



RESEARCH CENTRE UPDATES

Visit of Interns, House Surgeons of Pushpagiri College of
Dental Sciences to PRC

Dr Aniket Naha, Scientist, Medical Biotechnology and Computational Drug Designing Laboratory, Pushpagiri Research Centre demonstrated the facilities and functioning of various instruments present in his lab and Microbial Technology Research & Infectious Disease Laboratory to all the house surgeons and Interns of Pushpagiri College of Dental Sciences on 2nd February, 2024.



One Day Workshop cum Hands-on-Training on 'Introduction to Bioinformatics & Sequence Analysis'



The "One Day Workshop cum Hands-on-Training on 'Introduction to Bioinformatics & Sequence Analysis'" organized by Pushpagiri Research Centre on 9th February, 2024, proved to be an enlightening and enriching experience for all participants. **Rev. Dr. Mathew Mazhavancheril, Director & Head of PRC**, set the tone for the event with an inaugural speech that emphasized the importance of bioinformatics in modern scientific research. The workshop delved into various facets of bioinformatics and sequence analysis, offering a comprehensive understanding of these essential tools in contemporary biological research. **Mr. George Varghese, the Coordinator of PRC**, outlined the facilities and scopes available at the Research Center, providing attendees with insights into the resources at their disposal. Other Faculty members of PRC namely **Dr Soumya RS, Dr Leya Elizabeth Babu, Dr Betsy A Jose, Dr Rosin A Varghese, Dr. Poornima C** were also present in the workshop.



Dr. Aniket Naha, an expert in Clinical Microbiology & In-silico Drug Designing, served as the resource person for the workshop. Through a combination of theoretical sessions and hands-on training, Dr. Naha guided participants through more than 10 practical and challenging tasks. His expertise and guidance enabled attendees to navigate complex bioinformatics tools and techniques effectively

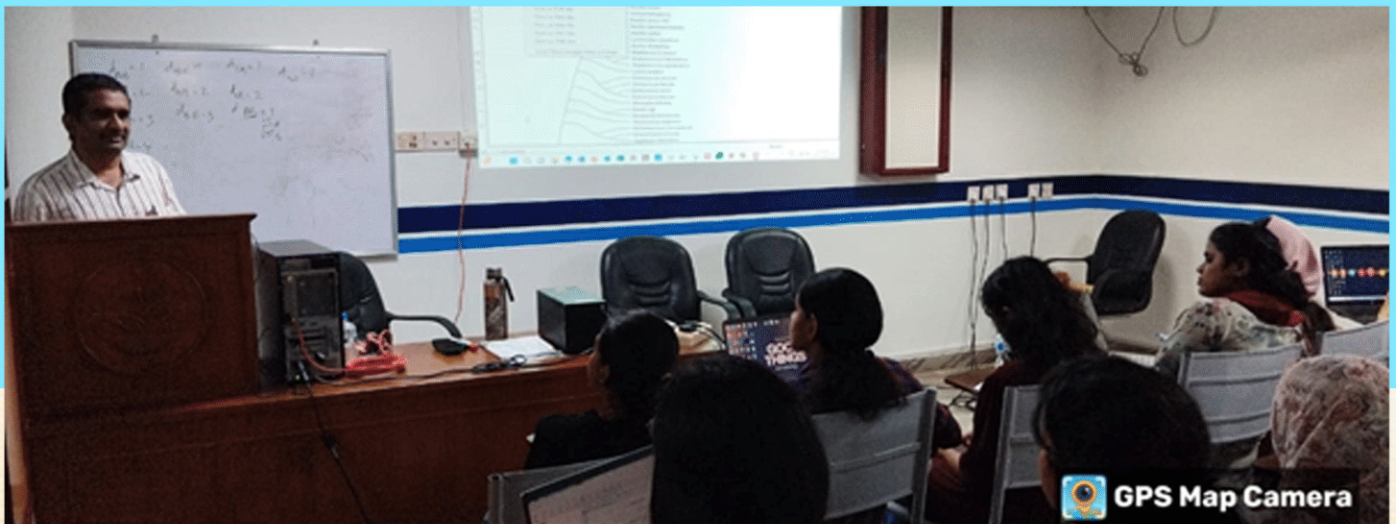


Dr. Yogesh Bharat Dalvi, a scientist at the Molecular Biology & Phytochemical Laboratory, extended a warm welcome to all participants, setting a friendly and conducive atmosphere for learning. The workshop witnessed overwhelming responses from students, research scholars, and faculty members, with over 50 participants from esteemed institutions such as Pushpagiri Institute of Medical Sciences and Research Centre, MACFAST Tiruvalla, and St. Berchmans College, Changanassery

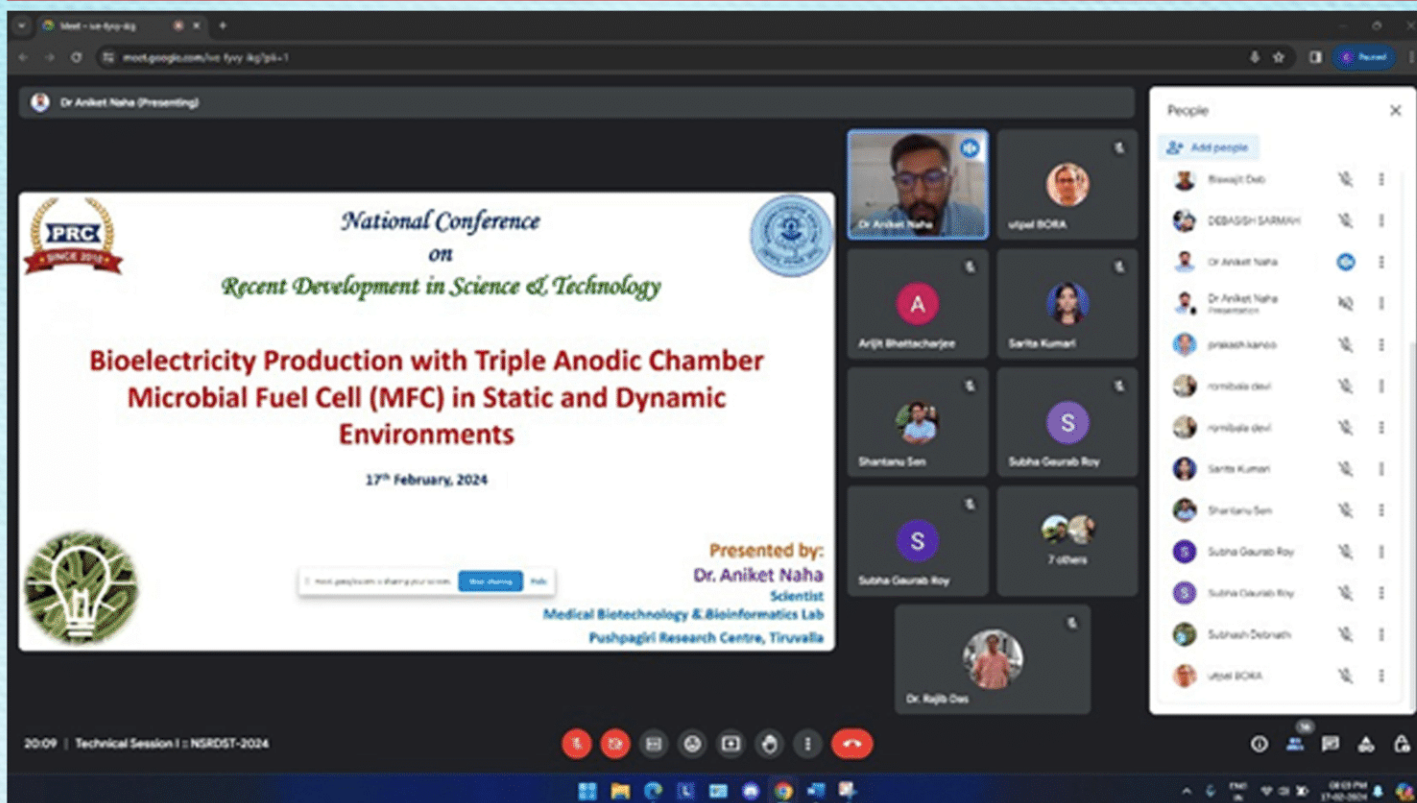


The event spanned from 8:00 am to 4:00 pm, encompassing both theoretical sessions and practical demonstrations. Participants actively engaged in the hands-on sessions, demonstrating a keen interest in mastering bioinformatics tools and methodologies. The positive feedback received from students underscores the success of the workshop, with many expressing a desire for more interactive sessions in the future.

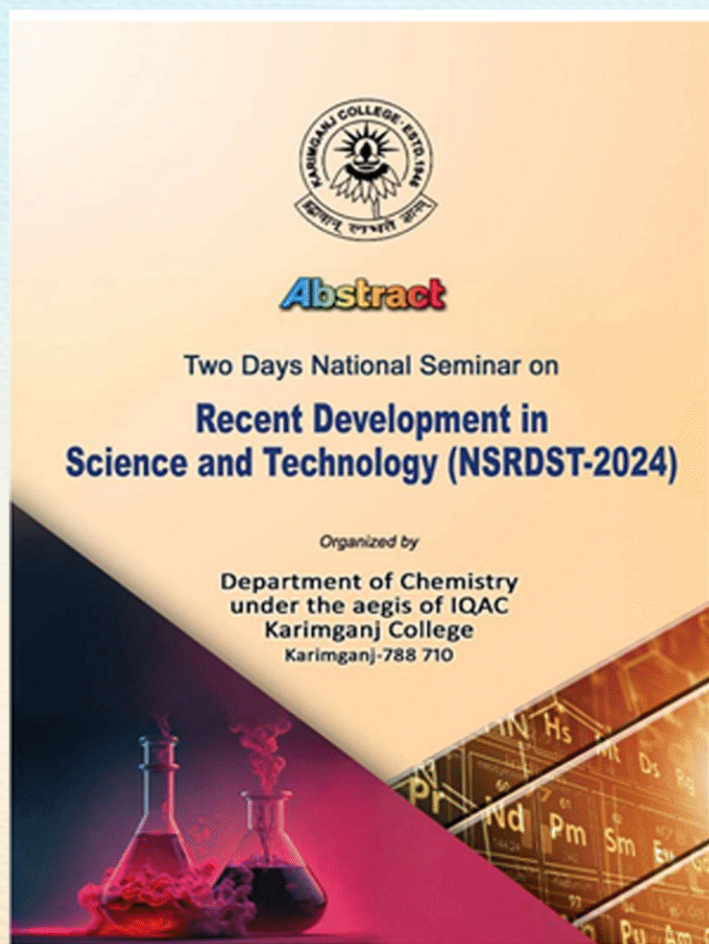
Dr. Nebu George Thomas, Professor & Scientist at Tissue Engineering & Regenerative Medicine Laboratory delivered a heartfelt vote of thanks, expressing gratitude to all contributors and participants for their active involvement and enthusiasm. Overall, the workshop proved to be a resounding success, fostering knowledge exchange, skill development, and networking opportunities in the field of bioinformatics and sequence analysis



Invited Oral Presentation on 2 Days National Seminar at Karimganj College



Dr. Aniket Naha, Scientist PRC, was invited to deliver an oral presentation (online) on the research topic 'Bioelectricity Production with Triple Anodic Chamber Microbial Fuel Cell (MFC) in Static and Dynamic Environments' in the 2 Days National Seminar on Recent Developments in Science and Technology (NSRDST-2024) held at Karimganj College affiliated to Assam University, Silchar on 17th February, 2024. The abstract of the research was published jointly by Dr Aniket Naha and Rev. Dr Mathew Mazhavancheril (Dr. Nibu Varghese) along with Dr. Soumitra Nath, Associate Professor, Gurucharan College, Silchar in the Book of Abstract of the conference proceedings



NSRDST-ABS-073

Bioelectricity Production with Triple Anodic Chamber Microbial Fuel Cell (MFC) in Static and Dynamic Environments

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ABSTRACT

The recent challenges of sustainable energy crisis drive the road for an affordable, accessible and eco-friendly energy sources, with immense attention on microbial fuel-cells (MFCs). MFCs substantiate as an alternate energy production pipeline that utilizes microorganisms to catalyze the conversion of organic matter into electrical energy through electrochemical reactions. The primary objective of the current study was to generate bioelectricity using a triple anodic chambered MFC. A total of 10 omniphilous with unique colony morphology were isolated from the fruit seed dump sites. Amongst all, VTEASMJ1 was identified as highly proficient in biofilm production and capable of utilizing natural sugars (sucrose bagasse), as a carbon source. Optimization of nutritional sources (carbon and nitrogen) and physical parameters (temperature and pH) revealed the optimal growth conditions for VTEASMJ1 at 1.5% carbohydrate and protein source respectively, under ambient temperature of 30 ± 2 °C and pH of 7.0 ± 0.5. Moreover, VTEASMJ1 exhibited the ability to synthesize amylose and cellulase, with subsequent quantification and amplification of these genes through PCR. Molecular characterization via 16S rRNA gene sequencing identified VTEASMJ1 as the closest neighbour to *Flavobacterium* sp. Finally, a triple anodic chambered MFC was constructed using VTEASMJ1 in the anodic chambers and catholyte in the cathodic chambers for bioelectricity production. The results demonstrated that VTEASMJ1 achieved a maximum current of 725 μA with a voltage of 515 mV. On standalone and hybrid coupled MFC systems, ongoing improvements aim to enhance power production, ultimately paving the way for commercialization and integration into existing wastewater treatment facilities.

Keywords: Bioelectricity; Phylogenetic; Extremophiles; Electrochemical cell.

(61)

Memorandum of Understanding (MoU) signed between Christ (Deemed to be University) and the Pushpagiri Research Centre

Christ (Deemed to be University) is one among the premier private universities in India with NAAC Grade 'A+'. The University is ranked among top 100 universities in India at 67 in the NIRF India Ranking 2023 of Ministry of Education, Government of India. The multi disciplinary University which focuses on teaching, research and service offers Bachelor, Master and Doctoral programmes in humanities, social sciences, sciences, commerce, management, engineering, architecture, education, and law to about 30000 students. The University offers its programmes at four campus locations in Bangalore in Karnataka, at Lavasa in Pune in Maharashtra, and Ghaziabad in Delhi NCR.

A MoU was signed by **Dr. Anil Joseph Pinto, Registrar, Christ (deemed to be University)** and **Rev. Dr. Mathew Mazhavancheril, the Director & Head of Research, Pushpagiri Research Centre** on **10th Feb 2024** in the presence of faculties from Christ **Rev. Dr. Jobi Xavier, Dr. Pari and Dr. Arun K.B.** The duration of MOU is for 5 years, and the major objectives are to enhance research particularly on animal and clinical, knowledge exchange, and human resource training.



DR. YOGESH CONFERENCE PUBLICATION FEB. 2024

- Conference Name:** International Conference on Multidisciplinary Approaches to Sustainable Development Goals (SDGs) & International Partners' Meet 2024 AT Rajagiri College of Social Sciences (Autonomous) & Rajagiri Business School Kochi, Kerala, India (January 10 & 11, 2024)

ORAL presentation title and abstract

- Ameliorative effect of *Phellinus caryophylli* (Agaricomycetes) Against the Complete Freund's Adjuvant-Induced Inflammation in Rodent Model: A Molecular Investigation - **Yogesh Bharat Dalvi***, Ruby Varghese, Jiya Jose and Nebu Varghese
- Potential Anti-proliferative and Apoptotic Properties of *Capparis Moonii*: A Cellular and Molecular Approach - Pallavi Laxman Yadav, Ruby Varghese, **Yogesh Bharat Dalvi***, Jiya Jose, Nebu Varghese, Nutan Padmanabha Malpathak

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Multidisciplinary Approaches to SDGs-Life Sciences

PP-08	Green Synthesis and Characterization of Manganese Oxide Nanoparticles Using Leaf Extract of <i>Plectranthus barbatus</i> - <i>Abhishek Puro, Anup Kishore, Sushil Mishra</i>	71
Topic 2: FNISH: PP-09 to PP-23		
PP-09	Natural Rubber Latex Films Loaded with Gentamicin Sulfate for the Control of Catheter-Associated Urinary Tract Infection (CAUTI) - <i>Binoy G*, Jiya Jose*, Sani K. Nirayambath and Sarita G. Bhat</i>	72
PP-10	Anti-Inflammatory Potential of <i>Catolopogon giganteus</i> Leaf Through In-vitro Techniques - <i>Vivek Keshava</i>	73
PP-11	Ameliorative Effect of <i>Phellinus caryophylli</i> (Agaricomycetes) Against the Complete Freund's Adjuvant-Induced Inflammation in Rodent Model: A Molecular Investigation - <i>Yogesh Bharat Dalvi, Ruby Varghese, Jiya Jose and Nebu Varghese</i>	74
PP-12	Potential Antiproliferative and Apoptotic Properties of <i>Capparis Moonii</i> : A Cellular and Molecular Approach - <i>Pallavi Laxman Yadav, Ruby Varghese, Yogesh Bharat Dalvi, Jiya Jose, Nebu Varghese, Nutan Padmanabha Malpathak</i>	75
PP-13	Antiproliferative and Antioxidant Potential of Some Tropical Medicinal Plants - <i>Sania G. Puro</i>	76
PP-14	Phytochemicals Based Topical Gel: Synergistic Effects of Plant Extracts in Burn Healing - <i>Abin Jose</i>	77
PP-15	Evaluation of Bacteriophage Φ_{Pm} From PKMS1 As a Bioregulator for <i>Pseudomonas aeruginosa</i> Induced Chronic Wound Infections - <i>Nivedha Mahan and Sarita Gopinath Bhat</i>	78
PP-16	Development of a Novel Growth Factor Incorporated Bioactive Calcium Sulfate Cement for Vial Plug Therapy - <i>Ana George</i>	79
PP-17	Development of Inflammation Model in Adult Zebrafish to Study Neurotransmitter Modulation Through Out Brain Axis - <i>Sani J Menachery</i>	80
PP-18	Chemical Profiling, In Vitro Antioxidant, Antifibrotic Activity of Different Solvent Extracts of <i>Clerodendrum infundibulatum</i> L. - <i>Phalgunika A. Nair, Anoop P. Kishore, Parvathi T. Chandrakumar, Binitha Joseph, Raju Gnanaprakasam</i>	81
PP-19	Biochemical Profiling, Nutritional Composition and Anticancer Activity of Methanol Extract of <i>Citrus sinensis</i> (L.) Osbeck - <i>Anna George, Ramana Anand, V. Mahalingam Srinivas, Sushil Jose, Raju George</i>	82
PP-20	Fight Mosquito Borne Diseases Via CRISPR-Cas9 Genome Editing System - <i>Elaine Millery F and Cassio St</i>	83
PP-21	Cytotoxic Activity of <i>Amarophallus pectinifolius</i> Tuber on Cervical Cancer Cell Line - <i>Anja Jose</i>	84

Multidisciplinary Approaches to SDGs-Life Sciences

PP-11

Ameliorative Effect of *Phellinus caryophylli* (Agaricomycetes) Against the Complete Freund's Adjuvant Induced Inflammation in Rodent Model: A Molecular Investigation

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Abstract

Inflammation is a physiological phenomenon that protects the host organism from foreign intruders by activating immune cells to migrate towards the pained tissue and eradicate the cause of damage. However, prolonged immune response leads to chronic inflammation that results in various diseases such as rheumatoid arthritis, atherosclerosis, and asthma. A plethora of preventive natural anti-inflammatory agents are available, amongst them from time immemorial, the medicinal mushroom *Phellinus* has been quite often used in folk medicine. The present study envisages assessing the anti-inflammatory activity of *Phellinus* water-alcohol extract (PWE). Water-alcohol extracts of *Phellinus* were prepared and subjected to membrane stabilization and protein denaturation assays. Further, arthritis was induced in animals by injecting 50 μ l of Complete Freund's Adjuvant (CFA) in the left tibiotarsal joint of rats. PWE in a dose-dependent manner exhibited membrane stabilization, reduced paw inflammation, improved gait, and restored the biochemical, radiological and histological aberrations via down-regulating TNF- α , NF- κ B, and COX-2, while up-regulated the mRNA expression of I κ B, IL-4, and IL-10. Thus, the present study revealed water-alcohol inflammatory and anti-oxidative activity of water-alcohol extract of *Phellinus caryophylli* (Agaricomycetes).

Keywords: Complete Freund's Adjuvant; Inflammation; Antioxidant; *Phellinus caryophylli*; Protein Denaturation; Arthritis; Stress

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Multidisciplinary Approaches to SDGs-Life Sciences

PP-12

Potential Antiproliferative and Apoptotic Properties of *Capparis moonii*: A Cellular and Molecular Approach

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Abstract

The present study investigated the anticancer activity of hexane, chloroform, ethyl acetate, Methanol, and waterleaf and shoot extract of *Capparis moonii* against murine splenocytes and murine cancer cell line Dabney's lymphoma ascites cells (DLA). Cytotoxicity and cell viability were analyzed using a trypan blue exclusion assay. All the extracts exhibited no toxicity against murine splenocytes. Out of 10 extracts, chloroform leaf extract was proved to be extremely potent with 100% cell death percentage at 250 μ g/ml concentrations after 24 hrs of incubation. The remaining nine extracts demonstrated dose-dependent activity. Furthermore, the mode of cell death was analyzed using the Acridine orange and Propidium Iodide dual staining method, which revealed the cell cytotoxicity induced by *C. moonii* extracts was through apoptosis. Additionally, molecular analysis in *C. moonii* -DLA cells revealed that *C. moonii* extracts induced apoptosis by both intracellular extrinsic pathways. Thus, the present investigation exhibits the anti-proliferative and apoptotic property of *C. moonii* against the murine DLA cell line.

Keywords: *C. moonii*; Apoptosis; Cancer; Cytotoxicity; Antioxidant; Oxidative Stress

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2. **Conference Name:** The 8th International Conference on Recent Advances in Material Chemistry (ICRAMC – 2024) is organized by Department of Chemistry, SRM Institute of Science and Technology, Kattankulathur, Chennai (15-17 February, 2024)

POSTER presentation title and abstract

- a. Biomedical Application of Polyherbal Extract & Silver Nanoparticles Incorporated in Sodium Alginate. Bhagyashri Somani, Kishor Bhosale, **Yogesh Dalvi**, Shraddha Kapadnis, Bharat Shinde, Archana Tanwar
- b. Chitosan Hydrogels Infused with Polyherbal Extracts for Tissue Engineering. Bhagyashri Somani, Kishor Bhosale, **Yogesh Dalvi**, Aditi Joshi, Bharat Shinde, Archana Tanwar

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Biomedical Application Of Polyherbal Extract & Silver Nanoparticles Incorporated in Sodium Alginate

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ABSTRACT

In tissue engineering, biopolymeric hydrogels are gaining prominence for their inherent advantages, marked by exceptional biocompatibility, biodegradability, and bioadhesion derived from their biological origin. The augmentation of these hydrogels with active compounds and nanoparticles further enhances their functional characteristics. This study centers on the development of sodium alginate hydrogels incorporating polyherbal extracts and nanoparticles, with a specific focus on their suitability for wound healing. Silver nanoparticles are synthesized in an eco-friendly manner using polyherbal extracts. The formation of sodium alginate hydrogels involves crosslinking with ZnCl₂ salt, and the incorporation of polyherbal extracts and nanoparticles prompts a thorough characterization. Comprehensive analyses, including SEM, FTIR, and XRD, are conducted to assess nanoparticle size and hydrogel porosity. Additional evaluations encompass *in vitro* cytocompatibility, hemocompatibility, and a scratch assay for wound healing assessment. SEM analysis discloses nanoparticles with an average diameter of 32nm and a highly porous hydrogel structure. FTIR results highlight significant vibrations in C-C and OH bonds. The MTT assay affirms cytocompatibility, showcasing a notable 95% cell survival rate after 72 hours. The scratch assay indicates enhanced fibroblast migration compared to the control, while hemolysis assessment reveals minimal hemolytic potential well within the acceptable limit of 1%. To conclude, the integration of polyherbal extracts and nanoparticles into sodium alginate-based hydrogels holds significant promise as wound dressings, promoting both cell proliferation and migration, thereby positioning them as compelling candidates for applications in tissue engineering.

INTRODUCTION

- Polyherbal extracts: Natural compounds with diverse medicinal properties.
- Silver nanoparticles: Known for their antimicrobial and therapeutic effects.
- Sodium alginate: Biocompatible & biodegradable polymer, widely used in drug delivery and tissue engineering & known for their antimicrobial activity.
- Development of sodium alginate hydrogels incorporating polyherbal extract and nanoparticles.

METHODOLOGY

Plant Extracts preparation

Fabrication of Sodium Alginate Hydrogel by Incorporation of Plant Extract and Nanoparticles

Chitosan Hydrogels Infused with Polyherbal Extracts for Tissue Engineering

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ABSTRACT

In recent years, biopolymers have garnered substantial interest in tissue engineering owing to their commendable biocompatibility and biodegradability. Chitosan, with its attributes of easy administration, low toxicity, and excellent water retention, aligns with the requisites of an ideal medication delivery system. Given the susceptibility of medicinal plants to degradation, an efficient delivery system becomes imperative to preserve their antioxidant and anti-microbial properties. Consequently, the incorporation of polyherbal extracts into chitosan not only ensures the retention of medicinal properties but also facilitates sustained delivery. This study focuses on the development of cross-linking chitosan hydrogel loaded with polyherbal extracts, evaluating its physicochemical characteristics, drug loading, and drug release properties. The efficacy of polyherbal extract-infused chitosan hydrogels for drug delivery is further examined *in vitro* through cytocompatibility and hemocompatibility testing. Scanning electron microscopy (SEM) analysis unveils a highly porous hydrogel structure. The MTT assay demonstrates a remarkable fibroblast cell survival rate exceeding 90% at 72 hours. Additionally, the hydrogels exhibit no blood cell aggregation and less than 1% hemolysis. The combined attributes of sustained drug release and biocompatibility position chitosan hydrogels as promising candidates in the realm of tissue engineering.

RESULTS

INTRODUCTION

- ♦ Medicinal plant *Glycyrrhiza glabra* (Licorice) has antioxidant and antimicrobial properties but is prone to degradation
- ♦ Chitosan: Ideal medication delivery system
 - Easy administration
 - Low toxicity
 - High water retention
- ♦ Chitosan (CS), Polyvinyl alcohol (PVA) and glutaraldehyde (GTA) hydrogels
 - Hydrogels: type of biomaterials
 - CS/PVA-GTA Hydrogels are biodegradable with high swelling and shrinking ratio
- ♦ Incorporation of polyherbal extracts into chitosan results in
 - Retention of medicinal properties
 - Sustained delivery

METHODOLOGY

CONCLUSION

- In the experiment, *Glycyrrhiza* extract was used to synthesize silver nanoparticles
- Sodium Alginate hydrogels were synthesized and *Glycyrrhiza* extract and silver nanoparticles were added to the gel.
- The nanoparticles characterization proved their size to be approximately 100nm.
- The findings suggested that the hydrogel could be a promising method for delivering the extract in a more sustainable manner
- MTT and hemolysis study reveals the Cytocompatibility nature of the scaffold (ISO10993)
- Nonetheless, further research is necessary to explore the physicochemical properties and *in vivo* efficacy.

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