Harassment	173	233	35
Content related	10	42	320
Intrusion Attempts	55	24	(56)
Denial of Services	12	10	(17)
Vulnerability Reports	45	11	(76)
Total	5581	5592	

The above Comparison of Cyber Security Incidents reported to Cyber999 in Malaysia from January–June 2012 and 2013 clearly exhibits the cyber security threats. As crime is increasing even the security measures are also increasing. According to the survey of U.S technology and healthcare executives nationwide, Silicon Valley Bank found that companies believe cyber-attacks are a serious threat to both their data and their business continuity.

- 98% of companies are maintaining or increasing their cyber security resources and of those, half are increasing resources devoted to online attacks this year
- The majority of companies are preparing for when, not if, cyber attacks occur
- Only one-third are completely confident in the security of their information and even less confident about the security measures of their business partners.

There will be new attacks on Android operating system based devices, but it will not be on massive scale. The fact tablets share the same operating system as smart phones means they will be soon targeted by the same malware as those platforms. The number of malware specimens for Macs would continue to grow, though much less than in the case of PCs. Windows 8 will allow users to develop applications for virtually any device (PCs, Tablets and smart phones) running Windows 8, so it will be possible to develop malicious applications like those for Android, hence these are some of the predicted trends in cyber security.[3]

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Goals : The majority of the business operations run on the internet exposing their data and resources to various cyber threats. Since the data and system resources are the pillars upon which the organization operates, it drives lacking maxim that a risk to these individuals is definitely a threat to the group itself. A threat can be anywhere between a minor bug in a code to a complex cloud hijacking liability. Risk assessment and estimation of the cost of reconstruction help the organization to stay prepared and to look ahead for potential losses. Thus, knowing and formulating the objectives of cybersecurity exact to every organization is crucial in protecting the valuable data. Cybersecurity is a practice formulated for the safeguard of complex data on the internet and on devices safeguarding them from attack, destruction, or unauthorized access. The goal of cybersecurity is to ensure a risk-free and secure environment for keeping the data, network and devices guarded against cyber terrorisation.

Goals of Cyber Security?

The definitive objective of cybersecurity is to defend the data from actuality stolen or co-operated. To attain this, we aspect at 3 important goals of cybersecurity.

1. Defensive the Privacy of Information
2. Conserving the Integrity of Information
3. Controlling the Obtainability of information only

To approved users these objectives practise the confidentiality, integrity, availability (CIA) triad, the base of entirely safety agendas. This CIA triad model is a safety model that is intended to guide strategies for data security inside the places of a society or corporation. This model is similarly mentioned to in place of the AIC (Availability, Integrity, and Confidentiality) triad to side-step the mistake with the Central Intelligence Agency. The rudiments of the triad are reflected the three greatest vital mechanisms of safety. The CIA standards are one that greatest of the societies and businesses practice once they have connected a new request, makes a record or when assuring access to approximately information. On behalf of data to be totally safe, all of these safe keeping areas must originate into result. These are safe keeping strategies that all effort together, and hence it can be incorrect to supervise one policy.

CIA triad is the greatest collective standard to measure, choice and appliance the proper safety panels to condense risk.

Confidentiality : Making guaranteed that your complex satistics is reachable to accredited users and safeguarding no informations is revealed to unintended ones. In case, your key is private and will not be shared who power adventure it which ultimately hampers Confidentiality.

Methods to safeguard Confidentiality:

- Data encryption

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- Two or Multifactor verification
- Confirming Biometrics

Integrity: Make sure all your data is precise; dependable and it must not be changed in the show from one fact to another.

Integrity ensure methods:

- No illegal shall have entrance to delete the records, which breaks privacy also. So, there shall be
- Operator Contact Controls.
- Appropriate backups need to be obtainable to return proximately.
- Version supervisory must be nearby to check the log who has changed.

Availability : Every time the operator has demanded a resource for a portion of statistics there shall not be any bout notices like as Denial of Service (DoS). Entirely the evidence has to be obtainable. For Example, a website is in the hands of attacker's resultant in the DoS so there hampers the obtainability.

Here are few steps to maintain these goals :

1. Categorising the possessions based on their position and precedence. The most important ones are kept back safe at all periods.
2. Holding down possible threats.
3. Determining the method of security guards for each threat
4. Monitoring any breaching activities and managing data at rest and data in motion.
5. Iterative maintenance and responding to any issues involved.
6. Updating policies to handle risk, based on the previous assessments.[2]

Cyber Security Techniques:

1.Access control and password security : The concept of user name and password has been fundamental way of protecting our information. This may be one of the first measures regarding cyber security.

2.Authentication of data : The documents that we receive must always be authenticated be before downloading that is it should be checked if it has originated from a trusted and a reliable source and that they are not altered. Authenticating of these documents is usually done by the antivirus software present in the devices. Thus a good antivirus software is also essential to protect the devices from viruses.

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3.Malware scanners : This is software that usually scans all the files and documents present in the system for malicious code or harmful viruses. Viruses, worms, and Trojan horses are examples of malicious software that are often grouped together and referred to as malware.

4.Firewalls : A firewall is a software program or piece of hardware that helps screen out hackers, viruses, and worms that try to reach your computer over the Internet. All messages entering or leaving the internet pass through the firewall present, which examines each message and blocks those that do not meet the specified security criteria. Hence firewalls play an important role in detecting the malware.

5. Anti-virus software: Antivirus software is a computer program that detects, prevents, and takes action to disarm or remove malicious software programs, such as viruses and worms. Most antivirus programs include an auto-update feature that enables the program to download profiles of new viruses so that it can check for the new viruses as soon as they are discovered. An antivirus software is a must and basic necessity for every system. [3]

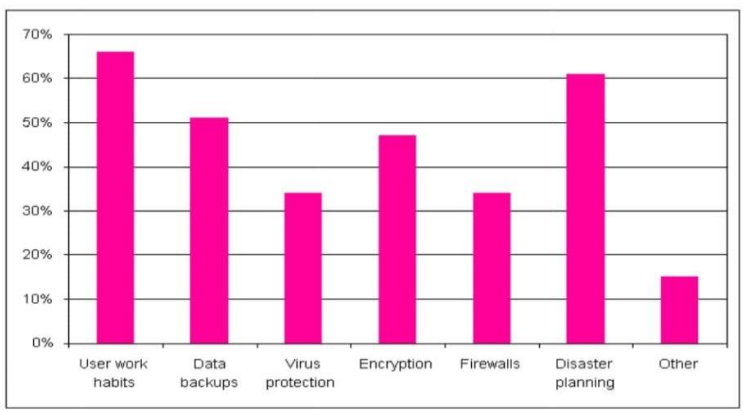

TABLE: Technique on cyber security

Methodlogy: The methodology adopted followed a systematic literature review (SLR), proposed by authors in, to derive conclusions and reflections about the above research questions. This academic approach helped us gather, examine, sort, and study the pertinent papers within the topic frame. The recommended guidelines of this method consist of three main stages:

- Planning the review, which focuses first on the identification of the need for a review, their proposal, and the development of their protocol;
- Conducting the review involves identifying the research using predefined keywords and search strings, selecting the studies based on inclusion and exclusion criteria, performing a study quality assessment using predefined criteria and checklists, extracting data, and monitoring progress before summarizing findings and providing data synthesis;

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- Reporting recommendations and disseminating evidence through a descriptive analysis of findings and insights.

Consulting several reputable academic libraries helped us to gather pertinent articles related to our subject and respond to the research questions. These libraries are as follows:

1. ACM (Association for Computing Machinery) digital library;
2. JSTOR;
3. IEEE Xplore digital library;
4. MDPI;
5. Science Direct;
6. Scopus;
7. Springer;
8. Web of Science.

The current study aims to collect pertinent papers published from 2016 to 2024. To this end, many specific keywords are used in the research methodology during this period, such as: "CPE and CVE", "vulnerability detection", "vulnerability assessment", "CWE and vulnerabilities", "matching vulnerabilities", "asset inventory and CPE", "vulnerability detection and AI", "CVE and CPE by graph", "CVE and CPE by FM" and "VMS and vulnerability detection".

As shown below in Figures 1 and 2, the research method consisted of four procedures to gather the most significant papers related to our subject. The first stage involves gathering and building a global overview of the scientific contributions found in the literature review. Next, this study initially retrieved 846 papers from the academic libraries. By eliminating duplicates and out-of-scope papers, and classifying the publications using the abstract and title, the paper number was reduced to 487 papers. Then, 256 articles were selected by using predetermined criteria relevant to our topic. The following criteria were adopted:

- Papers published within the last 8 years;
- Relevant papers according to the research question posed previously;
- Papers suggesting vulnerability detection methods;
- Methods leveraging the usage of basic security metadata or AI techniques;
- Papers offering well-documented research on the proposed methods.

To provide unbiased research, the analysis was limited to academic contributions focusing on the described methods relative to our topic. Ultimately, data analysis results(125 articles) were separated into two studies: the main study, which conducts a thorough and deep investigation of the article's content, and the connected study, which is sufficiently investigated to derive further insights and future contributions.[4]

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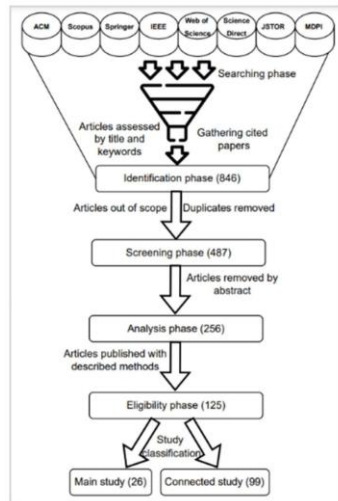

Fig 1: Process of the methodology used in the literature

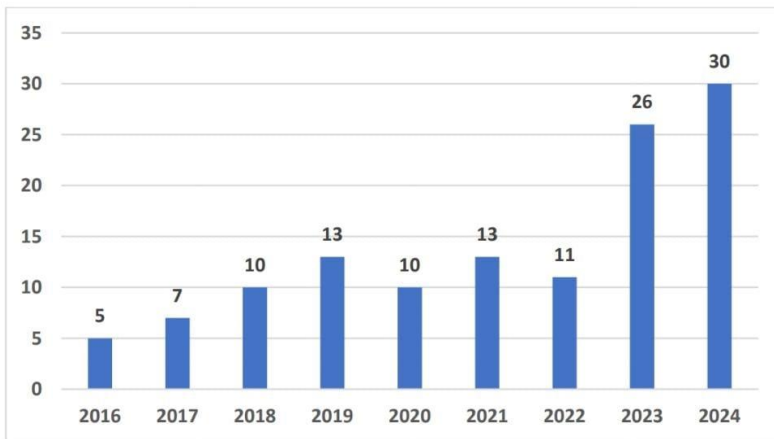

Fig 2: Distribution by year of the analysis study

Conclusion : Computer security is a vast topic that is becoming more important because the world is becoming highly interconnected, with networks being used to carry out critical transactions. Cyber-crime continues to diverge down different paths with each New Year that passes and so does the security of the information. The latest and disruptive technologies, along with the new cyber tools and threats that come to light each day, are challenging organizations with not only how they secure their infrastructure, but how they require new platforms and intelligence to do so. There is no perfect solution for cyber crimes but we should try our level best to minimize them in order to have a safe and secure future in cyber space.[3]

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Decoding Barth Syndrome: Genetic Insights, Structural Mutations, and Functional Impacts of Human X-Linked Genes

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ABSTRACT

Background: Barth syndrome, a rare X-linked genetic disorder, is caused by mutations in the tafazzin (TAZ) gene, leading to mitochondrial dysfunction and clinical manifestations like cardiomyopathy, skeletal myopathy, and neutropenia. . Affected individuals are prone to recurrent infections and fatigue due to compromised immune function. Diagnosis involves genetic testing for TAZ mutations, blood tests showing neutropenia and elevated 3-methylglutaconic acid levels, and echocardiography to assess cardiomyopathy. Mass spectrometry can detect abnormal cardiolipin profiles. Early recognition and supportive care, including infection management and cardiac monitoring, are crucial for improved outcomes.

This study explores the genetic and structural impacts of TAZ mutations using bioinformatics tools, including Uniprot, FASTA, BLAST, and MultAlin. Protein sequences of TAZ variants were retrieved from Uniprot and analysed using BLAST to identify evolutionary relationships and conserved regions. MultAlin revealed critical amino acid residues essential for cardiolipin remodelling, disrupted by missense mutations affecting protein folding and enzymatic function. Computational modelling further demonstrated structural changes in mutant TAZ proteins, impacting protein stability and lipid interactions. Molecular dynamics simulations highlighted the functional consequences of these mutations, emphasizing their role in disease pathology. This study

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underscores the molecular mechanisms of TAZ mutations in Barth syndrome, offering insights for targeted therapies to restore mitochondrial function and improve patient outcomes.

Methodology: The study employed a comprehensive bioinformatics approach to analyse the target protein. First, the protein sequence was retrieved in FASTA format from the UniProt database, ensuring the use of high-quality, accurate data. The BLAST algorithm was then utilized to search for homologous sequences by comparing the target protein against a broad range of protein sequences in the database. This comparison helped uncover evolutionary relationships and functional similarities between the target protein and other known proteins. Next, multiple sequence alignment was performed using the Multalin tool, which allowed for the identification of conserved regions and sequence variations among homologous proteins, providing insights into functionally important residues. To further understand the protein's structural properties, the 3D structure was visualized using the Visual Molecular Dynamics (VMD) software. This visualization enabled detailed examination of the protein's conformation and interactions. By integrating sequence retrieval, alignment, and structural visualization, this methodology provided a holistic understanding of the protein's functional and structural characteristics, supporting further research and potential applications.

Result and Discussion: We selected the Barth Syndrome protein sequence (UniProt ID: Q16635) and retrieved nine related FASTA sequences for analysis. Using the BLAST algorithm, we compared these sequences against the RCSB PDB database and found that only two sequences showed partial identity, with less than 30% sequence similarity to the query protein. Subsequently, we performed a multiple sequence alignment using the MultAlin tool, which allowed us to identify specific amino acid variations across all nine sequences. Our analysis revealed distinct amino acid changes in critical regions, providing insight into potential functional implications. Despite these findings, no direct structural matches were found in the RCSB PDB database, underscoring the novelty of these sequences in the context of Barth Syndrome.

Conclusion: This study provides new insights into the molecular characteristics of Barth Syndrome by identifying key amino acid variations in the Barth Syndrome protein. The lack of significant structural matches in the RCSB PDB database suggests that these sequences may represent novel, under-explored variants of the protein. The amino acid changes detected across all sequences may contribute to a deeper understanding of the disease's pathophysiology, potentially offering targets for further functional studies or therapeutic strategies. This research highlights the importance of exploring sequence variations in rare diseases and provides a foundation for future investigations into Barth Syndrome's molecular mechanisms.

Keywords: Cardiomyopathy, Skeletal myopathy, Echocardiography, Homologous sequences, Consequences

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Covid-19 Drug Development and Therapeutics

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Abstract:

The COVID-19 pandemic, caused by the SARA –COV-2, has necessitated rapid advancements in drug discovery and development. Therapeutics targeting the virus have been categorized into antiviral agent, immune modulators, and supportive care treatments. Antiviral drug such as Remdesivir and Molnupiravir, inhibit viral replication, while monoclonal antibodies like Bamlanivimab and casirivemab neutralize the virus by targeting its spike protein. Immunomodulators, including corticosteroid like Dexamethasone and JAK inhibitors, manage hyperinflammation associated with severe cases. Futhermore, repurposed drugs like Hydroxychloroquine and Azithromycin were initially explored, though their efficacy remains controversial. Advancement in drug development have been accelerated by computation modeling high- throughput screening, and international collaboration. Despite these efforts, challenges persist, including the emergence of viral variants, drugs resistance, and equitable global distribution. Future strategies emphasize the development of broad spectrum antivirals, combination therapies and integration of precision medicine approaches. This abstract highlight the critical progress in Covid-19 therapeutics while underscoring the need for sustained research to combat this evolving global health crisis.

Keywords: Covid-19, Therapeutics, Immune, Molnupiravir, viral replication

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Antibacterial Neem

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Abstract:

Neem [*Azadirachta indica*], a versatile medicinal plant, has been widely studied for its antibacterial properties. This study investigates the antibacterial potential of neem extracts against common pathogenic bacteria. Neem leaves, bark and seeds contain bioactive compounds such as azadirachtin, nimbin and quercetin which exhibit potent antimicrobial activity. Various solvents including aqueous and organic extract were tested against bacteria like *Escherichia coli*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*. Results demonstrated significant inhibition

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of bacterial growth, indicating the efficacy of neem extract as a natural alternative to synthetic antibiotics.

Keywords: Neem, Medicinal plant, *Staphylococcus aure*us

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Chrysanthemum Cinerariaefolium

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ABSTRACT

Pyrethroids are the synthetic chemical compounds modeled after natural pyrethrins, which are derived from chrysanthemum flowers. Known for their potent insecticidal properties, pyrethroids act on the nervous systems of insects by modifying sodium channel function, resulting in paralysis and eventual death. Due to their effectiveness and low application rates, pyrethroids have become widely used in agriculture, public health programs and household pest control. Despite their efficiency, pyrethroids pose environmental and health concern. They exhibit low mammalian toxicity compared to other insecticides but can be highly toxic to aquatic organism such as fish and invertebrates. Pyrethroids are relatively stable in the environment, persisting longer than natural pyrethrins, which raises concern about bioaccumulation and ecological disruption. Furthermore, prolonged exposure to pyrethroids may contribute to insect resistance and potential health risks in humans, including skin irritation, respiratory issues, and possible neurotoxicity. This abstract explores the chemistry, mechanism of action, application, environmental implication, and resistance concern associated with prethroids. Emphasis is placed on developing sustainable and integrated pest management practices to mitigate their ecological and health impacts while maintaining their efficacy in controlling pest population.

KEYWORDS: Pyrethroids, chrysanthemum, mammalian toxicity, invertebrates, neurotoxicity

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Rotenones

Payal Sharma and Kanupriya Sharma

Department of Science, Biyani Girls Colleges, Jaipur, INDIA

ABSTRACT

Rotenones are naturally occurring organic compounds derived primarily from the roots, stems and leaves of various plant species belonging to the leguminoceae family such as derris and lonchocarpus. These compounds function as potent insecticides and pesticides owing to their ability to disrupt cellular respiration by inhibiting the mitochondrial electron transport chain at complex 1.This inhibition results in decreased ATP production ultimately leading to cell death in target organisms. While rotenones have been widely used in agriculture, pest control and fishery management, their application raises concern due to their toxicity to non-target organisms including fish and beneficial insects. In humans prolonged exposure has been linked to health risks such as neurodegenerative effects associated with Parkinson disease. Rotenone are biodegradable with a short half-life in sunlight and soil making them environmentally less persistent compared to synthetic pesticides.

KEYWORDS: Rotenone, Parkinson disease, Biodegradable

❑❑❑

The Biochemical basis of Oxidative Stress and its Role in Neurodegenerative Disorders

Priya Gouri

Department of Medical, Paramedical and Allied Health Sciences, Jagannath University, Jaipur

Abstract

Oxidative stress has emerged as a significant factor in the pathogenesis of neurodegenerative disorders with the imbalance between the levels of reactive oxygen species (ROS) production and antioxidant defense systems. Due to their high rate of oxygen consumption, a very limited regenerative capability, and lipid-rich nature, neurons are particularly prone to oxidative damage. This biochemical process contributes to cellular dysfunction, protein misfolding, and DNA damage, all of which are implicated in diseases such as Alzheimer's disease (AD), Parkinson's disease (PD), Huntington's disease, and amyotrophic lateral sclerosis (ALS). This paper will explore the biochemical mechanisms that underlie oxidative stress: including the role of mitochondria, metal

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ion Dysregulation, and impaired antioxidant defenses. Moreover, we talk about how oxidative stress increases Neuroinflammation, protein aggregation, and synaptic dysfunction-all the hallmarks of Neurodegeneration. Interactions between oxidative stress and disease progression reveal that antioxidant therapy must be targeted in order to avoid neuronal damage and delay disease onset.

Methodology : The present review synthesizes information from primary and secondary sources, including peer-reviewed research articles, systematic reviews, and clinical studies published in reputable journals. A systematic literature search was performed using databases such as Pub Med, Scopus, and Web of Science. Keywords were "oxidative stress," "neurodegenerative disorders," "Alzheimer's disease," "Parkinson's disease," "antioxidants," "ROS," and "mitochondrial dysfunction." Inclusion criteria included only the most recent studies within the last 15 years, and they had to focus on biochemical pathways and clinical relevance. Exclusion criteria were studies that did not include biochemical insights or were solely based on non-neuronal models. The data from the reviewed sources were compiled and synthesized to give a complete picture of the involvement of oxidative stress in Neurodegeneration.

Discussion : Oxidative stress results from an imbalance in the formation of ROS, including superoxide anions (O2-), hydrogen peroxide (H2O2), and hydroxyl radicals (OH•), beyond the antioxidant defenses that can be neutralized. In neurodegenerative diseases, mitochondria are both sources and targets of oxidative stress. Mitochondrial dysfunction impairs electron transport chain activity, increases the production of ROS, and decreases ATP synthesis. The resultant oxidative damage to proteins, lipids, and nucleic acids triggers a cascade of cellular events that promote neuronal apoptosis.

Oxidative stress has been implicated in the pathology of Alzheimer's disease in beta-amyloid (Aβ) plaques and Neurofibrillary tangles. Aβ oligomers trigger ROS production, and that results in lipid peroxidation and protein carbonylation, which further worsens synaptic function and memory. Likewise, in Parkinson's disease, oxidative stress kills dopaminergic neurons of the substantia nigra because of auto-oxidation of dopamine and alpha-synuclein aggregates. In Huntington's disease and ALS, the interaction of oxidative stress with genetic mutations worsens the degeneration of neurons. Another critical element of Neurodegeneration involves the interaction between oxidative stress and Neuroinflammation. Microglia, being activated by Neurodegeneration, have been shown to cause the production of pro-inflammatory cytokines and additional ROS, causing a vicious cycle of inflammation and oxidative damage, which threatens neuronal survival and accelerates disease progression.

In addition, metal ion Dysregulation, most importantly iron, copper, and zinc, enhances oxidative stress via Fenton chemistry, by which excess metal ions catalyze the conversion of H2O2 into the highly reactive hydroxyl radicals. This process further heightens oxidative damage to cellular constituents. While the presence of endogenous antioxidant systems-such as superoxide dismutase (SOD), catalase, and glutathione (GSH)-provides the brain with a certain form of defense, such systems have been overwhelmed in neurodegenerative conditions. Diminution of antioxidants and

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reduction in enzymatic activity render oxidative stress insurmountable for the brain, therefore making neurons vulnerable to this damage.

There has been some preclinical promise of therapeutic strategies aimed at combating oxidative stress. Several antioxidants, such as NAC, coenzyme Q10, and edaravone, scavenge ROS and increase mitochondrial function to exert Neuroprotective effects. Mixed results in clinical trials further underscore the complexity of the pathways of oxidative stress and need for targeted interventions.

Conclusion : Oxidative stress is central to the etiopathogenesis of neurodegenerative diseases by contributing to cellular dysfunction, protein aggregation, and neuronal death. The biochemical underpinning of oxidative stress is seen as mitochondrial dysfunction, disruption in metal ion homeostasis, and compromised antioxidant defense, thereby all contributing to the process of disease progression. An understanding of these mechanisms would serve to provide insight into putative therapeutic targets to counteract oxidative damage. Although antioxidant therapies have shown promise, clinical translation is a challenge because Neurodegeneration is multifactorial. Future research should be in the development of targeted antioxidant strategies and combination therapies to address oxidative stress more effectively and improve clinical outcomes in neurodegenerative diseases.

Keywords: Oxidative stress, neurodegenerative disorders, Alzheimer's disease, Parkinson's disease, antioxidants

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Isolation and Characterization of Arsenic Tolerant Bacterial and its Possible Application in Arsenic Biosorption

Renu Khandelwal and Pallavi Kaushik

Centre for Advanced Studies, Department of Zoology, University of Rajasthan,Jaipur, INDIA

Abstract:

Many such arsenic tolerant bacteria have been isolated from arsenic contaminated sites which have also been found to play significant role in arsenic bioremediation. This research investigates the bioremediation capabilities of the arsenic-tolerant bacterium identified as *Acinetobacter junii* Sr4b strain with accession number: OP006747. The bacterium was characterized by biochemical properties, gram staining, SEM analysis etc. The preliminary biosorption experimentation using bacterial biomass demonstrated more than 70% Arsenic removal after the equilibrium time of 60

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min and estimated biosorption capacity of =7.13 mg/g of wet biomass. Thus, the high arsenic tolerance and removal efficiency is a significant contribution of this research in the field of bioremediation.

Keywords: Arsenic, Bioremediation, Biosorption capacity, Minimum inhibitory concentration

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Maths in Medical Science

Gunjan Saini and Rachna Khandelwal

Department of Science, Biyani Girls College, Jaipur, INDIA

Abstract

Maths is a crucial part of medicine. All the graphs, equations, statistics, and general maths we learn at school help us to understand important aspects of human and veterinary medicine, biology, and science in general. People always think that biology and chemistry are important for doctors, nurses, midwives, scientists, and all the other people involved in medicine and healthcare-related jobs, but in fact maths is also vital. This article explores how we check heart disease, how we predict and measure how many people will be affected by various diseases, and how maths is used to treat patients and prevent the spread of contagious diseases.

Cardiologists and other type of doctors also want look at the structure of heart, blood vessels, or other organs. There are several methods use to image inside the body included X-ray, computed tomography (CT), ultrasound, and magnetic resonance imaging (MRI). All these imaging techniques required maths and the measures must be accurate as there is no room for error in medicine.

Once a medical condition has been diagnosed, patients must be monitored, and medications must be given properly. Calculating drug doses relies on maths such as addition, fractions and algebraic equations, and these calculations are extremely important because a dose of medicine that would help an adult could be harmful to a child, whilst a child's dose might not be enough to help an adult. Many drugs are given per kilogram of body weight. If a patient needs surgery, medical professionals are needed to check the patient's blood pressure, calculate oxygen levels, monitor body temperature and respiratory rate, and administer the correct doses of an aesthesia and fluids. By creating and using graphs and equations, these medical professionals can determine whether a patient is getting better or deteriorating, and what the patient needs during treatment.

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Conclusion There are so many ways that maths is vital in human and veterinary medicine. Medical professionals may be calculating the risk of a disease spreading, how much medicine to give, how quickly the heart is beating, or whether a patient is improving or declining.

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Cisplatin use as an Antineoplastic Agent

Khushboo Sharma, Jyoti Sharma and Neetu Khandelwal

Department of Science, Biyani Girls College, Jaipur, INDIA

ABSTRACT

Cisplatin is a chemotherapy drug widely used to treat ovarian and testicular cancers. It is classified as a platinum-based alkylating agent and is known for its high efficacy, especially in solid tumors.

Cisplatin works by forming platinum-DNA adducts. It binds to the DNA strands and causes cross-linking, which is Disrupts DNA replication and transcription. Triggers cell cycle arrest and apoptosis (programmed cell death). It is most effective against rapidly dividing cancer cells. It is often part of combination chemotherapy regimens (e.g., BEP for testicular cancer, with Bleomycin and Etoposide). Cisplatin remains one of the most effective chemotherapy drugs, especially for testicular and ovarian cancers. However, its side effects, particularly nephrotoxicity, ototoxicity, and neuropathy, require close monitoring and supportive care to minimize long- term complications.

Keywords: Cisplatin, Antineoplastic Alkylating - agent, transcription, nephrotoxicity, apoptosis

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Monitoring Comprising pf X-Ray Radiation and Case Study of their Dose with respect to Alara

Rajesh Kumar Rajput and Dhruvashri Shekhawat

Dept of Basic Life and Applied Science, Apex University, Jaipur, INDIA

ABSTRACT:

Rontgen in 1895 discovered the x-rays, when was studying the phenomenon of discharge of electricity through rarefied gases. He found that when the pressure in the discharge tube is reduced to 0.001 mm of mercury and electric discharge is passed between cathode and anode, the glass wall behind cathode begins to glow with greenish yellow color. During his experiment he also observed that fluorescent screen placed close to discharge tube continued to fluorescent close to the discharge tube continued to fluorescent even if the discharge tube was completely covered with a black paper. Although the intensity of fluorescence was reduced by interposing various thickness of different substance between screen and tube but it could not be cut off entirely. When plate of iron was placed it costs a shadow on the screen showing that certain radiation are coming out from the discharge tube. After performing a series of experiment Rontgen concluded that when a beam of fast moving electrons striken a solid target, invisible high penetrating radiation is produced. Because of their unknown nature Rontgen called these radiations as X-Ray.

KEYWORD: Radiation, Charge, X Ray, Wave, Experiment

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PROGRAMME AT A GLANCE

Date: December 21, 2024; Saturday (Day-2)

Theme: Revolutionizing Healthcare - Collaborative Pathways to Advanced Therapeutics and Global Wellbeing

Standard Time	Schedule
09:00 AM- 09:05 AM	Floral Devotion to Lord Ganesha by Dignitaries
09:05 AM- 09:10 AM	Ganesh Vandana from BGC Student
09:10 AM- 09:15 AM	Floral Welcome for Dignitaries
09:15 AM – 09:20 AM	Welcome address by Organizing host **Mr. Ashok Vaid** Principal, Maheshwari Public School, INDIA
09:20 AM – 09:30 AM	Opening address by Organizing Chair **Dr. Manish Biyani** Director (R&D), Biyani Group of Colleges, INDIA
Seminar on 'Study in Japan (SIJ)' (09:30 AM – 12:05 PM) **Chair: Prof. Manish Biyani** **Professor, School of Sci. & Tech., Kwansei Gakuin University, JAPAN**	
09:30 AM – 09:40 AM	SIJ-1, **Prof. Hirohisa Tanaka** Professor, School of Sci. & Tech. Dept. of Nanotech. for Sustainable Energy, Kwansei Gakuin University, JAPAN
09:40 AM – 09:50 AM	SIJ-2, **Prof. Yuji Maeda** Professor, Institute of Business and Accounting Business School, Kwansei Gakuin University, JAPAN
09:50 AM- 10:00 AM	SIJ-3, **Introduction of Kwansei Gakuin University**, JAPAN
10:00 AM – 10:10 AM	SIJ-4, **Introduction of University of Tokyo**, JAPAN
10:10 AM – 10:20 AM	SIJ-5, **Introduction of Saitama University,** JAPAN
10:20 AM – 10:30 AM	SIJ-6, **Introduction of Kanazawa University**, JAPAN
10:30 AM- 10:40 AM	SIJ-7, **Introduction of Akita Prefectural University**, JAPAN
10:40 AM- 10:50 AM	SIJ-8, **Introduction of Shibaura Institute of Technology**, JAPAN

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10:50 AM – 11:00 AM	SIJ-9, **Introduction of Toho International**, JAPAN
11:00 AM – 11:10 AM	SIJ-10, **Introduction of Naitei Bridge**, JAPAN
11:10 AM – 11:20 AM	Pathway of Insights **Q&A Session**
11:20 AM – 11:35 AM	Motivational address by Organizing host **Dr. Sanjay Biyani** Director (Acad.), Biyani Group of Colleges, Jaipur, INDIA
11:35 AM – 11:45 AM	**Introduction of Biyani Group of Colleges**, INDIA
11:45 AM- 11:55 AM	India-Japan Cultural Program
11:55 AM –12:00 Noon	Vote of Thanks (Memento distribution & Group photo)
12:00 Noon - 01:00 PM	Japanese Universities Exhibition display
01:00 PM - 02:00 PM	Lunch Break
Invited Technical Session (02:00 PM – 04:10 PM) **Chair: Dr. Vidhi Sharma & Ms. Remya Renjan** **Associate Professors, Biyani Nursing College, Jaipur**	
01:00 PM - 02:00 PM	Registration
02:00 AM- 02:05 AM	Floral Welcome for Dignitaries
02:05 PM -02:30 PM	IL-1, **Dr. Mamta Nebhinani** Assistant Professor, College Nursing, AIIMS, Jodhpur, INDIA
02:30 PM-02:55 PM	IL-2, **Dr. Soma Bhattacharjee** Managing Director and Head of Communities & Engagement at IJCIH & Pratyaksh medical care LLP, Noida, INDIA
02:55 PM-03:20 PM	IL-3, **Prof. Neeta Rajesh Bhide** Prof. SGT University, Gurgaon, INDIA
03:20 PM-03:45 PM	IL-4, **Dr. Laxmi** Associate Professor, School of Health Science Indira Gandhi National Open University (IGNOU), New Delhi, INDIA
03:45 PM- 04:10 PM	IL-5, **Dr. Rohit Avasthi** HUMOKIND PLUS Private Limited, Jaipur, INDIA

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04:10 PM-04:15 PM	**Vote of Thanks** (Group Photo & Memento Distribution)
Human Resource (HR) Conclave and Panel Discussion (04:15 PM – 05:00 PM) **Panellist(s): Fortis Escorts Hospital; Bhagwan Mahaveer Cancer Hospital, Apex Hospital, Narayana Hospital, CK Birla Hospital, TCS Cluster Head Passport Department**	
Chair : Prof. Renu Nagar **Former Project Manager, Foreign Recruitment, TNAI**	
05:00 PM – 05:10 PM	Memento Distribution and Group Photo
05:10 PM – 05:15 PM	Closing Remarks

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DAY-2 : (21 December, 2024)

Invited Lecture 1

Intelligent Automotive Catalysts inspired by Ayurveda Aporia: "Can things make us Happy?"

Hirohisa Tanaka

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Kwansei Gakuin University

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- ✧ Graduate School of Science and Technology
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  1, Gakuen-Uegahara, Sanda, 669-1330, Hyogo, Japan
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Research Interest:

Catalyst, Fuel Cell, Ayurveda

Education & Professional Career:

1998	Ph.D. University of Tokyo (Catalyst)
1989-2016	Executive Scientist, Daihatsu Motor Co., Ltd.
2016-Present	Professor of Kwansei Gakuin University

Major Publications:

- Self-regeneration of a Pd-perovskite catalyst for automotive emissions control, Nature, 418, p.164-167 (2002). DOI: 10.1038/nature00893
- Self-regenerating Rh- and Pt-based perovskite catalysts for automotive-emissions control, Angew. Chem. Int. Ed., 45, p.5998-6002 (2006). DOI: 10.1002/anie.200503938
- A Platinum-Free Zero-Carbon-Emission Easy Fuelling Direct Hydrazine Fuel Cell for Vehicles, Angew. Chem. Int. Ed., 46, p.8024-8027 (2007), DOI: 10.1002/anie.200701334

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- Investigation of hydrogen superoxide adsorption during ORR on Pt/C catalyst in acidic solution for PEFC by in-situ high energy resolution XAFS, Journal of Power Sources, 557 (2023) 232508, DOI: 10.1016/j.jpowsour.2022.232508
- Development of hydrogen oxidation reaction catalysts to overcome CO poisoning and elucidation of reaction mechanism, J. Phys. Chem. C, 127, p. 11542−11549 (2023). DOI: 10.1021/acs.jpcc.3c02237

Awards:

1. Fellow: Japan Society of Automotive Engineers
2. The Minister Commendation from the Ministry of Education, Culture, Sports, Science and Technology (MEXT), [Research Achievement Award] 2003
3. Society of Automotive Engineers: Environmental Excellence in Transportation Awards
4. Catalysis Society Award [Technology Division], 2003

He was selected in both 'the Single Recent Year' and 'Career-Long' categories of "the Top 2% of the World's Most Influential Researchers in 2024", announced by Stanford University and Elsevier in September 2024.

Abstract

Intelligent Automotive Catalysts inspired by Ayurveda Aporia: "Can things make us Happy?"

Hirohisa Tanaka

Kwansei Gakuin University, School of Engineering, Japan

I have loved India since I was a child. I can't really explain why I love India so much. Before I entered elementary school, I read the story of Buddha and imagined what kind of country India was. Buddha teaches that people must let go of attachments to be happy. Attachment to things, money, and fame brings people negative emotions such as worries and dissatisfaction. Meanwhile, I studied materials science at university and got a job at a ceramic manufacturer. I really enjoyed materials development, but I always had a fundamental question in my mind: "Can things make us happy?"

Buddha abandoned the fort of Kapilavastu on his 29th birthday and went on a journey of training. Following that legend, I also quit my job on my 29th birthday and went on a wandering journey. I started my journey in the Sahara Desert, a world with nothing as far as the eye can see in 360

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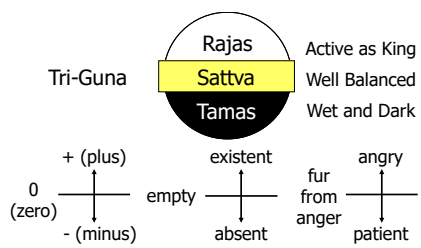
degrees, passed through the Middle East, traveled from Pakistan to the Karakoram Highway, and visited China, the Silk Road, Tibet, Nepal, and finally revisited my long-cherished dream of India.

There was no answer to the question, "Can things make us happy?" I suddenly had an epiphany in Bodh Gaya. I changed his question to the hypothesis that "things can make us happy" and decided to return to the field of materials research and development. I then returned to Japan and joined an automobile company, where I developed an "intelligent catalyst" with the goal of "making cars whose exhaust gases are cleaner than the air in the environment."

Conventional automotive catalysts are made by dispersing precious metals in ceramic powders with a large surface area. To ensure performance that meets environmental standards even after the car's lifespan of 100,000 km, it was necessary to increase the amount of precious metals to compensate for deterioration, but this actually promotes the growth of precious metal-particles. How do we overcome the contradictory characteristics of activity and deterioration? The clue to solving this problem was found in the wisdom of ancient Indian philosophy, "Ayurveda," and its view of immortality and health.

It is believed that practical wisdom on treatment was handed down from the Atharvaveda, which records Brahmanism around 1000 BC. Various ideas on Ayurvedic health are presented in the form of dialogues between sages. The main ideas are ”Pancha-Mahabhuta” (five elements), “Pancha-Karma (five acts), and “Tri-Dosha” (three poisons). What was most interesting to me was the idea of the “Tri-Guna”, the elements that make up Prakriti, which strongly reflects the basic concepts of Sankhya philosophy. Guna refers to the nature of things and evokes and idealizes “Sattva” (purity), a state of balance controlled by reason between “Rajas” (passion) and “Tamas” (ignorance).



Sattva represents complete satisfaction, and in Buddhism, those who seek it are called bodhisattvas. This can be said to be a uniquely Indian idea like the discovery of “Zero” between positive and negative. This gave me a hint for solving problems. Based on this idea, I invented an "intelligent catalyst" that heals itself when damaged while driving a car. A paper on the catalyst has been published in the scientific journal Nature, and the catalyst is installed in more than 6.5 million super-ultra-low-emission vehicles.

Keywords: automotive emissions control, self-regeneration, intelligent, Ayurveda

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Invited Lecture 2

Access for All: Strategies for Achieving Global Health Equity

Mamta Nebhinani

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Assistant Professor, College of Nursing, All India Institute of Medical Sciences Jodhpur Rajasthan, Team Member of the SEAR NCD Service Delivery Network; WHO SEAR

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Research Interest:

Prevention and control of Non communicable diseases; Women health; Health equity; Nursing Education-Newer teaching learning strategies.

Professional Career:

Date/period	Post/Designation held	Organization
22nd Apr 2016-till date	Assistant Professor	College of Nursing, AIIMS, Jodhpur, Rajasthan
8th Oct 2013-22nd Apr 2016	Tutor/Clinical Instructor	College of Nursing, AIIMS, Jodhpur, Rajasthan
18th Jul 2011 to 07th Oct 2013	Lecturer	Silver Oaks College of Nursing, Mohali, Punjab
23rd Jan 2007 to 11th Jul 2009	Staff Nurse	Advanced Pediatric Centre, PGIMER, Chandigarh
1st Aug 2006 to 31st Dec 2006	Clinical Instructor	Swami Devi Dayal College of n Barwala, Haryana, India

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Education

Year	Degree	College/University
2009-2011	M.Sc. (Community health Nursing)	National Institute of Nursing Education, PGIMER, Chandigarh, India
2022	Ph.D. (Nursing)	Indian Nursing Council, New Delhi in Collaboration with RGUHS, Bengaluru.

Professional Attainments /Courses

- Honourable Jury Mention Certificate for Excellence in research. 5th South Asian Education Awards 2020 Jan 25.
- Outstanding researcher in Nursing Education award, Venus International Foundation, Chennai October 2020.
- Nominated member to attend leadership programme on mental health systems, Melbourne, Australia
- Best Teacher award by Rajasthan Nursing Council, 15th August 2023.
- Certificate for appreciation for research contribution for authoring book chapter, Annual research Day-2024, AIIMS Jodhpur

Total publications: Book chapter: 04; Research papers: 50

Major Publications:

- Nebhinani N, Kuppili PP, **Mamta.** Feasibility and effectiveness of stress management skill training in medical students. Med J Armed Forces India. 2024; 80(2):140-144. doi:10.1016/j.mjafi.2021.10.007
- Jha S, Vyas H, **Nebhinani M**, Singh P, T D. The Effect of Birthing Ball Exercises on Labor Pain and Labor Outcome among primigravidae Parturient Mothers at a Tertiary Care Hospital. Cureus. 2023 Mar 13;15(3):e36088. doi: 10.7759/cureus.36088. PMID: 37065328; PMCID: PMC10097428
- **Nebhinani M**, Avasthi RD, Meena M, Parihar M, Sharma M, Nagar M, Neha, Nisha. Barriers related to self-care management among people with diabetes mellitus- a narrative review. Biomedicine: 2022; 42(4): 628-634. DOI: https://doi.org/10.51248/.v42i4.876
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- **Nebhinani MR**, Phalswal U, Ohri U, Raj S, Vineeta, Suman, et al. Knowledge on prevention of breast cancer among females attending outpatient department of All India Institute of Medical Sciences, Jodhpur, Rajasthan. Int J Community Med Public Health 2021; 8: 3888-94
- **Nebhinani M**, Kumar A, Parihar A, Rani R. Stress and Coping Strategies among Undergraduate Nursing Students: A Descriptive Assessment from Western Rajasthan. Indian J Community Med. 2020 Apr-Jun;45(2):172-175. doi: 10.4103/ijcm.IJCM_231_19. Epub 2020 Jun 2. PMID: 32905220; PMCID: PMC7467204.
- **Nebhinani M,** Saini SK. Knowledge, skills of female health workers regarding selected non communicable diseases risk reduction and client satisfaction: a pilot study from western part of Rajasthan, India. Int J Res Med Sci 2020 Aug; 8 (8): 2802-8. DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20203089

Research Projects: Extramural/Intramural funding: 10

Abstract

Access for All: Strategies for Achieving Global Health Equity

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Global health equity ensures equal access to quality healthcare regardless of socioeconomic status, location, or cultural background. Despite advances in medical technology and healthcare delivery, disparities persist, especially in low- and middle-income countries. Addressing social determinants of health is essential. Factors like poverty, education, and housing significantly influence health outcomes. Targeted policies can reduce disparities by promoting income equality, improving educational access, and enhancing living conditions. Government-led initiatives focused on reducing poverty and creating supportive environments can improve health equity. Additionally, community engagement and culturally sensitive programs ensure that interventions are relevant, effective, and sustainable. Strengthening healthcare systems is another critical strategy. Building

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resilient health infrastructure, training healthcare workers, and ensuring access to essential medicines and technology are key components. Universal health coverage (UHC) is central to this whole concept. Global partnerships play a pivotal role in advancing health equity. Multilateral organizations, non-governmental organizations (NGOs), and philanthropic institutions can mobilize resources, share expertise, and promote knowledge exchange.

Achieving health equity also requires policy coherence across sectors such as trade, agriculture, and the environment. Policies promoting sustainable development, climate resilience, and fair trade can mitigate indirect health risks and foster healthier societies. Political commitment and accountability mechanisms are crucial to maintaining health equity as a global priority.

In summary, advancing global health equity requires a multi-dimensional approach that addresses social determinants of health, strengthens healthcare systems, and promotes global cooperation. Policymakers, healthcare providers, and communities must collaborate to ensure health is upheld as a fundamental human right.

Keywords: Access; Equity; Global; Health; Strategies

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Invited Lecture 3

Healthcare beyond Boundaries: Collaborative Approaches to Therapeutic Advancements

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Professional Experience

March 2023-till date	Professor cum HOD Department of Obstetrics and Gynaecological Nursing, Faculty of Nursing	SGT University
July 2021-March 2023	Principal cum Professor	K.L. Sharma College of Nursing, Sehore, M.P.
Nov.2020–June 2021	Vice Principal	Shri Sai Institute of Nursing Sciences
July 2018 -Oct2020	Vice Principal	Mansarovar Nursing College
Nov 2015 -June2018	Principal	Samarpan College of Nursing
Jan 2013 –Nov 2015	Principal	LCH Nursing Academy
June 2010 -Dec2012	Vice Principal	LBS nursing college, Harda, M. P
Sep 2006 -July2008	Worked as an Asst. Lecturer	Choithram college of Nursing
Jan 05 -July2006	Worked as sister tutor cum clinical instructor	Smt. R. D. Gardi Nurses Training Centre, Shri Cloth Market Hospital, Indore

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Qualifications :

Pursuing	Manipal Academy of Higher Education's online	MBA in Hospital Administration
2021	SRK University,Bhopal	Ph.D. Nursing
2014	Indian Institute of Human Rights, New Delhi	Post Graduate Programme in Human Rights
2012	MLB govt. Girls College, Indore	M. A. Psychology
2010	Choithram College Of Nursing, CH&RC / Devi Ahilya University, Indore.	M.Sc. Nursing
2004	Government College of Nursing, Maharaja Yeshvant Rao Hospital, Devi Ahilya University, Indore	B.Sc. Nursing

Professional Attainments /Courses

- Certified Trainer for NRP & FBNC
- Inspector for MPNRC, MPMSU & NABH.
- Certification of Master trainers on labour room nurses training manual.
- External Examiner for Rajasthan University of Health Sciences, Madhya Pradesh Nurses Registration Council, Jiwaji University Gwalior & Awadhesh Pratap Singh University Rewa etc.
- GAFTM Trainer for HIV and AIDS
- BNC-NRP trainer for IAP NRP
- Guest Lecturer for Regional Health And Family Welfare Centre Indore
- Attended Training for FIMNCI Attended basic holistic health and foot reflexology at Pune
- Life member of Trained Nurses Association of India
- Life member of Nursing Research Society of India
- Life member of Society of Midwives of India
- Life Member of National Neonatology Forum
- Life Member of The Nursing Teachers Association.
- Premium Professional Member of Society For Nursing Practices (SFNP)

Publication/Research

Publications

SCOPUS	**8**
WEB OF SCIENCE	**10**

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UGC care	**5**
Paper presented	**5**
Poster presented	**2**
Design patent	**2**
Copyrights	**4**

Projects :

- An exploratory study to assess the knowledge, practice and attitude of nurses who attended SBA training programme in selected hospitals of Indore.
- Janani Suraksha Yojna : A scheme run by Government of India.
- A study to assess the present curriculum to suit the future nursing practice needs and applicability of theory in nursing practice.
- An Experimental study to assess the effectiveness of early breastfeeding in third stage of labour.
- An exploratory study to assess the severity of menopausal symptoms and the life satisfaction levels among menopausal women.
- Nurse Led Diabetes Clinic (NLDC) at SGT Hospital, Gurgaon, Haryana.
- Nurse Led Menopause Clinic (NLMC) at SGT Hospital, Gurgaon, Haryana.
- Kegal exercise facilitator – Design Patent.
- Colostrum Feeding Practices in different parts of the country- PAN India (on going project)
- Antenatal Colostrum Harvesting during last trimester of pregnancy.
- Working on video modules on midwifery and research for nursing students through LMS of SGT University, Gurgaon, Haryana.
- Year long outreach activity in Menopause health

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Abstract

Healthcare beyond Boundaries: Collaborative Approaches to Therapeutic Advancements

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The landscape of healthcare is evolving, emphasizing the importance of collaboration across disciplines and borders to drive therapeutic advancements. "Healthcare Beyond Boundaries" explores innovative frameworks that transcend traditional healthcare delivery models, integrating diverse expertise from medicine, technology, and public health. This collaborative approach fosters the sharing of knowledge, resources, and best practices, thereby enhancing patient outcomes and accelerating the development of new therapies.

Key themes include the role of interdisciplinary teams in research and clinical practice, the impact of global health partnerships, and the utilization of digital health technologies to facilitate communication and data sharing. Case studies highlight successful initiatives that illustrate the power of collaboration in addressing complex health challenges, such as infectious diseases and chronic conditions.

By harnessing the collective strengths of various stakeholders, including healthcare providers, researchers, policymakers, and patients, this framework not only promotes innovation but also ensures equitable access to healthcare solutions. Ultimately, "Healthcare Beyond Boundaries" advocates for a unified approach to health challenges, positioning collaboration as a cornerstone for future therapeutic advancements.

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Invited Lecture 4

Behavior Change Communication

Laxmi

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10/2013 – 10/2018	Assistant Professor (Sr. Scale)	School of Health Sciences, IGNOU
10/2007 – 09/2013	Assistant Professor	School of Health Sciences, IGNOU
06/2007 – 09/2007	Nursing Tutor	Lady Reading Health School, Delhi
10/2001 – 05/2007	Health Education Officer	Training Cell IPPVIII of MCD
01/1997 – 09/2001	Public Health Nurse	Health unit of IPP VIII MCD

Qualification:

- July 1996 B.Sc. (Hons.) Nursing Raj Kumari Amrit Kaur College of Nursing, Delhi University
- July 2005 MSc. Nursing (CHN) Raj Kumari Amrit Kaur College of Nursing, Delhi University
- June 2009 Post Graduate Diploma IGNOU in Distance Education (PGDDE)
- April 2021 Ph.D. (Nursing) IGNOU

Professional Attainments/Courses:

Post Graduate Diploma in Distance Education (PGDDE)

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Publications/Research:

- Impact of Self Learning Material on Behaviour Change Communication among Auxiliary Nurses and Midwifes: A Pilot Study, International Journal of Nursing Education, Institute of Medico Legal Publications, Print ISSN : 0974-9349. Online ISSN : 0974-9357, 2018, Vol. 10 No 1, Pg 139-142.
- "Effect of Self Learning Material on Expressed Practices among Pre-service Auxiliary Nurse and Midwives regarding Behaviour Change Communication for Reproductive and Child Health Care", International Journal of Midwifery Nursing ISSN 2584-0800(online), 2019, Volume 5, Pg. 1 to 5.
- Study to Explore the Strategies To Increase Student Participation In Academic Counseling In The Programme Offered Through Open And Distance Learning Mode, International Journal of Convergence in Healthcare ISSN2583-2107(0nline), Year July 2021, Vol-1Issue No-2, Pg. 35-41.
- Effectiveness of Self Learning Material On Practices Of Community Health Workers related to Behavior Change communication(BCC) for Reproductive and Child Health (RCH) care, International Journal of Convergence in Healthcare ISSN2583-2107(0nline), Year July 2021, Vol-1Issue No-2, Pg. 42-49.
- Development of Self-learning material (SLM) on behaviour Change Communication (BCC) for selected Reproductive and Child Health (RCH) issues, International Journal of Midwifery Nursing ISSN 2584-0800(online), Year Feb 2022, Volume 5, Pg. 17-23.
- Use of ADDIED Model to Develop Self Learning Material on Behavior Change Communication (BCC) related to Reproductive and Child Health Care and Assess its Effectiveness on Knowledge of Auxiliary Nurse and Midwives (ANMs) Regarding BCC for Antenatal Care, International Journal of Nursing Education, Institute of Medico Legal Publications, Print ISSN : 0974-9349. Online ISSN : 0974-9357, April Year 2022, Volume -14, Pg. 68-76
- Use of Problem solving approach in the community health nursing practice - COMMUNITY COORDINATION FOR HEALTHY ACTION, International Journal of Convergence In Healthcare (ISSN 2583-2107) Published by IJCIH & Pratyaksh Medicare LLP, Jan – June 2023, Vol no.3 issue no. 1, Pg 33-37
- A Study to Assess the Knowledge of Auxiliary Nurses and Midwives (ANMs) on Relevant Information Related to Antenatal Care to be Provided to Beneficiaries to Bring Positive Health Seeking Behavior, International Journal of Convergence In Healthcare (ISSN 2583-2107), Published byIJCIH & Pratyaksh Medicare LLP, July-December 2023, Vol. 03, No. 02, Pg 109-116
- Descriptive study to assess the awareness and existing practices related to Behaviour Change Communication (BCC) among In-service Auxiliary Nurses and Midwifes

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(ANMs) for Reproductive and child health care (RCH) care, International Journal of Nursing Education, Institute of Medico Legal Publications, Print ISSN: 0974-9349. Online ISSN : 0974-9357, October 2023, Volume -15 issue-4, Pg 42 to 48.

- Effectiveness of planned teaching programme on knowledge and practices of primi gravida antenatal mothers regarding high risk factors of pregnancy: A case study to show use of problem solving approach, International Journal of Convergence in Healthcare, (ISSN 2583-2107), July to Dec 2024, Vol 2

Abstract

Behavior Change Communication

Laxmi

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Abstract

Behavior Change Communication (BCC) is one of the most cost effective ways of targeting the issues related to individual/family/community health. It is the strategic usage of communication to foster health seeking behaviors through health literacy, can be either focused at the community or individual level. Availing the health services by beneficiaries like pregnant women, infant, children and adolescents etc. is sign of positive health seeking behavior.

This is possible if the beneficiaries are aware of significance of health services, providing this awareness is the key role of all the health workers including nursing personnel. Practically low priority is given by busy health workers towards health education Health education and giving information is critical for ensuring people participation in health care.

Shift from IEC to BCC

Behavior Change Communication is used to improve people's health and well being. Earlier, majority of organizations were using information education and communication (IEC) strategies to improve awareness to bring about positive behaviors. IEC is used for generating awareness by using communication media like posters, leaflets, radio broadcasts, etc. and 'tell them' how to behave. It was realised that providing information alone is not enough for making personal choices and bringing about behaviour change among individuals. Communication strategies can have positive and sustainable effect when designed using a structured communication plan i.e. communications are designed for specific target audience after a situation analysis; pretesting of material; clear objectives, indicators and targets; a distribution plan with follow-up; regular feedback through

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monitoring; and formal evaluation. This approach is known as Behaviour Change Communication, uses a more interactive methodology and focuses majorly on the end actions of the client. Behavior Change Communication is the use of communication tools to develop specialized messages in order to bring positive behavioral changes in individual and society.It also helps in maintaining appropriate behaviours. Traditional IEC methods concentrated on giving information using and creating awareness while BCC follows a more structured approach of behavioral theories and systematic implementation processes. BCC is used for taking another step forward - enabling action. It means providing a supportive environment that will enable people to initiate and sustain positive behaviour It throws light on various issues like, should one focus on direct communication to disseminate messages or interpersonal communications? Which communication media will approach the target audience in an effective way? The strategy employed by BCC answers such crucial questions. A carefully planned and managed BCC strategy makes sure that the identified behaviour for change is feasible within the social and cultural context in which people live.

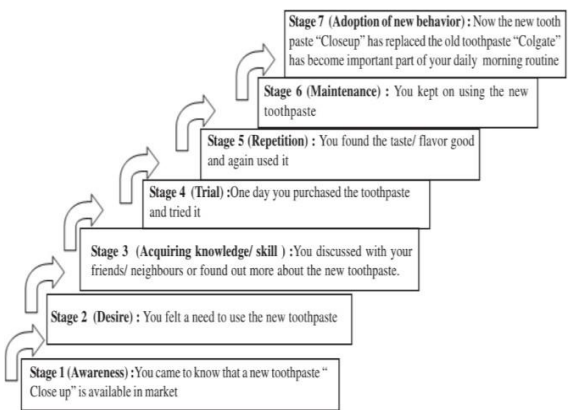

Fig. 1. Stages of behavior change each state

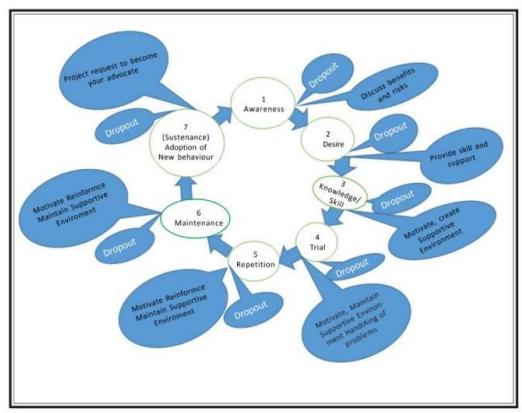

Fig. 2. Challenge of drop out at and Role of health worker

Fig. 1 explains behaviours change is a complex process in which 1 passes through various successive stages and drop out is possible at any stage, which become challenging for health worker and demand need base communication as highlighted in fig 2.

BCC focuses on promoting individual behaviour change and does not account for interplay of biology with social determinants (social norms and cultural practices) that shape human interaction. In order to impact social dimensions of health practitioners developed a systematic, strategic and targeted communication approach and framed the term Social and Behaviour Change Communication (SBCC). SBCC is the interactive and research oriented communication processes which uses strategies to address tipping points for change at individual, community, and social levels. The powerful tools used by SBCC programmes are mass media, community-level activities, IPC, information and communication technologies and new media. SBCC is the use of

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communication to bring changes in behaviours by service utilization, influencing knowledge, attitude, and social norms positively.It aims to change both social conditions and individual behaviours. It uses a holistic, socio-ecological model to identify points for change by examining individual knowledge, motivation, and other behaviour change communication concepts. It also focuses on the social, cultural, and gender norms, skills, physical and economic access, and legislation that contribute to an enabling environment.

Though the terms Information Education Communication Behaviour Change Communication and SBCC are generally used inter-changeably however, these terms are not similar

Keywords: Behavior Change Communication**,** Information education and communication, Social and Behaviour Change Communication.

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Invited Lecture 5

Innovations in Nursing are being propelled by the Synergy created through the Convergence of Digital Healthcare

Soma Bhattacharjee

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Professional Experience:

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Aug 2017- Jan 2023	Editor	Institute of medico legal publication,Noida
2017-2018	Lecturer, medical physiology	Rajkumari Amrit Kaur College of Nursing, Lajpat Nagar , New Delhi

Qualifications :

2018-19	Odyssey Informatics	Medical Coding
M.Sc.	Amity University	Medical Physiology
B.Sc.	Kurukshetra University	Biotechnology

Professional Attainments /Courses

- Patent searching
- Patent law
- Patent analysis
- Docketing & ip asset management

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Publications:

1. Impact of Body Mass Index on Cognitive Attention Function in University Students
2. To study the effects of obesity on attention-cognitive function in college students
3. Diabetes: Physiological and Psychological Aspects
4. Effects of Reactive Oxygen Species in p16 Expression and its Modulation by Curcumin in MCF-7 Breast Cancer Cell Line.
5. The Universal Crisis of covid and its lasting impact on children

Abstract

Innovations in Nursing are being propelled by the Synergy created through the Convergence of Digital Healthcare

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The incorporation of Artificial Intelligence (AI) into nursing is revolutionizing the healthcare industry. AI technologies can analyse large datasets to aid in diagnosing diseases, predicting patient outcomes, and identifying individuals at risk for certain health conditions. AI supports robotic process automation, allowing nurses to focus more on direct patient care by streamlining repetitive tasks. The rise of sophisticated chatbots and virtual health assistants powered by AI is also significant, as they offer patients 24/7 support and information. The adoption of wearable health technology is rapidly progressing in the healthcare field. These devices allow for real-time monitoring of patients' vital signs, providing nurses with essential information without the need for constant physical checks. This feature is especially advantageous for managing chronic conditions like diabetes and heart disease, where continuous monitoring can lead to better health outcomes. Additionally, the advancement of Electronic Health Records (EHRs) has transformed them into comprehensive systems that consolidate data from various sources, including wearables, to create a holistic view of a patient's health. EHRs also utilize predictive analytics to alert nurses to potential health issues, improving preventative care and enhancing collaboration among healthcare professionals.

Keywords : AI Technologies, Convergence, Nursing Profession, Electronic Health Records (EHRs), Synergy, Innovation.

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Invited Lecture 6

Strategies for Achieving Global Health Equity

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Professional Experience:

2020- Till date	Executive Director	Humokind Plus Private Limited, Jaipur
2018-20	Assistant Professor	Bansur Nursing College, Bansur, Alwar
2017-18	Lecturer	Bansur Nursing College, Bansur, Alwar
2015-17	Lecturer	Mahatma Gandhi Nursing College, Jaipur
2011-13	Clinical Instructor	Mahatma Gandhi Nursing College, Jaipur
Qualification:		
2018-2022	Ph. D Nursing	Mahatma Gandhi University, Jaipur
2013-15	M.Sc. Nursing	Geetanjali University, Udaipur
2006-2011	B.Sc. Nursing	RUHS, Jaipur

Professional Attainments / Courses:

- Course of essential up skilling for nurses certified by the Trained Nurses Association of India (TNAI)
- Training of Trainers in Forensic Nursing by GFNPSS in collaboration with Rama University Kanpur

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Publications / Research:

1. Effectiveness of self-Instructional Module on knowledge regarding prevention and management of occupational health hazards among marble factory workers in selected marbles factories at Udaipur city, Rajasthan. IOSR Journals, Vol.7, Issue.1, Ver.8, Jan-Feb.2018.
2. Implantable Contact Lens (ICL): An excellent vision correction option. IJNH Journals, Vol.4(4), 86- 88, 2018.
3. Prevalence and clinical spectrum of vitamin B12 deficiency. GFNPSS- International Journal of Multidisciplinary Research, Volume 2 issue 7 July 2021
4. Writing a review article: for the new researcher. SDES- international general for interdisciplinary research, Volume 2 issue 4 July- August 2021
5. Prevalence And Clinical Spectrum of Vitamin B-12 Deficiency, IJSR-International Journal of Science & Research Volume 10 Issue 12, December 2021
6. Prevalence and clinical spectrum of vitamin b-12 deficiency in a cohort of patient presenting with neurological disorders in tertiary care hospital of Rajasthan, IJSR-International Journal of Science & Research Volume 11 Issue 1, Jan - March 2022
7. Occupational stress among nursing officer- A Literature Review, GFNPSS- International Journal of Multidisciplinary Research, Volume 3 issue 6 June 2022

Abstract

Strategies for Achieving Global Health Equity

Rohit Avasthi

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Indian Entrepreneur, Business Executive and Angel Investor,

Global health equity refers to the principle of fairness and justice in access to healthcare and health outcomes worldwide. It aims to reduce health disparities and ensure that everyone, regardless of their education, race, ethnicity, gender, income, or geographic location, has access to quality healthcare and opportunities for good health.

Principles of Global Health Equity

1. Universal Access: Ensure that everyone has access to essential healthcare services, including prevention, diagnosis, treatment, and care.

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2. Fair Distribution: Distribute healthcare resources and services fairly, prioritizing those who need them most.
3. Social Determinants: Address the social determinants of health, such as poverty, education, and employment, which affect health outcomes.
4. Human Rights: Ensure that healthcare policies and programs respect human rights, including the right to health, dignity, and non-discrimination.
5. Community Participation: Involve communities in healthcare decision-making and planning to ensure that their needs and priorities are addressed.

Challenges to Global Health Equity

1. Health Disparities: Persistent health disparities exist between different populations, including racial, ethnic, and socioeconomic disparities.
2. Limited Access: Many people lack access to quality healthcare services, particularly in low-income and middle-income countries.
3. Inadequate Resources: Healthcare systems in many countries face inadequate resources, including funding, personnel, and infrastructure.
4. Conflict and Crisis: Conflict, natural disasters, and other crises can disrupt healthcare systems and exacerbate health inequities.

Strategies to Achieve Global Health Equity:

1. Strengthen Health Systems: Improve healthcare infrastructure, increase access to essential medicines, and enhance healthcare workforce capacity.
2. Universal Health Coverage: Implement universal health coverage to make sure that everyone has an access to essential healthcare services.
3. Community-Based Interventions: Implement community-based interventions, such as community health worker programs, to improve access to healthcare.
4. Address Social Determinants: Address the social determinants of health, such as poverty and education, to improve health outcomes.
5. Global Cooperation: Foster global cooperation and partnerships to share knowledge, expertise, and resources to achieve global health equity.

Benefits

1. Improved Health Outcomes: Reduced morbidity and mortality.
2. Reduced Health Disparities: Narrowing gaps in health access and outcomes.

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3. Increased Economic Productivity: Healthy populations contribute to economic growth.
4. Enhanced Social Cohesion: Reduced health inequities promote social justice and equality.

Challenges

1. Limited Resources: Inadequate funding, infrastructure, and workforce.
2. Conflict and Crisis: Disruptions to healthcare systems and services.
3. Social and Cultural Barriers: Addressing diverse values, beliefs, and practices.

Call to Action

1. Advocate for Policy Change: Support policies promoting health equity.
2. Engage Communities: Involve communities in health decision-making.
3. Support Global Health Initiatives: Contribute to international efforts promoting health equity.

Conclusion

"Global Health Equity: Access for All" is a fundamental principle aiming to ensure everyone receives quality healthcare, regardless of Socioeconomic Status, Geographic Location, Demographic Characteristics. Achieving global health equity requires a sustained commitment to addressing the root causes of health disparities and ensuring that everyone has access to quality healthcare and opportunities for good health. Together, we can achieve global health equity and ensure access to quality healthcare for all. Health equity is obtained when everyone can attain their full potential for health and well-being.

Keywords: Strategies, Global Health equity, Healthcare, Challenges, Benefits

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CONTRIBUTED PAPERS

Abstract

Evaluating the Effectiveness of Mobile Health (mHealth) Applications for Appointment Booking in Hospitals

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Background: The healthcare sector is experiencing significant changes due to digital technologies, especially mobile health (mHealth) platforms. These platforms are designed to optimize healthcare delivery, enhance patient involvement, and improve communication between patients and providers. Mobile Health applications provide various functionalities, including appointment scheduling, reminders, real-time doctor availability, and management of patient health records. These applications aim to rectify inefficiencies in conventional appointment systems, often characterized by long wait times and complex booking methods, thus enhancing patient satisfaction and overall experience. The Objectives of this study are to evaluate patient satisfaction regarding the usability and features of mobile health apps, to examine the effectiveness of the Mobile health app in minimizing appointment delays and assess its contribution to enhancing communication between patients and providers.

Methodology: A cross-sectional survey methodology was employed, focusing on 153 active users of the mobile health application. Participants were chosen through simple random sampling to ensure a heterogeneous sample. Data collection involved a structured questionnaire examining key variables such as booking ease, communication efficacy, wait durations, appointment availability, and overall satisfaction levels. Descriptive statistics facilitated the analysis of quantitative data, while qualitative insights were gathered through thematic analysis of open-ended feedback.

Results: The survey unveiled several significant insights pertaining to the Mobile Health applications. Participants predominantly perceived the appointment scheduling process as uncomplicated and conducive to user engagement. The communication features, including timely reminders and confirmations, garnered especially positive evaluations, demonstrating that users valued these components of the application. In terms of securing appointments, participants conveyed contentment with the availability of physicians and their capacity to locate preferred appointment slots, underscoring that the application aligns with their expectations in these domains. Nevertheless, challenges were identified in certain facets of the user experience. The most salient concern articulated was the duration of waiting to secure appointments with preferred physicians, indicating a necessity for enhanced optimization in this domain. However, the findings underscore the potential for further enhancement of the application's functionality and user experience, especially through addressing waiting time and the augmentation of accessibility.

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Discussion: The results highlight the Mobile Health App's role in enhancing patient engagement and satisfaction. Positive evaluations for scheduling and communication indicate success in mitigating conventional shortcomings. Nonetheless, a suboptimal wait time rating for favoured physicians indicates a necessity to broaden the physician network and refine scheduling methods. Furthermore, improving the user interface for older adults (senior citizens) and first-time users could enhance accessibility.

Conclusion: Mobile Health Applications signify a substantial advancement in the utilization of digital innovations within the healthcare sector. Although it demonstrates commendable efficiency in user-friendliness and communication, it is imperative to tackle the recognized deficiencies in physician accessibility and appointment scheduling delays. Through focused enhancements, the application possesses the capability to establish a standard for patient-centric mHealth platforms, thereby improving the overall provision of healthcare services and elevating patient satisfaction.

Keywords: Mobile health, health application, appointment, technology

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Assess the Knowledge Regarding Cervical Cancer among B.Ed. Students in Selected Colleges at Jaipur, Rajasthan with a view to Develop an Informational Booklet

Latha P.S.

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Background: Cervical cancer is the third most common cancer in women worldwide. It is a type of cancer that develops when abnormal cells grow in the lining of the cervix. Cervical cancer can be 100% preventable if preventive measures are implemented properly. In India, the incidence rate was 13.3 per 100,000 women per year in 2020.In this study, the researcher selected B.Ed. students from the Biyani Institute of Education. The objectives of the study were to assess the knowledge of cervical cancer among B.Ed. Students and to develop a self-instructional module on cervical cancer for B.Ed. Students.

Methodology: The researcher used quantitative research approach and Non experimental research design in this study. Non probability convenient sampling was used to select 60 B.Ed. students as participants. Demographic and structured knowledge questionnaire were used to assess their knowledge regarding cervical cancer.

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Results: The mean knowledge score was 6.83%. Only 1.66% of students had average knowledge, while 98.34% had poor knowledge. None of the students demonstrated good knowledge about cervical cancer. Based on these findings, the researchers developed a module on cervical cancer.

Conclusion: This study emphasizes the importance of preventing cervical cancer, which is essential for sustaining life. Early identification of problems, timely action, and appropriate referrals play a critical role. The utilization of preventive services is a key factor in reducing cervical cancer related mortality & morbidity.

Keywords: Knowledge, Cervical Cancer, B.Ed. Students, Information Booklet

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A Study to Evaluate the Effectiveness of Selected Pranayama Technique on Educational Stress Level among B.Sc. Nursing Students in selected Nursing College at Rajasthan

Jishu George

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Background: Stress among students is a common issue that can have serious consequences on their mental and physical health, academic performance, and overall well-being.

Stress is more likely to occur in circumstances where the demands are high, and the amount of control is low, when there is minimal support or help available for the individual. Stress is a dynamic process that may bring changes in the quality and quantity to internal and external environment of an individual.

It was found out that Academic pressure, Exams and assessments, Homework and assignments, Time management, Social relationships, Extracurricular activities, Family expectations, Financial concerns, balancing school and personal life, Uncertainty about the future inadequate resources, low motivation leads to stress among students. Coping strategies may play a significant role in the way students manage stressful academic events and perform best at college. Greater academic stress results in lower course grades; however, students who engaged in problem-focused coping were more likely to be motivated and they perform better than students who engaged in emotion-focused coping. College students have an exposure with many challenges during their academics to attain educational goals. When students face such negative experiences, they can be demotivated and have an adverse effect on their performance. Difficulties in handling stress can turn to mental health problems. So there is an urge to educate the B.Sc Nursing students regarding academic stress and

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coping strategies. Hence the present study was undertaken to evaluate the effectiveness of selected pranayam techniques on educational stress level among B.Sc. nursing students in selected nursing college in Rajasthan

Methods: The study involved single group pre-test and post-test without a control group using pre-experimental design, with non-probability continence sampling. Academic stress was administered to 300 B.Sc. Nursing students. Pre-test was conducted on first day before organizing pranayama technique. Post- test was conducted after organizing pranayama technique using stress measuring scale. Descriptive and inferential statistics was used for inference estimation.

Results: The collected data was analysed by the use of descriptive and inferential statistics. The overall pre-test mean educational stress score was 63.89% followed by post-test 38.95% with reduction of academic stress by reducing academic stress by 20.70% which is statistically significant. The paired't' test was computed and it was 26.82 which is higher than the table value and is significant at 20.70%. intervention was effective in reducing academic stress. There was a significant association between educational stress scores with demographic variables like Age, Gender, Religion, Class (In Year), Family Income (Monthly), No. of Sibling, Number of classes attended to reduce educational stress, Source of information to reduce academic stress at 5% level.

Conclusion: The findings of the study showed that there was a deficit in knowledge regarding academic stress. The Pranayam technique was effective by reducing the academic stress B.Sc. Nursing student regarding academic stress.

Keywords: Effectiveness; Pranayam technique, Knowledge, B.Sc. Nursing students, Academic stress and Coping strategies.

❑❑❑

A Study to Assess Effectiveness of Video Assisted Teaching Programme on Knowledge Regarding Breast Self-Examination among B.Ed. Students Studying in Selected College at Jaipur, Rajasthan

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Background: The breast cancer is a leading cancer among women worldwide. Early detection helps in recognizing abnormal changes in breast cancer mortality in India is 12.7 per 1 lakh women. Breast self-examination is an early detection tool that helps the woman herself to recognize pathologic changes in breast. The aim of the study was to level of Knowledge regarding Breast self-examination before and after intervention and to develop and administer video assisted teaching

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Programme on Breast self-examination among B.Ed Students studying in selected college Jaipur Rajasthan.

Method: In this evaluatory study quantitative research approach was utilized. The research design selected was pre experimental one group pre-test post-test. The researcher selected 30 B.Ed. students by using non probability convenient sampling. Demographic and a structured knowledge questionnaire was used to collect data regarding breast self-examination and used to assess the knowledge of the B.Ed. Student regarding breast self-examination. A video assisted teaching programme (VATP) was used as an intervention. The collected data was analysed by using descriptive and inferential statistics

Result: The paired t test computed pre-test ($\bar{x}$ = 7.13, SD =2.59) and post-test ($\bar{x}$ = 9.6, SD =2.43). The mean difference indicated an improvement in knowledge level regarding breast self-examination post-intervention. The computed t-value was 3.8093 at a 0.05 level of significance level. It revealed that the video assisted teaching programme was statistically significant.

Conclusion: There is an urge to create an awareness regarding breast cancer and its early detection strategies like breast self-examination. Demonstration of steps of breast self-examination helps in regular self-checkup. This will surely help in reducing mortality rate due to breast cancer worldwide.

Keywords: Breast self-examination (BSE), Video Assisted Teaching Programme (VATP), Breast Cancer, B.Ed Students

❑❑❑

A Study to Assess the Effectiveness of Structured Teaching Programme on Knowledge Regarding the Effects of Extracurricular Activities in Reduction of Academic Stress among Nursing Students in Selected Nursing Colleges at Jaipur, Rajasthan

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Background: The study exploring the effectiveness of Structured Teaching Programme on knowledge regarding the effects of extracurricular activities in reduction of academic stress. This study aims to assess the knowledge about academic stress, effects of academic stress, extracurricular activities and effects of extracurricular activities in reduction of academic stress.

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Methodology: The samples include 300 nursing students and are selected by Non probability purposive sampling technique at selected nursing colleges at Jaipur. The research design used for this study was pre experimental one group pre-test post-test design. Data analysis was done by using Chi-Square and paired "t" test.

Results: Overall pre-test and post-test mean score was 11.95 and 18.05 respectively. The 't' value was 6.42, shows that there is a significant increase in the knowledge after the administration of structured teaching programme. The $\chi 2$ values show that there is significant association between the pre-test level of knowledge and their socio demographic variables such as age and residence.

Conclusion: Nursing students had a remarkable increase in the knowledge regarding the effects of extracurricular activities in reduction of academic stress, when compared to their previous knowledge, prior to the implementation of the structured teaching programme.

Keywords: Structured teaching programme; Knowledge; Nursing students; Nursing colleges.

❑❑❑

A Study to Assess the Effectiveness of Nursing Intervention for Management of Menstruation Related Stress among the Adolescent Girls in a Selected College at Jaipur, Rajasthan

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Background: Menstruation, though a normal physiological process, few adolescent girls consider it to be a stressful event due to the impact of somatic, psychological and social stressor on the mental wellbeing of the individual. As a health professional, the nurse has a major role in identifying the level of menstruation related stress among the adolescent girls and to teach the measures to manage menstruation related stress as a part of promoting their physical and mental wellbeing. 70% of adolescent girls started viewing menstruation as a stressful event due to their negative attitude towards it and lack of knowledge on management of menstruation related stress. This study aimed to assess the effectiveness of nursing intervention on management of menstruation related stress through meditation.

Method: The pre-experimental study was conducted using one group pre-test post-test research design at selected college in Jaipur after getting formal permission from concerned authorities. Sample size was 30 and were selected using non–probability convenient sampling technique. Written consent was obtained from samples. On Day-1, the pre-test menstruation related stress level (somatic, psychological and social stressors associated with menstruation) was assessed by using

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rating scale. On the same day, the nursing intervention was administered for one hour with the help of a power point which was used as teaching aids.

Results: The mean pre-test menstruation related stress score percentage was 55% which has been reduced to 30% at post-test. There was no significant association between the mean pre-test menstruation related stress with their age, onset of menarche and level of pain tolerance.

Conclusion: The nursing intervention was significantly effective in reducing the menstruation related stress among the adolescent girls.

Keywords: Effectiveness, Nursing intervention, Menstruation related stress, Adolescent Girls.

❑❑❑

Assess the Knowledge Regarding Artificial Intelligence among Nursing Students in Selected Colleges at Jaipur, Rajasthan

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Background: Artificial Intelligence (AI) is transforming the nursing profession. It becomes important for Nursing faculty members to help nursing students in appropriate development of technical efficiency so that they can get benefit from AI in various ways like personalized training, virtual simulations, interactive tutorials, data analysis, clinical decision report, predictive analytics, medication management, fall detection, better patient outcomes etc. It is vital to make sure that student nurses are prepared to adopt AI technology and it is important for their successful integration into the healthcare workforce. This study aimed to examine student nurses' knowledge regarding AI technology,

Methodology: The quantitative research approach was used and the research design was Non experimental cross sectional study. The study was conducted in a Nursing College at Jaipur, Rajasthan. Non probability convenient sampling was used to select two hundred student nurses. Data were collected using structured knowledge questionnaire. Descriptive statistics was performed to analyse the data.

Results: The results revealed that student nurses demonstrated moderate level of knowledge regarding AI The study also identified potential barriers of using AI technology, such as lack of computer skills, lack of AI knowledge and awareness, and lack of interest etc.

Conclusion: The findings of this study provided important insights into the factors influencing student nurses' awareness. By embracing AI, nursing students can improve their education, clinical

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practice, and patient care, ultimately transforming the nursing profession. By improving technological proficiency, increasing AI understanding, and providing practical experiences competent future nurses can be prepared for future who can contribute to improved patient care outcomes.

Keywords: Artificial intelligence, Healthcare workforce, Virtual simulation, Patient outcome

❑❑❑

A Study to Evaluate the Effectiveness of Self-Instructional Module on Knowledge Regarding Voluntary Blood Donation Among B.Sc. Nursing Students at Selected Nursing College of Jaipur City in Rajasthan

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Background: Blood is an important part of human body. Blood maintains the vitality and physiology of human body organs. The demand for blood transfusion is high so there is an urge to make people aware regarding blood donation to meet the blood supply. Young students can be the active source as a blood donor so they need to be educated. Blood transfusion is the process of transfusing whole blood or its any component in a receiver which is obtained from a compatible donor. The indications for blood transfusion include restoration of oxygen level, replenishing the loss of any of the blood component (Plasma, RBC or Platelets etc.) Voluntary blood donors are the only source of blood in current scenario. The aim of this study was to evaluate the effectiveness of self-instructional module on knowledge regarding voluntary blood donation among B.Sc. Nursing students.

Materials and Methods: A quantitative research approach was used. The pre experimental research was conducted on 60 B.Sc. Nursing students. The research design used was one group pre-test and post-test design. The demographic variables analysed for the study were age, gender, occupation, education, income, marital status and previous source of knowledge. The study was conducted by using non-probability convenient sampling technique. A structured knowledge questionnaire was prepared to collect the data regarding voluntary blood donation in terms of knowledge.

Result: The pre- test and post-test knowledge scores of participants regarding voluntary blood donation revealed that before administering self-instructional module, that is in pre-test ,25%(15) subjects had poor knowledge, 66.66%(40) had average knowledge, and 8.33%(5) had good knowledge scores, where after administration of educational programme, in post-test 4 (6.67%)

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subjects had poor knowledge, 65%(39) had average knowledge, and 28.33%(17) had good knowledge scores. The effectiveness of self-instructional module was assessed with paired t-test and it was revealed that there was a significant gain in the knowledge at 0.05 level of significance.

Conclusion: The study revealed that improving knowledge enhancement regarding voluntary blood donation among young would improve the ratio of blood donation in the society. The study concluded that administration of self-instructional module was an effective knowledge improving strategy.

Keywords: Blood Donation, Self Instructional Module, Nursing students.

❑❑❑

A Study to Assess the Knowledge Regarding Occupational Exposure to Blood and Body Fluids and Post Exposure Prophylaxis among Staff Nurses Working in a selected Hospitals Jaipur, Rajasthan

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Background: Healthcare workers have a high risk of occupational exposure in developing countries including the India, with high incidence of blood borne diseases and prevalence of unsafe practices. Among the various blood borne diseases, the most common and important ones are HIV, hepatitis B, and hepatitis C infections. The most common mode of transmission is through needle stick injuries, percutaneous injuries (caused by scalpels, suture needles, wires and drills) mucosal splashes and contamination of abraded skin are other modes of acquiring by blood borne infections. The objectives of the study were to assess the knowledge regarding occupational exposure, post exposure prophylaxis to blood and body fluids among staff nurses working in selected hospital, to find out an association between occupational exposure to blood and body fluids with their selected socio demographic variables and to find out the association between knowledge regarding post exposure prophylaxis and selected demographic variables like Age, Gender, Professional Qualification, Professional Experience, Working Are, In-Service Programme.

Methodology: The Quantitative research approach was used for this study. Descriptive research design was used in this study. The non -probability sampling technique was used and the sample comprised 100 staff nurses of selected Hospital, Jaipur, Rajasthan. The tools used for data collection was structured knowledge questionnaire to assess the knowledge of staff nurses regarding occupational exposure to blood and body fluids and post exposure prophylaxis.

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Result: Majority of staff nurses i.e. 35(35%) were in the age group of 21-30 years. 75 (75%) were male, 75 (75%) had diploma in nursing, Majority of staff nurses 35 (35%) had 6-10 years of experience, 35 (35%) staff nurses have working in surgical/ medical ward, a majority of them 75 (75%) did not attend in service education programme on occupational exposure to blood and body fluids. Staff nurses had average knowledge regarding occupational exposure to blood and body fluids. Staff nurses have poor knowledge regarding post exposure prophylaxis. There was an association with occupational exposure to blood and body fluids and selected demographic variables at 0.05 level of significance. There is an association with post exposure prophylaxis and selected demographic variables at 0.05 level of significance. Whereas there is no significance relationship of knowledge scores with Age, professional qualification and working areas at 0.05 level of significance. Whereas significant relationship of knowledge score with gender, professional experience and in services programme

Conclusion: The study concludes that although staff nurses have average and poor knowledge to occupational exposure to blood and body fluids and post exposure prophylaxis, overburden of work and lack of facilities of equipment's and non- availability of in- services continuous nursing education programs affects work performance. So, there is a need to impact the knowledge, training programs to reduce the chances of occupational exposure to blood and body fluids.

Keywords: Knowledge, Occupational Exposure, Blood And Body Fluids, Post Exposure Prophylaxis, Inservice Education Programme.

❑❑❑

A Descriptive Study to Assess the Knowledge Regarding Computer Vision Syndrome and its Preventive Measures among Computer Users at Selected Institution Jaipur

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Background: Computer vision syndrome (CVS) is a rising concern for individuals who uses computers on a daily basis. The objective of the study was to assess the knowledge regarding computer vision syndrome and its preventive measures among computer users.

Methodology: A quantitative research approach and descriptive research design was used to conduct this study. Non probability purposive sampling technique was used to select samples. The sample consisted of 100 computer users who worked on a computer for more than five hours per day. A structured knowledge questionnaire was used to collect data from samples after getting informed consent. The collected data was analysed by using descriptive and inferential statistics.

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Result: The findings of the study showed that the majority of the participants (64%) had average knowledge regarding CVS, 25% of the participants had a good knowledge and only 11% of the participants had poor knowledge. The mean score of knowledge was 16.8, mean % was 67.1 and SD was 4.8. The result showed an association between knowledge and selected demographic variables like age, education and total number of hours spent on computer per day at 0.05 level of significance.

Keywords: Knowledge, Computer vision syndrome, Preventive measures, Computer users.

❑❑❑

Smart City Healthcare Delivery Innovations: Essential Technologies and Indicators for Developing Nations

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Jayoti Vidyapeeth Women's Universtiy, Jaipur

Abstract:

The concept of smart cities has recently gained remarkable traction worldwide due to the growing interest in using technology to solve various urban problems, especially in the field of healthcare. Smart cities are proving to be transformative, leveraging a wide range of technological tools and processes to improve access to healthcare, optimize patient outcomes, reduce costs and increase overall efficiency.

Methods This article delves into the profound impact of smart cities on the healthcare landscape and discusses their potential implications for the future of healthcare delivery. In addition, the study examines the necessary infrastructure needed for developing countries to create smart cities capable of providing smart health and care services. To ensure a comprehensive analysis, we used a well-structured search strategy across weighted databases, including PubMed, OVID, EMBASE, Web of Science and Scopus.

Results: Our findings provide compelling evidence of the pivotal role that smart city technology plays in improving healthcare delivery, paving the way to improve access, efficiency and quality of care for communities around the world. By harnessing the power of data analytics, Internet of Things (IoT) sensors, and mobile applications, smart cities are powering real-time health monitoring, early disease detection, and personalized treatment approaches.

Conclusion: Smart cities have the transformative potential to reshape healthcare practices and provide developing countries with invaluable opportunities to create intelligent and adaptable

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healthcare systems tailored to their specific requirements and constraints. In addition, the implementation of smart health care systems in developing countries can lead to better accessibility and affordability of health care, as technology integration can optimize resource allocation and improve the overall efficiency of health services. It can also help ease the burden on overburdened healthcare facilities by streamlining patient care processes and reducing wait times, ensuring that medical care gets to those who need it faster.

Keywords: Smart City, healthcare delivery, smart health, developing countries

Introduction:

A smart city represents a dynamic urban landscape that harnesses the power of technology and data-driven approaches to enhance the well-being and prosperity of its inhabitants. Many countries have achieved success in implementing smart cities that use innovative technologies and data-driven approaches to improve the well-being of their residents. In particular, Singapore stands out as one of the world's most advanced smart cities, using a range of technologies such as sensors, analytics and automation to increase public transport efficiency, smart waste management and environmental sustainability.

Materials and Methods:

Our study includes a comprehensive literature review aimed at examining the components and indicators related to Smart City applications in healthcare delivery. We followed specific elements of the PRISMA-ScR checklist such as:

1. **Structured summary**: Including background, objectives, eligibility criteria, sources of evidence, diagramming methods and conclusions related to review questions and objectives. This helps provide a concise overview of the review.

2. **Setting the questions and objectives**: A clear statement of the questions and objectives that have been raised in the review, with reference to their key elements. This helps readers understand the focus of the review.

3. **Summary of main results:** Providing a summary of the main results obtained from the review. This helps readers quickly understand the key findings.

Results:

Research Question 1) Incorporating smart city approaches improves healthcare delivery

Based on a comprehensive review of the articles, it is clear that smart cities have the potential to revolutionize healthcare through several key benefits.

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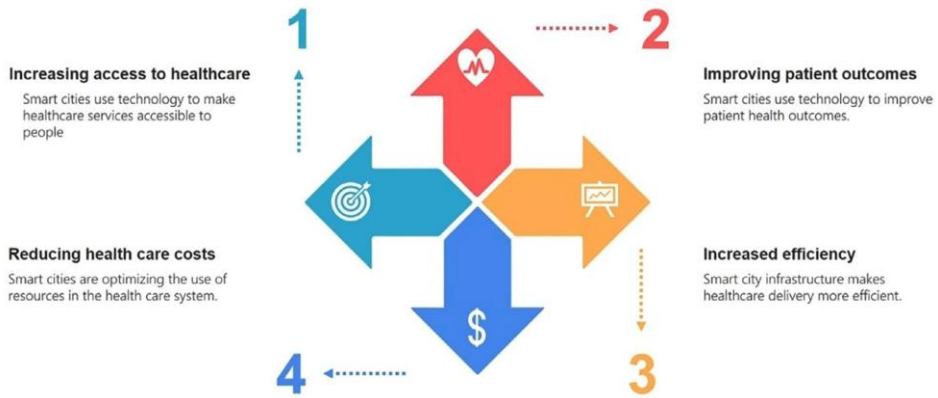

Fig 1 How Smart Cities can improve healthcare delivery

Research question 2) Technological tools used by smart cities in the development of health services

Through a comprehensive review of the collected articles, it is clear that the core technologies underlying smart city healthcare services are IoT devices, wearables, artificial intelligence (AI), telemedicine, EHR, mobile health (mHealth) and Biometric sensors

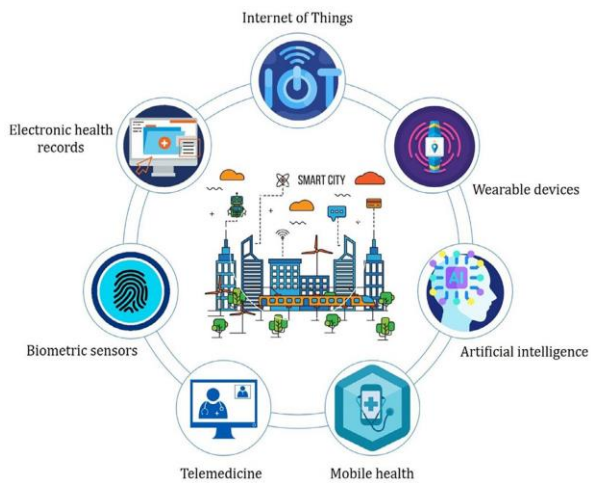

Fig. 2. Illustration of basic technologies for a smart city in the provision of health services

Discussion:

Regarding the first research question (ie, how smart cities can improve healthcare), four key application aspects emerged as significant contributors: (1) Increasing access to healthcare (4 articles); (2) Improving patient outcomes (5 articles); (3) Smart cities using technology to improve patient health outcomes

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Implications of health care delivery innovations in developing countries

Identify local needs and challenges: Conduct a thorough assessment of the health care environment in a specific developing country to identify the most pressing health care needs and challenges. This will help prioritize areas that require innovation and improvement.

Fostering Public-Private Partnerships: Collaboration between government, the private sector, NGOs and stakeholders is essential for successful healthcare innovation.

Conclusion:

The primary objective of this research study was to identify crucial technologies and infrastructures relevant to a developing country and determine fundamental indicators for a smart city in healthcare delivery services. To achieve this goal, we conducted a comprehensive review of the existing literature, analyzing the insights and solutions presented by various researchers.

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विश्व कल्याणी अर्हं योग प्रार्थना

अर्हं दोहावली

अर्हं ही चिज्ज्योति है, अर्हं अर्हत् सिद्ध।
अर्हं साधु मंगलं, अर्हं लोक प्रसिद्ध ।1।

अर्हं से सब स्वर सधें, व्यंजन होवें व्यक्त।
अर्हं पूरण ज्ञानमय, करता चित्त सशक्त ।2।

अर्हं के सन्नाद से, भागें रोग विकार।
चित्त शान्ति शक्ति भरे, जागें शुद्ध विचार ।3।

अहं भाव ही मोह है, भ्रम माया अज्ञान।
अर्हं नाशे अहं को, सत्य मिले सज्ज्ञान ।4।

चन्द्रसूर्य सा तेजमय, अर्हं ध्याता संत।
ज्ञानकेन्द्र पर नित्य ही, बन जाता अरिहन्त ।5।

जो हो सो हो, जो है सो है,

हमको क्या, हमको क्या, हमको क्या?
जनम सुनिश्चित, मरण सुनिश्चित
कर्मों का फल मिलना निश्चित
फिर संयोग-वियोगों के क्षण
घबराने से क्या?
जो हो सो....

पर तुलना से हँसना रोना,
सुखी दुःखी यूं पल पल होना
चेतन को इन क्षणिकाओं में,
आखिर मिलता क्या?
जो हो सो....

पत्नी, बेटी, दौलत भाई,
कर्म फलों की है परछाई।
परछाई पकड़न को दौड़े,
तू पाएगा क्या?
जो हो सो....

भाव मुक्त कर कर्म फलों से,
बन साक्षी लख ज्ञान बलों से
चेतन का परिणाम नहीं जो
उन भावों से क्या।
जो हो सो....

ओं अर्हं बोल

ओं अर्हं, ओं अर्हं, ओं अर्हं बोल
सभी कार्य की सिद्धि से तू
पहले इसको बोल
ओं अर्हं...

जिसने भी यह मंत्र पढ़ा, दुःख सारा ही दूर किया
जिसने भी इसको ध्याया, सुख का पारावार लिया
इसकी महिमा इसकी शक्ति, नहीं सका कोई तौल॥1॥
ओं अर्हं...

भोजन से पहले तू ध्याले, चलते फिरते भी तू गाले।
सोने से पहले, जग कर के, मन को इसका नाद सुनाले
सिद्ध शुद्ध अविरुद्ध मंत्र से, तू अपना मुख खोल॥2॥
ओं अर्हं...

दुराचरण को दूर भगाए, सोता तेरा भाग्य जगाए
ध्यान साधना इसकी करके, मानव अपना भाग्य बनाए
तन मन आतम शुद्धि करे ये, महिमा है अनमोल॥3॥
ओं अर्हं..

कुछ हो या ना हो

कुछ हो या ना हो मेरा मन दुर्बल ना हो
प्रेम भाव से क्षमा भाव से समता मय मेरा स्वभाव हो
गुणी जनों के दर्शन से मन मंगल-मंगल हो ॥1॥

कुछ हो या न हो मेरे मन में घृणा न हो
कुछ हो या ना हो मेरा मन दुर्बल ना हो।।
जो भी मिला है मुझको जग में निर्मल-निर्मल लगा है म
क्रोध रहित जो काम रहित जो ऐसे गुरु की भक्ति नित हो

कुछ हो या ना हो मन गुरु निन्दक ना हो
कुछ हो या ना हो मेरा मन दुर्बल ना हो।।
मोक्ष मिलेगा मिलता रहेगा धर्म पलेगा फलता रहेग
अहंकार तज कुटिल भाव तज मन तुम सरल रहो ॥3

कुछ हो या ना हो मेरे मन में छल ना हो
कुछ हो या ना हो मेरा मन दुर्बल ना हो।।

मेरे मन में तेरे मन में

मेरे मन में तेरे मन में सबके मन में हो
बैर न होवे पाप न होवे भाव क्षमा का हो॥

मेरे मन में तेरे मन में सबके मन में हो
मेरा मंगल तेरा मंगल सबका मंगल हो॥

मेरे मन में तेरे मन में सबके मन में हो
मेरा जीवन तेरा जीवन सबका उत्तम हो॥

मेरे मन में तेरे मन में सबके मन में हो
प्रभु के चरणा गुरु के चरणा सबको शरणा हो॥

मेरे मन में तेरे मन में सबके मन में हो
तन निरोगी मन हो निर्भय बोधि समाधि हो॥

मेरे मन में तेरे मन में सबके मन में हो
दुखियारा ना कोई होवे मन ज्योतिर्मय हो॥

मेरे मन में तेरे मन में सबके मन में हो। .....

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OUR GROUP COLLEGES

Girls Colleges

Biyani Girls College
www.biyanicolleges.org
Affiliated to University of Rajasthan
B.B.A.|B.Com. (Pass Course/Hons.) |M.Com. (ABST)
CA/CS
B.Sc. (Biology/Maths/Biotech.)
M.Sc. (Biotech/Physics/Maths/Chemistry/Zoology/Botany/Environmental Science)
BCA
B.A.| BVA (Visual Arts)
M.A. (Geography/English Literature/Economics)
IAS/RAS

Biyani Institute of Science & Management
www.bisma.in
Affiliated to Rajasthan Technical University, Kota
MBA | Ph.D in Management
MCA

Biyani Girls B.Ed. College
www.biyanigirlscollege.com
Affiliated to University of Rajasthan
Approved by National Council of Teachers Education
B.Ed.|M.Ed.|B.Sc.-B.Ed|M.Ed|D.El. Ed.| B.Ed.-M.Ed.

Biyani Institute of Science & Management (Nursing)
Biyani School of Nursing & Paramedical Science
www.biyaninursingcollege.com
Affiliated to RUHS, Jaipur
Approved by INC and RNC
G.N.M.|B.Sc.Nursing

Biyani Institute of Skill Development
www.bisd.in
Affiliated to Vishvakarma Skills University, Jaipur (VSURAJ)
B.Voc. - Fashion Designing
B. Voc. - Journalism & Mass Communication

Biyani Institute of Yoga & Naturopathy
www.biyanicolleges.org
Affiliated to Jagadguru Ramanandacharya
Rajasthan Sanskrit University, Jaipur
PGDYT | BCCYPD | ACCYPD

Pursue degree with
- Personality Enhancement Program
- Digital Marketing
- Cambridge English Certification Course
- Value-added Certification Course
- Information Technology Training

Co-Ed Colleges

Biyani College of Science & Mgmt.
www.bcsmjaipur.com/edu
Affiliated to University of Rajasthan
B.A.|B.Sc.|B. Com.|B.A.-B.Ed.|B.Sc.- B.Ed.

Biyani Law College
www.biyanilawcollege.com
Affiliated to Dr. Bhimrao Ambedkar Law University, Jaipur
Approved by Bar Council of India, New Delhi
BA-LL.B. | LL.B. | LL.M. | PGD.LL.

Biyani Institute of Pharmaceutical Sciences
www.biyanipharmacycollege.com
Affiliated to RUHS, Jaipur
Approved by Pharmacy Council of India, New Delhi
D. Pharma | B. Pharma

Biyani Institute of Architecture & Design
www.biyanicolleges.org
Affiliated to Rajasthan Technical University, Kota
Approved by AICTE, New Delhi
B. Arch.

Biyani Private ITI
www.biyaniiti.com
Approved by Quality Council of India, New Delhi
ITI Trade- Electrician

Biyani Institute of Physical Education
www.bcsmjaipur.com
Affiliated to University of Rajasthan
B.P. Ed.

Jaipur Institute of Yoga & Naturopathy
www.biyanicolleges.org
Affiliated to Jagadguru Ramanandacharya
Rajasthan Sanskrit University, Jaipur
PGDYT

Jaipur Institute of Pharmaceutical Sciences
www.biyanipharmacycollege.com
Affiliated to RUHS, Jaipur
Approved by Pharmacy Council of India, New Delhi
D. Pharma

Top Universities of Japan in Educational Fair

KWANSEI GAKUIN UNIVERSITY

Faculty of System Science and Technology
Akita Prefectural University
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Saitama University
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