PROCEEDINGS OF
INTERNATIONAL CONFERENCE ON

NEW HORIZONS OF NATURAL PRODUCTS

&

AYUSH REMEDIES

NOVEMBER 27-28, 2021

समुचित ज्ञान अमृतम्
ESTD - 2007

GUJARAT TECHNOLOGICAL UNIVERSITY

S I P
SOCIETY OF PHARMACOGNOSY
(FORMERLY INDIAN SOCIETY OF PHARMACOGNOSY)

This page was intentionally left blank

PROCEEDINGS OF
INTERNATIONAL CONFERENCE ON

NEW HORIZONS OF NATURAL PRODUCTS

&

AYUSH REMEDIES

NOVEMBER 27-28, 2021

ESTD - 2007

GUJARAT TECHNOLOGICAL UNIVERSITY

SOCIETY OF PHARMACOGNOSY
(FORMERLY INDIAN SOCIETY OF PHARMACOGNOSY)

First Published: 2021

Proceeding of International Conference on "New Horizons of Natural Products and AYUSH Remedies"

Editors: Dr. Sanjay Chauhan, Dr. Jigna Vadalia, Mr. Udaykumar Vegad, Dr. Manju Misra, Dr. Kashyap Thummar

ISBN: 978-81-955306-3-2

DISCLAIMER

The authors are solely responsible for the contents of the papers compiled in this volume.

The publishers or editors do not take any responsibility for the same in any manner.

Errors if any are purely unintentional and readers are requested to communicate such errors to the editors or publisher to avoid discrepancies in future.

Typeset by:

Graduate School of Pharmacy, Gandhinagar

GTU Gandhinagar Campus

Gujarat Technological University, Ahmedabad-383001 (Gujarat)

Printed in India by:

Graduate School of Pharmacy, Gandhinagar

GTU Gandhinagar Campus

Gujarat Technological University, Ahmedabad-383001 (Gujarat)

Message From Vice Chancellor, GTU

I am pleased to know that the Graduate School of Pharmacy - Gujarat Technological University and Society of Pharmacognosy are jointly organizing 25th International Convention of Society of Pharmacognosy conference – 2021 from 27th – 28th November. The main theme of the conference is "New Horizons of Natural Products and AYUSH remedies.

The theme of the conference is based on the different natural products and their importance in traditional medical systems. This conference will be of immense help for the understanding of contemporary approaches in the field of natural products and their branches like Phytopharmaceuticals, Nutraceuticals, Food for Special Medical Purpose, Cosmetics. Further the recent developments in the field of herbal drug development and role of a natural product in the current pandemic situation of Covid-19, will also be highlighted. I am sure that the conference will be a bridge to meet the gap between scientists from all around the world, people from industries and academia who are a part of this conference working in diverse fields. This conference will be able to articulate their insight and suggest suitable innovations for the betterment of mankind.

I convey my warm regards to the Graduate school of Pharmacy and Society of Pharmacognosy for organizing such a conference. I wish all success to this event.

Prof. (Dr.) Navin Sheth
Vice Chancellor
Gujarat Technological University, Ahmedabad

 ISBN: 978-81-955306-3-2

MESSAGE FROM GSP-GTU DIRECTOR

I am delighted to inform you that the Graduate school of Pharmacy - Gujarat technological Technology and Society of Pharmacognosy are jointly organizing 25th International Convention of Society of Pharmacognosy conference – 2021 from 27th – 28th November. The main theme of the conference is "New Horizons of Natural Products and AYUSH remedies.

To ensure that the better use of natural product as a traditional medicine and recent developments in the fields of drugs discovery, formulation development, manufacturing, standardization & quality control, regulatory affairs of natural products.The conference will also address the usefulness of phytomedicines in addressing the current pandemic situation of COVID 19, especially immune boosters from natural resources. The overall objective of this conference is to encourage the discovery of a natural products and support the development of the formulations based on natural resourcesw.

It is my pleasure to reiterate our sincere effort in taking ahead the legacy of Indian Traditional Medicine at Graduate School of Pharmacy in the form of Department of phytopharmacy and phytomedicne. I am sure that together our efforts will go a long way in taking a step towards discovery of drugs based on natural products and their formulation. Further it will be immensely useful for the researchers from around the world to create a unique platform for collaboration and integration of research from diverse streams.

I wish from bottom of my heart that this conference serve as medium between industy and university to play their part in betterment of healthcare system,

I wish all dignitaries, delegates and participants of INTERNATIONAL CONFERENCE 2021 and Graduate School of Pharmacy to have a grand and successful event.

Dr. Sanjay Chauhan
Director – Graduate School of Pharmacy

 ISBN: 978-81-955306-3-2

MESSAGE FROM GENERAL SECRETARY OF SOCIETY OF PHARMACOGNOSY

I am happy to note that the Graduate School of Pharmacy, Gujarat Technological University (GTU) is organizing the 25th Annual Convention of Society of Pharmacognosy and International Conference on New Horizons of Natural Products and AYUSH Remedies during November 27-28, 2021 at Ahmedabad (Gujarat). The theme of the convention is very appropriate in the present context.

With deliberation of the various scientific sessions, this convention will provide an opportunity for discussions and knowledge dissemination about the quality, safety and GMPs in phytomedicnes and other herbal products including various opportunities & current challenges.

I hope that the convention will develop a common research agenda and vision for exploring Indian herbal products on global map.

On this auspicious occasion, I extend my best wishes to the organizers for the grand success of this mega scientific meeting.

Prof. Umesh K. Patil
Gen. Secretary Society of Pharmacognosy

 ISBN: 978-81-955306-3-2

MESSAGE FROM CHAIRMAN –LOCAL ORGANIZING COMMITEE

It is indeed a great pleasure to write as Co-Chairman of the local organizing committee of the 25th National Conventionof Society of Pharmacognosy and International Conference with the theme of "New Horizons of Natural Products and Ayush Remedies".
With the blessings and continuous guidance and motivationof our Hon. Vice Chancellor, Gujarat Technological University and untiring efforts of local organizing committee and advisory board of Society ofPhrmacognosy and many more, we are able to organize this 25th Convention and International conference.

I would like to express my gratitude and sincere thanks to the Director, Graduate School of Pharmacy, all the office bearers of GTU, EC Members and state coordinators of Society of Pharmacognosy and the entire team of Gujarat for their tremendous support and guidance.

My regards and best wishes to all the delegates, speakers, session chairs and judges, and all the invitees who have come to attend this convention and enlightening Gujarat Technological University with your knowledge and grace.

Dr. Rakesh K. Patel
Co-Chairman, LOC

 ISBN: 978-81-955306-3-2

CONTENTS

 ISBN: 978-81-955306-3-2

FULL PAPER

ORAL PRESENTATION

SESSION 1- DEVELOPMENTS IN THE FIELDS OF STANDARDIZATION AND QUALITY CONTROL

 ISBN: 978-81-955306-3-2

SESSION 2- MODERN APPROACHES FOR *IN-VITRO, IN-VIVO*, AND *IN-SILICO* EVALUATION OF HERBAL PRODUCTS & AYUSH MEDICINE

 ISBN: 978-81-955306-3-2

SESSION 3 - PRESENT CHEMICAL INVESTIGATIONOF MATERIALS OF NATURAL ORIGIN

 ISBN: 978-81-955306-3-2

 ISBN: 978-81-955306-3-2

SESSION 5 - REPURPOSING TRADITIONAL MEDICINE FOR ADDRESSING COVID-19

POSTER PRESENTATION

RESEARCH BASED

 ISBN: 978-81-955306-3-2

REVIEW BASED

 ISBN: 978-81-955306-3-2

 ISBN: 978-81-955306-3-2

ABOUT GSP-GTU

Graduate School of Pharmacy (GSP) is a constituent institute of Gujarat Technological University (GTU). It started its operations from the Academic Year 2017-18.It is established by Gujarat Technological University with a view to engage in M. Pharm and PhD level programs and to offer quality education at affordable cost. The institute is recognized by All India Council for Science and Technology (AICTE) as well as Pharmacy Council of India (PCI).Currently it offers M. Pharm (Pharmaceutical Regulatory Affairs), M. Pharm (Pharmaceutical Quality Assurance) and M. Pharm (Pharmaceutics) courses. GSP will be starting M. Pharm in Phytopharmacy and Phytomedicines form AY 2021-22.

ABOUT INTERNATIONAL e-CONFERENCE

Through human history and evolution, natural products have played an essential role in the development and treatment of several diseases. From experience and several religious traditions, various traditional medical systems have emerged. Due to promising effectiveness of traditional medicines, the fascinating field of Phytomedicines and Phytopharmaceuticals has gained enormous popularity. Further, modern scientific approach towards ethno medicines have given rise to novel branches like Phytopharmaceuticals, Nutraceuticals, Food for Special Medical Purpose and Cosmetics in fields of herbal drug development. With these advancements, there is a greater need to have a thorough understanding of contemporary approached in fields of natural products. The conference aims to address recent developments in the fields of drugs discovery, formulation development, manufacturing, standardization & quality control, regulatory affairs of natural products.

The conference will also address the usefulness of phytomedicines in addressing the current pandemic situation of COVID-19.

Conference Tracks

1. Present chemical investigations of materials of natural origin.
2. Modern approaches for in vitro, in vivo and in silico evaluation of herbal products & AYUSH medicines.
3. Recent trends in development of formulations containing phytochemicals.
4. Developments in the fields of standardization and quality control.
5. Biological chemistry and regulation of phytomedicines.
6. Repurposing traditional medicines for addressing COVID-19.

 ISBN: 978-81-955306-3-2

ORGANIZING COMMITTEE

CHIEF PATRON
Prof (Dr.) Navin R. Sheth
Hon. Vice Chancellor, GTU

PATRON
Dr. K. N. Kher
Registrar, GTU

CHAIRMAN LOCAL ORGANIZING COMMITTEE
Dr. Sanjay Chauhan
Director – Graduate School of Pharmacy

CO-CHAIRMAN LOCAL ORGANIZING COMMITTEE
Dr. Rakesh. K. Patel
Principal Sal College of Pharmacy

ORGANIZING SECRETARY
Dr. JignaVadalia
Mr. UdaykumarVegad

JOINT SECRETARY
Dr. Biren Shah
Dr. AshvinDudhrejiya
Dr. Ravi Manek

 ISBN: 978-81-955306-3-2

ADVISORY COMMITTE

National Advisory Committee

- Dr. C. K. Kokate
- Dr. B. G. Shivananda
- Dr. S. Saraf
- Dr. Milind Umekar
- Dr. Satish Sardana
- Dr. H. S. Ansari
- Dr. S. P. Dhanabal
- Dr. Munish Garg
- Dr. KumudUpadhyay
- Dr. S. C. Mandal
- Dr. H. S. Lamba
- Dr. K. N.Patel
- Dr. V. K. Dixit
- Dr. A. N. Kalia
- Dr. Sunil Jalalpure
- Dr. AbhaySinghai
- Dr. Vimal Kumar
- Dr. Ganga RoaBattu
- Dr. S. K. Sharma
- Dr. Julfikar A. Bhat
- Dr. AlokMukharjee
- Dr. H. Mukhtar
- Dr. C. S. Bhargava
- Dr. C. Veeresham
- Dr. Umesh K. Patil
- Dr P. G. Yeole
- Dr. N. M. Patel
- Dr. S. H. Mishra
- Dr. A. K. Pathak
- Dr. M. L. Kori
- Dr. Prakash Itankar
- Dr. Rakesh Patel
- Dr. PramodHurakadle
- Dr. M. B. Patil
- Dr. RichaDayaramani

State Advisory Committee

- Dr. Sanjiv Acharya
- Dr. Manan Rawal
- Dr. Niyati Acharya
- Dr. UmangGajjar
- Dr. Nikunjana Patel
- Dr. Mamta Shah
- Dr. Vineet Jain
- Dr. TanviDodiya
- Dr. Madhavi Patel
- Dr. Krupa Gadhvi
- Dr. Jitesh Jariwala
- Dr. Sangita Shukla
- Dr. MaitreyiZaveri,
- Dr. Kishore Dholwani
- Dr. Devang Pandya
- Dr. Neeraj Vyas

 ISBN: 978-81-955306-3-2

LOCAL ORGANIZING COMMITTEE

	Committee Members
Scientific Committee	❖ Dr. Manju Misra ❖ Dr. KashyapThummar ❖ Mr. Ravisinh Solanki ❖ Ms. Anjali Patel
Registration	❖ Ms. Hardi Joshi ❖ Ms. AsmatbanuPathan ❖ Ms. DeepmalaSenva ❖ Ms. VidhiSheth
Hospitality	❖ Dr. Dashrath M Patel ❖ Ms. BhumikaMaheriya ❖ Dr. DigneshKhunt ❖ Dr. J. B. Dave ❖ Ms. Urmila Patel ❖ Mr. Devang Master
Medal and Printing	❖ Dr. Rajesh Patel ❖ Mr. Ravi Patel ❖ Mr. Akash Rathod

 ISBN: 978-81-955306-3-2

LIST OF VOLUNTEERS

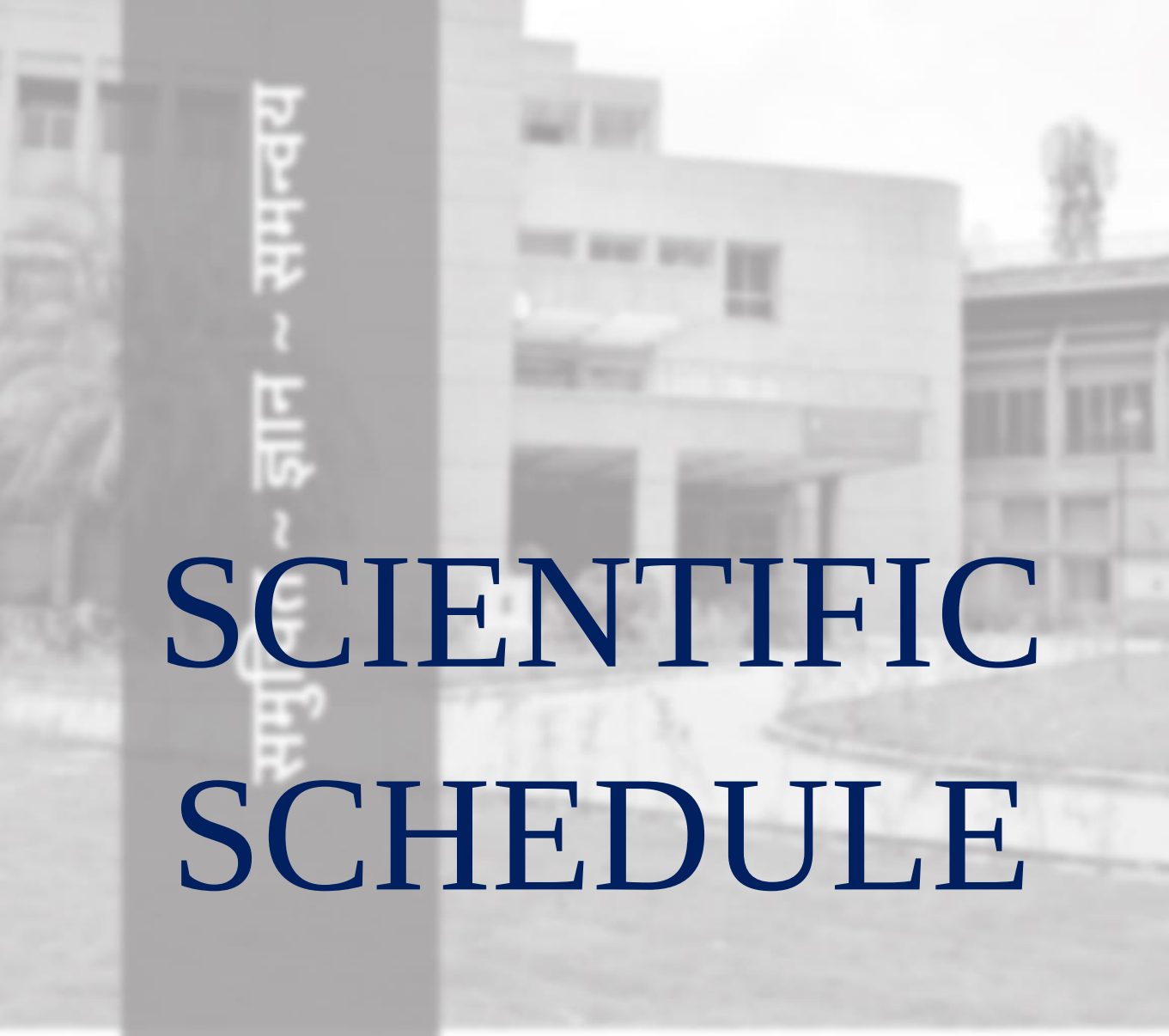
COMMITTEE NAME	STUDENT NAME
Student Coordinator	❖ Vikash Umeshkumar Tiwari
Abstract Book Proceddings	❖ Mohammadhassan Harsoliya ❖ Harshilkumar Jani ❖ Fenil Patel ❖ Disha Vihol
Hall Committee	❖ DevangKumar Prajapati ❖ Shivani Dhorajiya ❖ Rutvi Shah ❖ Sonal Vishwakarma ❖ Mihir Jesur ❖ Sanjaykumar Purohit ❖ Meetkumar Shah ❖ Reeya Patel ❖ Riti Patel ❖ Janki Kakkad ❖ Anujkumar Maradiya ❖ Kartiksinh Solanki ❖ Ritu Sharma ❖ Kinnari Patel ❖ Prachee Audichy ❖ Drashti Bhatt ❖ Megha Patel ❖ Priyanka Vadher ❖ Parthkumar Patel ❖ Abhishek Duber ❖ Dishita Parmar ❖ Frenil Kotak ❖ Devashri Vadiya ❖ Dhairyashri Kher
Food committee	❖ Mehulkumar Prajapati ❖ Pankajbhai Bhoye ❖ Ravin Malam ❖ Rishi Bhavsar

 ISBN: 978-81-955306-3-2

	❖ Jayvin Raval
	❖ Bheda Mayur
	❖ Jeel Patel
Media committee	❖ Nikhita Badiyavadara
	❖ Rohit Rutvi
	❖ Parth Narigara
	❖ Pinal Patel
	❖ Urvik Zalavadiya
	❖ Nitish Mandal
Poster committee	❖ Shital Singh Rajput
	❖ Hardi patel
	❖ Divya Sharma
	❖ Aarti Bodar
	❖ Sushama Sinha
	❖ Nishaben Patel
	❖ Shraddha Patil
	❖ Mansi Patel
	❖ Shraddha Patel
Registration committee	❖ Renita Nagani
	❖ Hinal Harkhani
	❖ Monika Sorathiya
	❖ Pooja Parmar
	❖ Kankshi Pathak
	❖ Mansi Lakhatariya
	❖ Nishant Tejura
	❖ Nrupa Kapadia
	❖ Dhruvil Shah
Transport committee	❖ Rajan Prajapati
	❖ Manil Patel
	❖ Smit Nayi
	❖ Yash Khodiya
	❖ Vivek Joshi
	❖ Himanshu Mehta

 ISBN: 978-81-955306-3-2

This page was intentionally left blank



SCIENTIFIC SCHEDULE

GRADUATE
SCHOOL OF
PHARMACY

This page was intentionally left blank

Day 1:27th November 2021, Saturday: Morning Session

Time	Program	Venue
8:30 am to 9:45 am	Registration & Breakfast	**Gujarat Technological University, Ahmedabad (Hall B0)**
10:00 am–11.00 am	Inauguration Ceremony	
11:00 am to 11:45 am **KEYNOTE LECTURE-1**	**Prof. Bhushan Patwardhan** National Research Professor – AYUSH, Delhi, India **Topic:**Pharmacognosy Research in COVID Times **Chair: Prof. V K Dixit** **Co-Chair: Dr.Vimal Kumar & Dr. Sanjay Chauhan**	
11:45 am to 12:00 pm	Tea Break	
12:00 pm to 12:45 pm **PLENARY SESSION-1**	**Prof. Sanjay M. Jachak** Head, Department of Natural Products, National Institute of Pharmaceutical Education and Research, Mohali **Topic:** Translational Research in Drug Discovery and Development from Natural Products: Challenges and Opportunities **Chair: Prof.PramodYeole** **Co-Chair: Prof. Mahesh T. Chhabria & Dr. D M Patel**	
12:45 pm to 1:30 pm	Lunch Break	

Day 1:27th November 2021, Saturday: Afternoon Session

	Venue: HALL B0 Gujarat Technological University, Ahmedabad	Venue: HALL A2 Gujarat Technological University, Ahmedabad
1:30 pm to 2:15 pm **PLENARY SESSION-2**	**Dr. Kamalesh Prasad** Senior Principal Scientist CSMCRI, Bhavnagar, Gujarat, India **Topic:** Pharmaceutical potential of seaweeds and products derived from them **Chair: Dr. U K Patil** **Co-Chair: Dr. Munish Garg & Dr. Manju Misra**	
2:15 pm to 3:00 pm **PLENARY SESSION-3,4**	**Prof.CiddiViresham** Principal, Shri Ramchandra Faculty of Pharmacy, Chennai. **Topic:** Medicinal plants for the	**Prof. Dan Staerk** Professor, Natural Products Research Group, Department ofDrug Design And Pharmacology University of

 ISBN: 978-81-955306-3-2

	treatment of Diabetic Complications **Chair: Dr. A N Kalia** **Co-Chair: Dr. Mohan lal Kori & Dr. J B Dave**	Copenhegen, Denmark **Topic:** Accelerating natural product-based drug discovery by advanced bioactivity-correlating techniques **Chair: Prof. Gangarao Battu** **Co-Chair: Dr. Pramod Hurakdle & Mr. Ravi Solanki**
3:00 pm to 3:45 pm **KEYNOTE LECTURE-2** **PLENARY SESSION-5**	**Dr. Vaidya Rajesh Kotecha** Secretary, Ministry of AYUSH, Government of India **Topic:** Ministry ofAyush Research & Development and Public Health Initiatives in the mitigationof Covid-19 **Chair: Prof. C N Patel** **Co-Chair: Dr. Satish Sardana & Ms. Jigna Vadalia**	**Prof. Satyajit Sarker** Director, School of Pharmacy and Biomolecular Sciences, Liverpool John Moores University (LJMU), UK **Topic:** Antimicrobial activity of selected Iraqi medicinal plants: A resazurin assay and scanning electron microscopy based screening approach **Chair: Dr. S. Jalalpure** **Co-Chair: Dr. Rajendra S. Bhambar & Mr. Udaykumar Vegad**
3:45 pm to 4:00 pm	Tea Break	
4:00 pm to 6:00 pm	Poster and Oral Presentation	
6:00 pm to 7:00 pm	Executive Committee Meeting of Society of Pharmacognosy	
7:00 pm onward	Gala Dinner	

Day 2:28th November 2021, Sunday: Morning Session

Time	Program	Venue
9:00 am to 10:00 am	Breakfast	**Gujarat Technological University, Ahmedabad**
10:00 am to 11:00 pm **PLENARY SESSION-6**	**Akshay Charegaonkar** Director Anchrom Enterprises (India) Pvt. Ltd, Mumbai, Maharashtra, India **Topic:** Fully Automated HPTLC for the routine quality control of Herbal Medicines **Chair: Prof. Abhay Singhai** **Co-Chair: Dr.Kashyap Thummar & Ms. Hardi Joshi**	
11:00 pm to 11:45 pm	**Poster and Oral Presentation**	
11:45 pm to 12:00 pm	**Tea Break**	
1:00 pm to 2:00 pm	**Lunch Break**	

 ISBN: 978-81-955306-3-2

Day 2:28th November 2021, Sunday: Afternoon session

	Venue: HALL B0 Gujarat Technological University, Ahmedabad	**Venue: HALL A2 Gujarat Technological University, Ahmedabad**
2:00 pm to 2:45 pm **PLENARY SESSION-7,8**	**Dr. Wanchai De-Eknamkul** Professor and Head Natural Product Biotechnology Research Group Faculty of Pharmaceutical Sciences Chulalongkorn University, Bangkok 10330, **Topic:** From Simple Screening of Natural 5-α Reductase Inhibitors to Discovery of an Anti-Hair Loss Compound with Complete Mechanistic Effects on Androgenic Alopecia Prevention **Chair: Prof .Mamta Shah** **Co-Chair: Dr. Niranjan Kanki & Dr. D M Patel**	**Dr. Nafees Ahmed** Senior Lecturer, Monash University, Malaysia **Topic:** Phytochemical and Biological Evaluationof Selected Medicinal Plants from Himalayan region **Chair: Dr. Alok Mukerjee** **Co-Chair: Dr. Rakesh Patel & Dr. Rajesh Patel**
2:45 pm to 3:30 pm **PLENARY SESSION-9,10**	**Dr. Shankar Katekhaye** Director (Research and Quality), Nature's Laboratory Ltd, UK **Topic:** A bee product for holistic health **Chair: Dr. Milind Umekar** **Co-Chair: Dr. Prakash Itankar & Dr. Dignesh Khunt**	**Dr. Olga Maria Duarte Silva** Associate Professor, University of Lisbon, Portugal **Topic:**Regulationof Medicinal Plants - A portuguese perspective **Chair: Prof. N M Patel** **Co-Chair: Mr. Ravi Patel & Mr. UdayKumar Vegad**
3:30 pm to 3:45 pm	**Tea Break**	
3:45 pm onward	Valedictory Function**(Gujarat Technological University, Ahmedabad (Hall B0)**	

 ISBN: 978-81-955306-3-2

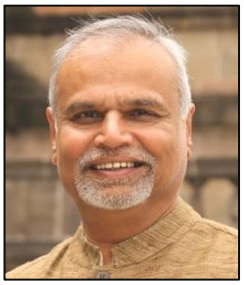
This page was intentionally left blank

KEYNOTE LECTURES

GRADUATE SCHOOL OF PHARMACY

This page was intentionally left blank

Pharmacognosy Research in COVID Times



Bhushan Patwardhan, PhD, FNASc, FNAMS
National Research Professor – Ayush
Interdisciplinary School of Health Science
Savitribai Phule Pune University

ABSTRACT

COVID-19 therapeutics needs safer drugs to treat infections, immunological and mental health problems. Search for effective drugs for chemoprophylaxis and therapeutics against SARS-CoV-2 is in progress however no proven drugs are available yet. Pharmacognosy based drug discovery, development and repurposing can play an important role in offering promising candidates especially antiviral and immunomodulators. Various in silico, pre-clinical and clinical studies on medicinal plants with ethnopharmacology relevance are in progress in India. The Ministry of AYUSH has supported large scale population-based surveys, observational studies and randomized controlled clinical trials to scientifically validate effectiveness of Ayurvedic medicines in prophylaxis and clinical management of COVID-19. Over 100 clinical trials on AYUSH interventions have been registered on CTRI, which include prophylaxis, adjunct/ add-on treatment and standalone therapies for COVID-19. Pre clinical studies have shown considerable anti-viral activity of few promising medicinal plants. Ayurveda based immunomodulators such as Ashwagandha, Guduchi, Pippali,Yashtimadhu, and AYUSH 64 have shown beneficial effects as prophylaxic agents and as an add-on in the standard care for mild to moderate cases of COVID-19. This lecture will offer few glimpses of ethnopharmacology research in COVID times in India.

 ISBN: 978-81-955306-3-2

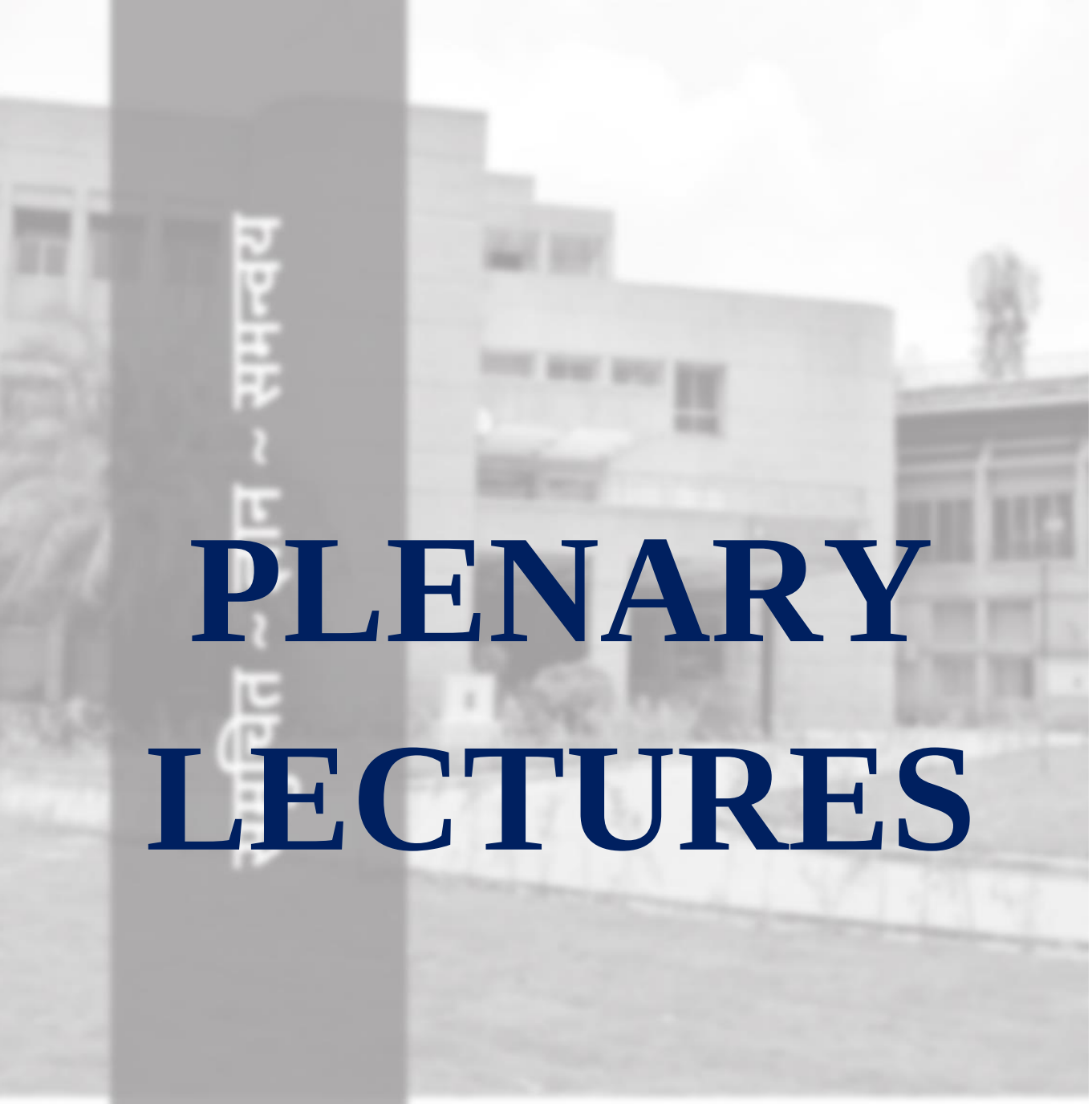
Ministry of AYUSH Research & Development and Public Health Initiatives in the Mitigation of Covid-19

Dr. Vaidya Rajesh Kotecha
Secretary,
Ministry of AYUSH,
Government of India.

ABSTRACT

The outbreak of COVID-19 has accentuated the need to strengthen health systems and accelerate research and development (R&D) programmes. The Ministry of AYUSH took several initiatives to tap into the potential of AYUSH systems to contain the impact of the COVID-19 pandemic. Ministry of AYUSH is equipped for providing appropriate response to the public health challenges through scientific communication & collaboration; evidence based interdisciplinary research activities and Public health care delivery system. Ayurveda and Yoga has been included in the National Clinical Management Protocol for management of COVID-19. AYUSH 64 is recommended in National Clinical Management protocol for Covid 19 based on Ayurveda and Yoga and a nationwide campaign was launched for the distribution of AYUSH 64 and kabasurakudineer through 87 clinical units of Research Councils and National Institute under Ministry of AYUSH. Total 137 evidence based research studies has been completed so far and 25 of them have been published in reputed indexed Journals. Further more others are in different stages of publications including 36 as preprints available in public domain. The Ministry was steadfast in providing all kinds of support all through the crisis, which facilitated them to play noteworthy roles in the fight against the pandemic.

 ISBN: 978-81-955306-3-2



PLENARY LECTURES

GRADUATE SCHOOL OF PHARMACY

This page was intentionally left blank

Translational Research in Drug Discovery and Development from Natural Products: Challenges and Opportunities

Sanjay M. Jachak
Professor and Head, Department of Natural Products,
NIPER-SAS Nagar (Mohali), 160062 Punjab
sanjayjachak@niper.ac.in

ABSTRACT

Natural products (NP) have been the most productive source of leads for the discovery and development of drugs over the years. Medicinal plants serves as one of important sources of drugs worldwide since they possess interesting biological properties. About 80% of the world's population uses plant/botanical-derived medicines which are called as herbal medicines. A considerable growth has been seen in the herbal medicine market in recent years as an alternative to medicinal products with chemically derived APIs. In drug discovery and development based on natural products of plant origin, there is requirement of potential plant resources as a source of lead molecules. In this aspect, exploring medicinal plant biodiversity provides rational approach to search for new medicines. At the same time in several traditional medicines throughout the world, medicinal plants constitute an important ingredient of medicines. India with its rich medicinal plant biodiversity in terms of three hotspots viz. Eastern Himalaya, Western Himalaya and Western Ghats, provide an excellent opportunity for drug discovery and bio-prospecting. Given the fact that there are around 45,000 higher plant species occur in India out of which around 15,000 species are of medicinal importance; there is a great promise to explore Indian medicinal plants for evaluationof various biological activities.

There are several difficulties and challenges associated with the development of herbal drug products. The challenges mainly are related to regulatory guidelines, lack of knowledge of herbal medicines with the drug regulatory authorities, assessment of safety and efficacy, quality control, safety monitoring; for herbal drugs. All these challenges could be addressed effectively by promoting use of herbal drugs through application of modern scientific methodology to herbal drugs/natural products promoting translational research so that the value-added products can be developed. In this presentation translational research approaches in the field of natural products, herbal drugs/traditional medicine will be enumerated with case studies from ongoing research in our laboratory.

 ISBN: 978-81-955306-3-2

Pharmaceutical Potential of Seaweedsand Products Derived from Them

Kamalesh Prasad [1,2]
[1] *Natural Products & Green Chemistry Division, CSIR-Central Salt and Marine Chemicals Research Institute, GijubhaiBadheka Marg, Bhavnagar- 364 002, (Gujarat), INDIA,*
Phone No : +91-278-2567760. Fax No. +91-278-2567562; Email: kamlesh@csmcri.res.in /
[2] *Academy of Scientific and Innovative Research (AcSIR), Ghaziabad 201002, India*

ABSTRACT

Seaweeds are the oldest bio resource present in oceans and available widely across the globe with predominant occurrence in coastal waters. Number of seaweeds are reported to demonstrate pharmaceutical potential in the form activities such as Anthelmintic, Anti-inflammatory, Antioxidant, anti-microbial, anti fungal, anti tumour etc., The various products derived from seaweeds such as carrageenan, fucoidan, Caulerpin, Trifarin, Peyssonoic Acid, Arestolene, Cartilagineol, Tiomanene, D-galactan, Sargatrioletc are reported to have various activities ranging from anti-cancer to antifungal. Substantial research being done at CSIR-CSMCRI to utilize seaweeds growing in Indian waters as a source of commercially important products having potential for pharmaceutical applications. The potential of the seaweeds need to be further explored from pharmaceutical point of view and detail research to establish them as economical source of bioactive molecules should be done.

Among the various natural polymers, polysaccharides are one of the oldest biopolymers present on the earth. They also play a very crucial role in the survival of both animals and plants. Although among the polysaccharides cellulose, starch and chitosan find more applications but there are several applications in food and healthcare industries where seaweed polysaccharides are preferred due to some of their characteristic properties. Further, due to the increasing scarcity of bioresources for material generation for the future, seaweeds are emerging as suitable alternative biomass resources for various products and materials. The application of seaweed polysaccharides in different formats such as gel, colloidal solutions, thin films etc. find numerous applications in pharmaceutical and food industries. Furthermore, the polysaccharides have hydroxyl groups in the structure and due to such favourable chemical structures, it is relatively easier to make their chemical derivatives. Several seaweed polysaccharide derivatives has the potential for industrial applications.

 ISBN: 978-81-955306-3-2

Medicinal Plants for the Treatment of Diabetic Complications

Prof.Ciddi Veeresham
Professor of Pharmacy (retired)
University college of pharmaceutical Sciences
Kakatiya University
Warangal TS 506009
Email: ciddiveersham@yahoo.co.in

ABSTRACT

Diabetes Mellitus (DM) is a chronic metabolic disorder of impaired metabolism of Carbohydrates fats and proteins, characterized by hyperglycemia resulting from decreased utilizationof carbohydrates and excessive glycogenolysis and Gluconeogenesis from amino acids and fatty acids. People with Diabetes mellitus are at higher risks of developing serous diabetic complications such as neuropathy, nephropathy, cataract and heart attacks. Four molecular mechanisms are involved in the development of diabetic complications; increase in the flux of glucose through polyol pathway, increased intracellular formationof advanced glycation e-d-products (AGES), activation of protein kinase C (PKC) and increased flux through the hexosamine pathway. Among these polyol pathway plays a vital role in the development of diabetic complication. In view of the researchers started working on the synthetic compounds for the treatment of diabetic complications. The failure of synthetic compounds because of their law safety and poor pharmacokinetics made look into alternative source from plants / phytochemicals. So in view of these the book gives details about several plants and phytochemicals reported for the treatment of diabetic complications. Our research findings by working several plants and Phytochemcials revealed that Urosolic acid is the best for treatment of diabetic complications. The SLN formulations of urosolic acid was found good bioavailability and pharmacodynamic activity.

 ISBN: 978-81-955306-3-2

Accelerating Natural Products-Based Drug Discovery by Advanced Bioactivity-Correlating Techniques

Prof. Dan Staerk
Natural Products Research group
Department of Drug Design and Pharmacology
University of Copenhagen
Denmark

ABSTRACT

To accelerate the search for new bioactive natural products with potential as drug leads, there is a need for advanced technologies that allow pinpointing, isolation, and structure elucidation of individual constituents responsible for the bioactivity of crude extracts. In this lecture, the use of advanced bioactivity-correlating technologies like ligand fishing, bioactivity-correlated metabolomics, and high-resolution inhibition profiling coupled with high-performance liquid chromatography-photodiode array-high-resolution mass spectrometry-solid-phase extraction-nuclear magnetic resonance, i.e., HPLC-PDA-HRMS-SPE-NMR, will be presented.

 ISBN: 978-81-955306-3-2

Antimicrobial Activity of Selected Iraqi Medicinal Plants: A Resazurin Assay and Scanning Electron Microscopy Based Screening Approach

Prof. Satyajit Sarker
Director,
School of Pharmacy and Biomolecular Sciences,
Liverpool John Moores University (LJMU),
UK.

ABSTRACT

Shaymaa Al-Majmaie[1], Lutfun Nahar[1,2], George P Sharples[1]and
Satyajit D Sarker[1*]

[1]*Centre for Natural Products Discovery (CNPD), School of Pharmacy and Biomolecular Sciences, Liverpool John Moores University, James Parsons Building, Byrom Street, Liverpool L3 3AF, United Kingdom*
[2]*Laboratory of Growth Regulators, Institute of Experimental Botany ASCR &Palacký University, Šlechtitelů 27, 78371 Olomouc, Czech Republic*
*Email address of the plenary speaker: S.Sarker@ljmu.ac.uk

Iraq shares borders with Turkey in the North, Saudi Arabia in the South, Iran in the East and Syria in the West.It enjoys significant diversity in its landscape and climatic conditions, resulting in a rich diversity in the Iraqi flora.There are 360 medicinal plants from 270 genera and 98 families found in Iraq. However, the tentative total number of plant species growing in Iraq is 3300, which belong to 908 genera and 136 families. Iraqi medicinal plants formed the foundationof Iraqi traditional medicinal heritage and practice, which still thrive in Iraq, and can be traced back to the Sumerian period (3000-1970 BCE) and then the Assyrian period (1970 to 589 BCE).Iraqi medicinal plants and their products have long been used for the treatment of various human ailments including infections and playing a significant role in the Iraqi healthcare system.
In continuation of our studies involving evidence-based phytotherapy, and plant-based drug discovery, which is the core research activity within the Centre for Natural Products Discovery at Liverpool John Moores University, three Iraqi medicinal plants from the genera *Citrus* and *Ruta* were studied for their antimicrobial activities, using resazurin assay and scanning electron microscopy (SEM) aiming at providing evidence for their traditional medicinal uses. Several antimicrobial compounds, predominantly coumarins and isoquinoline alkaloids, were isolated from these species, some of which showed promising anti-MRSA activity against clinical isolates of methicillin-resistant *Staphylococcus aureus*.

 ISBN: 978-81-955306-3-2

Fully Automated HPTLC for the Routine Quality Control of Herbal Medicines

Akshay Charegaonkar
Director
Anchrom Enterprises (India) Pvt. Ltd,
Mumbai, Maharashtra, India

ABSTRACT

High Performance Thin Layer Chromatographyis a modernized form of TLC. Conventional TLC has changed over the years to a fully automated system. CAMAG HPTLC PRO is a newly launched world's 1st fully automated system. HPTLC is now widely used in herbal industry. Fast, reliable results, low cost, and ease of use proves it to be technique of choice.

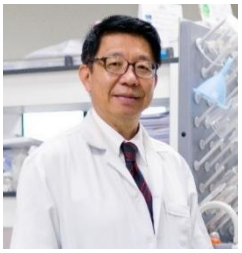
The fully automated HPTLC PRO has a plate storage unit, Applicator and Development module. Derivatizer, Detector and MS-Interface is expected to be launched in 2022.

Key Takeaways:

- How HPTLC has evolved over the years?
- HPTLC for routine quality control.
- Herbal Drug Development

 ISBN: 978-81-955306-3-2

From Simple Screening of Natural 5-α Reductase Inhibitors to Discovery of an Anti-Hair Loss Compound with Complete Mechanistic Effects on Androgenic Alopecia Prevention



Dr.Wanchai De-Eknamkul
Natural Product Biotechnology Research Unit,
Department of Pharmacognosy and Pharmaceutical Botany,
Faculty of Pharmaceutical Sciences,
Chulalongkorn University,
Bangkok, Thailand.,

ABSTRACT

Steroid 5α-reductase (5α-R) is an enzyme that catalyzes the conversion of testosterone (T) to 5α-dihydrotestosterone (DHT) Overexpression of 5α-R has been known to affect the balance between T and DHT causing androgenic disorders, such as prostate cancer, hirsutism, and androgenic alopecia. Androgenic alopecia (AGA) is a major type of scalp hair loss caused by the over-production of DHT, a potent androgen functioning in located in the hair follicles. Therefore, 5α-R has been considered as an important target for searching potential inhibitors as anti-AGA agents. An HPTLC method was developed as part of a new non-radioactive cell-based assay for sensitive detecting the formationof DHT. Among randomly selected 50 plant extract samples, only the one of *Avicennia marina* was found to exhibit the 5α-R inhibitory activity. The active constituent was subsequently isolated and identified as a known furanonaphthaquinone, namely avicequinone C. Interestingly, mechanistic studies revealed that avicequinone C was not only inhibit the 5α-R activity in hair dermal papilla cells, but also the subsequent step oftranslocation of DHT-androgen receptor complex from the cytoplasm to the nucleus, with significant formation of hair growth-promoting factors. These results suggested that avicequinone C has a potential for developing as a natural anti-AGA agent.

 ISBN: 978-81-955306-3-2

Phytochemical and Biological Evaluation of Selected Medicinal Plants from Himalayan region

Dr.Nafees Ahmed
Senior Lecturer,
School of Pharmacy
Monash University,
Malaysia.

ABSTRACT

Himalayan region is rich with natural resources specifically medicinal plants. These plants have been used traditionally since centuries. This research work attempted to probe into the phytochemical composition and pharmacological properties of four selected medicinal plants namely: *Anagallis arvensis* (aerial androot parts), *Bougainvillea glabra* ***(***aerial and flower parts), *Buxus papillosa* (aerial and stem parts), and *Filago germanica* (aerial and root parts), having traditional folklore uses against commonailments. A detailed systematic literature review (regarding traditional uses, phytochemistry, biological/pharmacological, and toxicological activities) of these plants was conducted. The extraction of all the selected plant parts was done by maceration using methanol (MeOH), and dichloro-methane (DCM) solvents and the percentage yields were calculated. The preliminary phytochemical screening was performed by determining their total bioactive contents ***via*** spectrophotometric methods, secondary metabolites by using ultra-high-performance liquid chromatography mass spectrometry (UHPLC-MS), and high-performance liquid chromatography photodiode array (HPLC-PDA) polyphenolic quantification. For biological fingerprinting, antioxidant, enzyme inhibitory, and anti-cancer potential were assessed. An antioxidant potential was determined by using six different assays namely: 2, 2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging, 2, 2′-azino-bis (3-ethylbenzothiazoline-6 sulphonic acid) (ABTS) free radical scavenging, cupric ion reducing antioxidant capacity (CUPRAC), ferric reducing antioxidant power (FRAP), phosphomolybdenum total antioxidant capacity (TAC), and metal chelating activity (MCA) assays. The inhibitory activities of all the plant extracts against enzymes related to diabetes (α-glucosidase and α-amylase), neurological problems (acetylcholinesterase (AChE) and butyrylcholinesterase (BChE)), ***Helicobacter pylori*** infections (urease), inflammatory disorders (lipoxygenase (LOX)), and skin problems (tyrosinase) were evaluated. Anticancer activity was tested by using MTT cell viability assay on five different human cancer cell lines, i.e., MCF-7 and MDAMB-231 (breast cancer), CaSki (cervix cancer), DU-145 (prostate cancer), and SW-480 (coloncancer). Promising activities have been displayed by many extracts. Bioactivity-guided fractional and isolation of natural products was performe. To conclude, our results suggest that the studied plant extracts can be considered asapromising lead origin for natural bioactive enzyme inhibitory, antioxidant as well as anti-cancer compounds which could pave the way for new horizons for drug discovery from medicinal plants.

 ISBN: 978-81-955306-3-2

A Bee Product for Holistic Health

Shankar Katekhaye
Nature's Laboratory,
Unit3B Enterpriseway,
Whitby,
United Kingdom – YO22 4NH

ABSTRACT

Propolis (bee glue) is a natural resinous mixture produced by honeybees from substances collected from parts of plants, buds, and exudates. In Greek, propolis called as "defender of the city," which means this natural product is used in hive defense. Since ancient times propolis has been in folk medicine. Egyptians used bee glue to embalm their cadavers. Greek and Roman physicians used it as mouth disinfectant and as an antiseptic and healing product in wound treatment, prescribed for topical therapy of cutaneous and mucosal wounds. Propolis provide beneficial effect on human health by its antimicrobial, antiviral, and antioxidant properties. Nowadays, propolis is a natural remedy found in many health foods stores in different forms for topical use. Current applications of propolis include formulations for cold syndrome (upper respiratory tract infections, common cold, and flu-like infections), as well as dermatological preparations useful in wound healing, treatment of burns, acne, herpes simplex and genitalis. Lately propolis has been gaining attention for its role in antibiotic resistant bacterial treatment as synergistic effect which redundant antibiotics effective again.

 ISBN: 978-81-955306-3-2

Regulationof Medicinal Plants - A Portuguese Perspective

Dr. Olga Maria Duarte Silva
Associate Professor,
University of Lisbon,
Portugal.
osilva@campus.ul.pt

ABSTRACT

In Portugal European, TCM, Ayurveda and African herbal medicines are used mainly in a complementary way, together with other medicines. In this communication an actual picture concerning the way of use of herbal traditional medicines and natural products will be given. Even though the herbal medicines now, in our country like in the other European countries are considered under the medicine's regulation, as far as we know no herbal health product currently for sale on the Portuguese market is marketed as a traditional herbal medicine therefore it is not under supervision of the medicine regulatory authority in Portugal – Infarmed. In fact, these are mostly sold as food or food supplements, being under the law as such, with no obligation to demonstrate their quality, safety, and effectiveness. Examples are herbal health products used in the treatment of disorders of the digestive system or for the treatment of infections of the urinary system or used in the treatment of mental stress and sleep disturbances, as frequent cases of falsification and non-compliance with the quality requirements considered necessary for an herbal medicine. This situation led to the creation in Portugal, by the Portuguese Quality Institute, of a technical committee for Traditional and Complementary Medicine - TC 212 - which, in accordance with the objectives of the World Health Organization and taking as a model, the work developedwithin the scope of ISO/TC 249 - Traditional Chinese medicine, an international committee devoted to the TCM standardization, intend to aims to establish a set of recommendations to improve the way in which herbal health products are produced, distributed and dispensed in Portugal. For these, it is necessary to carry out research work that allows the establishment of quality and safety parameters and the verification of the effectiveness of medicinal plants and respective preparations obtained from unofficial plant materials, giving examples of the work in this communication.scope, is being carried out at the Pharmacognosy Laboratory of the Faculty of Pharmacy of the University of Lisbon, targeting Portuguese, Oriental, and African medicinal plants, using the most modern technologies.

Keywords: Herbal medicines; Regulation; Quality; Safety; Eficacy.

FULL PAPERS

GRADUATE SCHOOL OF PHARMACY

This page was intentionally left blank

PCP359

Formulation and Evaluation of Sustained Release Tablets Using Natural Polymers

AP0316	AP0271	AP0312	AP0285
Ms. Jyotsana Paradkar	**Dr. Jayshree Taksanda**	**Dr. Kamlesh Wader**	**Prof. Milind Umekar**
jyotsanaparadkar0306@gmail.com	jayabtaksande@gmail.com	Kamleshwadher@gmail.com	drmilindumekar@gmail.com

Smt. Kishoritai Bhoyar College of Pharmacy

ABSTRACT:
The influence of formulations containing both hydrophilic and hydrophobic materials on drug release pattern from matrices was examined. Gum damar and gum copal were used to investigate the efficacy of combination matrices in sustaining drug release since they are water insoluble. The hydrophilic substance was hydroxypropyl methylcellulose K100M and the model drug was diclofenac sodium. The effect of the concentration of hydroxypropyl methylcellulose on the drug release pattern of hydrophobic material was investigated. The best drug-to-polymer ratio was found to be 1:1. The release pattern of the 75:25 hydrophobic: hydrophilic polymer ratio was found to be identical to that of the marketed formulation. The initial burst release that occurred in individual hydrophobic matrices was greatly reduced at this ratio. As the concentration of hydrophobic substance was raised, the drug release followed Higuchi's equation. The formulations were compared to the commercially available Voveran SR and a correlation was formed.

Key words: Diclofenac sodium, drug: polymer ratio, gum copal, gum damar, hydroxypropyl methylcellulose

1. INTRODUCTION

Sustained-release dosage form extends the duration of your time of therapy, reduces side effects and increases safety and patient compliance by reducing the frequency of dosing [1]. Drug release-retarding materials play a crucial role in such systems. Various materials are thus been investigated for sustaining the discharge from the drug-loaded matrices. Some of them like agar, guar gum, sodium alginate and carob gum are thoroughly reviewed earlier [2]. Of the varied approaches to formulate sustained release matrices, one method is to include drug with release-retarding polymer. Cellulose ether derivatives, such as hydroxypropyl methylcellulose (HPMC), are the most often utilized polymers for such processes [3]. Due to nontoxicity, easy handling and no requirement of specified technology for production of sustained-release tablets, HPMC is usually used as release-retarding material [4].

The sustaining properties of gum copal (GC) and gum damar (GD) have been investigated [5]. GC has also been investigated as a covering for long-term drug delivery [6], whereas GD has been investigated as a microencapsulating material [7]. All of the work demonstrates good sustaining property of the materials. These natural-based polymers are mostly utilized as varnishes. GC is derived from Burseraceae trees, while GD is derived from Dipterocarpaceae plants [8].

Various ways of sustaining drug release from the dosage form have been tested but the matrix system, in which the drug is disseminated in a porous network of polymer, is the most appealing from the economic, process development, and scale-up perspectives [9]. Sustained release tablets have been made with a variety of polymers. However, only a few have seen widespread use. As a result, the quest for a polymer capable of sustaining the release is currently ongoing. Natural polymers are gaining popularity as a result of their biodegradability, stability and ease of use [10].

Diclofenac sodium (DS) is a commonly used nonsteroidal anti-inflammatory drug. The medication is used to treat rheumatic diseases [11]. For the treatment of arthritis, the medicine is commonly recommended as once-

 ISBN: 978-81-955306-3-2

daily sustained-release tablets [12]. A comparative *in vitro* drug release study was conducted using several formulations including DS. Hydroxypropyl methylcellulose (HPMC) and Sodium carboxymethyl cellulose (NaCMC) [13], for example, have been employed to keep the release going. One of the key reasons for developing an extended release formulation is the drug's short half-life.

The suggested research aimed to investigate the effect of hydrophilic polymers on drug release patterns from hydrophobic matrices. The effectiveness of hydrophilic–hydrophobic mixed matrices in sustaining drug release was also studied.

2. LITERATURE REVIEW:

Bhardwaj et al., (2000), reviewed about the recent advancements in the field of natural gums and their derivatives as carriers in the sustained release of pharmaceuticals. They also mentioned about use of natural gums and their derivatives in pharmaceutical dosage forms, their use as biodegradable polymeric materials to deliver bioactive agents has been hampered by the synthetic materials [2].

Yan et al., (2000), prepared Nifedipine (NF) and Polyethylene glycol (PEG) Solid dispersion using Solid dispersion technique, Matrix tablets of NF hydroxypropylmethylcellulose (HPMC) were also prepared. The absolute and relative bioavailability of the tested tablets were investigated. According to the findings, the NF HPMC tablet could be an excellent 24-hour sustained-release formulation [4].

Morkhade et al., (2006), investigated, natural gum copal and gum damar as potential sustained release matrix forming components. Tablets were evaluated for pharmacotechnical properties, drug content uniformity and in vitro drug release kinetics. Effect of gum concentration on in vitro drug release profile was also examined. They concluded that, both the gums produced matrix tablets with good strength and acceptable pharmacotechnical properties [5].

Ho et al., (1997), investigated, Clofen SR ® and Voltaren SR® were shown to have similar levels of absorption in terms of AUC. Based on the three pharmacokinetic characteristics of C max (ss), C min (ss) and Fluctuation (ss), the fluctuation in plasma concentration was less for Clofen SR ® than for Voltaren SR® in steady state. This empirical correlation may be able to anticipate the relative extent of absorption, but it does not suggest the possibility of erratic diclofenac sodium concentration changes in the plasma [11].

3. OBJECTIVES:

The objective of the present study was to formulate and evaluate of sustained release tablets using natural polymers.

4. EXPERIMENTAL WORK:

4.1 Materials and methods

Diclofenac sodium was procured from Zim Laboratories Ltd., Nagpur, India. GD and GC were received as a gift sample from Imex Inc., Chennai, India. Hydroxypropyl methylcellulose (Methocel K100M, Premium) was procured from Colorcon Asia Pvt. Ltd., Mumbai, India. Magnesium stearate, dicalcium phosphate and lactose monohydrate were purchased from Loba Chemie Laboratories Ltd., Goa, India. Avicel PH 102 was obtained from Signet Chemicals Ltd., Mumbai, India. Potassium dihydrogen phosphate, propanol, methanol and sodium hydroxide were procured from Ranbaxy Fine Chemicals Ltd., New Delhi, India.

4.1.1 Manufacture of tablets:

Different polymer concentrations were used to make DS sustained release tablets. A variety of drug: polymer ratios were tested, including 1:3, 1:2, 1:1, and 1:0.5. The 1:1 ratio was found to be the most effective in dissolving trials, as it delays the release of the drug for more than 10 hours. Throughout the trial, the ratio was kept constant, and the drug content was kept to 100 mg each tablet. The polymer ratio was kept constant, while the polymer combination was altered at different concentrations (100, 75, 50 and 25%). All of the ingredients were sieved with sieve no. 100 before being combined (Sethi Standard Test Sieves, New Delhi, India). Before granulation, the materials were accurately weighed and an appropriate amount of propanol was

 ISBN: 978-81-955306-3-2

utilized as a granulating agent. The slug was sieved with sieve no. 16 and the granules were dried at room temperature (27±2°).

The dried granules were then sieved with sieve no. 40, with fines weighing no more than 5% of the total granule weight. Prior to compression, the dried granules were coated with magnesium stearate at a concentration of 1% w/w. On a rotary tablet press machine (Rimek Minipress I), the granules were compressed using 10 mm concave punches at an acceptable compression force. The tablet's weight was limited at 400 mg. The composition of various matrix tablets is shown in Table 1.

Table 1: Tablet Formulations Containing Different Concentrations of Polymers

Batch	Diclofenac sodium	HPMC	Gum copal	Gum damar	Lactose	DCP	MCC	Magnesium stearate
H1	100	100	-	-	195	-	-	5
C1	100	-	100	-	195	-	-	5
C2	100	-	100	-	-	195	-	5
C3	100	-	100	-	-	-	195	5
D1	100	-	-	100	195	-	-	5
D2	100	-	-	100	-	195	-	5
D3	100	-	-	100	-	-	195	5
CHc1	100	25	75	-	195	-	-	5
CHc2	100	25	75	-	-	195	-	5
CHc3	100	25	75	-	-	-	195	5
DHc1	100	25	-	75	195	-	-	5
DHc2	100	25	-	75	-	195	-	5
DHc3	100	25	-	75	-	-	195	5
CHb1	100	50	50	-	195	-	-	5
CHb2	100	50	50	-	-	195	-	5
CHb3	100	50	50	-	-	-	195	5
DHb1	100	50	-	50	195	-	-	5
DHb2	100	50	-	50	-	195	-	5
DHb3	100	50	-	50	-	-	195	5

4.2 Evaluation of tablet:

Matrix tablets were analyzed for weight variation, tablet hardness, friability and crown thickness. To test for weight variation, 20 tablets were randomly selected from each batch and were weighed for uniformity. A Roche friability apparatus was used to check the friability of tablets. Vernier calipers were used to measure the thickness and the Monsanto hardness tester was used to measure the hardness of tablets. Table 2 contains a list of all measurement parameters.

4.2.1 Weight variation:

A random sample of twenty tablets was selected and the average weight calculated. To determine the variation, individual pills were weighed.

4.2.2 Tablet hardness:

Using a Monsanto hardness tester, the force required to crush ten tablets was determined.

4.2.3 % Friability:

To test the durability of the tablets, Roche friability devices were used.

 ISBN: 978-81-955306-3-2

4.2.4 Determination of content:

20 tablets were weighed and powder to assess the content uniformity.

4.2.5 In vitro release of drug:

Electrolab Dissolution apparatus USPI was used to conduct in vitro experiments.

4.2.6 In vitro drug release kinetics:

Different mathematical equations can be used to investigate the mechanism of drug release from matrix tablets.

Table 2: Evaluation Parameters of Matrix Tablets (Gum=100%)

Batch	Average weight (mg)	Thickness (mm)	Hardness (kg/cm^2)	Friability (%)	Drug content (mg)
H1	400.2 ± 1.02	4.03±0.089	6.2±0.23	0.304	94.3
C1	399.21±1.96	3.934±0.109	5.9±0.6	0.25	99.3
C2	402.3± 1.12	3.60±0.056	6.5±0.39	0.01	95.1
C3	400.3±2.36	3.89±0.1	7.1±0.11	0.321	100.1
D1	399.5±2.56	4.144±0.043	6.5±0.49	0.15	96.9
D2	396.8±1.08	3.91±0.109	6.8±0.55	0.236	97.2
D3	400.5±2.37	3.93±0.068	7.1±0.61	0.213	98.7

Each value is mean N=3±SD. The formulations containing gum damar and gum copal were evaluated for different evaluation parameters as per IP

5. RESULT AND DISCUSSION:

Preliminary tests revealed that lubricant at a concentration of 1% w/w provided adequate flow characteristics. Tables 2–4 provide all of the evaluation parameters. The parameters are well within IP 1996's specified limitations. The tablets had a somewhat increased hardness, which could be attributed to the solubility of GC and GD in alcohol. However, the greater hardness value has just a minor or no influence on drug release. The hardness of all batches is between 5.9 and 7.5 kg/cm^2.

Table 3: Evaluation Parameters of Matrix Tablets (Gum: HPMC=50%)

Batch	Average weight (mg)	Thickness (mm)	Hardness (kg/cm^2)	Friability (%)	Drug content (mg)
CHb1	400.9±0.21	3.95±0.38	6.8±0.59	0.207	99.8
CHb2	403.6±1.02	3.89±0.56	6.9±1.36	0.392	98.6
CHb3	401.6±0.91	3.93±1.02	7.2±1.19	0.216	97.2
DHb1	402.5±1.05	4.01±0.39	6.8±0.54	0.401	95.1
DHb2	401.3±0.86	3.97±0.59	6.7±0.57	0.266	100.1
DHb3	400.8±0.25	3.94±1.19	7.1±0.61	0.306	99.3

 ISBN: 978-81-955306-3-2

Table 4: Evaluation Parameters of Matrix Tablets (Gum: HPMC =75%)

Batch	Average weight(mg)	Thickness (mm)	Hardness (kg/cm^2)	Friability (%)	Drug content (mg)
CHc1	400.9±1.02	3.97±1.02	6.2±0.46	0.215	99.5
CHc2	402.0±1.13	4.06±1.16	6.9±0.65	0.184	99.7
CHc3	399.5±1.32	3.89±0.76	7.1±1.09	0.119	97.2
DHc1	394.6±2.23	3.87±0.93	6.0±1.96	0.263	94.9
DHc2	402.8±1.57	3.98±0.13	6.8±1.89	0.096	100.3
DHc3	407.5±2.61	4.14±1.95	7.4±2.32	0.145	100.6

Each value is mean N=3±SD. The formulations containing GC and GD with HPMC were evaluated for different evaluation parameters as per IP. HPMC=Hydroxypropyl methylcellulose

Figures 1 and 2 showed the release of diclofenac sodium from GC and GD matrices, respectively. The lactose-containing batches have a longer lasting release, whereas the lactose-free batches release the drug at a higher concentration. However, the inclusion of microcrystalline cellulose in the mixed matrices promotes drug release as the concentration of HPMC in the matrices increases. The use of 75% HPMC results in the drug being released in less than 2 hours, which is unacceptable. The inhibition of hydrophobic GC and GD in crosslinking HPMC could be the cause. Solid particles (GC or GD) can minimize HPMC chain entanglement, lowering gel resistance [14-15]. Although 50% polymer replacement results in release of up to 90%, matrices containing 25% HPMC produce a release pattern that is similar to the marketed formulation (figs. 3 and 4).

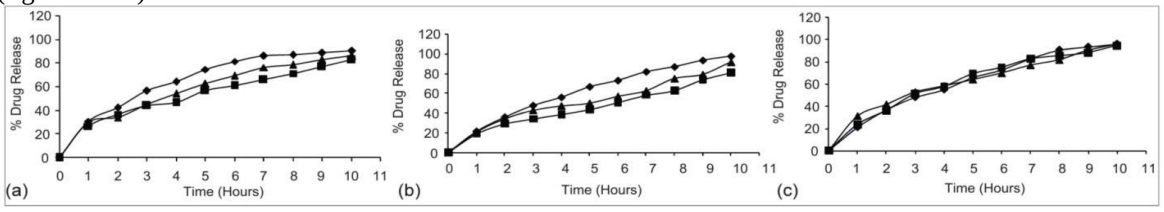


Fig. 1: Dissolution profile of diclofenac sodium from matrices containing varying concentration of gum copal.
(a) 100%. C1 (♦), C2 (■) and C3 (▲); (b) 75%. CHc1 (♦), CHc2 (■) and CHc3 (▲); (c) 50%. CHb1 (♦), CHb2 (■) and CHb3 (▲). Each plotted value is the mean of n=3

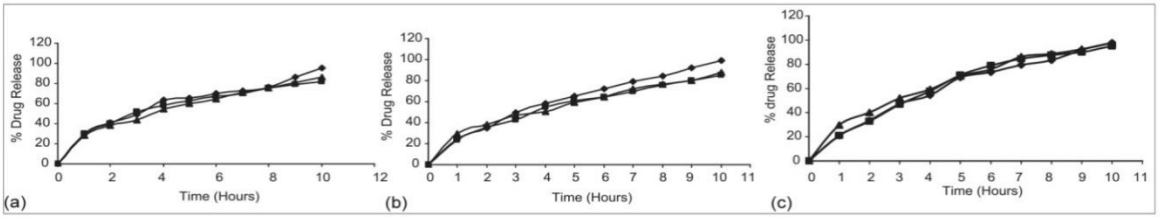


Fig. 2: Dissolution profiles of diclofenac sodium from matrices containing varying concentration of gum damar (GD).
(a) 100%. D1 (♦), D2 (■) and D3 (▲); (b) 75%. DHc1 (♦), DHc2 (■) and Dhc3 (▲); (c) 50%. DHb1 (♦), DHb2 (■) and Dhb3 (▲). Each plotted value is the mean of n=3

 ISBN: 978-81-955306-3-2

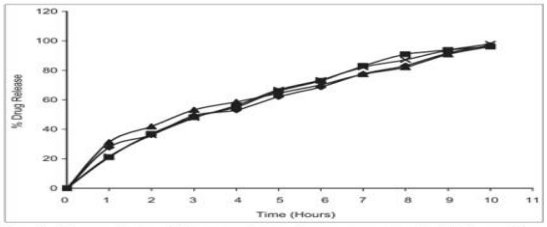


Fig. 3: Comparison of drug release from gum copal (GC) matrices and Voveran SR.
Voveran SR (♦), CHb1 (■) and CHb3 (▲), CHc1 (×). The formulation containing GC and hydroxypropyl methylcellulose (HPMC), showing maximum release was compared with the marketed formulation

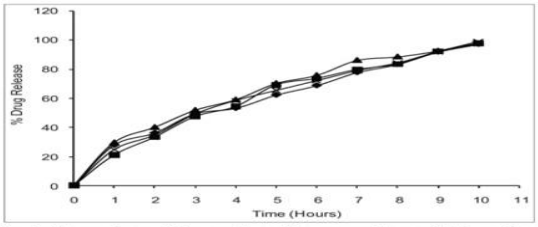


Fig. 4: Comparison of drug release from gum damar (GD) matrices and Voveran SR.
Voveran SR (♦), DHb1 (■) and DHb3 (▲), DHc1 (×). The formulation containing GD and hydroxypropyl methylcellulose (HPMC), showing maximum release was compared with the marketed formulation

The presence of 50% HPMC in the matrices reduced the initial burst release from the matrices. Reduced initial burst release could be due to a lack of sufficient time for swelling and gelling. Sustained release may be due to the presence of the hydrophobic polymer at higher concentrations, resulting in water impermeable matrices in 75 % of the GC/GD tablets. The findings are quite similar to those reported by [Takka et al., 2001] for HPMC: Eudrgit S [16].

Individual matrices demonstrate Kosmeyer -Peppas as a release model, which backs up the data (Table 5). The release of hydrophobic matrices could be a result of a multitude of mechanisms. When HPMC is included in the matrices, the release pattern shifts toward Higuchi's model. Higher 'n values could be achieved by reducing the first burst discharge from the matrices. The Voveran SR's release was found to follow Higuchi's equation, with the exponent moving towards Zero order release, which is desirable. A similar release pattern was seen in formulations containing 50% HPMC.

Table 5: Release Kinetics of Diclofenac Sodium from Different Matrices of Gum Copal and Gum Damar

(A) 100% GC and GD			
H1	Highuchi Eq.	0.992 0.383	9. 451
C1	Kosmeyer-Peppas Eq.	0.991 0.419	33.515
C2	Kosmeyer-Peppas Eq.	0.985 0.301	42.686
C3	Kosmeyer-Peppas Eq.	0.993 0.421	27.631
D1	Highuchi Eq.	0.994 0.483	29.845
D2	Highuchi Eq.	0.959 0.377	33.099
D3	Kosmeyer-Peppas Eq.	0.996 0.432	29.517
(B) 75% GC, GD and Voveran SR			
CHc1	Highuchi Eq.	0.997 0.485	28.354
CHc2	Kosmeyer-Peppas Eq.	0.974 0.538	18.459
CHc3	Kosmeyer-Peppas Eq.	0.992 0.569	22.822
DHc1	Highuchi Eq.	0.994 0.482	245.856
DHc2	Kosmeyer-Peppas Eq.	0.974 0.377	33.020
DHc3	Highuchi Eq.	0.991 0.491	24.913
Voveran SR	Higuchi Eq.	0.996 0.473	28.147
(C) 50% GC and GD			
CHb1	Highuchi Eq.	0.954 0.613	28.094
CHb2	Highuchi Eq.	0.963 0.534	27.195
CHb3	Highuchi Eq.	0.994 0.507	31.852
DHb1	Kosmeyer-Peppas Eq.	0.985 0.658	24.091
DHb2	Highuchi Eq.	0.981 0.593	25.497
DHb3	Highuchi Eq.	0.997 0.497	31.897

 ISBN: 978-81-955306-3-2

DS release from HPMC matrices is limited, with only around 80% of the drug released during in vitro dissolving studies, however drug release from GC and GD matrices alone in the same ratio (drug:polymer) of 1:1 resulted in nearly entire drug release, as shown in fig. 5. As a result, it can be stated that replacing 50% to 75% of the HPMC with GC or GD results in matrices with the desired release pattern. Furthermore, the release schedule is similar to that which is currently accessible on the market. However, merely a 25% substitution of HPMC by GC or GD delays the release. All of the tablet's properties were found to be within acceptable limits, implying that polymers have no effect on the assessment parameters. As a result, its presence is critical for drug release from matrices.

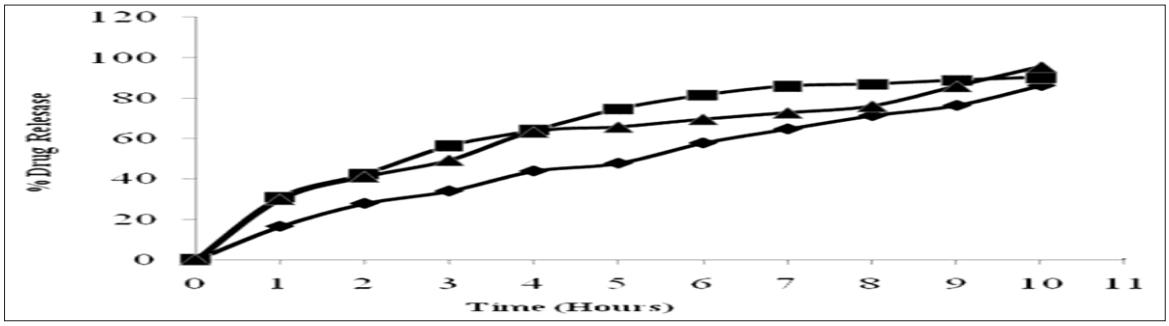


Fig. 5: Comparison of drug release from various matrices. Comparison of drug release from hydroxypropyl methylcellulose (HPMC), gum copal (GC), and matrices gum damar (GD) containing diclofenac sodium. H1 (♦), C1 (■), D1 (▲). The release of drug from formulations containing the hydrophobic polymer is compared with the one having hydrophilic release retarding polymer

The pills' hardness was found to be between 5.9 and 7.4 kg/cm2. The weight loss of tablets during friability tests was not significant, ranging from 0.01 to 0.40%. The drug content was between 94 and 100 mg, which is permissible according to IP 1996.

6. CONCLUSION:

HPMC, depending on the concentration, may have an effect on the drug release pattern from GC and GD matrices. Simultaneously, the type of diluent utilised has an impact on drug release from matrices, which is consistent with previous findings. The Higuchi equation governs the drug release from the coupled matrices, implying that the drug diffuses slowly across the matrix.

7. ACKNOWLEDGEMENTS:

The authors are grateful to M/s. Zim Laboratories, Kalmeshwar, for donating a gift sample of diclofenac sodium for this study. They are also grateful to Imex Inc., Chennai, for providing free GC and GD samples. Smt. Kishoritai Bhoyar College of Pharmacy, Kamptee, Nagpur, provides them with excellent services.

8. **FUNDING SOURCES:** No funding was received for this project.

9. REFERENCES:

1. Fukuda, M., Peppas, N. A., & McGinity, J. W. (2006). Properties of sustained release hot-melt extruded tablets containing chitosan and xanthan gum. *International journal of pharmaceutics*, *310*(1-2), 90–100.
2. Bhardwaj, T. R., Kanwar, M., Lal, R., & Gupta, A. (2000). Natural gums and modified natural gums as sustained-release carriers. *Drug development and industrial pharmacy*, *26*(10), 1025–1038.
3. Velasco, M. V., Ford, J. L., Rowe, P., & Rajabi-Siahboomi, A. R. (1999). Influence of drug: hydroxypropylmethylcellulose ratio, drug and polymer particle size and compression force on the release of diclofenac sodium from HPMC tablets. *Journal of controlled release: official journal of the Controlled Release Society*, *57*(1), 75–85.
4. Yan, G., Li, H., Zhang, R., & Ding, D. (2000). Preparation and evaluation of a sustained-release formulation of nifedipine HPMC tablets. *Drug development and industrial pharmacy*, *26*(6), 681–686.
5. Morkhade, D. M., Fulzele, S. V., Satturwar, P. M., & Joshi, S. B. (2006). Gum copal and gum damar: Novel matrix forming materials for sustained delivery. *Indian journal of Pharmaceutical Sciences*, *68*(1), 53-8.
6. Morkhade, D. M., & Joshi, S. B. (2005). Gum copal: A novel coating material for sustained drug delivery. *Int J Pharm Excip*, *7*, 78-83.
7. Morkhade, D. M., & Joshi, S. B. (2007). Evaluation of gum damar as a novel microencapsulating material for ibuprofen and diltiazem hydrochloride. *Indian Journal of Pharmaceutical Sciences*, *69*, 263-8.
8. Vandenabeele, P., Avilès, M. O., Castilleros, D. T., & Moens, L. (2007). Raman spectroscopic analysis of Mexican natural artists' materials. *Spectrochimica Acta Part A Molecular and Biomolecular Spectroscopy*, *68*(4), 1085-8.
9. Lafuente, C. S., Faucci, M. T., Arevalo, M. F., Fuenten, J. A., Rabasco, A. M., & Mura, P. (2002). Development of sustained release matrix tablets of didanosine containing methacrylic and ethylcellulose polymers. *International Journal of Pharmacy*, *234*, 213-21.
10. Da Silva, D. A., De Paula, R. C., & Feitosa, J. P. (2007). Graft co-polymerisation of acrylamide onto Cashew gum. *European Polymer Journal*, *43*, 2620-9.
11. Ho, H. O., Liu, C. H., Lin, H. M., & Sheu, M. T. (1997). The development of matrix tablets for diclofenac sodium based on an empirical in vitro and in vivo correlation. *J Control Release*, *49*(2-3), 149-56.
12. Avachat, A., & Kotwal, V. (2007). Design and evaluation of matrix-based controlled release tablets of diclofenac sodium and chondroitin sulphate. *AAPS PharmSciTech*, *8*(4), E88.
13. Rao, Y. M., Veni, J. K., & Jayasagar, G. (2001). Formulation and evaluation of diclofenac sodium using hydrophilic matrices. *Drug development and industrial pharmacy*, *27*(8), 759–766.
14. Hayashi, T., Kanbe, H., Okada, M., Suzuki, M., Ikeda, Y., Onuki, Y., Kaneko, T., & Sonobe, T. (2005). Formulation study and drug release mechanism of a new theophylline sustained-release preparation. *International journal of pharmaceutics*, *304*(1-2), 91–101.
15. Grassi, M., Zema, L., Sangalli, M. E., Maroni, A., Giordano, F., & Gazzaniga, A. (2004). Modeling of drug release from partially coated matrices made of a high viscosity HPMC. *International journal of pharmaceutics*, *276*(1-2), 107–114.
16. Takka, S., Rajbhandari, S., & Sakr, A. (2001). Effect of anionic polymers on the release of propranolol hydrochloride from matrix tablets. *European journal of pharmaceutics and biopharmaceutics: official journal of Arbeitsgemeinschaft fur Pharmazeutische Verfahrenstechnik e.V*, *52*(1), 75–82

PCP353

Emulgel Contained with Pongamia Pinnata Extract: Design and Characterisation

AP0310	AP0315	AP0314	AP0312	AP0285
Abhidha Deshpande	**Muskan Motwani**	**Vaishnavi Raut**	**Dr. Kamlesh Wadher**	**Prof. Milind Umekar**
aparnadeshpande@gmail.com	sureshmotwani70@gmail.com	vraut2008@gmail.com	drkamleshwadher@gmail.com	drmilindumekar@gmai

Smt. Kishoritai Bhoyar College of Pharmacy

ABSTRACT:

Emulgel is a new topical drug delivery technology that has recently been introduced to the market. The objective of the present research work was to design, develop and statistically optimise Pongamia Pinnata extract emulgel for better transdermal distribution using 3^2 factorial designs. Carbopol and the emulsified agent ratio [(Span: tween)] were chosen as independent variables, with viscosity (cp) (Y1) and spreadability as dependent variables (Y2). The physical appearance, rheological behaviour, in vitro drug release, and ex vivo permeability studies of the produced Pongamia Pinnata extract emulgel were all assessed. According to a percent drug diffusion analysis, the developed topical PPE emulgel formulation released a maximum of 59.15% ± (0.512) over a period of 6 hours. The prepared emulgel was studied for 90 days at a temperature of 40°C±2°C and a relative humidity of 75%±5% relative humidity (RH).There was no phase separation and no significant changes in physical appearance, percent viscosity, percent spreadability, or medication content as compared to the original formulation. The extract was found to reduce immobility time while also improving active behaviours like climbing.

Key words: Emulgel, Pongamia Pinnata, In vitro dissolution, Psoriasis, Topical delivery.

1. INTRODUCTION:

Microemulsion, Nanogel, Niosomes, and Liposomes have been used from a decade as a novel topical carriers for improving medication penetration into the skin[1,2].The use of synthetic drugs for psoriasis is hampered by the inherent side effects of drug moiety and also with the problems associated with conventional delivery systems[3,4]. Emulgels are emulsions that are gelled by combining with a gelling agent. They can be oil-in-water or water-in-oil emulsions.Emulgels combine the benefits of emulsions and gels to provide a dual control release approach for hydrophobic medicines [5]. Thixotropic, greaseless, readily spreadable, easily removable, emollient, nonstaining, water-soluble, longer shelf life, and bio-friendly are some of the benefits of emulgels for topical usage [6]. Pongamia Pinnata has traditionally been used to treat a variety of inflammatory conditions. This plant's seed is consumed in tribal medicine, and its oil is used to cure psoriasis and arthritis in Ayurveda [7-9]. The goal of this study was to create an emulgel from Pongamia Pinnata hydroalcohlic extract (PPE)

2. LITERATURE REVIEW:

1. Srisuk P et al (2012), compared the physicochemical properties and in vitro permeability of methotrexate (MTX)-entrapped deformable liposomes made from phosphatidylcholine (PC) and oleic acid (OA) to those of MTX-entrapped traditional liposomes made from PC and cholesterol (CH).

2. Singka G. S et al (2010), studiedthe effect of sodium carbonate (Na2CO3) on topical distribution of methotrexate (MTX) from a loaded nanogel in vitro and modification of prostaglandin E2 (PGE2) synthesis

 ISBN: 978-81-955306-3-2

in skin ex vivo was investigated in this study. A nanogel was produced, described, and loaded with MTX using co-polymerised N-isopropylacrylamide (NIPAM) and butylacrylate (BA).

3. Katare OP et al (2010), extensively reviewed about Psoriasis as a chronic inflammatory skin disorder that may drastically impair the quality of life of a patient. According to them, among the various modes of treatments for psoriasis, topical therapy is most commonly used in majority of patients. They also justified that topical formulations based on Natural and traditional Herbs could be effective in treatment of Psoriasis.

3. OBJECTIVES:

The goal of this study was to create a Pongamia Pinnata extract emulgel that has been conceived, produced, and statistically optimised for improved transdermal distribution.

4. EXPERIMENTAL WORK:

Imiquimod was obtained from Glenmark Pharmaceutical. Carbapol 934 was obtained from LobachemieLTD, Mumbai. Spans 80, Tween 80, Liquid Paraffin were obtained from Sigma Aldrich, Mumbai. Triethanolamine, Polyethylene glycol-400, Dimethyl sulfoxide was obtained from Merck chemical, Mumbai.

Table: 1 3^2full Factorial Design: Factors, Factor Levels and Responses for Emulgel Formulation

Factors (Independent variables)	**Factor levels used**		
	Low (-1)	**Medium (0)**	**High (+1)**
Amount of carbapol (X_1)	0.5	1	1.5
nount of emulsified agent(X_2)(Span:Tween)	2	4	6
Responses (Dependent variable)			
Y_1 = Percent viscosity (% cp)			
Y_2 = Percent spread ability (% min/sec)			

Table: 2 Preparation of Emulgelusing Following Concentration (%W/W)

Ingridient	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**	**F7**	**F8**	**F9**
Carbapol 934	1	0.5	1.5	1.5	1.5	0.5	0.5	1	1
Emulsified Agent (Span:Tween)	6	4	2	6	4	2	6	4	2
Liquid paraffin	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Propylene glycol	5	5	5	5	5	5	5	5	5
DMSO	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Methyl Paraben	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Triethanolamine	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s
Water	Upto 100	Upto 100	Upto 100	Upto 100	Upto 100	Upto 100	Upto 100	Upto 100	Upto 100

4.1 Experimental design (3^2full factorial design):

The qualitative characteristics and levels reported in Tables 1 and 2 were used to create nine PPE emulgel formulations using a 3^2 factorial design. The experimental design was created and evaluated using the Design Expert software Expert® DX 10.0.7.0. (Stat-Ease Inc., MN). As independent variables (X2), the amount of Carbapol (0.5, 1, and 1.5% w/w) (X1) and the amount of emulsified agent ratio [(Span: tween) 2 (0.9:1.1), 4

 ISBN: 978-81-955306-3-2

(1.5:2.5), and 6 (2:4) w/w] were tested. The dependent variables were chosen to be viscosity (cp) (Y1) and spreadability (Y2). The optimal formula was chosen based on its desirability, which was then subjected to further examination.

4.2 Preparation of emulgel:

dispersing Carbopol 934 was dispersed in purified water to prepare Gel with a mechanical shaker at a moderate speed, and adding triethanolamine (TEA) to adjust pH to 6–6.5 [10]. The emulsion's oil phase was made by dissolving span 20 in light liquid paraffin, and the aqueous phase by dissolving tween 20 in purified water. PPE was dissolved in ethanol and combined with the aqueous phase, while methyl parabens were dissolved in propylene glycol. Both the oily and aqueous phases were heated to 75^0c separately, and then the oily phase was introduced to the aqueous phase and stirred continuously until it reached room temperature. To make the emulgel, the resulting emulsion was mixed with the gel in a 1:1 ratio with moderate stirring. Tables 1 and 2 illustrate the composition of herbal emulgel formulations.

4.3 Evaluation of Emulgel: Physical appearance, pH of emulgel**,** Viscosity, Spreadability, Drug Content, In vitro Diffusion Studies, *ex-vivo* permeation Study and Stability Study were carried out s per the standard procedure.

5. RESULT AND DISCCUSION:

5.1 Preparation of Emulgel:

5.1.1 *Experimental desing (3^{2}full factorial design):*

The emulgel formulation was optimised using a full factorial design (3^2). The formulation variables listed in Table 2 were used to manufacture all nine batches of Emulgel. The influence of percent w/w of Carbapol and emulsified agent as independent variables, as well as their interactions, on the investigated responses was estimated using RSM (dependent variables; percent viscosity and percent spreadability).The goal of this experiment was to find significant factor effects impacting formulation performance and to set them to great levels for the attractiveness of the results in Table 3.The flux experimental data were examined using Design Expert®DX210.0.7.0 licence version software, and mathematical models were obtained for each response to evaluate the quantitative effects of factors (A and B) and their levels of low (-1), intermediate (0), and high (+1) on the preferred responses. The following polynomial equations represent the mathematical relationship generated using multiple linear regression analysis (MLRA) for the researched response variables (percent viscosity and percent spreadability) that were related to different responses and independent variables (quadratic model).

Table: 3 Composition 3^2 full Factorial Design with Measured Responses of Emulgel.

Batches	Variable level in coded form		Variable level in actual form		Response Variables	
	A	B	Carbapol %w/w (X_1, W)	Emulsified agent %w/w (X_2, W)	% Viscosity (cp)	% spreadabilty (sec)
F1	-1	-1	0.5	2	12680	100
F2	0	-1	1	2	14001	55
F3	+1	-1	1.5	2	16110	141
F4	-1	0	0.5	4	8648	156
F5	0	0	1	4	14108	160
F6	+1	0	1.5	4	13852	48
F7	-1	+1	0.5	6	9678	62
F8	0	+1	1	6	14989	75
F9	+1	+1	1.5	6	19499	86

 ISBN: 978-81-955306-3-2

$$Y_1 \text{ (cp)} = 12839.22 + 3075.8A + 229.17B + 1597.75AB - 54.83A^2 + 2290.17B^2. \quad (1)$$

$$Y_2 \text{ (SP)} = 119.89 - 7.17A - 12.17B - 4.45AB + 2.17A^2 - 34.84B^2. \quad (2)$$

The following equations reveal the quantitative impact of the independent variables, percent w/w carbapol and emulsified agent, on the dependent variables, such as percent viscosity (Y1) and percent spreadability (Y2). The quadratic model's correlation coefficient (r2) for response percent viscosity (Y1) and percent spreadability (Y2) was determined to be significant.

The coefficients of A and B were positive in the regression analysis of the above equation (1) of response Y1 (percent viscosity), indicating that as Carbapol (A) grew, the percent viscosity increased, and as the emulsifying agent (B) increased, the percent spreadability increased. The higher the concentration of emulsified agent, the lower the viscosity and, as a result, the percent viscosity. The percent viscosity of the various emulgel batches ranged from 8648 to 19499%.

Batch F4 had the lowest viscosity due to the Carbapol: Emulsified agent mixture (-1, 0). The analysis of variance (ANOVA) was used to estimate the model's significance using the ANOVA data; the model F-value of response (B) (10.60) suggested that the model's is significant.

5.2 **Percent Spreadability:**

The percent spreadability of various emulgel batches ranged from 48% to 160%. Batch F4 had the best spreadability due to the Carbapol: Emulsified agent mix (-1, 0).

5.3 **Physical Appearance:**

The PPE emulgel compositions were off-white viscous, smooth, and uniform in appearance. They were easy to disseminate and had a good bioadhesion.

5.4 **PH Determination:**

All produced formulations had pH values in the range of 5.99±0.04 to 6.82±0.05, which is regarded acceptable because values higher than this can cause irritation when applied to the skin.

5.5 **In-Vitro drug release:**

Figure 2 depicts the in vitro release characteristics of PPE from its various emulgel formulations. The produced topical PPE emulgel formulation released a maximum of 59.15%±0.512 during a period of 6 hours, according to percent drug diffusion data. As a result, it's possible to deduce that the emulgel formulation can control medication release for a longer period of time, lowering therapeutic costs.

5.6 **Stability Study of (Design Optimized) Emulgel:**

PPE that has been optimised According to ICH requirements, the emulgel formulation was subjected to accelerated stability testing. When compared to the initial formulation, the results showed no phase separation and no significant changes in physical appearance, percent viscosity, percent spreadability, or drug content.

 ISBN: 978-81-955306-3-2

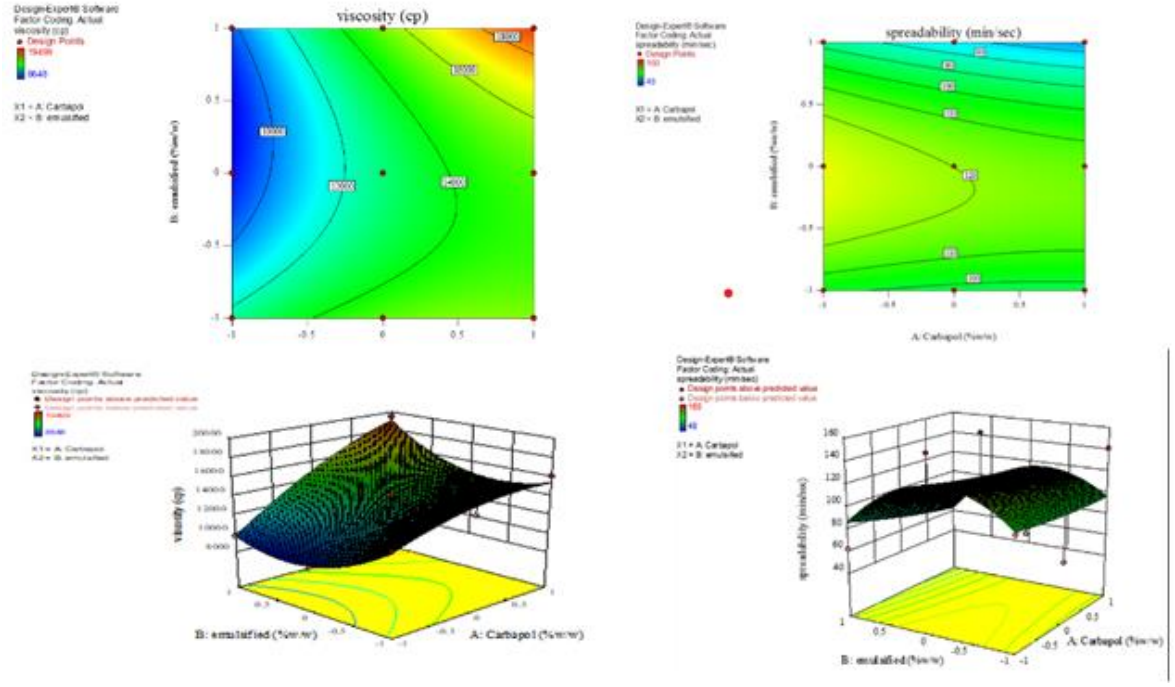


Figure:1 Contour plot and Response surface plot showing the effect of carbapol (X1) and emulsified agent (X_2) on % Viscosity and % spreadability (Y_2) of emulgel.

6. CONCLUSION:

In the present work, a topical emulgel of Pongamia Pinnata was developed and put through a series of physicochemical tests, including rheological tests, spreadability tests, in vitro, in vivo, and ex-vivo release tests, with promising results. In order to explore the release behaviour of drugs from formulation, in vitro drug release of Pongamia Pinnata from emulgel was performed. Based on the findings, it was determined that the rate of medication release increases over time.

7. FUNDING SOURCES: No funding was receivedfor this project.

8. REFERENCES:

1. Srisuk, P., Thongnopnua, P., Raktanonchai, U., & Kanokpanont, S. (2012). Physico-chemical characteristics of methotrexate-entrapped oleic acid-containing deformable liposomes for in vitro transepidermal delivery targeting psoriasis treatment. International journal of pharmaceutics, 427(2), 426–434.

2. Singka, G. S., Samah, N. A., Zulfakar, M. H., Yurdasiper, A., & Heard, C. M. (2010). Enhanced topical delivery and anti-inflammatory activity of methotrexate from an activated nanogel. European journal of pharmaceutics and biopharmaceutics: official journal of Arbeitsgemeinschaft fur Pharmazeutische Verfahrenstechnik e.V, 76(2), 275–281.

3. Katare, O. P., Raza, K., Singh, B., & Dogra, S. (2010). Novel drug delivery systems in topical treatment of psoriasis: rigors and vigors. Indian journal of dermatology, venereology and leprology, 76(6), 612–621.

4. Pradhan, M., Singh, D., & Singh, M. R. (2013). Novel colloidal carriers for psoriasis: current issues, mechanistic insight and novel delivery approaches. Journal of controlled release: official journal of the Controlled Release Society, 170(3), 380–395.
5. Ajazuddin, Alexender A, Khichariya A, Gupta S, Patel RJ, Giri Kumar T, Tripathi DK.(2013). Recent expansion in an emergent novel drug delivery technology: Emulgel. J Control Release, 171,122–132.
6. Jain A, Deveda P, Vyas N, Chauhan J, Khambete H, et al.(2011). Development of antifungal emulsion based gel for topical fungal infection(s). Int. J. Pharm. Dev. Res, 2 (12), 18–25.
7. Bose, M., Chakraborty, M., Bhattacharya, S., Bhattacharjee, P., Mandal, S., Kar, M., & Mishra, R. (2014). Suppression of NF-κB p65 nuclear translocation and tumor necrosis factor-α by Pongamia pinnata seed extract in adjuvant-induced arthritis. Journal of immunotoxicology, 11(3), 222–230.
8. Carcache-Blanco, E. J., Kang, Y. H., Park, E. J., Su, B. N., Kardono, L. B., Riswan, S., Fong, H. H., Pezzuto, J. M., & Kinghorn, A. D. (2003). Constituents of the stem bark of Pongamia pinnata with the potential to induce quinone reductase. Journal of natural products, 66(9), 1197–1202.
9. Kesari V, Das A, and Rangan L.(2010). Physico-chemical characterization and anti-microbial activity from seed oil of Pongamiapinnata, a potential biofuel crop. Biomass Bioenergy, 34(1), 108–115.
10. Naga Sravan Kumar Varma, V., Maheshwari, P. V., Navya, M., Reddy, S. C., Shivakumar, H. G., & Gowda, D. V. (2014). Calcipotriol delivery into the skin as emulgel for effective permeation. Saudi pharmaceutical journal: SPJ: the official publication of the Saudi Pharmaceutical Society, 22(6), 591–599.

 ISBN: 978-81-955306-3-2

PCP348

Piper Betel Leaf: A Potential Chemo Protective Agent

AP0296 Shubham V. Gupta	AO0285 Prof. Milind Umekar	AP0286 Dr.Renuka Das	AP0302 Mr. R. Nalaspure
gshubham834@gmail.com	drmilindumekar@gmail.com	renukadas1979@gmail.com	rnalaspure@gmail.com

Smt. Kishoritaibhoyar College of pharmacy, Kamptee

ABSTRACT

Plants contain a much greater diversity of bioactive compounds than any man-made chemical compounds.ThePiper betel leaves are magnificent reservoirs of phenolic compounds with antiproliferative, Antimutagenic, antibacterial, and antioxidant properties. Leaf contains abundance of biophenolics such as hydroxychavicol, eugenol, chavibetol, and piperols.The data focus the remarkable chemotherapeutic and chemopreventive potential of betelLeaves against a variety of cancer types. The phytochemicals of betel leaves modulate an extensive array of signallingmolecules such as transcription factors as well as reactive oxygen species (ROS) to control multiple nodes ofvarious cellular proliferation and death pathways.An overall perspective on the cancer-Fighting benefits of the phenolic phytochemicals in betel leaves and a comprehensive overview of theMechanisms responsive to dose-driven ROS-mediated signaling cascades conscripted by bioactive phenolics to confer chemotherapeutic and chemopreventive advantages. These ROS-triggered responses elicit a protective xerothermic antioxidant response to premalignant cells toconstitute a chemopreventive effect or generate a curative chemotherapeutic response by pro-oxidativelyaugmenting the constitutively elevated ROS levels in cancer cells to tip the balance in favour of selectiveapoptosis induction in cancer cells while sparing normal ones.There is potential of the evergreenVine, betel leaf, for chemo preventive and chemotherapeutic in formulation of dosage form for management of cancer.

Keywords: Biophenolics, chemoprotective, chemotherapeutic, phytochemicals, xerothermic

1. INTRODUCTION

According to a WHO research, cancer is progressively assuming the position of a disease with a high death rate, accounting for 8.8 million deaths in 2015. (WHO 2017). New discoveries in cancer treatment are being reported by researchers all around the world, and they have undeniably enhanced the health and care of cancer patients. However, the present treatment is excessively expensive and severe, and advanced metastasized cancer is still incurable. Nonetheless, there is an ongoing quest for effective and safer chemopreventive compounds in order to increase pharmacological efficacy and lower cancer treatment costs. Several ionic radicals formed in cells, such as superoxides, hydroxyl radicals, and nitric oxide radicals, sometimes known as reactive oxygen and nitrogen species (ROS and RNS), function as pro-mutagens, leading to cancer development. When considering the role of ROS and RNS in cancer, the use of complementary and alternative medications is important in cancer treatment. As a result, natural phytochemical chemicals that are useful in cancer prevention, retardation, delay, or cure are becoming a backup option.Among the several classes of phytochemicals found in several medicinal plants, these alternative techniques preferably target the anti-inflammatory and antioxidant capabilities of polyphenols. The anti-cancer properties of the betelvine plant and its bioactive chemical components. [1]

 ISBN: 978-81-955306-3-2

Natural products are a huge resource for the development of medications and small molecules to treat a variety of ailments. Several medicinal plants have been thoroughly investigated in order to identify ingredients that are both extremely effective and low in toxicity when used in therapies. A variety of natural phytochemicals found in foods have been discovered as potential pharmacologic agents. The discovery of these bioactive components is critical for the treatment of a variety of diseases. As well as for the manufacture of pharmaceuticals, it is used to treat symptoms and disorders.[2]

For its digestive, stimulative, oral refreshing, carminative, aphrodisiac, astringent, antibacterial, and hepatoprotective effects, *Piper betel L.*, often known as 'green gold,' is a regularly taken dietary ingredient .[2]

Piper betel leaves are rich in bioactive compounds such as polyphenols, alkaloids, steroids, saponins, and tannins.The leaf extract has also been discovered to have biological detoxification, antioxidant, antimutagenic, and anticancer properties, implying that *Piper betel*has chemopreventive potential against a variety of illnesses, including liver fibrosis and prostate cancer.[3]

Among these compounds, hydroxychavicol (4-allyl catechol), a phenolic derivative derived from *Piper betel* leaves, has been found to exert anti-inflammation properties It has antibacterial, antifungal, antinitrosation, and antimutagenic characteristics, as well as acting as an antioxidant with varied scavenging properties for H2O2, superoxide, and hydroxyl radicals. By drastically decreasing the generation of the proinflammatory cytokine TNF-a and inhibiting lipid peroxidation, HC has shown potent anti-inflammatory and antioxidant action.The leaves of this plant are the most important portions, and they have tremendous therapeutic effect. The betel vine is a perennial creeper with 4–7 in. long and 2–4 in. broad leaves. The plant is propagated vegetatively in shadow settings using giant bamboo sticks or trees such as coconut or areca nut trees. The betel leaf is mostly sold for its medicinal properties. It is distinguished by its size and colour. The betel vine has been dubbed "India's green gold." In India, about 20 million individuals are known to make a living from farming and marketing betel leaves. The size, colour, taste, and scent of the betel leaf can be used to classify it into different types. Mysore, Banarasi, Salem, Magadhi, Kauri, Calcutta, Bagerhati, and Ghanagete are some of the most commonly planted betel vine kinds in India. [3]

2. LITERATURE REVIEW

Some of these plants are high in phytocompounds such as phenolics, flavonoids, and complex alkaloids, which can modulate a variety of metabolic pathways and thus be employed as medicinal agents. One such plant, betelvine, is high in bioactive compounds. Betelvine, a religiously significant plant in Southeast Asia, is a member of the Piperaceae family and is primarily used for chewing [1]**.**

The antibacterial, antifungal, and antimutagenic effects of hydroxychavicol (HC), a significant phenolic derivative isolated from the leaves of Piper betle L., are well documented. In this study, the anticancer activity of HC against Ehrlich Ascites Carcinoma (EAC) cells in Swiss albino mice was assessed in vivo, as well as the in silico interaction of HC with cancer receptors [2].

Carvacrol, chavicol, chavibetol, hydroxychavicol, eugenol, eugenol methyl ether, methyl eugenol, eucalyptol, eucalyptol, estragole, allyl catechol, 4-hydroxycatechol, cadinene, -caryophyllene, -lactone, p-cymene, cepharadione [3].

The Piperaceae, or pepper family, is responsible for many of the health advantages associated with Piper betel (locally known as Paan). It's a well-known herb that may be found all over the world. Betel leaves are the most valuable part of the plant; they contain tannins, chavicol, phenyl, propane, sesquiterpene, cyneole, alkaloid, sugar, and some essential oil and have been found to have various medicinal value, including

 ISBN: 978-81-955306-3-2

digestive, appetiser, aromatic, expectorant, stimulant, antibacterial, euphoria-inducing, antiprotozoan, carminative, anti-fungal, and aphrodisiac [4].

3. CHEMICAL CONSTITUENTS

The volatile oil, Betel oil, is the main ingredient of the leaves. Betelphenol (chavibetol) and chavicol are two phenols found in this product. Arakene, an alkaloid with characteristics comparable to cocaine, has been found in the leaves. 0.8-1.8 percent volatile oil containing chavicol, betelphenol, eugenol, and allyl pyrocatechinCineol, caryophyllene, cadinene, and menthone are all terpenes. Essential oils have different chemical compositions: safrole in the leaf, stalk, stem, and root, and ß-phellandrene in the fruit. The essential oil content of younger leaves has been observed to be higher. Active chemicals have been discovered in leaf and other plant components, including hydroxychavicol, hydroxychavicol acetate, allypyrocatechol, chavibetol, piperbetol, methylpiperbetol, piperol A, and piperol B. Fourteen components were discovered in the essential oil and ether soluble fraction of leaves, including eight allypyrocatechol analogues. [4]

Table: 1 the Anticancer Properties of the Phytochemicals from *Piper Betle*

Phytochemical	Anticancer properties	References
Hydoxychavicol	Chemotherapeutic and antiproliferative activities	[5]
Chavibetol	Free radical scavenging activities	[6]
Safrole	Antimutagen	[7]
β-carotene	Antioxidant	[8]
Eugenol	Antitumor activity	[9]

Source: As reference shown table

4. ANTIOXIDANT PROPERTY OF BETEL LEAVES

Multiple chemical components are invariably present in therapeutic plant extracts. Vitamins, ascorbic acid, thiamin, riboflavin, calcium, minerals, and carotenes are abundant in betelvine leaf. Aside from that, the plant betelvine contains allylpyrocatechol, chavicol, hydroxychavicol, eugenol, and other essential oil components. However, their anti- and prooxidant activities in extracts are representative of an averaged "profile" of constituent anti- and prooxidantactivity.The extract's activity could be additive, or there could be a complicated synergistic interaction between the different components that results in the desired pharmacological effect. There are numerous contradicting data on ROS-quenching antioxidant mechanisms and ROS-generating prooxidant activities, both of which are thought to be important in chemopreventive and chemotherapeutic effects. The Food and Drug Administration (FDA) and other health authorities have placed limits on the use of components like safrole and hydroxychavicol because they have been documented to form hepatotoxic intermediates with genotoxic consequences. As a result, creating a framework for an accurate assessment of the chemopreventive and/or chemotherapeutic contributions of these two-faced phyto compounds poses a challenge.The paradoxical roles of betelvine phytochemicals in healing disease, as well as the diversity of their phenolic functioning, must be addressed. Free radicals are a "key factor" in the majority of major health problems, including cancer, rheumatoid arthritis, Alzheimer's disease, and other neurological disorders and cardiovascular diseasesCancer therapy aims to eliminate these free radicals. Prooxidants from plants, which are substances that further boost free radicals, are utilised to destroy cancer cells in the late stages of cancer when the cancer cells have high levels of free radicals. Antioxidants, on the other hand, are preferred to lower free radicals during the early phases and after chemo/radiotherapy. Antioxidants are chemicals that have the ability to scavenge free radicals and protect cell protein, lipid, and

 ISBN: 978-81-955306-3-2

carbohydrate from harm. Prooxidant and antioxidant properties are found in components of betelvine leaf extract. Betel Leaves has a number of important antioxidant characteristics. [1]

5. CHEMOPROTECTIVE ACTION OF BETEL LEAVES

5.1 Hydroxychavicol:

The main active component of betelvine leaf is hydroxychavicol, which has chemotherapeutic and antiproliferative properties. It's an antimutagenic substance that also acts as a cyclooxygenase inhibitor. In oral carcinoma cells and prostate cancer cells, hydroxychavicol was found to inhibit cell cycle progression.Because of its antinucleogenic effects, hydroxychavicol was also effective in avoiding stomach ulcers. According to one study, hydroxychavicol functions as an APC (tumour suppressor protein), has anti-ulcerogenic properties, and suppresses inflammatory response molecules (nitric oxide synthase and COX-2) that are known to promote tumour growth by downregulating the NF-kB pathway. It has been found to reduce the risk of gastric cancer caused by indomethacin-induced stomach ulcers.hydroxychavicol interacts with gamma-tocotrienol, a vitamin E isomer, to affect many cellular signalling pathways, triggering apoptosis in human glioma cells and inhibiting cell proliferation synergistically.[1]

5.2 Free Radical Scavenging Effects

Free radicals are constantly replenished in the typical scenario due to numerous cellular metabolisms, which mostly consist of reactive oxygen and nitrogen species (ROS and RNS) (RNS) Free radicals are thought to be beneficial at very low concentrations, but in excess, they induce inflammation, cytotoxicity, and mutagenesis, as well as initiate or accelerate carcinogenesis. In an in vitro study, the aqueous extract of the betel vine's inflorescence was found to successfully scavenge H2O2, superoxide radicals, and hydroxyl radicals.In the PUC18 plasmid, the extract also reduced DNA damage caused by hydroxyl radicals.

The reducing power, free radical scavenging, and deoxyribose degradation activities of the methanolic leaf extract of betel vine leaves support previous results. Hydroxychavicol, on the other hand, has been found to have antileukemic action through the formation of reactive oxygen species (ROS). In chronic myeloid leukaemia (CML) cells, non-apoptotic concentrations of buthioninesulfoximine in combination with hydroxychavicol induced a synergistic caspase-dependent and apoptosis-inducing factor (AIF)-dependent pathway that resulted in expression of inducible nitric oxide synthase (iNOS) and apoptosis. [3]

5.3 Antimutagenic Effects:

One of the most basic processes in carcinogenesis is the induction of DNA damage, which leads to mutations in the nuclear material. Previous research has shown that oxidative and nitrative free radicals cause oxidative stress and damage cellular DNA, resulting in mutations. Nucleotide rearrangement, base modification, miscoding, gene duplication, and oncogene activation are all examples of DNA sequence changes that have a role in cancer start and progression.

Betel vine leaf extract did not cause any morphological transformation in the hamster embryo cells nor induce sister chromatid exchanges in phytohaemagglutinin (PHA)-stimulated and virally transformed human lymphocytes. N′nitrosonornicotine, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone, and 4-(N-nitroso methyl amino)-1-butanone are among the nitrosamines found in tobacco (3-pyridyl) Tobacco consumption or chewing has been linked as the primary cause of carcinogenesis due to the presence of -1-butanone, which are major carcinogens.[3]

 ISBN: 978-81-955306-3-2

5.4 Induction of Selective Apoptosis and Cell Death of Neoplastic Cells

Apoptosis, or programmed cell death, is a key mechanism that regulates cell proliferation and elimination in all tissues and organ systems. Many studies have shown that chemopreventive substances obtained from food can suppress preneoplastic and tumour cells by targeting their signalling pathways and triggering apoptosis. This extract has been discovered to be more effective than imatinib (an anticancer chemical medication) while posing no significant harm. The extract inhibited tyrosine kinase activity, reduced Bcr-Abl protein levels, and induced death in cells. NPB001-05 also caused dysregulation of the endoplasmic reticulum (ER) stress, PI3K/Akt, and MAPK signalling pathways, according to transcriptional profiling from microarray analysis. Some potential phytochemicals of the betel vine leaf extract, such as hydroxychavicol, have been demonstrated in studies [3].

6. REFERENCES :

1. Shukla, D., Johri, J., Srivastava, S., & Singh, P. C. (2018). Assessment of Anticancer Properties of Betelvine. In *Anticancer plants: properties and application* (pp. 195-206). Springer, Singapore.
2. Hemamalini, V., Velayutham, D. P. M., Lakshmanan, L., Muthusamy, K., Sivaramakrishnan, S., &Premkumar, K. (2020). Inhibitory potential of Hydroxychavicol on Ehrlich ascites carcinoma model and in silico interaction on cancer targets. *Natural product research*, *34*(11), 1591-1596.
3. Kudva, A. K., Rao, S., Rao, P., Periera, R., Bhandari, G., Mathew, J. M., ... &Baliga, M. S. (2018). Piper betle Linn. in Cancer: Past, Present, and Future. In *Anticancer plants: properties and application* (pp. 327-347). Springer, Singapore.
4. Shah, S. K., Garg, G., Jhade, D., & Patel, N. (2016). Piper betle: phytochemical, pharmacological and nutritional value in health management. *Int J Pharm Sci Rev Res*, *38*, 181-189.
5. Shah, G. A., Shah, T. I., &Telang, S. (2016). Anti-proliferative efficacy of Piper betle leaf extracts against B16F10 melanoma in an in-vivo experimental model. *World J Pharm PharmSci*, *5*, 835-843.
6. Paranjpe, R., Gundala, S. R., Lakshminarayana, N., Sagwal, A., Asif, G., Pandey, A., &Aneja, R. (2013). Piper betel leaf extract: anticancer benefits and bio-guided fractionation to identify active principles for prostate cancer management. *Carcinogenesis*, *34*(7), 1558-1566.
7. Nagabhushan, M., Amonkar, A. J., Nair, U. J., D'Souza, A. V., &Bhide, S. V. (1989). Hydroxychavicol: a new anti-nitrosating phenolic compound from betel leaf. *Mutagenesis*, *4*(3), 200-204.
8. Hosein, M., Mohiuddin, S., & Fatima, N. (2015). Association between grading of oral submucous fibrosis with frequency and consumption of areca nut and its derivatives in a wide age group: a multi-centric cross sectional study from Karachi, Pakistan. *Journal of cancer prevention*, *20*(3), 216.
9. Dervis, E., Yurt Kilcar, A., Medine, E. I., Tekin, V., Cetkin, B., Uygur, E., &Muftuler, F. Z. B. (2017). In vitro incorporation of radioiodinatedeugenol on adenocarcinoma cell lines (Caco2, MCF7, and PC3). *Cancer Biotherapy and Radiopharmaceuticals*, *32*(3), 75-81.

 ISBN: 978-81-955306-3-2

PCP252

Kabasura Kudineer against Covid-19

AP0150
Dr. S. Sivakrishnan
Department of Pharmacy, Annamalai University,
sivacdm82@gmail.com

ABSTRACT:

SARS-CoV-2 causes COVID-19. There is no cure for it. SARS-CoV-2 is one of seven coronaviruses that can cause serious illnesses like Middle East Respiratory Syndrome (MERS) and Sudden Acute Respiratory Syndrome (SARS). It spreads like other coronaviruses, mainly through direct human contact. Mild to fatal infections. Kabasura Kudineer is a polyherbal mixture derived from the Siddha School of medicine in India. Infectious diseases such as cough, cold, fever, and other respiratory infections are treated with this churnam. It is one of the drugs recommended by the Ministry of AYUSH for the symptomatic management of COVID-19. Kabasura Kudineer reduced SARS-CoV-2 viral load in asymptomatic COVID-19 cases and had no adverse effects, indicating its use in the COVID-19 strategy.The phytocompounds attach to the coronavirus spike protein, preventing infectious cells from growing in human cell membrane receptors. As a result of these compounds, the human body is free of hazardous bacterias and viruses. Though there are not proper medications for this pandemic, the research shows that Kabasura Kudineer is the best immunity booster but it is not a medicine for treating COVID-19.

Keywords: COVID-19, Kabasura Kudineer, Siddha, Efficacy, Formulation

1. INTRODUCTION

1.1 Covid-19

As of July 2021, SARS-CoV-2 infection caused COVID-19, affecting over 190 million people and killing 408,600 [1]. So far, 7 HCV strains have been identified and classified as -CoV (229E and NL63) and -CoV (OC43, HKU1, SARS, MERS, and COVID-19 HCoVs). MERS HCoV and SARS were found to be the most virulent and lethal [2]. The HCoV has a 30,000 bp single-stranded RNA (+ssRNA). The virus consists of two protein clusters: (a) non-structural RNA-dependent RNA polymerase (RRP) that aids in virus replication, and (3b) spike proteins that aid in virus fusion and entry into the host cell, Nucleocapsid, Matrix, and Envelope proteins [3]. Antiviral drugs, MERS-Cov antibodies, SARS-CoV, and hydroxychloroquine and azithromycin are currently recommended [4-5]. These compounds block viral entry by inhibiting the ACE2 cellular receptor, acidifying the cell membrane, and stimulating the immune system. However, some studies show that hydroxychloroquine is ineffective against coronavirus and has side effects in patients with acute renal failure [6-7]. A new method to prevent SARS-CoV2 infection is urgently needed.

1.2 Symptoms

These include upper respiratory tract infections (URIs), fever, anorexia, malaise, muscle pain, sore throat, dyspnea, nasal congestion and headache, pneumonia, acute respiratory failure and septic shock. COVID-19 is confirmed by RT-PCR (real-time reverse transcription polymerase chain reaction) [8]. Asymptomatic people are COVID-19 positive but don't show any symptoms. These asymptomatic COVID-19 carriers may help SARS-CoV-2 spread rapidly [9]. Asymptomatic SARS-CoV-2 infection is 40–45%. Ayurveda, Siddha, Unani, and Sowa-Rigpa traditional formulations/practices have been transcribed into the Traditional Knowledge Digital Library in India. Action of herbal drugs is determined by phytochemical components

[10]. Plant-based antiviral research has advanced due to non-specific targeting antiviral therapeutic methods. Herbal antiviral preparations have helped treat viral infections.

1.3 Diagnosis

This COVID-19 test uses polymerase chain reaction (PCR) to detect virus genetic material (PCR). A long nasal swab (nasopharyngeal swab) is inserted into the nostril to collect fluid, or a shorter nasal swab (mid-turbinate swab) is used to collect fluid.

COVID-19 antigen test detects virus proteins. Some antigen tests can produce results in minutes using a long nasal swab. Others may be tested in a lab. When instructions are carefully followed, a positive antigen test result is considered accurate, but false-negative results are possible — meaning you can be infected but have a negative result. To confirm a negative antigen test result, the doctor may recommend a PCR test.

1.4 Kabasura Kudineer

Kabasura Kudineer is a well-known Siddha medicine that contains 15 herbal ingredients, each with its own distinct properties. Kabasura Kudineer Chooranam is a traditional Siddha formulation used to treat common respiratory ailments like the flu and cold. Siddha practitioners swear by this herbal concoction for respiratory symptoms like severe phlegm, dry and wet cough, and fever. Kabasura kudineer is a powerful anti-inflammatory, analgesic, antiviral, anti-bacterial, anti-fungal and antioxidant herb. Several studies have shown that kabasura kudineer's anti-inflammatory, antibacterial, and antipyretic properties help reduce swelling in the air passages. This Churnam's therapeutic and curative properties made it a popular flu remedy. The powdered Churnam is usually consumed after infusing it in water to form a decoction or kadha.

1.5 Ingredients and its benefits

This chooranam contains the following ingredients combined in equal proportions of 6.66% of each compound to make the formulation. Table 1 showed the ingredients and its benefits of Kabasura Kudineer.

Table 1: Kabasura Kudineer ingredients and its benefits

Ginger (Chukku)	Promote digestion and is beneficial in treating asthma and other chronic respiratory ailments.
Piper longum (pippali)	Potential to treat indigestion, asthma and cough.
Clove (lavangam)	Kill the bacteria and promote liver health.
Dusparsha (cirukancori ver)	Treat haemorrhoids.
Akarakarabha	Healing mouth ulcers, sore throat, cough and ailments caused due to the worsening of vata dosha.
Kokilaksha(mulli ver)	Treating jaundice, abdominal distention and urinary infections.
Haritaki (kadukkaithol)	Strong antioxidant and anti-inflammatory properties it facilitate to treat sore throat and allergies.
Ajwain (Karpooravalli)	It helps in relieving common cold and cough.
Kusta (kostam)	Treating gout and respiratory ailment.
Guduchi (seenthil thandu)	Antipyretic and immunomodulatory effects.
Bharangi (Siruthekku)	Treating allergic rhinitis, asthma and other inflammatory conditions.
Kalamegha (siruthekku)	Cleansing and purifying the blood and liver.
Raja pata (Vattathiruppi)	Curing fever and intestinal worms.
Musta (korai kizhangu)	Eases fever and burning sensation.

 ISBN: 978-81-955306-3-2

1.6 Indications

This choornam is effective in balancing the kapha dosha which is known to infect the respiratory system. The mixture is effective in treating respiratory disorders such as fever, cough, and colds, as well as treating the flu. This is usually provided as a mixture. It is administered for 6-12 weeks, depending on the doctor's advice.

1.7 Dosage

25-50ml mixture twice daily or as indicated. 5-10 g choornam in 200 ml water, heat till reduced to 50 ml.

2. DISCUSSION

By inhibiting viral immune escape mechanisms, Kabasura Kudineer may enhance host antiviral immune responses, which in turn shows antiviral activity through immunoregulatory mechanisms. Phytochemicals found in the Kabasura Kudineer herbs, such as flavonoids and polysaccharides have been identified as immunomodulating agents. *Tinospora cordifolia* contains cordifolioside A, cordifolioside B, syringin, and d-glucan, which have immunomodulatory activity. Dry ginger (*Zingiber officinale*) has immunomodulatory properties and is an effective antimicrobial and antiviral agent in vitro. In addition to immunostimulatory activity, *Costus speciosus*, *Clerodendrum serratum*, and *Anacyclus pyrethrum* have been shown to modulate both cell-mediated and antibody-mediated immune responses in Wistar rats. In a mouse model, *Syzygium aromaticum* water extract inhibited macrophages from producing IL-1beta and IL-6. To reduce the risk of transmission for COVID-19 asymptomatic individuals who are quarantined at home, Kabasura Kudineer appears to be a viable option [11].

3. CONCLUSION

The current exploratory study shows the integrated management of COVD-19 with Kabasura Kudineer and standard care of treatment has shown notable results in virologic clearance, thereby reducing hospital stay length than the discharge policy issued by health authorities. Moreover, there were no significant adverse reactions concerning the administration of Kabasura Kudineer. Further studies on Kabasura Kudineer will explore the public health potential of Siddha medicines in this current pandemic.

4. REFERENCES

1. Weekly epidemiological update on COVID-19 - 20 July 2021 [Internet]. [Cited 2021 Jul 22]. Available from: https://www.who.int/publications/m/item/weekly-epidemiological-update-on-covid-19%2D%2D-20-july-2021
2. Elfiky, A. A. (2020). Anti-HCV, nucleotide inhibitor, repurposed against COVID-19. Life Sci. 248:117477.
3. Elfiky, A. A., Mahdy, S. M., and Elshemey, W. M. (2017). Quantitative structure-activity relationship and molecular docking revealed a potency of anti-hepatitis C virus drugs against human corona viruses. J. Med. Virol. 89, 1040–1047.
4. Gautret, P., Lagier, J. C., Parola, P., Meddeb, L., Mailhe, M., Doudier, B., et al. (2020). Hydroxychloroquine and azithromycin as a treatment of COVID-19: results of an open-label non-randomized clinical trial. *Int. J. Anti-Micro. Agents* 56:105949.
5. Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., et al. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 395, 497–506.
6. Pelle, M. T., and Callen, J. P. (2002). Adverse cutaneous reactions to hydroxychloroquine are more common in patients with dermatomyositis than in patients with cutaneous Lupus erythematosus. Arch. Dermatol. 138, 1231–1233.

7. Tailor, R., Elaraoud, I., Good, P., Hope-Ross, M., and Scott, R. A. (2012). A case of severe hydroxychloroquine-induced retinal toxicity in a patient with recent onset of renal: a review of the literature on the use of hydroxychloroquine in renal impairment. Case Rep. Ophthalmol. Med. 2012:182747. doi: 10.1155/2012/182747
8. Emery SL, Erdman DD, Bowen MD, Newton BR, Winchell JM, Meyer RF, et al. (2004). Real-time reverse transcription–polymerase chain reaction assay for SARS-associated coronavirus. Emerg Infect Dis. 10(2):311–6.
9. Long Q-X, Tang X-J, Shi Q-L, Li Q, Deng H-J, Yuan J, et al. (2020). Clinical and immunological assessment of asymptomatic SARS-CoV-2 infections. Nat Med. 18:1–5.
10. Parasuraman S, Thing GS, Dhanaraj SA (2014). Polyherbal formulation: concept of Ayurveda. Pharmacogn Rev. 8(16):73–80.
11. S. Natarajan, C. Anbarasi, P. Sathiyarajeswaran, P. Manickam, S. Geetha, R. Kathiravan , P. Prathiba , M. Pitchiahkumar , P. Parthiban, K. Kanakavalli and P. Balaji. (2021).Kabasura Kudineer (KSK), a poly-herbal Siddha medicine, reduced SARS-CoV-2 viral load in asymptomatic COVID-19 individuals as compared to vitamin C and zinc supplementation: findings from a prospective, exploratory, open-labeled, comparative, randomized controlled trial, Tamil Nadu, India.Trials. 22. 10.1186/s13063-021-05583-0.

PCP214

Ethnopharmacological Evaluation of Some Herbal Immunomodulators in Colorectal Cancer with Focus on Targeting Cancer Stem Cells and Metastasis

AP0084
Alkeshkumar Patel*[1]
alkeshpatel.ph@charusat.ac.in

AP0000
Samir Patel[1]

AP0000
Hemangini vora[2]

[1] Ramanbhai Patel college of Pharmacy, CHARUSAT, Changa
[2] Gujarat Cancer and Research Institute (GCRI), Cancer civil, Ahmedabad

ABSTRACT:
Colorectal cancer (CRC) is the second deadliest cancer. The aggressive cancer stem cells (CSC) generate immortal progenitor cancer cells that metastasize to liver and lung which is the main reason for mortality of the host. Current chemotherapy fails to eradicate CSC due to its inheritance resistance. Negative correlation exists in between cancer stemness and anticancer immunity. Some flavonoids, alkaloids and polyphenols from natural product have been reported to modulate immunity and signaling pathways that affect cancer stemness. In this study, we evaluated the effects of *Tinospora cordifoilia and Solanum nigrum* in experimental animal model of CRC. Total 66Sprague Dawley rats divided into 6 groups (n=12 except normal control (n=6), RPCP/IAEC/2019-20/R2). Except the normal control, CRC were induced by DMH with 20 mg/kg for first 10 weeks and 30 mg/kg for next 10 weeks (total 20 weeks) in all other 5 groups (disease control, standard, standard plus therapeutic, therapeutic high and low dose). Treatment was given after induction of Cancer for 7 weeks. Thereafter, half of the animals (6) were sacrificed and remaining animals (6) left untreated for 5 weeks. So total study period was 32 weeks. Different Blood (complete blood counts, plasma IL-12) & tissue (Adenoma, adenocarcinoma, metastasis, CSC marker CD44) related parameters were measured to determine efficacy of test drugs against CSC and metastasis. Significant difference ($p<0.05$) observed in between disease control versus standard and high dose of test drugs with respect to cachexia, fecal occult blood, % lymphocyte level, IL-12, metastasis and positivity for cd44. Standard drug 5-fluorouracil failed to curb cancer stemness and metastasis after discontinuation of treatment at 27th week. The synergism of chemotherapy (5-fluorouracil) and high dose of herbal test drugs showed metastasis preventive effects in the liver and visceral organs. High dose showed sustained effects even after discontinuation of the treatment suggesting its positive effects on targeting CSC compared to 5- fluorouracil.

Keywords: Carcinogen, colorectal cancer, cancer stem cells, metastasis, immunomodulators, 5-fluorouracil, natural herbs

1. INTRODUCTION

Cancer remains one of the complex disease in the medical science that arise because of multiple numbers of abnormal hallmarks. The uncontrolled cell proliferation, anti-apoptotic potential, altered energy metabolism, immunoevasion, genetic mutations and sustain growth factors secretion responsible for Carcinogenesis. As per Global cancer statistics, Colorectal Cancer (CRC) is 3rd most common type of cancer in men while 2nd in the women. It has 2nd highest mortality rate of cancer related death worldwide. Multiple gene mutations like APC, K-Ras, p53 and defective signaling pathways of wnt/β-catenin, notch is playing major role in the development of CRC. Recent evidence indicates Cancer stem cells (CSC) responsible for CRC resistance, metastasis and advance stages of T4. Current chemotherapy fails to target CSC due to its potential enzymatic, genetic and transporters capacities.

 ISBN: 978-81-955306-3-2

2. LITERAURE REVIEW

During early stage of tumor growth, the innate and adaptive immune responses co-operate to identify and eliminate transformed cells. [1] The immune system is alerted of the presence of tumor cells by the presence of danger signals by transformed cells. CD4+ T helper cells, together with their innate counterparts support the activity of cytotoxic cells and macrophages. These cell secreting cytokines such as interleukin-12 (IL-12), tumor necrosis factor- alpha (TNF-α) and interferon-gamma**.** [2] The anti-neoplastic effects of IL-12 may be attributed to infiltration of NK cells within tumor [3]. Although insufficient cross talk, chronic inflammation, poor signaling and immunosuppression milieu of tumor leads to immunoevasion in chronic period. [4]

Based on two different theories: the stochastic or clonal evolution model, and the hierarchical or CSC model, all tumors are made of heterogeneous cell subpopulations. [5,6] In the hierarchical model, only a cell subpopulation known as tumor initiating cells (TICs) [7] responsible for initiate tumor growth and it defines CSCs as a minority cell tumor subpopulation endowed with properties like self-renewal, differentiation, and multi-potency. CSC-like properties may also be a function of cell type origin, signals from the stromal microenvironment, accumulated somatic mutations and stage of malignant progression. [8] These cells display resistance to chemotherapy [9], radiotherapy [10] and immunotherapy [11] and are TICs. [12] Several mechanisms, such as quiescence, are involved in chemoresistance. [9] Certain drug-resistant proteins also make stem cells more resistant to toxins that kill their terminally differentiated counterparts. [13] In addition, CSCs/TICs that have undergone an epithelial mesenchymal transition (EMT) appear to be more resistant to chemotherapy. [14] Conventional Chemotherapy and Radiotherapy produce immunosuppression and promoting conversion of normal stem cells into the cancer stem cells.

Negative association exist in between cancer stemness and anticancer immunity. [15] CSCs/TICs can produce immunosuppressive molecules that weaken the immune system. [16] Even CSCs/ TICs enroll cells that suppress the immune system. [17] Immune system may be undermined by disease, aging or medicinal immunosuppression. Certain signaling pathways, such as Notch, Wnt and Hedgehog, can support CSC/TIC escape. [18] CD44 is marker of tumour invasiveness and metastasis. It is also described as a putative colorectal CSC marker. [19-20]

Traditional Immunomodulators possess certain phytoconstituents from flavonoids, polyphenols and alkaloids category. The major one are Berberine, ellagic acid, kaempferol, tinosporide, naringenin, quercetin and solanine A from *Tinospora cordifolia* (TC) and *Solanum nigrm* linn (SN). These are working on multiple aspects of immunomodulation like activation of macrophages, rise in the level of T-cell infiltration, promoting natural killer cells activity and cytotoxic T- lymphocyte.

Experimental models help us to explore various stage of CRC that begin with presence of benign polyps to hyperplasia to metaplasia to dysplasia to benign tumor to malignant tumor and ultimately if not treated it metastasize to other organs and death of animals. 1,2 Dimethyl hydrazine (DMH) is considered as pro carcinogen that get further metabolized in liver. DMH get metabolically activated by hepatic enzyme and after passing many series of reactions that involve many intermediates like azomethane, azoxymethane, methylazoxymethanol- proximate carcinogen to the dangerous methylating agent called as methyl carbonium ions. The methyl carbonium ion damage epithelial cells by methylation of DNA base pair, produce mutation, shows aberrant crypt foci, trigger abnormal apoptosis process, and may induce hyperplasia followed by development of tumor.

3. OBJECTIVES

To prepare and evaluate phytochemical constituents from hydroalcoholic (30:70) extract of TC (stem) and aqueous extract of SN (leaves)

To evaluate Anti-cancer activity of test drugs in early and advance stage of Colorectal Cancer by its therapeutic intervention

To evaluate synergism effect of test drugs with standard drug, 5- fluorouracil (5-FU)

To determine efficacy of test drug against relapse and metastasis after stop of treatment with test drugs

To estimate role of test drug on targeting Cancer stem cells and disease aggressiveness

 ISBN: 978-81-955306-3-2

4. EXPERIMENTAL WORK

The herbal extracts received as gift sample from Pharmanza Herbal pvt ltd, Dharmaj. The animal study carried out as per the guideline of CPCSEA (RPCP/IAEC/2019-20/R2) at animal house facility of Ramanbhai Patel college of Pharmacy, CHARUSAT. Acute study was carried out as per the guideline 423 and based on that low and high dose of test drugs decided. CRC were induced by DMH with 20 mg/kg for first 10 weeks and 30 mg/kg for next 10 weeks (total 20 weeks) in all 5 groups (disease control, standard, standard plus therapeutic, therapeutic high and low dose) except normal control. 5-FU administered by subcutaneous route at 10 mg/kg for 7 weeks. Extract dissolved in distilled water and administered by oral route for 7 weeks of treatment at the dose of 50 and 100 mg/kg. Half population of rats (6) sacrificed at the end of 27th weeks and remaining 6 rats left for 5 weeks without treatment to observe advance stages and metastasis in the rats.

1. Extract preparation and Phytochemical evaluation
2. % change in body weight
3. White blood cells (WBC)
4. % Lymphocyte
5. Diarrhoea score
6. Estimation of IL-12 (ELISA)
7. Morphology of Colorectal tumor and Liver metastasis
8. Histology
9. Immunohistochemistry of CD44

5. RESULT AND DISCUSSION

5.1 The phytochemical screening based on qualitative analysis (Kokate, 1996) and HPTLC indicate the presence of Flavonoid, polyphenol and alkaloids present in herbal extracts.

5.2 % change in body weight
(For cachexia, cancer progress)

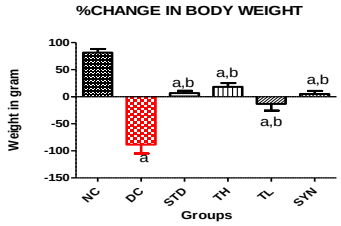


Figure 1:Body weight changes at the end of 27th weeks in each group. All values are expressed as mean ± SEM of 6 animals. a, P< 0.05 versus normal control, b, P < 0.05 versus disease control. One-way ANOVA followed by Tukey's multiple comparison tests using GraphPad Prism

5.3 White blood cells (WBC)
(For immunostimulant)

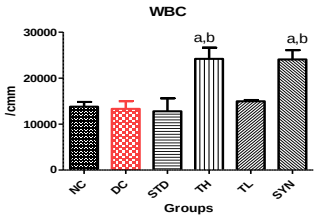


Figure 2:WBC value at the end of 27th weeks in each group. All values are expressed as mean ± SEM of 6 animals. a, P< 0.05 versus normal control, b, P < 0.05 versus disease control. One-way ANOVA followed by Tukey's multiple comparison tests using GraphPad Prism

 ISBN: 978-81-955306-3-2

5.4 % Lymphocyte
(For anti-tumor activity)

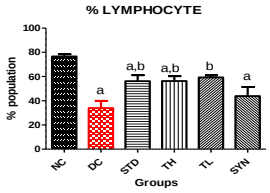


Figure 3:% Lymphocyte value at the end of 27th weeks in each group. All values are expressed as mean ± SEM of 6 animals. a, P< 0.05 versus normal control, b, P < 0.05 versus disease control. One-way ANOVA followed by Tukey's multiple comparison tests using GraphPad Prism

5.5 Diarrhoea score
(For cellular changes in cancer)

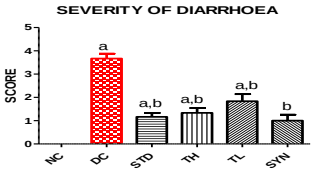


Figure 4:Diarrhoea score was measured on a scale of 0 to 4. Scores were analyzed using Kruskal-Wallis test followed by Dunn's multiple comparison tests. All values are expressed as mean ± SEM of 6 animals. a, P < 0.05 versus normal control, b, P < 0.05 versus disease control

5.6 Estimation of IL-12 (Elab science, ELISA)
(For natural killer activity)

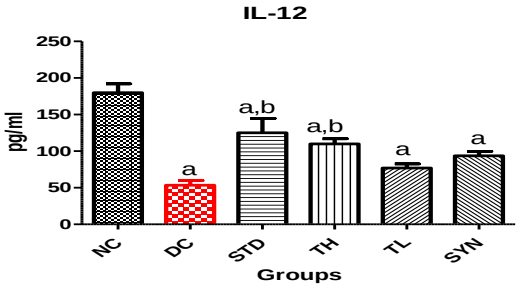


Figure 5:IL-12 (pg/ml) value at the end of 27th weeks in each group. All values are expressed as mean ± SEM of 6 animals. a, P< 0.05 versus normal control, b, P < 0.05 versus disease control. One-way ANOVA followed by Tukey's multiple comparison tests using GraphPad Prism

5.7 Morphology of Colorectal tumor and Liver metastasis

Figure 6: Tumor in Rat colon

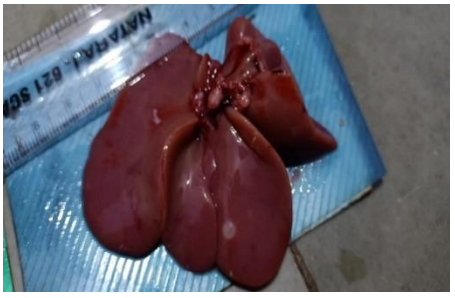
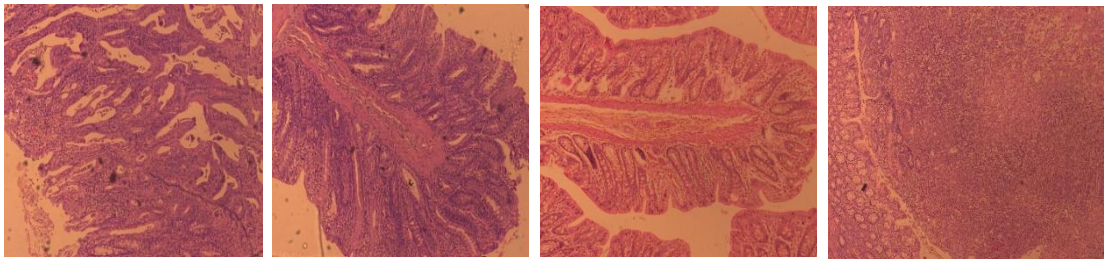


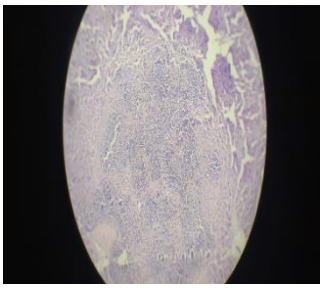
Figure 7: Liver metastasis

 ISBN: 978-81-955306-3-2

5.8 Histology (Hematoxylin and eosin staining)



(a) (b) (c) (d)



(e)

Figure 8: a indicate normal colon histology, b-dysplasia, c-moderately differentiated adenocarcinoma, d-signet ring cell carcinoma, e- liver metastasis (disease control and 5-FU treated at the end of the study)

5.9 Immunohistochemistry of CD44 (invitrogen)

(a) (b) (c)

Figure 9: a indicate low (test high dose), b- moderate (test high dose, 5-FU) and c- high (disease control, 5-FU, test low dose) staining positivity for CD44 marker in colonic tissue

6. DISCUSSION:

Animals from disease control group have shown poor overall and disease-free survival as CRC is the deadliest cancer. Standard drug 5-FU failed to curb cancer stemness and metastasis after discontinuation of treatment from 27th week. It indicates that 5-FU might promote wnt/ β-catenin pathway through p53 activation that results in CRC resistance and recurrence. High dose showed sustained effects even after discontinuation of the treatment suggesting its positive effects on targeting CSC compared to 5- FU. Expression of CD44 decreased in high test drug group compared to all disease treated groups that correlate

 ISBN: 978-81-955306-3-2

with tissue specific immune activation and decrease in CSC population. High scores of diarrhoea in the disease control group indicate dysregulation of water reabsorption and leaky blood vasculature of the tumors in the rat colon. Significance difference ($p<0.05$) has been observed in between disease control group versus 5-FU and high dose of test drug for IL-12 that can be correlated with good natural killer cells activity in the host. The probable mechanism of herbal extract involved downregulation of wnt/β-catenin pathway, slow down conversion of normal stem cells to CSC, reducing chronic colitis by suppressing proinflammatory cytokine (TNF-α, IL-6) level, preventing epithelial mesenchymal transition, improving immunosurveillance in the body. Low dose was not sufficient to prevent carcinogenesis. The synergism of chemotherapy (5-FU) and high dose of herbal test drugs showed metastasis preventive effects in the liver, lungs and visceral

7. CONCLUSION

5-FU unable to show sustain disease free survival in CRC. The selected immunomodulators in high dose able to target CSC by multiple mechanisms, so it can be explored further. The synergism of herbal drug with chemotherapy work against metastasis and advance stage of CRC.

8. ACKNOWLEDGEMENT

We thanks to Ramanbhai Patel college of Pharmacy, CHARUSAT, Changa and Gujarat Cancer and Research Institute (GCRI), Ahmedabad for their support in carrying out this research work.

9. FUNDING SOURCE

The funding to carry out research was provided by CHARUSAT SEED RESEARCH GRANT (Project no.17) and Pharmanza herbals pvt ltd, Dharmaj, Gujarat.

10. REFERENCES

1. Patel, A. (2014). Immunotherapy for Cancer: A Newer Dimension in Chemoprevention. *Asian Journal of Biomedical and Pharmaceutical Sciences*, *4*(33), 1-8.
2. Michele W.L.Teng, Michael H.Kershaw, Mark J.Smyth. (2013). Cancer Immunoediting: From Surveillance to Escape. Cancer Immunotherapy (Second Edition). Immune Suppression and Tumor Growth, 85-99.
3. Coca, S., Enrech, S., Moreno Garcia, V., Sáez, M. A., Gutiérrez, C., Colmenarejo, A., & Pérez Piqueras, J. (2005). Evaluation of the antitumor activity of interleukin-12 in an experimental murine model of colorectal cancer induced by 1, 2 dimethyl-hydrazine (DMH). *Revista Espanola de Enfermedades Digestivas*, *97*(9), 619-628.
4. Shalapour, S., & Karin, M. (2015). Immunity, inflammation, and cancer: an eternal fight between good and evil. *The Journal of clinical investigation*, *125*(9), 3347-3355.
5. Anderson K, Lutz C, van Delft FW, et al. (2011). Genetic variegation of clonal architecture and propagating cells in leukaemia. Nature, 469,356-61.
6. Codony-Servat J, Rosell R. (2015). Cancer stem cells and immunoresistance: clinical implications and solutions. Transl Lung Cancer Res,4(6),689-703.
7. Tang DG. (2012) Understanding cancer stem cell heterogeneity and plasticity. Cell Res, 22,457-72.
8. Gupta PB, Chaffer CL, Weinberg RA. (2009). Cancer stem cells: mirage or reality? Nat Med, 15,1010-2.
9. Li L, Bhatia R. (2011) Stem cell quiescence. Clin Cancer Res, 17, 4936-41.
10. Bao S, Wu Q, Li Z, et al. (2008). Targeting cancer stem cells through L1CAM suppresses glioma growth. Cancer Res, 68, 6043-8.
11. Irvin, D. K., Jouanneau, E., Duvall, G., Zhang, X. X., Zhai, Y., Sarayba, D & Wheeler, C. J. (2010). T cells enhance stem-like properties and conditional malignancy in gliomas. *PLoS One*, *5*(6), e10974.

12. Raulet DH, Guerra N. (2009). Oncogenic stress sensed by the immune system: role of natural killer cell receptors. Nat Rev Immunol, 9,568-80.
13. Hochedlinger K, Yamada Y, Beard C, et al. (2005). Ectopic expression of Oct-4 blocks progenitor-cell differentiation and causes dysplasia in epithelial tissues. Cell, 121,465-77.
14. Kalluri R, Weinberg RA. (2009). The basics of epithelial mesenchymal transition. J Clin Invest, 119, 1420-8.
15. AlexMiranda, PhineasT. Hamilton, Allen,W. Zhang, Swetansu Pattnaik, Etienne Becht, Artur Mezheyeus ki, Jarle Bruun, Patrick Micke, Aurélien de Reynies, Brad H. Nelson. (2019). Cancer stemness, intratumoral heterogeneity, and immune response across cancers. Proceedings of the National Academy of Sciences, 116 (18), 9020-9029.
16. Aguirre-Ghiso JA.(2007). Models, mechanisms and clinical evidence for cancer dormancy. Nat Rev Cancer, 7,834-46.
17. Kaplan RN, Riba RD, Zacharoulis S, et al. (2005). VEGFR1- positive haematopoietic bone marrow progenitors initiate the pre-metastatic niche. Nature, 438:820-7.
18. Takebe N, Harris PJ, Warren RQ, et al. (2011). Targeting cancer stem cells by inhibiting Wnt, Notch, and Hedgehog pathways. Nat Rev Clin Oncol. 8,97-106.
19. Du L, Wang H, He L, Zhang J, Ni B, Wang X, et al. (2008). CD44 is of functional importance for colorectal cancer stem cells. Clin Cancer Res.; 14:6751–60.
20. Visvader JE, Lindeman GJ (2008). Cancer stem cells in solid tumours: accumulating evidence and unresolved questions. Nat Rev Cancer 8: 755 – 768.
21. Kokate, C. K., Purohit, C. K., & Gokhale, S. B. (1996). Phytochemical tests. *Pharmacognosy*, *35*, 510-512.

 ISBN: 978-81-955306-3-2

PCP194

Development and Standardization of a Novel All Purpose Herbal Hair Cosmeceutical

AP0026
Nidamanuri Manju Bhargavi
School of Pharmacy, RK University
manjunidamanuri@gmail.com

ABSTRACT:
Appearance of hair makes an important impact on the total body feature. The current lifestyle has brought up several challenges against hair health. Many formulations for this are available in the market. However, these formulations usually treat a limited spectrum of the hair problems. Medicinal plants have been used for the treatment of hair since millenniums. The main objective of present study is to develop an all-in-one herbal formulation to treat various problems related to hair, simultaneously. **Materials and Methods:** *Ksheerapaka* method using different herbs like *Psidium guajava* leaves, *Moringa oleifera* leaves, *Trigonella foenum-graecum* seeds, *Carica papaya, Allium cepa*bulbjuice, *Nigella sativa*seed oiland*Salvia rosmarinus*essential oil, will be employed to develop the formulation. The formulated herbal oil will be standardized as per official guidelines using various chromatographic, physiochemical and biological methods. Development of an herbal formulation which will cover all aspects of the health of the hair.

Keywords – *Psidium gujava* leaves, *Moringa oleifera* leaves, *Carica papaya* leaves, *Trigonella foenum-graecum* seeds, *Allium cepa*bulbjuice, *Nigella sativa*seed oiland*Salvia rosmarinus*essential oil, new hair follicle, Prevent premature grey hair.

1. INTRODUCTION:

Hair is simple in structure but it plays important role in social functioning. Hair is made of a tough protein called keratin. Each hair has a hair shaft and a hair root. The shaft is the visible part of the hair that sticks out of the skin. There are about 1,000,000-2,000,000 hair follicles (HFs) present in scalp. Hair fiber is not steady in their full length, but instead outcomes from compact agencies of cells inside the fiber follicle, from which three extra common morphological accessories of hair constitution originate: There are multi-cellular cuticle sheath, the fibrous cortex, and the medulla. At the follicular level, a single layer of cells offers upward thrust to the cuticle, a protective layer overlaying the core of the fiber. It is made from β-keratins and displays a scaled constitution and possessing between seven and ten superimposed layers with the cuticle edges pointing toward the tip of the fiber [1-2].

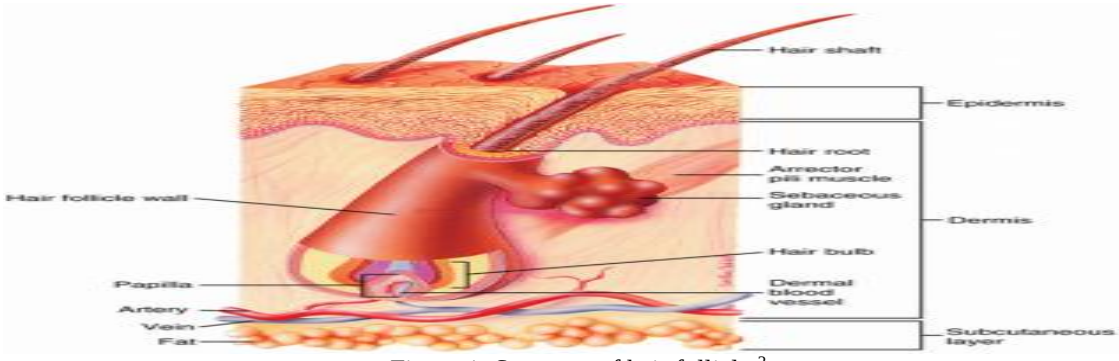


Figure 1: Structure of hair follicle [3]

 ISBN: 978-81-955306-3-2

The hair development undergoes a repetitive cycle that is Anagen section followed by using the Catagen and Telogen phase. The anagen stage in the scalp, there are roughly 100,000 hairs and 90% of the follicles are consistently within the anagen segment of hair development. The catagen stage follows the end of the development interval when a follicle begins to end up dormant. The telogen stage is a dormant or resting interval that lasts 3-4 months. A natural fee of hair progress is about 1/2 an inch per 30 days relying on hair follicles and age of a character. On normal, 50-60 scalp hairs are lost day-to-day in a normal hair growth cycle and new hairs begin to grow from these follicles. Hair loss starts of evolved when much less new hair starts the re-growth stage [3]. There are many causes for hair graying, but mainly hydrogen peroxide is responsible for it. The overproduction of H2O2 due to accumulated oxidative stress in the hair follicles. In other words, hair begins to bleach itself from the inside out. The over formation of H2O2 begins to block the melanin production. This process is a series of complex mechanism involving the effect of oxidative stress and follicle damage on key enzymes [2]. In general, 50-100 hairs at random are shed every day. An increase of more than 100 hairs per day constituents a state of hair loss or alopecia [4].Various factors contribute to hair disorders. Genetic predisposition and hormonal factors, various disease state such as typhoid, malaria, jaundice etc. The telogen/ anagen effluvium is the reason for hair fall / loss. Hair fall/ loss cause a very stressful state of mind for hair fall sufferers. Androgens are one of the most important causes for alopecia apart from a variety of other factors [6]. Natural products in the form of herbal formulations are available on the market and are used as hair tonic, hair growth promoter, hair conditioner, hair-cleansing agent, antidandruff agents, as well as for the treatment of alopecia and lice infection [6]. Several herbal products have been acclaimed with hair growth- promoting activity [7]. The traditional system of medicine in India acclaims several herbal drugs for hair growth promotion. The paper presents a review of those rare herbs used for hair problems.

1.1 Rosmary essential oil (Labiatae)

Commonly it is called as Rosemary, the other names of rosemary are rosemary coronarium, compass plant, Incensier and garden rosemary.The botanical name of rosemary is *Rosmarinus officinalis,* it is native of southern Europa, in this the main active constituents are Volatile Oil (1-2%), Bornyl acetate, Borneol, Cineole, Camphene, -pinene, Rosemarinic acid, & amyrins, Betulins & -Sitosterol.Furthermore, rosemary oil shows important clinical effects on mood, learning, memory, pain, anxiety, and sleep, the most important components of rosemary which are medicinally and pharmacologically active are rosmarinic acid, carnosic acid, and the essential oil. Rosmarinic acid have antioxidant effect [8].Carnosic acid is the one of the plant's key ingredients, have shown to heal nerve damage and restore tissue in the scalp. Due to having an anti-inflammatory effect it will improve cellular generation. This could help for hair regrowth and thickness.Rosemary oil is considered one of the best natural conditioners for hair. It adds a natural luster and shine to dull hair and gets rid of split ends [9].

1.2 Coconut oil (Arecaceae)

Commonly it is called as Coconut and Narikela. The botanical name of coconut is *Cocos nucifera,* it is largely cultivated in African and southeast Asian countries [10]. It contains catalase, peroxidase, amino acid, tyrosine, vitamin C and biotin, triglyceride of lauric acid (fatty acid), Leuco anthocyanin. Coconut oil is an excellent conditioner helps to re-growth of damaged hair. It also provides the essential required proteins for nourishing and healing damaged hair. It also helps in keeping your hair and scalp free from lice and lice eggs. Coconut oil used to treat hair fall, encourage regrowth, and prevent premature graying, nourish hair, strengthen roots, and increase hair thickness and reduce hair loss. It used as a good hair conditioner.[10]

1.3 Allium cepa (Alliaceae)

Commonly it called as onion, Bulb onion. The botanical name of onion is called *Allium cepa,* Onions have originated in Iran, the western Indian subcontinent, and Central Asia. It contains several phytonutrients such

 ISBN: 978-81-955306-3-2

as flavonoids, fructo oligosaccharides (FOS), and thiosulfates and other sulfur compounds contain high levels of phenolic compounds, which have antioxidantproperties [11-12].
The Sulphur content in onion is helps to nourish your strands and stimulate dormant hair follicles to reduce hair fall and boost hair growth. It helps to prevent environmental damage because onion juice is a great source of antioxidants. Daily massaging with onion juice on head reverses as well as delays the greying of hair.

1.4 Fenugreek (Leguminaceae)
Commonly it called as Methi seeds, the botanical name of methi seeds is *Trigonella foenum-graecum* and it also called as Methi, Methika, and Chandrika. The plant grows wild in Northern India and Southern and Eastern Europe, Pakistan, France, Morocco and Egypt. It contains mainly Saponin glycosides (Diosgenin, Trigogenin, and Yamogenin Gitogenin), Coumarin derivatives (Trigocoumarin, Trigoforin), Alkaloids, Proteins, Flavonoids and prolamine [13]. The major bioactive compounds in fenugreek seeds are polyphenol compounds, such as rhaponticin and isovitexin, small number of volatile oils and fixed oils has been found in fenugreek seeds. Fenugreek seeds are rich in folic acid, Vitamin A, Vitamin K and Vitamin C, and are a storehouse of minerals such as potassium, calcium and iron and also have high protein and nicotinic acid content, which are known to be beneficial against hair fall and dandruff, and in treating a variety of scalp issues like dryness of hair, baldness and hair thinning. It contains large amounts of lecithin, which hydrates the hair and strengthens the roots or hair follicles. The seeds also help in moisturizing the hair and bringing back the luster and bounce [14].

1.5 Moringa oleifera (Moringaceae)
Commonly it is called Horse Radish Tree, Drum-stick Tree.The botanical name of this herb is called Moringa Oleifera and also it is called Moringa pterygosperma Gaertn, this is native to the sub-Himalayan areas of India, Pakistan, Bangladesh, and Afghanistan.[20]Moringa leaf has proven that minimize dandruff and split ends by cleaning and moisturizing the hair. The zinc found in moringa enables the leaf to stimulate hair growth. Vitamin B and E are present heigh amount in Moringa leaf which promotes a healthy nourished scalp and also it contains high levels of iron extremely important to hair growth, especially for women. Iron carries oxygen to the hair follicles. The formation of keratin in the hair and scalp depends on the number of amino-acids, minerals, and vitamins present within your scalp and hair follicles. Moringa is rich in all of the nutrients needed to produce keratin, help with dry hair, or looking to rejuvenate and strengthen weak or broken hair, growth-promoting minerals into your hair and scalp, protect bad bacterial and fungal growth, and reduce the greying of hairs, dandruff and split ends [15].

1.6 Kala jeera oil: (Ranunculaceae)
Commonly it called Nigella seed, black cumin, kalajira and Kalongi. The botanical name of kalanji is *Nigella sativa*, mostly cultivated in Punjab, Himachal Pradesh, Bihar and Assam [16]. *N. sativa* oil rich source of linoleic acid, oleic acid, palmitic acid, and *trans*-anethole, and other minor constituents. The nigella seeds contain numerous esters of unsaturated fatty acids with terpene alcohols. Black seed oil contains omega-3 and 6 which encourages blood circulation, especially in the head, it will promote rapid hair growth within weeks. Using black seed oil along with other delivery ingredients to help decrease dandruff, and it can help resolve skin imbalances such as eczema and psoriasis on the scalp and body, it work on to hydrate, moisturize, and soften hair.

1.7 Papaya (Caricaceae)
The other names of Papaya Are Papaw or Paw Paw, Tree Melon. Botanical Name of papaya is*Carica papaya* (LINN.)Originally from southern Mexico (particularly Chiapas and Veracruz), Central America, and northern South America, the papaya is now cultivated in most tropical countries. The active components are carotenoids, vitamin C, thiamin, riboflavin, niacin, vitamin B-6 and vitamin K and flavonoids, Quinons,

 ISBN: 978-81-955306-3-2

Saponin glycoside, Enzymes, Amino acids, Phenols and phenolic acid, Organic acids, and others like creatine, cholin, Trigonelline etc. It Promotes Hair Growth**,** Controls Dandruff. Using papaya leaf to improve hair growth because rich supply of antioxidants, it leads to increase volume to hair, gives natural shine increase hair growth and preventing baldness and also it prevents premature greying of hair. It used as a natural hair conditioner [17].The leaf juice will nourishes your hair roots, making them stronger. It protects your hair from the harmful ultraviolet rays of the sun preventing hair damage.

1.8 Guajava leaf (Myrtaceae)

Commonly it called as Guava and Botanical name of guava is *Psidium guajava* L. It is a native plant of tropical America, but now cultivated throughout the tropics. Wherever the climate is suitable the plant has become naturalized. The guava leaves mainly contain Cytokinins like Zeatin, Zeatin riboside, Zeatin nucleotide. Ascorbic acid an important antioxidant, is present heigh amount in guava leaves. Guava has a high content of protocatechuic acid, quercetin, ferulic acid, quercetin, gallic acid and caffeic acid which are important antioxidants. As the nutrients present in them help arrest hair loss. They are rich in vitamins A and C, folic acid, copper, potassium, fibre, manganese, flavonoids, and other phytochemicals. All of these qualities are beneficial for hair growth and controlling hair loss, air will become soft and lustrous and increase its volume by using Guava leaf juice on hair [18].

2. CONCLUSION:

In present paper complied the isolated phytoconstituents i.e., lauric acid,vitamin K and flavonoids, Quinons, Saponin glycoside, Enzymes, Amino acids, Phenols and phenolic acid Guayavolic acid, Essential oil, p-cymene, thymoquinone, catechin, gallic acid and sulfur compounds from various plants extract that are also believed to this has led to increase interest in alternative remedies such as herbal medicine. A new revolution provides for herbal drugs for hair growth. In this paper, we summarized some of the herbs that are believed to reduce the rate of hair loss and at the same time stimulate new hair reduce the rate of hair loss. At last, it is concluded that most hair growth promotion studies were performed with plants and their extracts in animals' models. More scientific evidence and documentation is desirable for promotion of herbal treatment to hair loss which must be substantiated by reliable clinical trials with standardised material and formulation.

3. REFERENCES:

1. Human Anatomy by Matthew Hoffman, MDHttps://Www.Webmd.Com/Skin-Problems-And Treatments/Picture-Of-The-Hair#1.
2. Ebling FJ. The biology of hair. Dermatol Clin 1987; 5(3):467-81.
3. Pushpendra kumar Jain, debajyoti das, et al. prospect of herbs as hair growth potential. Innovare Journal of Medical Science.2017; Vol 5, Issue 1: 25-33.
4. Chase HB. Growth of the hair. Physiol Rev.1954; 34(1):113-26.
5. Bagatell, C. & Bremner, W. J. et al. Androgens in men- uses and abuses. New Engl, J. Med. 1996; 334:707-715.
6. Olsen, E, A. In, Olsen, ed. et al. Disorders of Hair growth, Diagnosis and Treatment, New York; MC Grow Hill, Inc.1993; 257-287.
7. Takahashi, T., Kamiya, T. & Yokoo, Y.et al. Proanthocyanidines from grape seeds promote proliferation from mouse hair follicle cells in vitro and convert hair cycle in vivo. Acta Derm Venereol, 78, 1998; 428-432.
8. Medically reviewed by Debra Rose Wilson, Ph.D., MSN, R.N., IBCLC, AHN-BC, CHT — Written by Alysse Dalessandro Santiago on July 23, 2020 https://greatist.com/health/rosemary-oil-for-hairBrush Up on Rosemary Oil for Hair Growth.

 ISBN: 978-81-955306-3-2

9. Kadambari Srivastava Rosemary oil for hair: a guide to get the best out of this miracle oil Dec 28, 2020.
10. G. S. Vala, 2 P. K. Kapadiya. et al. Medicinal Benefits of Coconut Oil. International Journal of Life Sciences Research ISSN. 2014; Vol. 2, Issue 4: 2348-3148 (online), pp: (124-126), Month: October - December.
11. R. Slimestad, T. Fossen, and I. M. Vågen, et al. "Reviews. Onions: a source of unique dietary flavonoids," Journal of Agricultural and Food Chemistry, vol. 55, no. 25, pp. 10067–10080, 2007.
12. G. Griffiths, L. Trueman, T. Crowther. et al. "Onions—a global benefit to health," Phytotherapy Research, vol. 16, no. 7, pp. 603–615, 2002.
13. Textbook of Pharmacognosy, Gupta, Sharma, Pragati Prakashan, Edition 2014, Ch-29, Some Traditional Drugs, Pg- 595-597.
14. Sajad Ahmad Wani, Pradyuman Kumar.et al. Fenugreek: A review on its nutraceutical properties and utilization in various food products, King Saud UniversityJournal of the Saudi Society of Agricultural Sciences (2018) 17, 97-106. http://dx.doi.org/10.1016/j.jssas.2016.01.007
15. By Brendan mccannMay 15, 2020. How Can Moringa Benefit Hair Growth. https://insidemoringa.com/how-can-moringa-benefit-hair-growth/
16. The Ayurvedic Pharmacopoeia of india, Part-I, volumeI, Page No:202-203
17. Ansley Hill, RD, LD on April 15, 2020 — Medically reviewed by Miho Hatanaka, RDN, L.D.https://www.healthline.com/nutrition/papaya-leaf.
18. Sumona BoseJun: 9 Fabulous Ways a Daily Dose of Guava Benefits Your Skin and Hair 12, 2020. https://www.bebeautiful.in/all-things-skin/everyday/benefits-of-detox-water-to-get-clear-skin.
19. The Ayurvedic Pharmacopoeia of India, Part-I, volumeIII, Page No: 198-200.
20. The Ayurvedic Pharmacopoeia of India, Part-I, volume-IV, Page No: 114-115.

 ISBN: 978-81-955306-3-2

PCP235

Evaluation of Antidiadetic Activity of Isolated Compounds from Trichosanthes Dioicain Allaxon Induced Diabetic Rat Model

AP0118
Bindurani L G P Ram
School of Pharmacy, Vishwkarma University,
Kondhwa (Bk.) Pune. Maharashtra.
bindurani.ram@vupune.ac.in

ABSTRACT

Plants with medicinal value are gradually gaining importance in clinical research due to their well-known property of no side effects as compared to synthetic drugs. *Trichosanthes dioica*, also known as pointed gourd, is a vine plant in the family Cucurbitaceae, *Trichosanthes dioica* has been mentioned in various Ayurvedic texts in the treatment of such life style diseases. The plant has a promising place in Ayurvedic system of medicine due to its various medicinal values like, anthelmintic, antihyperglycemic, anti-inflammatory properties. The present study was aimed to evaluate the anti-diabetic activity of isolated compounds from aerial parts of *Trichosanthes dioica* in alloxan induced diabetic rats. Diabetic wistar albino rats were treated with standard drug Glibenclamide and prepared drug formulation in two different doses 250 mg and 500 mg/kg. Hypoglycemic effect was evaluated in these rats and the efficacy of isolated compounds was administered in alloxan induced diabetic rats. At the end of study period blood glucose level were statistically analyzed based on the results. Isolated compounds produced a significant reduction in blood glucose level when compared with non-treated diabetic rats. So, the present research work was confirmed that the isolated compounds possess hypoglycemic effect significantly.

Key Words: Trichosanthes dioica, antidiabetic, Allxon induced, Diabetes mellitus.

1. INTRODUCTION

*Trichosanthes dioica*is a very ancient Ayurvedic medicinal herb & vegetable. It has been used since the times of Charaka & Susruta, for 2000 years. It is very beneficial to improve gastric health. Its root, leaf & fruit are used in many Ayurvedic medicines.*Trichosanthes dioica* similar to cucumber and squash, though unlike those it is perennial [1]. It is a dioecious (male and female plants) vine (creeper) plant with heart-shaped leaves (cordate) and is grown on a trellis. The fruits are green with white or no stripes. Size can vary from small and round to thick and long 2 to 6 inches (5 to 15 cm). It thrives well under a hot to moderately warm and humid climate [2-3]. The plant remains dormant during the winter season and prefers a fertile, well-drained sandy loam soil due to its susceptibility to water-logging. In present times, the lifestyle diseases like obesity, hyperlipidemia, constipation etc. have been drawing tremendous attention of researchers and medical practitioners [5]. *Trichosanthes dioica* provides an answer to many such diseases. The plant is rich in Vitamin A, Vitamin C, Tannins, Saponins, alkalodis and tetra and pentacycline triterpenes. In recent years, a number of plants commonly used to treat diabetes in the traditional system of medicine have been explored scientifically by research group for the investigation of their chemical constituents, elemental analysis, their role in diabetes management, and pharmacological activities [6]. Thus, the present investigation was undertaken to evaluate the antidiabetic profile of the isolated compounds of *Trichosanthes dioica* arial part on blood glucose level (BGL) of normal and alloxon induced sub- and mild-diabetic rats during fasting blood glucose (FBG) and oral glucose tolerance test (OGTT) studies, so that a novel oral anti-diabetic agent can be identified with high nutritive value [7].

 ISBN: 978-81-955306-3-2

2. MATERIAL AND METHODS

2.1 Preparation of Crude Drug

Fresh arial parts of *Trichosanthes dioica* (5 kg) were collected in the month of June from the local area of Pune, Maharashtra (India) and shade-dried. It was authenticated by Director, Botanical survey of India, Pune, and Maharashtra. A voucher specimen has been submitted. The dried plant material (1 kg) was mechanically crushed and initially defatted with petroleum ether extracted with ethanol (95%) measured about 2 g each after evaporating the solvent using water bath to obtain semisolid material. The standard extracts obtained from *Trichosanthes dioica* was then stored in a refrigerator at 4°C for further use for phytochemical investigation and pharmacological screening.

2.2 Preparation of Fractions of Crude Extract

Ethanolic extract then fractionated using Petroleum ether and Chloroform. The ethanolic extract, chloroform fractions obtained from *Trichosanthes dioica* was then stored in a refrigerator at 4°C for further use for phytochemical investigation and pharmacological screening. Petroleum ether fraction was not used in the study because of very less yield.

2.3 Isolation of Phytoconstituents

The isolation was started with hexane and polarity increased with ethyl acetate. The elution up to hexane: ethyl acetate (5:5), were mixed together on the basis of their TLC profile to get fraction (A). This fraction was concentrated and re chromatographed with hexane DCM mixture with increasing proportion of DCM. The elution up to hexane: DCM (7:3) were mixed together and refrigerated overnight with addition of di-ethyl ether, which yielded compounds (1A, 1B) as a white & yellowish powder respectively. Further elution up to hexane: DCM (2:8) yielded compound (2A, 2B), which was recrystallized as yellow & dark brown mass respectively with acetone. Depending on the yield compounds A & B selected for further studies.

2.4 Experimental Animals

Healthy adult Male albino Wistar rats of the same age group and body weight, 150–200 g, were selected for all the experiments. Animals obtained were housed in polypropylene cages at an ambient temperature of 25–30°C and 45–55% relative humidity with a 12 h dark and light cycle. Animals were fed pellet diet (Golden Feed, New Delhi) and water ad libitum. The study was approved by the Institutional Ethical Committee.

2.5 Investigational Model for Induction of Diabetes

Diabetes was induced by intra-peritoneal injection of Alloxan monohydrate (150 mg/kg b.w.) dissolved in the in normal saline. Blood was withdrawn (0.1 ml) from the tip of the tail of each rat under mild ether anaesthesia. The blood glucose level was checked before alloxanisation and after alloxanisation regularly in 24h intervals. Animals were considered diabetic when the blood glucose level was raised beyond 200 mg/100 ml of blood. This condition was observed at the end of 72 h after alloxanisation.

2.6 Preparation of Interventions

The measured quantity of extracts and fractions of Trichosanthes dioica and the standard drug glibenclamide (5 mg/kg) was suspended in 25% Tween-20 in distilled water. The solvent, test samples and standard drugs were administered by oral route based on dose and corresponding weight of the animals. For oral administration of test, standard as well as Solvent Feeding needle no 21 was used[3].

2.7 Blood glucose level determination

Fasting blood glucose concentration was determined using a Glucometer (Optimum), based on the glucose oxidase method. Blood samples were collected from the tip of tail at the defined time patterns.

 ISBN: 978-81-955306-3-2

2.8 Acute Oral Toxicity Study

The primary toxicity studies were designed to demonstrate the appropriate safe dose range that could be used for subsequent experiments rather than to provide complete toxicity data on the extract. Acute toxicity studies conducted revealed that the administration of graded doses of selected extracts plant (up to a dose of 4000 mg/kg) of did not produce significant changes in behaviors such as alertness, motor activity, breathing, restlessness, diarrhea, convulsions, coma and appearance of the animals. No death was observed up to the dose of 4 g/kg body weight. The mice were physically active. These effects were observed during the experimental period (72 hrs.). The result showed that in single dose; the plant extracts had no adverse effect, indicating that the medium average lethal dose (LD_{50}) could be greater than 4 g/kg body weight in mice. Based on these results 1/10th of the maximum safe dose was taken for further pharmacological screening. So the doses selected for further study were 250 mg/kg b.w. and 500 mg/kg b.w.

2.9 Experimental Design

Initial screening of the ethanolic extract for the hypoglycemic activity was done with a range of variable doses in normal healthy rats by conducting fasting blood glucose (FBG) and glucose tolerance test (OGTT) studies. The antidiabetic effect was assessed in sub- as well as mild-diabetic models with the same range of doses based on similar studies of FBG and GTT. (Rai et al., 2008).

2.9 Hypoglycemic Activity Study of Isolated Compound on Normoglycemic Animals (Single Dose Treated)

The hypoglycemic activity is important in the diagnosis of diabetes mellitus. It determines the ability of drug to decrease blood glucose level. This method permits for the effect of the drug to be tested in the animal with a whole pancreatic activity. The contrast may give some information regarding mechanism of action. The animals were fasted for 18 h, but were allowed free access to water before and throughout the duration of the experiment. At the end of the fasting period, taken as zero time (0 h), blood was withdrawn (0.1 ml) from the tip of the tail of each rat under mild ether anesthesia. Plasma was separated following centrifugation the glucose was estimated by the GOD/POD method using a glucose estimation kit from M/s. Sigma Diagnostics (India) Pvt. Ltd., Baroda, India. The normal rats were then divided into six groups of six animals each. Group I served as solvent control and received only vehicle (2 ml/kg) through the oral route, Group II received glibenclamide (5 mg/kg) and served as reference control. Groups III to VI received the compound A and B of at a dose of 250 and 500 mg/kg, respectively, through the oral route. Blood glucose levels were examined after 1, 2, 4, 6, 8 and 10 h of administration of a single dose of the test and control samples.

2.10 Antihyperglycemic Activity of Isolated Compound In Glucose-Loaded Animals (Oral Glucose Tolerance Test): The oral glucose tolerance test (OGTT) measures the body's ability to use main source of energy i.e., glucose. OGTT is to simplify and facilitate the diagnosis of diabetes this method is frequently referred to as physiological induction of diabetes mellitus because the blood glucose level of the animal is fleetingly increased with no damage to the pancreas. An oral glucose tolerance test (OGTT) was performed on diabetic rats by feeding glucose (5 g/kg) per os. Animals were deprived of food 18 h before and during the experiment, but were allowed free access to water. They were divided into 7 groups of 6 rats each. Group I served as normal control, Group II served as solvent control and received only vehicle (Tween + water - 2 ml/kg b.w.) through the oral route. Group III received glibenclamide (5 mg/kg b.w.). Groups IV to VII received the compound A and B of Trichosanthes dioicaat a dose of 250 and 500 mg/kg b.w., respectively, through oral route. The blood glucose level was determined before drug and glucose administration (1 and 0 h, respectively) and subsequently at 0.5, 1, 2 and 3h after.

 ISBN: 978-81-955306-3-2

2.11 LD50 Experiment

Toxic effect of the water extract was also studied by a LD50 experiment. Two groups of rats of both sexes (6 animals per group, 3 females and 3 males), weighing about 180–200 g, were orally treated with a single dose of 5 and 7.5 g of the ethanolic extract of Trichosanthes dioica leaves. Then, rats were observed for gross behavioral, neurologic, autonomic, and toxic effects continuously. Food consumption, faeces and urine were also examined at 2 h and then at 6 h intervals for 24 hr.

2.12 Statistical Analysis

Results are expressed as mean ± S.E.M for biochemical estimations. The quantitative data were analyzed by Dunnett's multiple comparison tests.

3. RESULT AND DISCUSSION

3.1 Effect of Isolated Compounds of *Trichosanthes Dioica*on Blood Glucose Level of Normoglycaemic Rats (Hypoglycemic Activity)

The effect of isolated compounds of *Trichosanthes dioica*on fasting blood glucose levels of normal rats are presented in table 1. The plant extracts at both the dose level of 250 and 500 mg/kg registered 77.42 to 85.32 mg/dl of fasting blood glucose level at the end of 10h of the study, while the standard drug, glibenclamide showed 71.63 mg/dl at the same time, with a low degree of significance while compared with solvent treated group. The percentage change of blood glucose of test extracts treated groups at the end of 10 h showed 4.27 to 15.10% fall when compared with initial BGL in a dose dependent manner. The potency order of the test extracts towards the falling of BGL is followed by ethanolic extract and chloroform fraction.

3.2 Effect of Isolated Compounds of *Trichosanthes dioica* on BGL of Glucose Loaded Hyperglycemic Rats (Oral Glucose Tolerance Test, OGTT)

The blood glucose level (BGL) of isolated compounds of Trichosanthes dioica, glibenclamide and vehicle treated albino rats after oral administration of glucose (5 g/kg) are summarized in Table 2 The compound A and B at 250 mg/kg dose level registered 89.13, 92.50 mg/dl at the end of 3 h of the study, while it was 91.50, 94.51 mg/dl with dose level of 500 mg/kg. However, at the same time the standard drug glibenclamide at 5mg/kg showed 62.51 mg/dl of BGL. However, the calculated percentage fall of BGL demonstrated 9.28, 20.83 and 15.73, 25.89% with respect to 250 and 500 mg/kg dose levels when measured at the end of the 3 h of the study, while at the same time glibenclamide showed a 34.54% fall of BGL. The progressive fall of BGL of the test extracts, in the different test hour showed a statistical significant of $p< 0.05$ to $p< 0.01$, while analyzed by using ANOVA followed by Dunnett's t-test. The ethanolic extract possesses more BG lowering potency than that of the ethanol extract in a dose dependent manner. The test extracts at tested dose levels also showed a significant fall of BGL while compared with the solvent control group during the study period of 30, 60 and 120 min.

 ISBN: 978-81-955306-3-2

Table- 1: Effect of Isolated compounds of Trichosanthes dioicaon Blood Glucose Level of normoglycaemic rats (hypoglycemic activity)

Groups	Treatment and Dose	Blood glucose level (mg/dl)							
		0	1	2	4	6	8	10	% Decrease at 10th hr.
I	Diabetic control (tween+ water)	94.6 ± 1.1	87.2 ± 4.62	91.43 ± 1.86	89.56 ± 0.81	91.58 ± 2.23	89.66 ± 0.46	92.67 ± 3.22	--
II	Glibenclamide (5mg/kg)	91.43 ± 1.31	81.22 ± 2.63	67.53 ± 2.34*	58.12 ± 2.61**	54.72 ± 2.44**	73.83 ± 1.42**	71.63 ± 2.81**	21.65
III	Compound-A (250mg/kg)	89.13 ± 1.2	87.6 ± 1.1	87.2 ± 2.65	86.73 ± 1.46	86.33 ± 1.43	86.12 ± 0.89*	85.32 ± 1.51	4.27
IV	Compound-A (500mg/kg)	88.4 ± 2.43	87.32 ± 2.16	86.49 ± 1.87	86.04 ± 1.67	85.6 ± 2.69	84.4 ± 1.43**	81.32 ± 2.49*	7.94
V	Compound-B (250mg/kg)	92.53 ± 1.27	91.46 ± 1.68	89.94 ± 1.09	87.11 ± 0.91	86.22 ± 2.13	84.11 ± 1.18**	82.11 ± 1.89*	11.22
VI	Compound-B (500 mg/kg)	91.18 ± 0.93	87.30 ± 0.78	85.49 ± 2.61	85.21 ± 1.37	84.33 ± 2.38*	82.66 ± 1.21**	77.42 ± 2.73**	15.10

Values are expressed in MEAN ± S.E.M of six animals. One Way ANOVA followed by Dunnet's t-test (t-value denotes statistical significance at *p<0.05, **p<0.01 respectively, in comparison to group-I)

Table- 2: Effect of Isolated Compounds of Trichosanthes dioicaon BGL of glucose loaded hyperglycemic rats (oral glucose tolerance test, OGTT)

Groups	Treatment and Dose	Blood glucose level (mg/dl)					
		0 min	30 min	60 min	120 min	180 min	% Decrease at end of 3hr
I	Normal control	83.75 ± 0.47	86.50 ± 0.98	88.50 ± 0.64	83.50 ± 0.64	86.50 ± 0.61	-
II	Solvent control (tween+ water	90.50 ± 0.64	135.52 ± 0.64**	118.83 ± 0.85**	98.50 ± 0.64**	91.50 ± 0.44**	32.48
III	Glibenclamide (5mg/kg)	89.43 ± 0.40	95.50 ± 1.04**	81.53 ± 0.91**	72.50 ± 0.64**	62.51 ± 0.72**	34.54
IV	Compound-A (250mg/kg)	83.62 ± 0.40	98.25 ± 0.85**	97.61 ± 0.91**	93.50 ± 0.64**	89.13 ± 0.34	9.28
V	Compound-A (500mg/kg)	87.50 ± 0.64	107.31 ± 1.37**	102.32 ± 1.10**	94.50 ± 0.64*	91.50 ± 0.64	15.73
VI	Compound-B (250mg/kg)	91.50 ± 0.64	116.84 ± 1.10**	109.83 ± 0.85**	102.65 ± 0.91*	92.50 ± 0.54**	20.83
VII	Compound-B (500 mg/kg)	82.97 ± 0.91	128.36 ± 0.85**	113.36 ± 1.10	101.51 ± 0.64**	94.51 ± 0.65**	25.89

 ISBN: 978-81-955306-3-2

Values are expressed in MEAN ± S.E.M of six animals. One Way ANOVA followed by Dunnet's t-test (t-value denotes statistical significance at *p<0.05, **p<0.01 respectively, in comparison to diabetic control group).

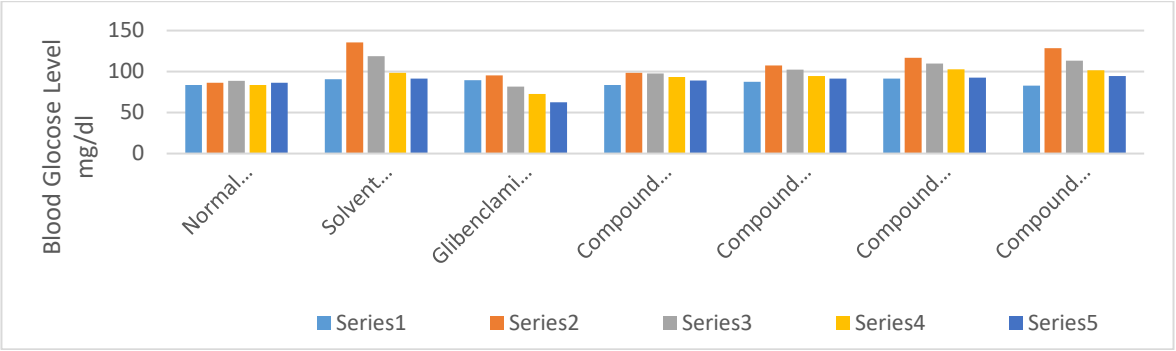


Fig 1: Effect of Isolated compounds of Trichosanthes dioicaon oral glucose tolerance in normal rats.

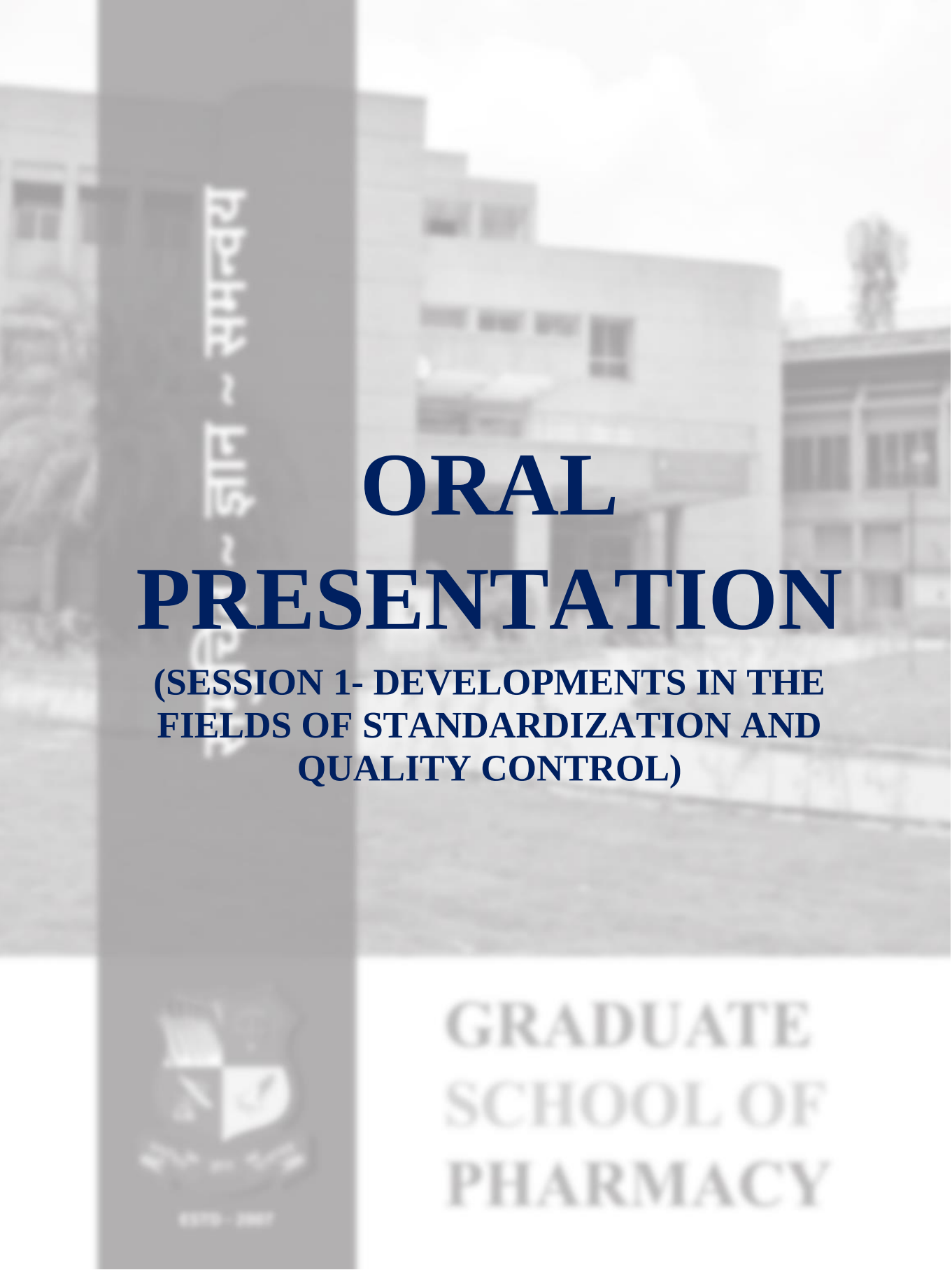
4. CONCLUSION

The research work focuses on anti-diabetic and hypoglycemic activity of Trichosanthes dioicafor their possible to validate their folklore claim followed by chromatographic separation, isolation of presence of phytoconstituent named Compound A and B among the most potent fraction of plants. The dose levels of the isolated compounds were selected based on the results of the acute toxicity study and found as 250 & 500 mg/kg b. w. respectively. Since both Compound A and B showed good activity, hence the investigators think it may be more worth full in terms of its blood glucose lowering ability.

5. REFERENCES

1. Gupta Vikas; Pagoch S S. Phytopharmacological review of trichosanthes dioica (patola) International Ayurvedic Medical Journal Volume 2; Issue 3; May - June 2014
2. Rai PK, Jaiswal D, and Diwakar S, Watal G (2008): Antihyperglycemic profile of Trichosanthes dioica seeds in experimental models. Pharm Biol 46: 360–365.
3. Sharma G, Pant MC (1988): Effect of raw deseeded fruit powder of Trichosanthes dioica (Roxb) on blood sugar, serum cholesterol, high density lipo-protein, phaspholipid and triglycerides levels in the normal albino rabbits. Indian J. Physiol Pharmacol 32: 161–163
4. Sharma G, Pant MC (1988): Preliminary observations on serum biochemical parameters of albino rabbits fed on seeds of Trichosanthes dioica (Roxb). Indian J Med Res 87: 398– 400.
5. Sharma G, Sarkar A, Pachori SB, Pant MC (1989): Biochemical evaluation of raw Trichosanthes dioica whole fruit and pulp in normal and mild-diabetic human volunteers in relation to lipid profile. Indian Drug 27: 24–28.
6. Sharma G, Pandey DN, Pant MC (1990): Biochemical evaluation of feeding Trichosanthes dioica seeds in normal and mild diabetic human subjects in relation to lipid profile. Indian J Physiol Pharmacol 34: 146–148.
7. OECD/OCDE Guideline for the Testing of Chemicals. Revised Draft Guideline; Acute Oral Toxicity, 2000, 425.
8. Kulkarni SK, Book of Experimental Pharmacology, Vallabh publisher, 3rd Edition, New Delhi, 2007, 128-130.
9. Prashant Kumar Rai; Dolly Jaiswal; Rakesh Kumar Singh; Rajesh Kumar Gupta; Geeta Watal; Glycemic Properties of Trichosanthes dioica Leaves Pharmaceutical Biology 2008, Vol. 46, No. 12, pp. 894–899.

This page was intentionally left blank



ORAL PRESENTATION

(SESSION 1- DEVELOPMENTS IN THE FIELDS OF STANDARDIZATION AND QUALITY CONTROL)

GRADUATE SCHOOL OF PHARMACY

This page was intentionally left blank

PCP327

Detection of Adulteration of Haritaki (*Terminalia Chebula*) Using HPTLC Fingerprinting

AP0244
Anjali Patadiya
apatadiya285@rku.ac.in

AP0019
Devang Pandya
director.sop@rku.ac.in

School of Pharmacy, RK University

Abstract:
Fruits of Haritaki **(***Terminalia chebula*) are one of the most prominent Ayurvedic medicines due to their several benefits, including purgation and immunomodulation. However, it is often adulterated to increase its purgative action, which may harm the intestine's health and normal functioning.The current study utilizes HPTLC fingerprinting for the detection of possible adulterants present in the powder of Haritaki fruits, namelyJamalgota (*Croton tiglium*), Trivrit (*Operculina turpethum*), Murva (*Marsdenia tenacissima*) and Kaladana (*Ipomoea hederacea*).Market samples of Haritaki, Jamalgota, Trivrit, Murva and Kaladana were collected and their aqueous extracts were prepared by maceration. Several pilot TLC were conducted using various mobile phases with the aim to identify a common mobile phase which could differentiate the TLC profile of Haritaki from each of the adulterants, and then proceed for comparative HPTLC fingerprinting.The suitable mobile phase from pilot TLC studies was found to be Methanol: Glacial acetic acid (10:1) which showed no spot in Haritaki extract but showed spots in extracts of each of the adulterants at different R_f, thereby ensuring that the adulterants can be detected in solid formulation or aqueous extract of Haritaki, confirmed further by HPTLC fingerprinting.This simple HPTLC fingerprinting can be used as a quality control measure in the herbal industry to detect adulteration of Haritaki, thereby benefiting the end-users.

Keywords: Adulteration, Haritaki, Jamalgota, Kaladana, Murva, Trivrit

PCP298

HPTLC Based Method for Standardization of *Milletia Pinnata* (Karanj) Using Herbal Markers

AP0236
Foram Ravat[1]
foramravat@gmail.com

AP0237
Kashyap Thummar[2]
ap_kashyap@gtu.edu.in

[1]Smt. C. V. Gajera Pharmacy Mahila Collage, Amreli
[2]Graduate School of Pharmacy, Gujarat Technological University

Abstract:
The use of plant-based traditional medicine is experiencing a revival, as it is seen as safer as and heals than the synthetic drugs. Indeed, one advantage of traditional remedies over modern drugs is that their effects and margin of safety have been known for long. *Pongamia pinnata* is a multipurpose legume tree indigenous to the Indian subcontinent, south East Asia. Historically, Pongamia has been used folk medicinal plant, particularly in Ayurveda and siddha system of Indian medicine. All parts of this plant have been widely used as traditional medicine to treat a broad spectrum of diseases and wounds. The phytochemical studies resulted in the discovery of large amount of compounds from various classes including flavonoids and terpenoids. The pharmacological studies revealed that this plant demonstrated a broad range of biological activities. The HPTLC based method will be developed for the standardization of plant part mainly stem. The method will be developed and validated using herbal markers. The extraction, phytochemical screening, isolation and characterization of photochemical carried out in this study. HPTLC method was developed by using Precoated Silica Gel G60 F254 aluminium sheets as a stationary phase and toluene: ethyl acetate: formic acid (7:3:0.3 v/v/v) as a mobile Phase. Detection was carried out at 260 nm. Developed method applied for standardization of karanjin in stem bark of *M. pinnata* by using herbal marker Karanjin. Standardization of isolated fraction carried out by using herbal marker in which isolated fraction F.31-45 is karanjin confirmed by using HPTLC and TLC-MS/MS and also carried out qualitative phytochemical screening test of methanolic extract of *M. pinnata* stem bark powder. For karanjin developed method was validated as per the ICH guideline in terms of Linearity, Precision, Accuracy, Specificity, LOD, LOQ and Robustness. Based on HPTLC bioautography technique, methanolic extract of stem bark show the antioxidant activity as result and based on the phytochemical screening test and DPPH assay, *M. pinnata* stem bark contain the flavone and flavonoid compound as major active constitute.
Keywords: *Milletia pinnata*, stem bark, standardization HPTLC, TLC-MS/MS, Column chromatography, Validation, karanjin.

PCP297

Preparation and Evaluation of "Yavishtha" an Anti-Aging Vanishing Cream

AP0184	AP0183	AP0176	AP0202
Harshoni Panchal	**Palash Thakkar**	**Mona Kukkar**	**Janvi Patel**
harson160320@gmail.com	**palash150899@gmail.com**	**monajjn1982@gmail.com**	**jpp3019@gmail.com**

[1]A.R.College of Pharmacy, V.V.Nagar
[2] Dr. K.N.M.I.P.E.R, Modinagar

Abstract:
The objective of this research work was to formulate the Antiaging vanishing cream which does not cause any side effects or adverse reactions. The cream also acts as a fairness expert in day to day life by removing aging signs, so to achieve these objectives cream is prepared by mixing the extracts of Arjuna, Guduchi, Carrot, Cucumber and Rose oil, to produce multipurpose effects on skin such as fairness, antiwrinkle sunscreen, moisturizing and antiaging properties. Now a days there is a great demand for herbal cosmetics in the world market and they are invaluable gifts of nature. Therefore, different formulations of Antiaging vanishing creams (F1 to F4) were prepared. Our study indicated that the formulation F3 and F4 found to be more stable, while remaining formulations were not stable and resulted in breakdown of the emulsion when stored.These formulations F3 and F4 had almost constant pH, homogeneous, emollient, non-greasy and easily removed after the application. The stable formulations were safe in respect to skin irritation and allergic sensitization.

Keywords: Anti-aging, Vanishing cream, Arjuna, Guduchi, Carrot, Cucumber, Rose oil.

PCP292

Standardization of Selected Plants Used As Dental Analgesic

AP0215	AP0216	AP0218	AP0220	AP0221
Drashti G. Patel	**Akanxa D. Patel**	**Twisha A. Modi**	**Sneha P. Dave**	**Dr. Kaushik B. Kanada**
dg9428833@gmail.com	pakansha118@gmail.com	moditwisha511@gmail.com	snehaoza23@gmail.com	kaushikkanada27@gmail.com

Dept. of Pharmacognosy, Saraswati Institute of Pharmaceutical Sciences, Dhanap, Gandhinagar

Abstract:

In the present work pharmacognostical and phytochemical standardization has been done for the barks of *Mimusopselengi (Borsali), Myrica nagi (Kayfal), Ficus benghalensis (Vad)* are widely used in various dental disorders as per Indian system of medicine. Morphological, physicochemical and phytochemical studies of procured material were performed conforming the identity, quality, purity of the barks. The quantity of tannins was estimated by redox titration method. The morphological characteristics of barks were compared and standardized with the standards mentioned in reference books. The Quality control and standardization parameters of bark powder of *Mimusopselengi (Borsali), Myrica nagi (Kayfal), Ficus benghalensis (Vad)* was found as per follows. The Foreign matter (0.34%, 1.53% , 1.02% w/w), Particle size (#120, #100, #120), %Loss on Drying (10%, 11%, 9%), *p*H of 10% aqueous solution (5.55, 6.63, 5.43), Water extractive value (10%, 20%, 20%), Alcoholic extractive value (20%, 8%, 30%), Ash value (9%, 11%, 3.5% w/w), Acid insoluble ash value (1.6%, 0.4%, 0.003%) and Water-soluble ash (4.84%, 5.13%, 3.93%) was found respectively for mentioned plants. Preliminary phytochemical screening of hydroalcoholic extracts of plant materials shown presence of carbohydrates, proteins, tannin, flavonoids and steroids. Tannin content in barks of *Mimusopselengi (Borsali), Myrica nagi (Kayfal), Ficus benghalensis (Vad)* was found 1.62 % w/w, 1.60 % w/w and 1.63 % w/w respectively. From the results obtained, it can be concluded that plant materials contains Tannins and flavanoids in high concentration which possess antioxidant and anti-inflammatory activity. Because of these properties, these drugs might be useful in various dental disorders. Moreover, pharmacognostical and phytochemical results standardized the quality of plant drugs. Further pharmacological evaluation should be done for the development of polyherbal dental analgesic formulation.

Keywords: *Mimusopselengi (Borsali), Myrica nagi (Kayfal), Ficus benghalensis (Vad),* dental disorder, analgesic.

PCP287

Molecular Tool for Benzimidazole Resistance in Small Reminant Parasites

AP0200
K. Syamala
DepartmentofVeterinaryParasitology, CollegeofVeterinary&AnimalSciences, Pookode, Wayanad, Kerala
syamala@kvasu.ac.in

Abstract:
Benzimidazole are widely used to treat nematodeinfections of human and animals, but anthelmintic resistance is wide spread in veterinary practice. Several polymorphisms of *β-tubulin* gene have been associated with BZ resistance. Anthelmintic resistance status in the two major strongyle parasite of goats like *Haemonchus contortus* and *Trichostrongylus* sp in Kerala was studied. It was assessed using PCR-RFLP in single larvae (L_3) of these parasites obtained from copro culture where faecal material were collected from goats in various farms in Thrissur.The BZ resistance status of *Haemonchus* sp has been associated with threeSNPs in the isotype *1 β-tubulin* gene at codons 167 (TTC to TAC; F167Y), 198 (GAA toGCA; E198A) and 200 (TTC to TAC; F200Y). Semi-nested PCR was done to amplify a 451bp product of the isotype *1 β-tubulin* gene with the three codons followed by RFLP with restriction enzymes Eco1051, HpyCH4V and HpyCH4III for genotyping *Haemonchus* sp.larvaeatcodons 167, 200 and 198, respectively. The most frequently identified polymorphism was associated with E198A, while F200Y was found to be the least common.Genotyping of *H. contortus* larvae using restriction digestion with Eco1051 for the detection of SNPs at codon 167 revealed the presence of both susceptible and resistant genotypes. In *Trichostrongylus* sp., a 246 bp region of isotype 1-*β tubulin* gene with codons 167, 200 and198 was amplified by semi nested PCR. Then RFLP was performed with restriction enzymes, RsaI, HpyCH4III and HpyCH4V, only resistant genotypes were detected at codon 167 usingRsaI. All three genotypes were detected at codon 200 using HpyCH4111. No polymorphism was noticed at codon1 98 using Hpy CH4V. In conclusion, RFLP-PCR is an ideal method to study the molecular epidemiology of BZ resistance in strongly eparasites of small ruminantsand to detect the emergence of the resistanceon the parasite.

Key words: Benzimidazole, Anthelmintic resistance, *Haemonchus contortus*, *Trichostrongylus* sp.

PCP271

Preparation and Evaluation of Morifen-Soya Cookies Developed Using Multi Blend Nutraceuticals

AP0144
Mohiniben Patel[1]
mohinipatel2712@gmail.com

AP0172
Shifaben Vahora[1]
shifavahora13@gmail.com

AP016
Mona Kukkar[2]
monajjn1982@gmail.com

[1]A.R.College of Pharmacy, V.V.Nagar
[2]Dr. K.N.M.I.P.E.R, Modinagar

Abstract:
In this present study attempts had been made to produce cookies from Wheat and Soya based composite flours with high nutritional and sensory properties from Moringa and Fenugreek flour blends. Different concentrations of flours were taken for preparation of cookies (F1 to F5) and evaluation was done by the sensory, microscopical, proximate and chemical attributes of the cookies. A5 composition has the best among the various formulated cookies. Cookies were found for good concentration of Vitamin C and Total Phenolics. These formulated cookies are nutritionally superior to that of refined wheat flour and utilization of such functional ingredients will improve the overall health of children, women and aged persons by prevent malnutrition, anemia & help in management of metabolic disorder like diabetes respectively. The results of this study may provide opportunities to promote and support the use of cookies form Functional food to achieve nutritional and therapeutic food security.

Keywords: Functional food, Cookies, Moringa, Fenugreek, Soya, Wheat.

PCP250

Comparative Studies of Cultivated & Wild Sources of Various Species of Tulsi Using High Performance Thin-Layer Chromatography

AP0058
Himanshu T. Makwana[1]
Himanshu23makwana@gmail.com

AP00019
Devang J. Pandya[2]
Devang.pandta@rku.ac.in

[1]Phyto Life Sciences Pvt. Ltd.
[2]School of Pharmcy, RK University

Abstract:
Tulsi is one of the most popular Ayurvedic herbs, found across Indian homes. It has numerous pharmacological benefits, besides being a powerful immunomodulator, because of which it was prominently used singly as well as in polyherbal formulations during COVID-19. However, there are several species of Tulsi, whose pharmacological potency might vary depending on their phytochemical variation. Also, the phytochemicals may vary depending on whether the species are cultivated or obtained from the wild. To study these variations, anormal phase high performance thin layer chromatography method was developed and validated for simultaneous detection and estimation of Ursolic acid, Eugenol and Rutin in hydroalcoholic extract of organically cultivated and wild sources of five different species of Tulsi namely, *Ocimum sanctum* (Ram tulsi), *Ocimum tenuiflorum* (Krishna tulsi), *Ocimum citriodorum* (Lemontulsi), *Ocimum gratissimum* (Vana/wild tulsi) and *Ocimum basilicum* (Sweet tulsi or Damro). The quantification of 3 phytochemicals was carried out based on peak area with a linear calibration curve at concentration ranges of 200-1200ng/band.The densitometric scanning was performed after derivatization at 280 nm for ursolic acid, 530 nm for Eugenol and 366 nm for Rutin. Correlation coefficient was found to be >0.995 indicating good linear correlation. Ursolic acid in WTWC was found to be9.51% whereas Eugenol in *Ocimum tenuiflorum* (organic cultivation) was found to be 1.74%. The highest percentage of Rutin (16.03%) was found in *Ocimum gratissimum* (wild cultivation). This study indicates that wildly growing species of Tulsi should be explored for pharmacological utility, owing to the superior phytochemical content in them. It also opens the avenue for further studies on finding reasons for higher phytochemical content in the wildly growing plants.

Keywords: HPTLC, Method validation, Ocimum species, Tulsi.

PCP204

Phytochemical Physicochemical and Preliminary Parameters for the Quality Assessment of SitopaladiChurna

AP0044
Amruta Balekundri
amrutaabc11@gmail.com

AP0063
Pramod J Hurkadale
pramodhurakadle@yahoo.com

Department of Pharmacognosy, KLE College of Pharmacy, Belagavi, Karnataka State, India.

Abstract:
In the present study the quality assessment of Sitopaladichurna a classical ayurvedic preparation was performed which is used as an immuno-modulatory for boosting the immunity in this post pandemic situation. This preparation is also used to treat throat related diseases and infections. The quality assessment of such Ayurvedic preparations is very much necessary from the efficacy and regulatory point of view. Hence the preliminary quality control studies were carried out that includes the Qualitative phyto-chemical testing, physicochemical parameters, Quantitative phyto-chemicals analysisand Physical characterization of marketed formulation, microbial studies and comparison with the marketed formulations. The above parameters carried out showed significant results and were found to be as per the limit of pharmacopeial criteria.

Keywords: Sitopaladichurna, quality assessment, immuno-modulatory.

PCP203

Preliminary Investigations for the Quality Assessment of TalisadiChurna

AP0044
Amruta Balekundri
amrutaabc11@gmail.com

AP0063
Pramod J Hurkadale
pramodhurakadle@yahoo.com

Department of Pharmacognosy, KLE College of Pharmacy, Belagavi, Karnataka State, India.

Abstract:
In this Covid-19 post-pandemic there is increase in consumption of immuno-modulators such as Talisadichurna. Hence an attempt to study was under taken towards the quality control testing ayurvedic classical preparation Talisadichurna which is widely used in treatment of respiratory diseases and for immunity modifications. The quality control testing of ayurvedic preparation is also an important aspect, which has been neglected due to no stringent regulatory protocols in AYUSH approved formulations. So as to ensure the quality assessment and their parameters which are carried out for phytochemical detection, physico chemical analysis of ingredients and other marketed formulations as well as their physical parameters and microbial studies of the marketed products. The above parameters were performed for their compliance with the pharmacopeial guidelines and the results were found within the regulatory requirements.

Keywords: Talisadichurna, immunity, post-pandemic, Covid-19.

PCP196

Bioactivity Guided Evaluation of Selected *Pluchea*Species

AP0024
Mrs. Kinjal Bera
kinjal_savani@yahoo.com

AP0029
Dr. Madhavi Patel
madhavi.patel@paruluniversity.ac.in

Parul institute of pharmacy, Limda, Baroda

Abstract:
The genus *Pluchea* belongs to family Asteraceae. In literature, *Pluchea* genus have been shown to possess anti-inflammatory activity. Taking into consideration, we have selected the unexplored *Pluchea* genus species available as rasna in Parul University campus. This study incorporates bioactivity guided fractionation using carrageenan induced rat paw oedema model along with quantitative evaluation includes the estimation of total tannins, total phenols and total flavonoids content in various extracts of leaf like hexane, chloroform, ethyl acetate and alcohol obtained after successive solvent extraction method. Further, the presence of active constituents was confirmed by using HPTLC and LC-MS. The ethyl acetate extract revealed more anti-inflammatory activity compared to other extracts. Total phenols and Total flavonoids content were found more in ethyl acetate extract. HPTLC and LC-MS analysis shows the presence of flavonoid, kaempferol in bioactive ethyl acetate fraction. The evaluation parameters developed in the present study would be serve as a useful tool for qualitative and quantitative evaluation selected of *Pluchea species.*

Keywords: *Pluchea species,* HPTLC, LC-MS, Flavonoids, Kaempferol.

PCP191

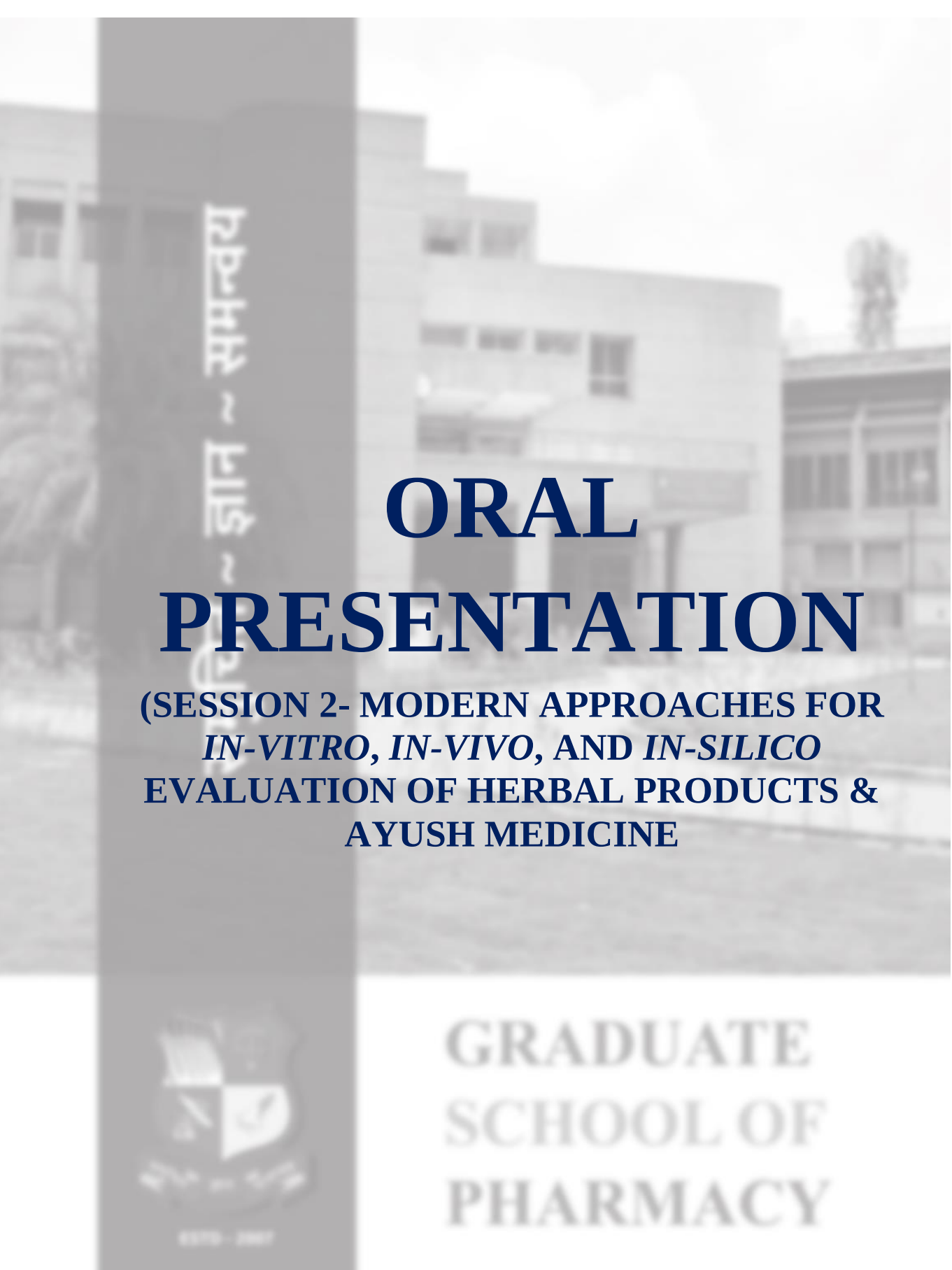
Phytochemical Screening and Nutritional Profile of Moringa Concanensis Leaves

AP0017
Vaishali Patil
Faculty of Pharmacy
Parul University
vp485632@gmail.com

Abstract:
The whole *Moringa* genus has approximately 13 species out of which only two species are cultivated in India i.e. *Moringa oleifera* and *Moringa concanensis*. *Moringa concanensis Nimmo* (Moringaceae) is a traditional medicinal plant, distributed in tropical deciduous forests of India. It has an impressive medicinal uses along with a good nutritional value. The aim of this study is to provide an overview of *M. concanensis* leaves i.e. its taxonomical classification, phytochemistry and nutritional profile. The successive solvent extraction was done in soxhlet apparatus using petroleum ether, chloroform, ethyl acetate, methanol and water as a solvent in increasing polarity order. After phytochemical screening it revealed the presence of alkaloids, flavonoids, tannins, phenols, carbohydrates, proteins, amino acids. Nutritionally it is very reach in vitamin C, vitamin E, Calcium, potassium, sodium, iron and dietary fibres. The plant is not edible but it has variety of phytochemical constituents as well as it is nutritionally rich; so it is beneficial to include it in herbal formulations. This study further helps to standardize, identify or quantify the species as well as their adulterations and also helps to prove its efficacy in the medicinal field.

Keywords: Soxhlet Extraction, Phytochemistry, Nutritional profile, *Moringa concanensis*, leaves.

This page was intentionally left blank



ORAL PRESENTATION

(SESSION 2- MODERN APPROACHES FOR *IN-VITRO*, *IN-VIVO*, AND *IN-SILICO* EVALUATION OF HERBAL PRODUCTS & AYUSH MEDICINE

This page was intentionally left blank

PCP352

Diuretic Potential of Onosma Bracteata Wall.: Confirmation of Traditional Claim and Phytochemical Basis

AP0025
Udaykumar Vegad[1]
udaygvegad@gmail.com

AP0019
Devang Pandya[2]
director.sop@rku.ac.in

[1]Graduate School of Pharmacy – GTU
[2]School of Pharmacy RK University

Abstract:
Gojihva or *Gaozaban* is an Ayurvedic cum Unani Medicinal plant described with various properties including cardiotonic and diuretic activity. *Onosma bracteata* Wall. It is considered as the official species of *Gojihva* in Ayurveda and is one of the species considered as Unani *Gaozaban*. The diuretic activity of sequential methanol and water extracts of *O. bracteata* was measured in Wistar rats of either sex in groups of six animals each at a dose of 100 mg/kg and 200 mg/kg of body weight per oral with Furosemide at the dose of 10 mg/kg as standardper oral. The cumulative urine volume (mean ± SD) excreted at 6 h and 24 h was measured and results were analysed using one way ANOVA test. The methanol extract at doses 100 mg/kg (1.65 mL ± 0.19) and 200 mg/kg (2.00 mL ± 0.28) and aqueous extractat dose 200 mg/kg (1.63 ± 0.12) showed highly significant diuretic activity ($p<0.0001$) at 6h compared to standard (0.67 mL ± 0.21) at 6 h. Further, preliminary phytochemical investigation along with TLC profiles of extracts revealed the presence of flavonoids/hydroquinone/phenolics in methanol extract. Additionally, elemental analysis of plant material detected Potassium (K) at a level of 672.12 ppm. Thus, the diuretic potential of the methanolic extract can be attributed to reported cardiotonic activity as well as an unknown mode of action of reported benzoquinones and phenolics. The milder diuretic action of the aqueous extract can be due to the presence of potassium salts in aqueous extracts. Thus, the traditional use of *Gojihva* as *mutral* (diuretic) is confirmed with a phytochemical basis. Further pharmacological and phytochemical investigations of methanol extract may reveal novel compounds with diuretic and cardiotonic potential.

Keywords: *Gojihva*, Ayurveda, *Onosma bracteata*, Diuretic Activity, Elemental analysis.

PCP351

Characterization and Evaluation of Antibacterial Activity of Biosynthesized Silver Nanoparticles using Herbal Extract.

AP0167	AP0000	AP0000	AP0000
Sarita Bawankule	**Rasika Patil**	**Nishant Awandekar**	**Milind Umekar**

Smt. Kishoritai Bhoyar College of Pharmacy, Kamptee Nagpur. Maharashtra

Abstract:
Nanotechnology is a mindset, even though the scientific community is fascinated with the field of nanoscience, most of the ongoing discussions, definitions, and attention is focused on nanotechnology. The medical properties of silver have been known for over 2,000 years. Since the nineteenth century, silver-based compounds have been used in many antimicrobial applications. Green synthesis of noble metal-nanoparticles (NM-NPs) has become a prominent area of interest in the field of nanoscience and technology, as it is a non toxic, economically viable and ecofriendly approach. Moreover, synthesis of using plant extracts is more advantageous over microbial route because it is simple, user friendly and less time consuming approach thus opted in current study. Aim of the study is Characterization and Evaluation of Antibacterial Activity of Biosynthesized Silver Nanoparticles using Herbal Extract of Andrographis Paniculata with the identification and collection of plant leaves and preparation of herbal extract there microbiological assay at different concentration then preparation of herbal nanoparticles evaluation of that extract for antimicrobial activity. Where it found the silver nanoparticles gives the potent antimicrobial activity.

Keywords: Nanotechnology, Silver, Antibacterial activity, Herbal Extract.

PCP341

Nanoparticles of Various Herbal Drugs Extract Produce Anticancer Activity

AP0264	AP0291	AP0285	AP0286
Mr. Vishal Gajbhiye[1]	**Mrs. Neha Gajbhiye[2]**	**Dr. Milind J. Umekar[2]**	**Dr. Renuka J. Das[2]**
vish2891@gmail.com	nehagajbhiye8@gmail.com	drmilindumekar@gmail.com	Dr.rjdas.skbcop@gmail.com

[1]SSPIPER KAMPTEE
[2]SKBCOP KAMPTEE

Abstract:
The burden of cancer disease on all over the world is consistently rising and because of the symptoms of chemotherapy there is an immense intrigue is creating towards the herbal treatment. Herbal products appear to be innocuous and at those times they can meddle with malignancy treatment. An enormous volume of clinical examinations has detailed that the helpful impacts of natural herbal products on the endurance, insusceptible regulation, and Quality of life (QOL) of malignant growth patients. Herbal drugs can deflect chemotherapy from executing malignancy cells, certain herbal products improve the impact of chemotherapy. Nanoparticles of herbal drugs are used to target the drug in a specific site which results better efficacy and better bioavailability than any other formulations. The investigation of nanoparticles on herbal drugs to treat cancer, for example. Sesquiterpenoid from *Tussilago Farfara*, oligopeptides from *Perilla Frutescens*, Oxymatrine from *Sophora Flavescens*, Curcumin from *Curcuma Longa*, vincristine from *Catharanthus Roseus*, Berberine from *Berberis Vulgaris*, Quercetin from *Spohoracli Japonica*, Paclitaxel from *Taxus Brevifolia*, Camptothein from *Camptotheca acuminate*, Catechins from *Camellia Sinesis* etc. The objective of this article is to summarize the drawbacks of chemotherapy and the advantages of novel herbal nanoparticles.

Keywords: Nanoparticles (NPs), Oligopeptide, Oxymatarine (OMT).

PCP332

Assessment of Pharmacokinetic Interaction of Hydro-Alcoholic Extract of *Salacia Oblonga* Root and Glibenclamide in Rats

AP0272	AP0007	AP0280	AP0277	AP0279
Ms.Jalpa Sanandia*[1]	**Ms. Jigna Vadalia[2]**	**Ms. Mousmi Thakur[1]**	**Dr. Sachin Parmar[1]**	**Prof.(Dr.) Navin Sheth[2]**
jalpa_912@yahoo.com	jigna.vadalia@gmail.com	mousmithakur9@gmail.com	parmar.sachin@rediffmail.com	sheth_navin@yahoo.com

[1] Saurashtra University, Rajkot
[2] Gujarat Technological University, Ahmedabad

Abstract:
Salaciaoblonga (SO) (Celastraceae) is a shrub and found in southern India and native to Sri Lanka. Mainly, root and bark is used to control glucose and fat in blood. Hydroalcoholic extract of root of *Salaciaoblonga* (HASO) contains mangiferin, salacinol, kotanol, epicatechin etc. as chemical constituents which play important role to control type-2 diabetics. The present study was to elucidate the pharmacokinetic (PK) interaction of Glibenclamide (GB) with HASO. A simple, precise liquid chromatography-tandem mass spectrometry (LC-MS/MS) method was developed to quantify GB in rat plasma.PK of GB was carried out in normal wistar rats weighing 180–250g of either sex, grouped to receive 0.5% CMC (Group-1), GB (1 mg/kg,p.o) (Group-2) and in combination of GB (1 mg/kg,p.o) and HASO (100 mg/kg,p.o) (Group-3) for single and multiple dose study. PK data showed enhanced time taken to achieve maximum plasma concentration (T_{max}), area under the curve (AUC_{0-t}), and C_{max} in combination group of GB (1mg/kg) and HASO (100mg/kg), and in multiple dose study combination group had a reduced C_{max} and AUC_{0-t} compared to GB alone treated group. Co-administration of HASO with GB at different dose study showed pharmacokinetic herb-drug interaction. Thus the pharmacokinetic profiles of GB were changed in presence of HASO and give less therapeutic effect as given in alone.

Keywords: Herb-druginteractions, *Salaciaoblonga*, Glibenclamide, Pharmacokinetics.

PCP315

Influence of Piperineon Pharmacodynamics of Repaglinide With Respect to Blood Glucose and Insulin Levels in Rabbits

AP0211
Sagar Pamu*[12]
dr.sagar@live.com

AP0212
Sazal Patyar[1]
sazal.17050@lpu.co.in

AP0213
Lakshmi Thakkalapally[3]
contactlaxmi@yahoo.co.in

[1]School of Pharmaceutical Sciences, Lovely Professional University, Phagwara, Punjab-144411.
[2]Anand Pharmacy College, Anand, Gujarat, India-388001
[3]Orbicular Pharmaceutical Technologies Pvt Ltd, R & D Center, ALEAP Industrial Estate, Behind Pragathinagar, Kukatpally, Hyderabad, Telangana, India – 500 090

Abstract:
Piperine is a thermonutrient herbal drug and dietary alkaloid which can cause significant pharmacodynamic food-drug interactions with respect to blood glucose levels and insulin levels. Piperine's impact on the pharmacodynamics of repaglinide is investigated in this study. To demonstrate how piperine affects repaglinide pharmacodynamics, the study conducted in normal rabbits and streptozotocin induced diabetic rabbits to estimate the single dose and multi-dose interaction study. In normal and diabetic rabbits, we gave repaglinide alone and in combination with piperine. Rabbits treated for 21 days and blood samples collected on day 1, 3, 7, 14 & day 21, to that following estimated for blood glucose levels by GOD-POD method and insulin levels by ELISA method for pharmacodynamics study. The study results found that piperine with repaglinide treatment showed significantly decreased blood glucose levels and increased percent blood glucose reduction and increased insulin levels than repaglinide alone treatment in normal and diabetic rabbits in pharmacodynamic study. The study results suggest that piperine with repaglinide showed the synergistic effect on β-cells to release more insulin for pharmacodynamic interaction and piperine may inhibited the repaglinide's metabolic enzyme CYP3A4. Piperine with repaglinide showed the synergistic effect on blood glucose levels by showing more insulin release in both normal and diabetic rabbits, according to the findings. This research results indicates that diabetic individuals should be monitored on a regular basis to prevent hypoglycemia effects when repaglinide and piperine are taken together.

Keywords: Piperine, Repaglinide, Pharmacodynamic drug interaction, Diabetes, Rabbits.

PCP296

Cumin: A Potential Spice Herb for Mosquito Control

AP0208
Vandana Singh
vandanamster@gmail.com

AP0230
Narayan Prasad Yadav
np.yadav@cimap.res.in

CSIR-CIMAP

Abstract:
Mosquitoes transmit serious human diseases like malaria, filariasis, dengue haemorrhagic fever and yellow fever causing millions of deaths every year. Extensive use of chemical insecticides for control of vector borne diseases has created problems related to physiological resistance to vectors and adverse environmental effects. Plant-based products with essential oils (EOs) are environmentally friendly alternatives for the control of disease vectors, hosts and/or parasites.The present study aims to evaluate the potential use of *Cuminum Cyminum* (Cumin) EO in the control of the dengue vector *Aedes Aegypti and* malarial vector *Anopheles Stephensi*. Cumin essential oil was extracted using Clevenger apparatus from the seeds and was analysed by GC-MS analysis. Styreneglycol (18.51%), 1,3cyclohexadien1carboxyldehye (18.24%), Benzaldehyde4 (1-methylethyl)/Cuminaldehyde (16.45%), α-terpineol (14.54%) were the major phytoconstituents, along with few minor phytoconstituents like γ-terpinene (9.26%), O-cymene (8.12%), β-myrcene (7.03%) and 2-β-Pinene (6.69%). The larvicidal activity of the EO was evaluated, using WHO procedure (2005) against fourth instar larvae of *Aedes Aegypti* and *Anopheles Stephensi* for 24 h at various oil concentrations. Furthermore, the repellent activities of the EO against adults of both the mosquitoes were evaluated using the vapor toxicity apparatus at various oil concentrations for one hour. Cumin oil displayed noteworthy larvicidalactivity of 100±0.0 and 73.33±5.77% after 24 hoursagainst the *Aedes Aegypti* and *Anopheles Stephensi* mosquito and repellency of 73.3±2.8 and 68.3±2.8 % respectively at 40 ppm concentrationafter one hour of treatment. The results showed that the cumin essential oil has remarkable potential for control of deadly *Aedes Aegypti* and *Anopheles Stephensi* larvae and mosquito and can be used as the natural mosquito control agent.

Keywords: Essential oil, Mosquito control, Larvicidal, Repellent, Cumin.

PCP259

Anti-Obesity Therapeutics of Polyphenol Enriched Fraction of *Alpinia glanga* rhizomes through Inhibition of Digestive Enzymes, 3T3-L1 Adipocyte and High-Fat Diet-Induced Obesity Rats

AP0163
Kavita Munjal[1]
kavitamunjal915@gmail.com

AP000
Showkat Mir[2]

[1]Department of Pharmaceutical sciences, MM college of Pharmacy, MM (DU), Mullana, Ambala, Haryana

[2]Department of Pharmacognosy and Phytochemistry, SPER, Jamia Hamdard, New Delhi

Abstract:
*Alpinia*is an herbal drug widely known for ethno medicine that has been used for centuries to treat kidney disease, diabetes, and other metabolic disorders. The current investigation is aimed to explore the anti-obesity effects of polyphenolicrich *A. galangal* rhizomes by inhibitory action of dietary enzymes, adipocytes in high-fat diet induced obesity in rats. Materials and methods: A methanol extract and its various fractions (hexane, ethyl acetate, chloroform & aqueous) from Alpinia were examined for inhibitory potential of digestive enzymes. Adipocyte dysfunction at cellular level was corrected by examining on cell viability of 3T3-L1 preadipocytes using MTT assay and in high-fat diet induced obesity in rats. Results: Ethyl acetate fraction of *Alpinia* (AGEF) was found to have maximum polyphenol content (353.17 mg GAE/g) and flavonoidal content (91.07mg/g QE). AGEF also exhibited maximum inhibitory activity of lipase (80.51 %, IC_{50} value 131.60 µg/ml.). AGEF did not induce any cell death up to 500 µg/ml, when examined on cell viability of 3T3-L1. AGEF significantly suppressed body weight and fat content, and improved serum lipid concentration in high-fat diet induced obese rats. Conclusion: The results indicate the potential of AGEF being useful in mitigating obesity.

Keywords: Anti-obesity, *Alpinia glanga* rhizomes, 3T3-L1 adipocyte**,** Digestive enzymes.

PCP229

Modulation of Steroid Hormone Synthesis by Methanolic Extract of *Mallotus phillippensis*

AP0087	AP0082	AP0093	AP0111	AP0107
Bimitha Benny[1]	**Sandesh Krishna[1]**	**Sujith S[2]**	**Preethy John[2]**	**Uma R[1]**
bimithabenny@gmail.com	sandeshkrishna7479@gmail.com	sujith@kvasu.ac.in	preethy@kvasu.ac.in	uma@kvasu.ac.in

[1]Dept of veterinary Biochemistry, CVAS Mannuthy
[2]Dept of Veterinary Pharmacology and Toxicology, CVAS Mannuthy

Abstract:

Oestrogen and progesterone, perform critical roles in regulating the growth, differentiation and maintenance of the function of female reproductive tissues. Cholesterol is the precursor of all steroid hormones which is first converted to progesterone, then testosterone and finally oestrogen. Phytoestrogens are plant-derived dietary substances that have a similar structure to 17-βoestradiol (E2). Because of their structural resemblance to E2, phytoestrogens can elicit (anti)oestrogenic effects via binding to oestrogen receptors. Present study explores possibility of use of *Mallotus philippensis* as alternative to oestrogen or its analogues. *Mallotus philippensis* was obtained locally, shade dried, pulverised, and extracted with methanol and concentrated using rotary vacuum evaporator and used for research. The qualitative phytochemical analysis of the extract was done. The cytotoxicity of methanolic extract was investigated in MCF-7 cells using the MTT assay at dose rates of 320, 160, 80, 40, 20, 10 µg/mL and the IC50 was calculated using online software AAT Bioquest. The cells were cultured in 6 well plates at concentration of $1x10^5$ cells/mL and treated with *M. Phillippensis* extract at Half IC_{50}, IC_{50} and Double IC_{50} concentrations for 96 hours. Every 48 and 96 hours, the culture media was collected and replaced with new media. The obtained media used for estimation of progesterone and oestrogen using ELISA.The qualitative phytochemical analysis revealed the presence of alkaloids, tannins, flavonoids, diterpenes and phenols.The IC_{50} was determined to be 190 µg/mL. There was a dose and time dependent increase in the concentration of oestrogen when the MCF-7 cells were exposed to half, IC_{50} and double the IC_{50} doses of methanolic extract of *M. Phillipensis.* However, there was a dose dependent decrease in the concentration of progesterone in the culture media when exposed to the above said doses. From the study, it could be inferred that *M. Phillipensis* produced a positive modulation of oestrogen synthesis and it could be the cause of decreased levels of progesterone.

Keywords: *M. Phillippensis*, MCF-7 cells, Progesterone, Oestrogen.

PCP228

Cytotoxicity of Methanolic Extract of Seed Coat of *Tamarindus Indica*

AP0082	AP0087	AP0093	AP0111	AP0107
Sandesh Krishna[1]	**Bimitha Benny[1]**	**Sujith S[2]**	**Preethy John[2]**	**Uma R[1]**
bimithabenny@gmail.com	bimithabenny@gmail.com	sujith@kvasu.ac.in	preethy@kvasu.ac.in	uma@kvasu.ac.in

[1]Dept of veterinary Biochemistry, CVAS Mannuthy
[2]Dept of Veterinary Pharmacology and Toxicology, CVAS Mannuthy

Abstract:

Breast cancer is a complex and variable disease that is invasive and primarily affects women. One of the major problems encountered with anticancer therapy is the presence of resistance to most of the drugs. Cancer cell lines are frequently employed as a preclinical model for anticancer drug development. Medicinal herbs are viable options for cancer treatment due to their low cost and lack of side effects. They may also act as adjuvants in the therapy of cancer. In this study, the methanolic extract of seed coat of *T Indica* L. was assessed for its anticancer activity in MCF-7 cell lines. The seeds of *Tamarindus indica* was collected locally, shade dried, the seed coat removed, pulverised, extracted with methanol and concentrated in a rotary vacuum evaporator and used for research. The qualitative phytochemical analysis of the extract was done. The cytotoxicity of methanolic extract was investigated in MCF-7 cells using the MTT assay at dose rates of 320, 160, 80, 40, 20, 10 µg/mL and the IC50 was calculated using online software AAT Bioquest. The cells cultures in 96 well plates at $1x10^5$ cells/mL and were treated for 24 hours with extracts of *T. indica* at concentrations of half, IC_{50} and double IC_{50} concentrations. The cells were trypsinised and subjected to Acridine orange - ethidium bromide staining (AOEB) and Jc-1 staining. The AOEB staining was used to evaluate the morphology of apoptotic cells, while the Jc-1 staining was employed to quantify the mitochondrial membrane potential of cells. Qualitative phytochemical analysis of the extract revealed the presence of alkaloids, steroids, glycosides, tannins, flavonoids, saponins, and phenols. There was a dose dependent decrease in the viability of cells exposed to different concentrations of the methanolic extract of *T. Indica.* The IC_{50} was found out to be 16µg/mL. There was presence of red fluorescence emitting cells in the highest concentration whereas orange and red cells were seen in IC_{50} and more of green cells in half IC_{50} indicating a dose dependent induction of apoptosis by the extract. From the study it could be concluded that the methanolic extract of *T. indica* induces apoptosis in cancer cells in a dose dependent manner and hence can be a lead molecule for development of an anticancer drug.

Keywords: *T.indica,* MCF-7 cells, MTT, apoptosis.

PCP223

Incorporation of *in-silico* studies in the development of novel polyherbal gel

AP0098
Disha Vihol
viholdisha@gmail.com

AP0323
Dr. Karuna Modi
Karuna.modi@lmcp.ac.in

AP0194
Dr. Mamta Shah
Mbshah2007@rediffmail.com

[1] Graduate School of Pharmacy-GTU
[2] L.M. College of Pharmacy- Ahmedabad

Abstract

Acne is widely prevalent among teenagers. For fast treatment, the majority of people are going for allopathic options but it has many side effects. Few people have also experienced pimples outbursts due to the treatment itself. The anti-acne effect is also diminished and the pimples also re-appear again after the stoppage of allopathic medicines. So, to combat these side effects, choosing herbal anti-acne treatment is much more effective. Hence, a polyherbal anti-acne gel consisting of four plants based on their literature studies on anti-acne action, native to India and comparatively cheaper to procure were selected. Materials and Methods: Protein database was collected fromthe RCSB Protein Data Bank website and then the ligands were collected from the Pub-chem website, which were merged further sequentially and as per need for analyzing activity by molecular docking studies along with molecular dynamic simulation by incorporating Autodock vina application and Pymol. Further, the gel base was prepared in Galaxy Pharmaceuticals PVT LTD, Ahmedabad, and then the plant extracts were added for preparing the anti-acne formulation. Results: The docking scores conducted for the anti-bacterial, anti-inflammatory, anti-sebum, and anti-oxidant activity for most of the phytoconstituents were satisfactory. Conclusion: Overall docking score ranged from -5.1 to -10.7. From that, Acacetin demonstrated a -9.4 docking score with *Propionibacterium acne* and *Staphylococcus epidermidis* thioredoxin reductase protein (anti-bacterial action) and 18alpha-Glycyrrhetinic acid showed a -9.4 score with inflammatory mediator Substance P receptor NK1 (anti-inflammatory activity). Hence, *in-silico* activity against acne was justified but further pharmacological activity needs to be demonstrated and proved.

Keywords: acne, *in-silico*, docking studies, phytoconstituents, polyherbal gel.

PCP216

Coumarins from Unriped Fruits of *Aegle marmelos* as Potential Pancreatic Lipase Inhibitors: *in-vitro* and *in-silico* Investigation

AP0096
Nisha Yadav
p20180446@pilani.bits-pilani.ac.in

AP0097
Dr. Atish T. Paul*
atish.paul@pilani.bits-pilani.ac.in

Department of Pharmacy, BITS, PilaniPilani-333031, Rajasthan

Abstract:
The pervasiveness of obesity is increasing day by day. Recent reports have shown people living with obesity are at greater risk of COVID-19 infection and hence it has become more relevant to aggressively tackle obesity.Orlistat a potent pancreatic lipase (PL) inhibitor, is the only clinically approved for long term treatment of obesity. However, it suffers from serious side effects including hepatotoxicity and pancreatitis. Thus, there is an urgent need to discover PL inhibitors. In the present study, the methanolic extract of *Aegle marmelos* L. (Rutaceae) fruits was found to exhibit a potential PL inhibition activity (IC_{50}=13.02µg/mL). Further isolation of psoralen and xanthotoxol was accomplished using flash chromatography. These phytochemicals exhibited PL inhibitory activity with IC_{50} value of 64.89 and 59.16 µM, respectively. Orlistat was used as standard (IC_{50}=0.99µM). Orlistat, psoralen and xanthotoxol were subjected to molecular docking studies into the active site of human PL (PDB ID: 1LPB) and were found to possess a MolDock score of -137.86, -84.62 and -87.11 kcal/mol, respectively. The interaction distance of the reactive carbonyl group from Ser 152 was found to play a key role in the PL inhibition activity. The distance was lesser psoralen (3.21**Å)** and xanthotoxol (3.15**Å)** as compared to orlistat **(**3.85**Å).** Molecular dynamics studies of these molecules were performed for 10ns and they were found to be stable in the active site of PL. In conclusion, this work highlights the role of psoralen and xanthotoxol as a coumarin-based scaffold for discovery and development of potential PL inhibitor.

Keyword: *Aegle marmelos*, Obesity, Pancreatic lipase, Coumarins, Orlistat.

PCP214

Ethnopharmacological Evaluation of some Herbal Immunomodulators and Colorectal Cancer with focus on Targeting Cancer Stem Cells and Metastasis

AP0084
Alkeshkumar Patel
alkeshpatel.ph@charusat.ac.in

Ramanbhai Patel college of Pharmacy, Charusat, Changa

Abstract:
Colorectal cancer (CRC) is the second deadliest cancer. The aggressive cancer stem cells (CSC) generate immortal progenitor cancer cells that metastasize to liver and lung which is the main reason for mortality of the host. Current chemotherapy fails to eradicate CSC due to its inheritance resistance. Negative correlation exists in between cancer stemness and anticancer immunity. Some flavonoids, alkaloids and polyphenols from natural product have been reported to modulate immunity and signaling pathways that affect cancer stemness. In this study, we evaluated the effects of *Tinospora cordifoilia* and *Solanum nigrum*in experimental animal model of CRC. Total 66 Sprague Dawley rats divided into 6 groups (n=12 except normal control (n=6), RPCP/IAEC/2019-20/R2). Except the normal control, CRC were induced by DMH with 20 mg/kg for first 10 weeks and 30 mg/kg for next 10 weeks (total 20 weeks) in all other 5 groups (disease control, standard, standard plus therapeutic, therapeutic high and low dose). Treatment was given after induction of Cancer for 7 weeks. Thereafter, half of the animals (6) were sacrificed and remaining animals (6) left untreated for 5 weeks. So, total study period was 32 weeks. Different Blood (complete blood cells, plasma IL-12) & tissue (Adenoma, adenocarcinoma, metastasis, and CSC marker CD44) related parameters were measured to determine efficacy of test drugs against CSC and metastasis. Significant difference ($p<0.05$) observed in between disease control versus standard and high dose of test drugs with respect to cachexia, fecal occult blood, % lymphocyte level, IL-12, metastasis and positivity for cd44. Standard drug 5-fluorouracil failed to curb cancer stemness and metastasis after discontinuation of treatment at 27^{th} week. The synergism of chemotherapy (5-fluorouracil) and high dose of herbal test drugs showed metastasis preventive effects in the liver and visceral organs. High dose showed sustained effects even after discontinuation of the treatment suggesting its positive effects on targeting CSC compared to 5- fluorouracil.

Keywords: Carcinogen, Colorectal cancer, Cancer stem cells, Metastasis, Immunomodulators, 5-fluorouracil, Natural herbs.

PCP205

Wound Healing Efficacy of *Jasminum mesnyi* Hance

AP0064
Arun Mittal
amittal@ggn.amity.edu

Amity Institute of Pharmacy, Amity University, Haryana

Abstract:
To substantiate the ethno-therapeutic claim of the traditionally used plant *Jasminum mesnyi* in skin diseases, by assessing its wound healing efficacy along with its antioxidant and antimicrobial properties; to recognize their role in wound healing. Excision and incision wound models were used to evaluate the wound healing activity of total ethanolic and successive ethanolic extracts on albino rats. The wound healing potential was assessed by measuring rate of wound contraction, epithelialization period, hydroxyprolinecontent, skin breaking strength and histopathological parameters. Reference standard drug was Povidone Iodine ointment. The antioxidant activity was determined using 2, 2-diphenyl-1-picrylhydrazyl (DPPH) method. The antimicrobial activity was determined by agar well diffusion method. Higher rate of wound contraction (94.63±1.62% on 15thday), decrease in the period of epithelialization (8.66±0.42days), higher skin breaking strength (184.0±5.42g), higher collagen content and favourable histopathological changes revealed thattopical application of ointment containing total ethanolic extract of *J. mesnyi* leaves has the most potent wound healing ability compared to successive and control group in both the models studied. The DPPH radical scavenging activity of total ethanolic extract was found to be 30.39µg/ml. Total ethanolic extract was found to be most effective against *Pseudomonas aeruginosa* having a zone of inhibition 17.85±0.6mm. The data of this study indicate that total ethanolic extract of the leaves exhibit potent wound healing, antioxidant and antimicrobial properties. This justifies the ethnomedicinaluse of plant for the treatment of wound and microbial infections.

Keywords: *Jasminum mesnyi*, Wound healing, Excision, Incision, Histopathlogy.

PCP200

Phytochemical Screening and Neuropharmacological Evaluation of *Abrus precatorius* and *Neolmarckia cadamba* Leaf Extract in Animal Model of Depression.

AP0045
Pritam Bhore*
pgb.ccopr@gmail.com

AP0046
Dr. Swapnil Goyal
swapnilmip@gmail.com

Mandsaur University, Mandsaur.

Abstract:
Abrus precatorius and *Neolmarckia cadamba* are Indian medicinal plants which referred in medicinal system of Ayurveda for treatment of various diseases. In the present study, ethanol extract of *Abrus precaorius* and *Neolmarckia cadamba* leaves extract studied for its antidepressant activity in acute animal model of depression. Petroleum ether, chloroform, ethanol and aqueous extracts are freshly prepared from green shade dried leaves of *Abrus precatorius* and *Neolmarckia cadamba*. Ethanol extract of both plant subjected to phytochemical screening to detect active phytoconstituents. The phytochemical study reveal the presence of flavonoid, as flavonoid have diverse effects on improvement of mood and playmajor role in stress induced depression, hencein this study antidepressant effect of ethanolextract of both plant was examined separately by using two animal behavior models, the Forced Swim Test (FST) in rat, Tail Suspension Test (TST) in mice. Locomotor activity assessed in open field test by using actophotometer. Comparative profile of the test formulation of ethanol extracts of *Abrus precatorius* (ApEe) and *Neolmarckia cadamba* (NcEe) was assessed for immobility time in forced swim test and tail suspension test at dosages 100mg/kg and200mg/kg body weight after acute oral administration. Ethanol extract of *Abrus precatorius* significantly reduced immobility time in rat forced swim test at 200 mg/kg, however it was significant with 100 mg/kg and 200mg/kg in mice tail suspension test. Ethanol extract of *Neolmarckia cadamba* shows significant immobility in rat forced swim test at 100mg/kg and 200 mg/kg body weight. However, it significantly reduced immobility in tail suspension test only at high dose 200 mg/kg body weight. In additional, open field test (Actophotometer) in rat was employed to check motor dysfunction of test extract. After acute oral administration of ApEe and NcEe test extract at dosage 100mg/kg and 200mg/kg there is no change of motor dysfunction was observed. Phytochemical screening indicate presence of flavonoid in test formulation of ethanol extracts of *Abrus precatorius* (ApEe) and *Neolmarckia cadamba* (NcEe). As flavonoid play major role in stress induced depression. During neuropharmacological evaluation both extracts significantly reduced immobility time in forced swim test and tail suspension test at dosages 100 mg/kg and 200mg/kg body weight after acute oral administration, hence the ethanol extract of both plant possess antidepressant activity in animal behavior model.

Keywords: *Abrus precatiorrous*, *Neolmarckia cadamba*, Phytochemical screening, Flavonoid, Locomotor activity, Antidepressant effect.

PCP198

In-vitro Methods for Screening Medicinal Plants against Chikungunya Virus

AP0033
Sukender Kumar*
sukenderramna@gmail.com

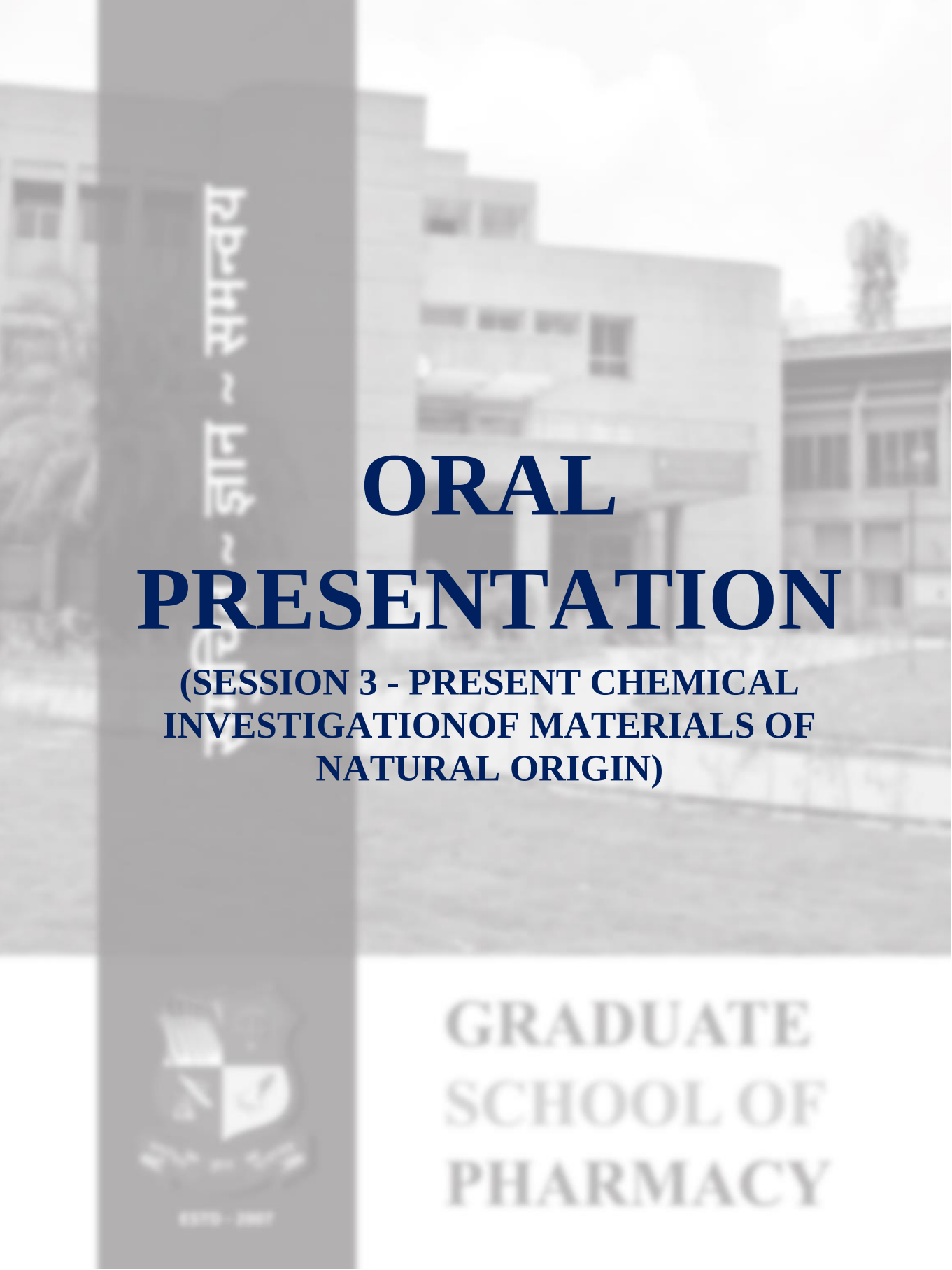
AP0034
Munish Garg
munishgarg@mdurohtak.ac.in

Department of Pharmaceutical Sciences, Maharshi Dayanand University, Rohtak-124001, Haryana, India.

Abstract:
Chikungunya virus (CHIKV) is an arthropod-borne virus having positive-sense single stranded RNA genome, spread by mosquitoes, infected over one million people around the world, and caused high morbidity due to the lack of specific treatment medications which makes the need for anti-CHIKV agents more crucial. Medicinal plants have been a rich source of new therapeutic agents since ancient times. The scientific studies, screening medicinal plants for anti-chikungunya activity, are using many methods and there is no standard protocol establishing minimum requirements of evaluation methods. The screening system should have good assay, accuracy, reproducibility, easiness, and reasonable cost. With that in mind, various major methods in the screening of medicinal plants for anti-CHIKV activity, have been underlined. These methods could establish an effective and reliable protocol for quality control of medicinal plants in terms of antiviral potential against Chikungunya.

Keywords: Chikungunya virus, antiviral evaluation, medicinal plants, anti-chikungunya potential.

This page was intentionally left blank



ORAL PRESENTATION

(SESSION 3 - PRESENT CHEMICAL INVESTIGATIONOF MATERIALS OF NATURAL ORIGIN)

This page was intentionally left blank

PCP347

Assessment of Antiarthritic Activity of *Pamburus missionis*

AP0305
Dr. Raveesha Peeriga
drprsha@gmail.com

V. V. Institute of Pharmaceutical Sciences, Gudlavalleru

Abstract:
The leaves of *Pamburus missionis* were used as antiarthritic activity in Indian traditional system of Medicine. Therefore in the current study, the antiarthritic activity was evaluated for leaf extracts using experimentally induced arthritic animal models. The ethanolic leaf extract of *Pamburus missionis* (EEPM) was studied Complete Freund's adjuvant (CFA) induced arthritis in rats using relevant inflammatory parameters viz. Paw volume, paw thickness, knee diameter, haematological parameters viz., RBC, WBC, Hb, ESR, RA factor and Radiographic analysis. Treatment with EEPM elicited reduction in paw edema, paw thickness, knee diameter, all controlled haematological parameters and improvement in radiographic analyzed features of hind paw. Evaluation of our experimental findings shown that the ethanolic leaf extract of *Pamburus missionis* (400 mg/kg) was better results when compared with that of standard drug hence it can be a feasible for the treatment of arthritis.

Keywords: *Pamburus*, Arthritic, Freunds Adjuvant, Heamatological, Inflammatory.

PCP336

Beneficial Effects of *Achyranthes aspera* on Manifestations of Nicotine Withdrawal Syndrome in Mice

AP0286
Renuka Das[1*]
renukadas1979@gmail.com

AP0285
Milind J. Umekar[1]
drmilindumekar@gmail.com

AP0288
Brijesh G. Taksande[1]
brijeshtaksande@gmail.com

[1]ShrimatiKishoritaiBhoyarCollege of Pharmacy, New Kamptee, Nagpur (M.S.), India-441 002
[2]Govt. College of Pharmacy, VMV Road, Amravati (M.S), India-444604

Abstract:
Tobacco addiction has significant health and economic impact worldwide. Although few drugs are available for the treatment of nicotine dependence, the success rate is very low, making it necessary to develop new strategies for its treatment. Smoking cessation exhibits an aversive withdrawal syndrome characterized by both increases in somatic signs includes bradycardia, gastrointestinal discomfort, and increased appetite. Affective symptoms primarily include depressed mood including anhedonia, dysphoria, anxiety, irritability, difficulty concentrating, and craving. In present study, abrupt withdrawal of daily nicotine injections (2 mg/kg, s.c., four times daily, for 10 days) significantly increased somatic signs viz. rearing, grooming, jumping, genital licking, leg licking, head shakes with associated depression (increased immobility in forced swim test) as well as anxiety (decreased the number of entries and time spent in open arm in elevated plus maze) and hyperalgesia in nicotine dependent animals. Repeated administration of *Achyranthes aspera* Linn**.** (AA**)** (5-20 mg/kg, i.p.). Before the first daily dose of nicotine from day 5 to 10 attenuated the elevated scores of somatic signs and abolished the depression, anxiety like behaviour and hyperalgesia induced by nicotine withdrawal in dependent animals. However, in separate groups, its acute administration 30 min before behaviour analysis of nicotine withdrawal was ineffective. This result clearly shows the effect of AA in development of nicotine dependence and its withdrawal. Taken together, these data support the use of AA for somatic signs and affective symptoms of nicotine withdrawal. This data may project therapies based on AA in anxiety, depression and mood changes associated with tobacco withdrawal.

Keywords: *Achyranthes apera* Linn., Nicotine withdrawal, Depression, Anxiety, Hyperalgesia serotonin.

PCP323

Estimation of Phenolic Acid and Flavonoids in Leaves of *Medicago sativa* and *Medicago arborea*

K. Kathiresan
Department of Pharmacy, Annamalai University,
Annamalai Nagar, Chidambaram, Tamil Nadu, India.
dr.kathiresan123@rediffmail.com

Abstract:
Objective: To explore physiochemical and phytochemical standardization of leaves of *Medicago sativa* and *Medicago arborea.* Method: As per WHO guidelines, physical standardization parameters with various solvents system were evaluated. The preliminary phytochemical screenings were adopted for disclosing the existence of phytochemicals in the discrete extracts. Thin layer chromatography and HPTLC were employed for methanolic extract of leaves of *Medicago sativa* and *Medicago arborea.* Result: Preliminary phytochemical screening with various extracts reveals phytoconstituents. HPTLC fingerprint were executed for leaves of *Medicago sativa* and *Medicago arborea* using selected solvent system. HPTLC analysis implies the presence of phenolic compounds and flavonoids in both the plant *Medicago sativa* and *Medicago arborea*. Conclusion: Quercetin and Gallic acid was raised to be more in *Medicago sativa* compared to *Medicago arborea*, however rutin was reported only in *Medicago sativa*. The outcome of the research leads for isolation, purification and utilization in herbal industries.

Key words: HPTLC, Methanolic extract, *Medicago sativa*, *Medicago arborea*, Quercetin, Gallic acid, Rutin.

PCP285

LC-MS/MS Analysis of Phenolic Compounds from the Hydro-Alcoholic Extract of *Telosma pallida* Flowers

AP0038
Punitkumar R. Bhatt
punitbhatt.ph@ddu.ac.in

AP0192
Gopi H. Shah
gopishah.ph@ddu.ac.in

Faculty of Pharmacy, Dharmsinh Desai University, Nadiad (Gujarat) India

Abstract:
The aim of the present study was to explore the phenolic composition of indigenous plant *Telosma pallida* (Roxb.) Craib. (Asclepiadaceae). It is a perennial climber found commonly in the Saurashtra region of Gujarat (India) and some parts of India. The flower of this plant are commonly consumed in various region of Gujarat and Maharashtra. Based upon preliminary experiments, phenolic profiling of hydro-methanolic extract (80%) of flower part of *T. pallida* was performed *via* HPLC-DAD-MS/MS analysis in the positive and negative ion mode. Fifteen major phenolic compounds cinnamic acid, gallic acid, caffeic acid, salicylic acid, ferulic acid, quercetin, catechol, chlorogenic acid, coumaric acid, syringic acid, kaempferol, vanillic acid, catechin, epicatechin and epigallocatechin were used as reference standards in this study. The analysis of the extract allowed the identification of 12 major phenolics out of 15 used in the analysis. Chlorogenic acid and quercetin were found in the highest concentration 2407.06 and 842.84 ng ml^{-1} using calibration curve method, respectively. Gallic acid, syringic acid and catechin were found to be absent.

Keywords: *Telosma pallida*, LC-MS/MS, Chromatography, Phenolic compounds.

PCP256

A Review on Phytochemicals: Indian Medicinal Plant(s) Showing Antidiabetic Activity

AP0105
Pradeep Adlak[1]
pradeepadlak@gmail.com

AP0106
Dr. Rakesh Sagar[2]
drrsagar@gmail.com

AP0152
Dr. Mohanlal Kori[1]
mohanlalkori@gmail.com

[1] **Vedica College of B.Pharmacy, RKDF University, Bhopal MP**
[2] **Shri Govindram Seksaria Institute of Technology and Science, Indore**

Abstract:
Phytochemicals of medicinal plants have diverse chemical as drug discovery and India is rich with indigenous medicinal plants that have been used in traditional Indian medicine to treat diabetes. The phytochemical constituents such as phenolic, tannins, saponin, flavonoids, alkaloids, steroids and glycosides were found in the plants shows the antidiabetic activity. This article revealed that traditional medicinal practitioner using medicinal plants for antidiabetic activity must have phytochemical components of definite chemical classes. The article reviews the work done so for in the literature survey of Indian origin having potential of antidiabetic activity. The attempt has been made to make this review article to explore existing and new plants and phytoconstituents for antidiabetic agents.

Keywords: Medicinal Plant, Phytochemicals, Antidiabetic activity, Flavonoids, Phenolic**.**

PCP227

Evaluation of *in-vitro* Antioxidant, Antimicrobial, Antitubercular and *in-vivo* Hepatoprotective and Antioxidant Activity of *Andrographis paniculata* Extracts

AP0028
Monika L. Jadhav
mljrcp@gmail.com

AP0000
Pratima A. Tatke

[1] Department of Pharmaceutical Chemistry, C. U. Shah College of Pharmacy, S.N.D.T. Women's University, Juhu campus, Mumbai

Abstract:
Andrographis paniculata (AP) (Kalmegh), belonging to the family Acanthaceae, used in Ayurveda, Siddha, Unani and Homeopathy to treat broad variety of diseases. All parts of the plant are extremely bitter due to which plant is known as "king of bitter". The objective of the research work was to evaluate *in-vitro* antioxidant, antimicrobial, antitubercular and *in-vivo* hepatoprotective and antioxidant activity of extracts of dried aerial parts of AP prepared in various solvents. Extraction was done by soxhlet extraction technique using hydro-alcohol (50:50), ethanol, methanol and ethyl acetate as solvents. The extracts were evaluated for percentage yield, phytochemical testing, total phenolic content (TPC), total flavonoid content (TFC), *in-vitro* antioxidant activity (using DPPH radical scavenging, hydroxyl radical scavenging, superoxide radical scavenging methods), *in-vitro* antimicrobial activity (against 2 gram positive, 2 gram negative bacteria and 2 fungi) and *in-vitro* antitubercular activity using Microplate Alamar Blue Assay (MABA). *In-vivo* hepatoprotective activity of selected extract was performed using Paracetamol induced hepatotoxicity model of 7 days and Isoniazid-Rifampicin induced hepatotoxicity model of 30 days and evaluated for liver diagnostic enzymes like bilirubin, AST, ALT and alkaline phosphatase. Ethanol and methanol extracts of AP showed higher TPC and TFC as compared to hydroalcohol and ethyl acetate extracts. In *in-vitro* antioxidant methods, all extracts showed remarkable antioxidant activities as evidenced by the low IC50. For *in-vitro* antimicrobial activity, all extracts showed antimicrobial activity against *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Bacillus subtilis*. Only ethanolic and methanolic extracts showed antimicrobial activity against both fungi. All the extracts showed moderate antimycobacterial activity by using MABA. Ethanol extract of AP at a dose of 200 mg/kg significantly reversed ($P < 0.05$) the elevation in the level of ALT, AST, ALP and bilirubin respectively in both models. Silymarin and ethanol extract of AP significantly increased ($P<0.05$) the level of CAT and SOD, while significantly reduced ($P<0.05$) the level of MDA compared to the hepatotoxicant only group. It was concluded that ethanol extract of AP carries significant antioxidant, antimicrobial, antitubercular and hepatoprotective activity and could find utilisation as adjuvant for antitubercular therapy to prevent liver damage due to long lasting antitubercular therapy.

Keywords: *Andrographis paniculata,* Antioxidant, Antimicrobial, Antitubercular, *in-vivo* hepatoprotective.

PCP226

The Chemical Constituents and Pharmacological Activities of *Anthocephalus cadamba*: A Review

AP0069
Nidhi Gupta
M.M. College of Pharmacy
M.M. (Deemed to be University)
gupta21nidhi@gmail.com

Abstract:
Anthocephalus cadamba is a traditionally used medicinal plant for the treatment of several human diseases. Plant parts have been used in Ayurvedic medicine for the treatment of blood related diseases, fever, uterine complaints, dysentery, wounds, ulcers and snake-bite. Phytochemical studies indicated that it is a rich source of diverse secondary metabolites such as triterpenes, triterpene glycosides, irridoid glycosides, steroids and alkaloids. Plant extracts and isolated active metabolites possess multiple biological activities such as antimicrobial, antioxidant, abortifacient, sedative, antiepileptic, DNA topoisomerase IB inhibition, antiviral, anti-inflammatory and antileishmanial activities. In this paper, literature available on the phytochemistry and pharmacology of *A. cadamba* is described till date.

Keywords: *A. cadamba*, Chemical Constituents, Phytochemistry, Pharmacology.

PCP213

Indigenous Antidiabetic Medicinal Plants with Insulinomimetic Property

AP0095
Manju Bala*
manjudeolia4@gmail.com

AP000
Anju Dhiman

Department of Pharmaceutical Sciences, *Maharshi Dayanand University,* Rohtak, Haryana-124001, India

Abstract:
Diabetes Mellitus is a devastating endocrine disorder with rising global prevalence and incidence. Approximately 150 million people are suffering from this disease in the world and the mortality rate is being enhanced. Decreased exercise, increased weight and stress, change in diet, malnutrition and alcohol consumption are the some of the major causes of Diabetes mellitus. The long term repercussion are neurological, eye, renal and cardiovascular complications, therefore, there is an urgent need for safer, efficient and affordable alternative treatments. Over 400 plant species are reported in ethnobotanical literature with hypoglycaemic activity for treating diabetes. Plants with hypoglycaemic activity mainly belongs to family like Liliaceae, Leguminoseae, Lamiaceae, Cucurbitaceae, Moraceae, Asteraceae, Moraceae, Araliaceae and Rosaceae. There are various most active plants like *Momordica charantia, Trigonella foenumgraceum, Gymnema sylvestre and Ficus bengalensis* containing bioactive phytoconstituents like momordicin, charantin, hydroxyleucine, polypeptides, leucocyandin-3-o-beta-d-galactosyl cellobioside, and leucopelargonidin-3-o-alpha-L-rhamnoside with insulinomimetic property. The objective of this study is compilation of various antidiabetic medicinal plants with insulinomimetic property along with lead compounds. It is evident that medicinal plants have become a growing part of modern and high-tech medicine.

Keywords: Diabetes mellitus, Herbal medicine, Hypoglyceamic activity, Insulinomimetic, Phytoconstituents.

PCP188

Development of Simple, Rapid and Economic Method for Extraction and Isolation of 3-O-Acetyl-11-Keto-B-Boswellic Acid from the Resins of *Boswellia serrata*

AP0011
Vishal Gokul Beldar[1]
vishalbeldar1994@gmail.com

AP0012
Dr. Manojkumar Jadhao[2]
manojjadhao04@gmail.com

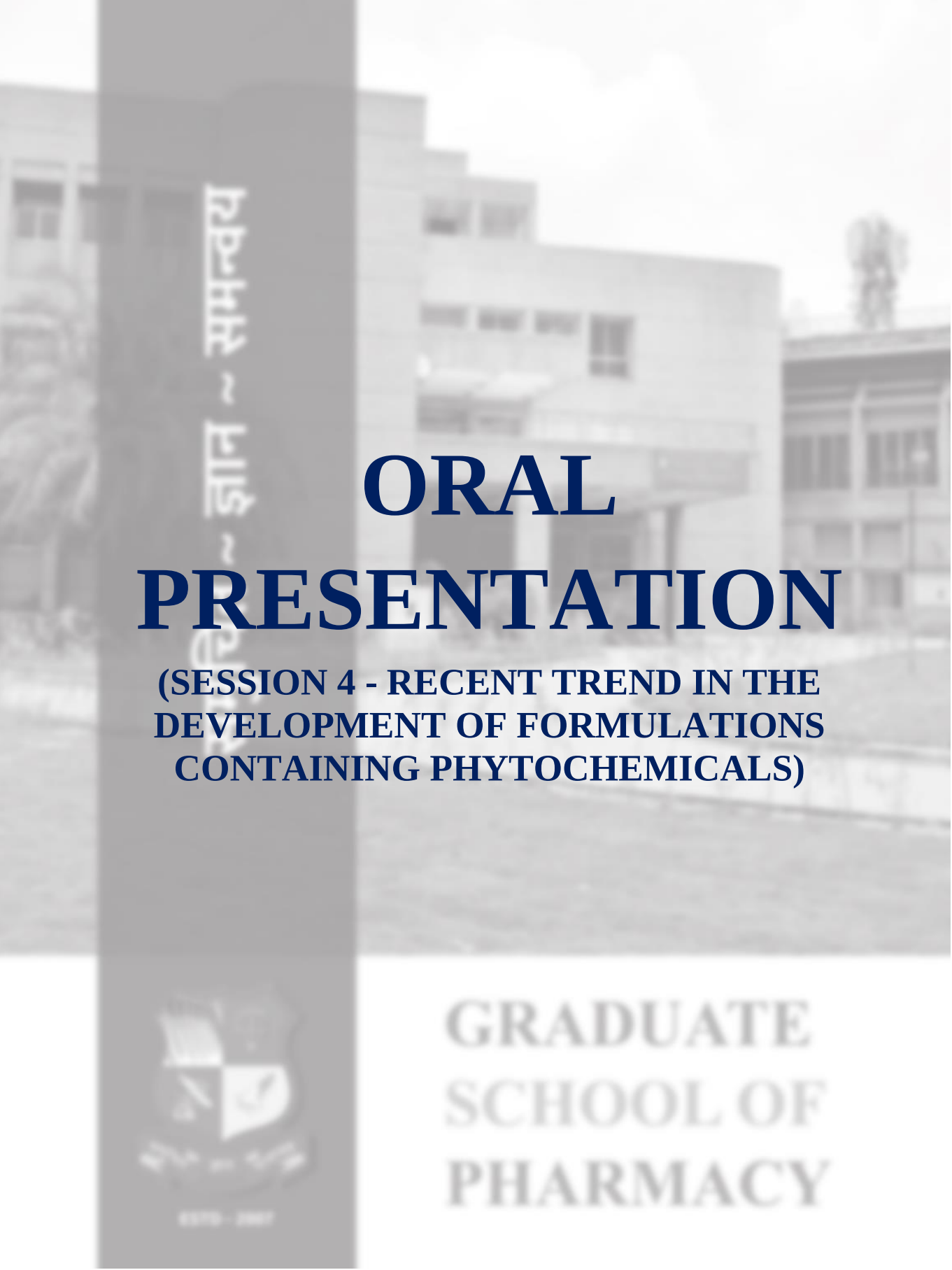
AP0013
Prof. Kirti S Laddha[3]
ks.laddha@ictmumbai.edu.in

[1]Department of Pharmaceutical Sciences and Technology, Institute of Chemical Technology Mumbai, Marathwada Campus, Jalna
[2]Department of Analytical Sciences, Institute of Chemical Technology Mumbai, Marathwada Campus, Jalna
[3]Department of Pharmaceutical Sciences and Technology, Institute of Chemical Technology, Mumbai, India

Abstract:
Boswellia serrata is an important species from the Boswellia genus, which contains the variety of significant phytoconstituents. Among all boswellic acids, 3-O-acetyl-11-keto-β-boswellic acid (AKBA) phytoconstituent was found to be more potent for various medicinal applications. The traditionally, column chromatography is used to isolate the AKBA from the raw material as well as from extracts which is mostly time consuming and laborious as well. Hence this research work epitomizes the development of new method for the isolation of AKBA from the resin extract of *B. serrata* which is simple, rapid and reproducible. The method of extraction and isolation of AKBA involved extraction of resins using hydro-alcoholic solution followed by treatment of alkali and acids to get crude precipitate of AKBA. The obtained crude AKBA was subjected to the dry column vacuum chromatography to separate and yield the high purity of the AKBA. The purity of the isolated AKBA established by TLC & UHPLC. Spectral characterization of the isolated compound was performed by employing IR, MS, and NMR. The proposed method found to be economically viable as well as can be used for isolation of AKBA from resin extract of *B. serrata* at industrial scale. The isolated AKBA also studied for the protein interactions. We studied the effect of AKBA on Hen Egg White Lysozyme (HEWL) protein by using steady state florescence spectroscopy method. The results show, AKBA inhibits the protein aggregation. This study helps for further development of lead molecule on protein aggregation related discoveries (amyloidogenic proteins).

Keywords: *Boswellia serrata*, Boswellic acids, AKBA, Extraction and Isolation, Hen Egg White Lysozyme, protein aggregation.

This page was intentionally left blank



ORAL PRESENTATION

(SESSION 4 - RECENT TREND IN THE DEVELOPMENT OF FORMULATIONS CONTAINING PHYTOCHEMICALS)

This page was intentionally left blank

PCP359

Formulation and Evaluation of Sustained Release Tablets Using Natural Polymers

AP0316	AP0271	AP0312	AP0285
Ms. Jyotsana Paradkar	**Dr. Jayshree Taksande**	**Dr. KamleshWadher**	**Prof. Milind Umekar**
jyotsanaparadkar0306@gmail.com	jayabtaksande@gmail.com	Kamleshwadher@gmail.com	drmilindumekar@gmail.com

Smt. Kishoritai Bhoyar College of Pharmacy

Abstract:
The influence of formulations containing both hydrophilic and hydrophobic materials on drug release pattern from matrices was examined. Gum damar and gum copal were used to investigate the efficacy of combination matrices in sustaining drug release since they are water insoluble. The hydrophilic substance was hydroxypropyl methylcellulose K100M, and the model medication was diclofenac sodium. The effect of the concentration of hydroxypropyl methylcellulose on the drug release pattern of hydrophobic material was investigated. The best drug-to-polymer ratio was found to be 1:1. The release pattern of the 75:25 hydrophobic: hydrophilic polymer ratio was found to be identical to that of the marketed formulation. The initial burst release that occurred in individual hydrophobic matrices was greatly reduced at this ratio. As the concentration of hydrophobic substance was raised, the drug release followed Higuchi's equation. The formulations were compared to the commercially available Voveran SR, and a correlation was formed.

Key words: Diclofenac sodium, drug: polymer ratio, gum copal, gum damar, hydroxypropyl methylcellulose.

PCP357

Boswellia serrata Loaded Emulgel: Design, Development, and *ex -vivo* Characterization

AP0315	AP0310	AP0313	AP0312	AP0285
Muskan Motwani	**Abhidha Desphande**	**Dr. Dinesh Biyani**	**Dr. Kalmesh Wadher**	**Prof. Milind Umekar**
sureshmotwani70@gmail.com	aparnadeshpande@gmail.com	dineshbiyani10@gmail.com	drkamleshwadher@gmail.com	drmilindumekar@gmail.com

Smt. KishoritaiBhoyar College of Pharmacy

Abstract:

The purpose of this study was to look into the potential of emulgel as a topical delivery system for increasing *Boswellia serrata* permeation (BS). SEM, percent drug content, and spreadability determination were used to characterise the BS loaded emulgel, which was prepared using a 3^2 factorial design. The experiment was designed to optimise the outcome, and surface plots were generated to compare with the practical results.The prepared BS loaded emulgel had an average spreadability of 29.840 to 75.6 g.cm/sec, and the pH of all formulations ranged from 6.3 to 7.09. Viscosity measurements were used to investigate rheological behaviour, and a skin irritation test was performed to assess formulation biocompatibility. A modified Franz diffusion cell was used to study skin permeation in rat dorsal skin. The BS emulgel demonstrated high drug deposition on excised rat skin; the test demonstrated the formulated emulgel's biocompatibility. These findings support the use of BS-loaded emulgel as a superior topical application vehicle for BS.

Keywords: *Boswellia serrata*, Emulgel, Factorial design, Spreadability.

PCP353

Emulgel Contained with *Pongamia pinnata* Extract: Design and Characterisation

AP0310	AP0315	AP0313	AP0312	AP0285
Abhidha Vinay Desphande	**Muskan Suresh Motwani**	**Dr. Dinesh M. Biyani**	**Dr.Kalmesh J. Wadher**	**Prof. Milind Umekar**
aparnadeshpande@gmail.com	sureshmotwani70@gmail.com	dineshbiyani10@gmail.com	drkamleshwadher@gmail.com	drmilindumekar@gmail.com

Smt Kishoritai Bhoyar College of Pharmacy, Kamptee, Nagpur, Maharashtra

Abstract:
Emulgel is a new topical medicine delivery method on the market. Using 32 factorial designs, the current study aims to design, prepare, and statistically optimise *Pongamia pinnata* extract emulgel for better transdermal distribution. Carbopol and Emulsified agent ratio [(Span: tween)] were chosen as independent factors, while viscosity (cp) (Y1) and spredability were chosen as dependent variables (Y2). The physical appearance, rheological behaviour, in vitro drug release, and *ex-vivo* permeability studies of the produced *Pongamia pinnata* extract emulgel were all assessed. According to the results of a percent drug diffusion investigation, the developed topical PPE emulgel formulation released a maximum of 59.15 percent 0.512 over a 6 hour time span. The prepared emulgel was studied for 90 days at a temperature of 40° C, 2°C and a relative humidity of 75 percent 5 percent (RH). When compared to the original formulation, the results showed no phase separation and no significant changes in physical appearance, percent viscosity, percent spredability, or drug content. The extract was able to decrease immobility time while also enhancing active behaviours such as climbing.

Keywords: Emulgel, Topical.

PCP350

Formulation and Evaluation of Intranasal Microemulsion of *Achyranthes aspera* Root Extract for Antidepressant Activity

AP0284	AP0286	AP0304	AP0301	AP0285
Sarvesh Fuke	**Dr. Renuka Das**	**Dr. A. A. Tatode**	**Dr. Arun T. Patil**	**Prof. Milind J. Umekar**
sarveshfuke29@gmail.com	renukadas1979@gmail.com	aatatode@rediffmail.com	profarunpatil@gmail.com	drmilindumekar@gmail.com

SmtKishoritaiBhoyar College of Pharmacy, Kamptee, Nagpur, Maharashtra

Abstract:

Nature has been a source of medicinal agents for thousands of years, before the introduction of modern medicines, disease treatment was entirely managed by herbal remedies. It is estimated that about 80% of the world population residing in the vast rural areas of the developing and under developed countries still depends mainly on medicinal plants. *Achyranthes aspera* has been used traditionally for the cure of various disorders. It has a broad pharmacological value. The plant has many potential compounds but the major activities are because of the presence of few bioactive compounds which includes, ecdysterone, achyranthine, betaine, pentatriaontane, 6-pentatriacontanone, hexatriacontane and tritriacontane. Though almost all of its parts are used in traditional systems of medicines, seeds, roots and shoots are the most important parts which are used medicinally. This research work is based on antidepressant activity of *Achyranthes aspera* root extract. The aim was to formulate and evaluate intranasal Microemulsion of *Achyranthes Aspera* root extract for the assessment of its antidepressant effect. Microemulsion was formulated using medium chain triglycerides, surfactant and co-surfactant which is a novel approach for drug delivery in the brain and its evaluation was done in terms of stability, particle size, phase separation etc. Antidepressant activity of formulation was conformed using modified forced swim test in rats. The results demonstrated that administration of microemulsion, significantly decreased the duration of the immobility time in modified forced swim test in rat in a dose dependant manner as compared to the control group, indicating the antidepressant activity of *A. aspera*. The extract was able to reduce immobility time and simultaneously enhance active behaviours like climbing. The study thus revealed antidepressant like activity of root extract of *Achyranthes aspera* as evidenced by animal model of depression.

Keywords: *Achyranthes aspera*, intranasal, microemulsion, antidepressant.

PCP349

A Comprehensive Study of Herbal Cosmetics Prepared From Flaxseed

AP0295	AP0285	AP0286	AP0302
Sakshi k. Fale	**Prof. Milind Umekar**	**Dr.Renuka Das**	**Mr.R.NAlaspure**
sakshifale2702@gmail.com	drmilindumekar@gmail.com	renukadas1979@gmail.com	rnalaspure@gmail.com

Smt Kishoritai Bhoyar College of Pharmacy, Kamptee, Nagpur, Maharashtra

Abstract:
The word cosmetics is known since ages. Natural beauty is a blessing and human uses cosmetics to look good and attractive. Number of herbal plants are used to treat various diseases and skin conditions naturally. Herbs are used in cosmetic formulation as they are having natural ingredients or constituents. Nowadays, herbal cosmetics are widely used as they have good activity and lesser side effects. Herbal cosmetics are used for daily purpose including cleanser, moisturizer, toner, lotions, creams etc. Herbal products improve the various functions of skin by boosting growth of collagen and thus eradicating harmful effects of free radicals, and maintaining keratin structure and making skin healthy. Essential oils are concentrated liquids and complex mixture of volatile compounds and can also be extracted from some plant organs. Flaxseed is used as traditional medicine and in formulation of skin products which helps in reducing acne and wrinkles and also gives antiaging effect and makes skin glowing and flawless. Flaxseed is used in formulation of hair oil, hair gel which helps in moisturizing and nourishes the hair. Flaxseeds are also used as nutritional additive and used in preparation of some dietary items.

Keywords: Cosmetics, Herbal, Collagen, Antiaging effect.

PCP348

Piper betel Leaf: A Potential Chemoprotective Agent

AP0296	AP0285	AP0286	AP0302
Shubham V. Gupta	**Prof. Milind Umekar**	**Dr. Renuka Das**	**Mr. R. N. Alaspure**
gshubham834@gmail.com	drmilindumekar@gmail.com	renukadas1979@gmail.com	rnalaspure@gmail.com

Smt Kishoritai Bhoyar College of Pharmacy, Kamptee, Nagpur, Maharashtra

Abstract:

Plants contain a much greater diversity of bioactive compounds than any man-made chemical compounds. The *Piper betel* leaves are magnificent reservoirs of phenolic compounds with antiproliferative, antimutagenic, antibacterial, and antioxidant properties. Leaf contains abundance of biophenolics such as hydroxychavicol, eugenol, chavibetol, and piperols. The data focus the remarkable chemotherapeutic and chemo-preventive potential of betel leaves against a variety of cancer types. The phytochemicals of betel leaves modulate an extensive array of signalling molecules such as transcription factors as well as reactive oxygen species (ROS) to control multiple nodes of various cellular proliferation and death pathways. An overall perspective on the cancer-fighting benefits of the phenolic phytochemicals in betel leaves and a comprehensive overview of the mechanisms responsive to dose-driven ROS-mediated signaling cascades conscripted by bioactive phenolics to confer chemotherapeutic and chemo-preventive advantages. These ROS-triggered responses elicit a protective xerothermic antioxidant response to premalignant cells to constitute a chemo-preventive effect or generate a curative chemotherapeutic response by pro-oxidatively augmenting the constitutively elevated ROS levels in cancer cells to tip the balance in favour of selective apoptosis induction in cancer cells while sparing normal ones. There is potential of the evergreen vine, betel leaf, for chemo preventive and chemotherapeutic in formulation of dosage form for management of cancer.

Keyword: Biophenolics, chemoprotective, chemotherapeutic, phytochemicals, xerothermic.

PCP344

Screening Antimicrobial Activity of Leaf Extract of *Cocculus hirsutus*

AP0205	AP0204	AP0274	AP0285	AP0300
Rakesh Kanchhul[1]	**Ram Musle[1]**	**Neha Raut[1]**	**Milind Umekar[1]**	**Shubhada Mangrulkar[2]**
rakeshkanchhul@gmail.com	ram.musle97@gmail.com	rautneha123@gmail.com	drmilindumekar@gmail.com	shubhadamangrulkar@gmail.com

[1]Smt. Kishoritai Bhoyar college of Pharmacy, Kamptee, Nagpur
[2]Priyadarshini J. L. college of Pharmacy, Nagpur

Abstract:

Cocculus hirsutes has been a well-known since ancient times that plant & species have antimicrobial activity. There has been a considerable interest to use plants & species for the elimination of microorganism because of increasing antibiotic resistance of microorganism. Hence, the present attempt was under taken to investigate the phytopharmacognostical studies of leaf *Cocculus hirsutus*. The fresh & healthy *Cocculus hirsutus* leaves were collected then extraction was done by maceration method, microwave & soxhlet extraction method. The extract was evaluated for it pharmocognostic characteristics. *Cocculus hirsutus* were evaluated for antimicrobial activity against clinically important bacteria *viz Escherichia coli, Staphylococcus aureus, Bacillus subtills, Proteus mirabilis.* The *in-vitro* antimicrobial activity was performed by cup plate method. The result extractive value of leaf extract of *Cocculus hirsutus* in different solvent are reported and the methanol leaf extract of *Cocculus hirsutus* give good antimicrobial activity against *E. coli, Staphylococcus aureus*. This study suggested that the leaf of *Cocculus hirsutus* obtained by infusion can be used in the treatment of various microbial diseases. The methanol extract of *Cocculus hirsutus* was found to be more effective against *E. coli, S. aureus*. There for extract might be useful for further disease infection associated with *E.Coli* and *S. aureus* as compare with ascorbic acid.

Keywords: *Cocculus hirsutus*, Pharmacognostical screening, Antimicrobialactivity, *E.coli, S.aureus.*

PCP342

Effect of Green Synthesized Fenugreek Metal-ion Nanoparticles on Resistant Microorganism

AP0270	AP0274	AP0278	AP0283	AP0285
Divya Zambre	**Neha Raut**	**Shweta Raut**	**Rashmi Zode**	**Dr. Milind Umekar**
zambredivya@gmail.com	rautneha123@gmail.com	shwetaraut1997@gmail.com	rashmizode@gmail.com	drmilindumekar@gmail.com

Smt. Kishoritai Bhoyar College of Pharmacy, Kamptee, Nagpur, Maharashtra.

Abstract:

The present research work is based on characterization and evaluation of green synthesized fenugreek metal ion complexes. The metal ion complexes such as Fenugreek-palladium, Fenugreek-cadmium, Fenugreek-zinc, Fenugreek-nickel, Fenugreek-sliver were synthesized and characterized by melting point, UV, SEM, EDS, FT-IR spectrophotometry. The antimicrobial activities of all complexes using the disc diffusion method were screened against normal and resistant strains of *Escherichia coli* and *Klebsiella pneumoniae*. The minimum inhibitory concentration of the metal ion complexes was determined by the broth dilution method. The antibacterial activity of 1:1 ratio of fenugreek palladium chloride was carried out to study the effect of green synthesized complexes. The melting point of complexes was above 300°C. Scanning Electron Microscope showed that the 1:1 ratio of Fenugreek-Palladium complexes has a different shape in the range from 369nm to 914nm. UV spectra showed a change in absorbance which confirm the formation of complexes. The result of energy dispersive spectrophotometry confirmed the presence of elements Pd, Cl, O, C, N, and Pt in the Fenugreek-Palladium complex. The FTIR spectra of all the compounds were scanned in the region of 4000-700 cm. The data showed a change in wavenumber as compared to the standard drug due to the formation of a metal ion complex. Antimicrobial activity studies revealed that complexes showed better activity against resistant organisms than normal organisms. The minimum inhibitory concentration result showed strong antimicrobial activity for all complexes at low concentrations. The present study provides that the combination of Fenugreek-metal ion would be having better antimicrobial activity against resistance strain of bacteria.

Keywords: Fenugreek-metal ion, Nanoparticles, Antimicrobial activity, Resistant Microorganism.

PCP326

Translating Ethnomedicine into Novel Medicine: Sophisticated Analysis of Extract of Karanj (*Pongamia pinnata*) Twigs and Development of Periodontal Chip Therefrom

AP0246
Vivek Joshi*[1]
rx.jvd.198@gmail.com

AP0019
Devang Pandya[2]
director.sop@rku.ac.in

[1]Graduate School of Pharmacy, Gujarat Technological University
[2]School of Pharmacy, RK University

Abstract:
Dental ailments like periodontitis, plaque, bleeding gums, dental caries, cavities, etc. are as much prevalent as cardiovascular disorders and diabetes in children as well as adults across the world. Surgical methods have proved costlier for their short-term cure. Ashtang Hridaya, an ancient Ayurvedic literature, suggests daily chewing of twigs of medicinal plants such as Arka, Karanj and Khadir to maintain dental hygiene by preventing ailments. *Pongamia pinnata* Pierre (*P. pinnata*) is a glabrous tree known for its anti-inflammatory, anti-microbial, analgesic, anti-ulcer and anti-oxidant activities. Various parts of *P. pinnata* like leaves, roots, pods and seeds are widely being used in many disorders; seed oil is used as biofuel. Claims regarding its potential ethnomedicinal utility in dental problems were investigated by preparing novel extract from their fresh twigs. Gas Chromatography – Mass Spectrometry (GC-MS/MS) of the extract could reveal 15 known compounds; of which few possessed known pharmacological activities. High Performance Thin Layer Chromatography (HPTLC) fingerprinting of the same was performed using Methanol: Water: Glacial Acetic acid (8: 2: 1) mobile phase; which revealed 2 peaks at 254 nm and 2 peaks at 366 nm. This research study might contribute in standardization; to establish purity, safety and efficacy of available formulations and aid in quality control in herbal industries by detecting adulteration. To provide sustained release of potentious novel extract upto 8 hours, biodegradable and mucoadhesive Periodontal chip, a novel approach for Buccal Drug Delivery System was developed and evaluated for various parameters. It could also enhance patient compliance by reducing dose administration frequency due to local and highly specific oral action, leading to prevention of dental ailments and improved dental hygiene.

Keywords: Karanj, Dental hygiene, GC-MS/MS, HPTLC, Standardization, Periodontal Chip.

PCP322

A Novel Self-Assembled Piperine Loaded Cubosomal nano Formulation for Targeting Melanoma: An *in-vitro* and *in-vivo* Evaluation

AP0203
Bhaskar kallappa Kurangi
Bhaskarkurangi19@gmail.com

AP0015
Sunil Satyappa Jalalpure
jajpuresunil@reddifmail.com

KLE College of Pharmacy Belagavi, KLE academy of higher education and research, Nehrunagar, Belahavi, 590010.

Abstract:
Melanoma is one of the most aggressive type of skin cancer, with high incidence rate and mortality, throughout the world. The present study aimed to develop, characterize, and evaluate the piperine-loaded cubosomes (PC) for targeting melanoma. A novel, self-assembled, PC nanoformulation was developed using glycerol monooleate and Pluronic F-127 by homogenization technique. Optimization of PC using 2-factor 3-level factorial design indicated cubic-shaped structures, having a mean particle size of 114±4.22 nm. Characterization was further done by assessing their zeta potential and entrapment efficiency which was -29.8 ± 1.20 and 86.31 ± 0.67%, respectively. *In-vitro* drug release of optimized PC demonstrated biphasic drug release with diffusion-controlled release of piperine (70.01 ± 5.22%). Optimized PC was further formulated into cubosomal gel by using carbopol (1.5% w/v) and the gel was evaluated for *ex-vivo* permeation and deposition which shows better drug permeation and deposition in mice skin layers in comparison to piperine gel. Biocompatibility of optimized PC was observed towards L929 (mouse fibroblast), with better anticancer activity against A375 (human melanoma) cell lines, when compared to pure piperine. Stability study showed the ability of cubosome to maintain their stability in different conditions. Composition of cubosomal gel has been proved non-irritant to the mice skin. *In-vivo* local bioavailability study depicted the good potential of nanocubosomal gel for skin localization when compared to PI drug solution. Topical application of PC-Gel into melanoma-bearing BALB/c mice up to six weeks resulted in tumor regression, thereby proposing the cubosomal gel to be a promising drug delivery system through transdermal application for the melanoma treatment.

Key Words: Piperine, Cubosoaml, Melanoma.

PCP310

Formulation and Characterization of Silibinin Loaded Targeted Polymeric Nanoparticles

AP0232
Priya Patel*[1]
pvpatel@sauuni.ac.in

AP0253
Mihir Raval[2]
rmihir@yahoo.com

[1]Saurashtra University, Rajkot
[2]Sardar Patel University, V.V.Nagar

Abstract:
The purpose of the present study was to optimize Silibinin loaded Polymeric Nanoparticle by application of quality by design (QbD) approach and its administration by metered dose inhaler that will reach lungs directly to give sustaining effect for the treatment of lung cancer. Box Behenken design was implemented for design of experimentation with 15 runs. Prepared nanoparticles were characterized for particle size, Zeta potential, polydispersity index, entrapment efficiency, in-vitro release study, FTIR, differential scanning calorimetric, X-ray diffraction along with scanning electron microscopy (SEM). Response surface curve and desirability factors helped in the selection of optimum formulation of nanoparticles. Optimized formulation was linked with folic acid. A lung cancer was developed by NNK Model and perform tissue distribution study and pharmacokinetic parameter. FTIR and DSC study reviled no interaction between the drug and other ingredients. Based on the QbD approach, design space (DS) was optimized with a range of selected variables with entrapment efficiency > 50% w/w and a particle size between 300 to 400 nm. *In-vitro* drug release followed dual mechanism via, diffusion and polymer erosion shows 72.32% in 8 hrs. By SEM Study its shows particles are spherical in shape. IC50 of Silibinin loaded liposomal nanoparticles on A549 lung cancer cell line showed that systems could be useful in treatment of lung cancer. Tumour cells in lungs were observed in approximately 95 % rats after 5 months of NNK treatment, as evident by histopathological analysis. Targeted polymeric nanoparticle may open a new wave for the treatment of lung cancer.

Keywords: Lung cancer, Polymeric nanoparticle, QbD, A549.

PCP301

Formulation and Evaluation of PLGA Coated Polymeric Nanoparticles of Thymoquinone Targeting Colon Cancer

AP0241
Prasiddhi R. Raikar
prasiddhiraikar07@gmail.com

AP0242
P. M. Dandagi
pmdandagi@yahoo.com

KLE College of Pharmacy, Belagavi

Abstract:
Thymoquinone (TQ) is a naturally occurring water-insoluble compound derived from *Nigella sativa* have proved as a promising chemotherapeutic agent. The goal of this research was to formulate a biodegradable nano formulation for TQ that would overcome its drawbacks such as light instability and hydrophobicity. TQ was first extracted from the seeds of nigella sativa and estimated using HPLC technique. TQ-encapsulated poly (lactic-co-glycolic acid) coated NPs were generated for this purpose utilizing a double emulsion solvent evaporation process to create a sustained and targeted release pattern for TQ. The presence of polymers and drug in the formulated formulation was verified by FTIR and DSC findings. The particle size, polydispersity index (PDI), drug loading efficiency, and drug release of the formulations were all measured. *In-vitro* investigations were used to synthesize, characterize, and assess the stability, bioavailability, of biodegradable polymeric NPs. A TQ NP formulation that has been optimized utilizing the Design of Experiment (DOE) technique, which entails adjusting one variable at a time, resulted in a particle size 113 nm, PDI of 0.12, around 75% loading efficiency, and sustained *in-vitro* drug release. The formulation was next examined in human cancer cell lines in culture to confirm its antiproliferative activity as a possible anticancer nanomedicine. The *in-vitro* results verified that the proposed nanoformulation demonstrated selective cellular uptake and cytotoxicity in colon cancer cells, as well as a sustained release profile for TQ.

Keywords: Thymoquinone, Chemotherapeutic, Biodegradable, PLGA, Nanoparticles, PDI, DOE.

PCP299

Development and Characterization of Nanoparticulate System Containing Novel Taxane Derivative

AP0210 **Mahesh Paithankar[1]*** mpaithankar@intaspharma.com

AP0234 **Mangesh Bhalekar[2]**

AP0235 **Ravi Pillai[3]**

[1]Intas Pharmaceuticals Ltd, Ahmedabad
[2]AISSMS College of Pharmacy, Pune
[3]Strides Pharma Science Ltd

Abstract:
Taxane derivatives, the most well-known natural-source cancer drugs in the world, are derived from the bark of the Pacific yew tree (*Taxus brevifolia*) and is used in the treatment of solid and non-solid tumours. Paclitaxel, Docetaxel as well as latest advanced molecule Cabazitaxel are comes under Taxol Derivative. Cabazitaxel (CBX) is a derived from 10-deacetylbaccatin III, which is extracted from foliage of yew needles (*Taxus baccata*). Despite promising anticancer activity, formulation development of CBX as well as other taxane derivatives are challenging due to its poor-water solubility and hypersensitivity reaction. Toxic surfactant used to solubilize taxane derivatives are also key contributors in hypersensitivity reactions. Amongst the available options, Nano particulate systems are the most widely used techniques to answer the solubility issues. The key objective of the present work is to develop a nano particulate system of CBX using a naturally occurring stabilizer. Natural stabilizer minimize the risk of hypersensitivity associated with taxol formulation. We developed a scalable manufacturing process to prepare nano particulate system. Critical process parameters were identified and optimized using. Design of Experiment (DOE). Furthermore, the optimal amount of natural stabilizer was optimized. Stabilized using the naturally occurring surfactant, the optimized nano formulation of CBX exhibited a narrow size distribution with a mean particle size in nm range along with excellent storage stability. The present research demonstrates the feasibility of developing and optimizing a stable nano formulation of taxane derivative using natural and non-toxic stabilizer.

Keywords: Taxol Derivative, Nano formulation, naturally occurring stabilizer, Design of Experiment (DOE).

PCP294

Ameliorating Potential of Prebiotics and Probiotics against Carbon Tetrachloride Induced Hepato-Toxicity

AP0192
Gopi H. Shah
gopishah.ph@ddu.ac.in

AP0038
Punitkumar R. Bhatt
punitbhatt.ph@ddu.ac.in

Dharmsinh Desai University, Nadiad (Gujarat) India

Abstract:
The objective of the present work was to evaluate the hepatoprotective activity of two marketed formulations VELGUT® (combination of probiotics) and VIZYLAC® (probiotic only) on carbon tetrachloride induced chronic liver injury model in rats. For the evaluation of hepatoprotective activity rats were randomly divided in four groups. Normal control (treated with normal saline only) and CCl_4 treated group (treated with intraperitoneal injection of CCl_4 once daily for 10 days followed by twice a week up to 49 days). Test groups composed of oral treatment of VELGUT along with CCl_4 (T_1) and VIZYLAC along with CCl_4 (T_2). CCl_4 treatment in the test group was similar to group 2. During treatment period blood samples were collected on day 0, 7, 14, 21, 28, 42, and 49 to analyse Alanine aminotransferase (ALT), Aspartate aminotransferase, (AST), Alkaline Phosphatase (ALP), direct bilirubin, total protein and albumin levels to asses liver function. Along with this cholesterol, glucose and malondialdehyde were also measured. A small piece of the liver was collected to perform histopathological studies. In the test groups, serum AST, ALT, ALP, and direct bilirubin were found to be significantly lower as compared to CCl_4 intoxicated rats and total protein and albumin were increased. Malondialdehyde was found to be significantly higher in CCl_4 intoxicated rats, whereas rats treated with probiotic and combination of probiotics were improved the liver functions in CCl_4 toxicatedrats. As protein oxidation may play a vital role in the pathogenesis of CCl_4 induced liver damage. Probiotics and combination of probiotics were effective in liver injury by healing liver functions and inhibiting protein oxidation.

Keywords: Hepatotoxicity, Lipid Peroxidation, Oxidative Stress, Carbon Tetrachloride, Liver biomarkers, Probiotics.

PCP286

Application of Natural Preservatives in Food and Pharmaceuticals

AP0201
Ms. Shital Janardan Patil
sjpmgvpc@gmail.com

Mahatma Gandhi Vidyamandir's Pharmacy College, Panchavati, Nashik-03, Maharashtra

Abstract:
Thermal effects, microbial action, effect of light as well as environmental factors are the critical parameters that impacts on shelf-life reduction of food and pharmaceuticals. Now days the search by additional methods of preserving food and pharmaceuticals has increased, able to ensure quality and safety. Many natural preservatives have urged from the customers, industry, and health community and sectors as a method with broad action antimicrobial preservatives with economical value. Natural preservatives, from the different origins, such as from animal sources chitosan, from a plant source, essential oils, and plant extracts, from microbiological sources, and many other natural sources all with great potential for use in food and pharmaceuticals. This review anchors on the natural preservatives from different sources in their forms of application, with their mechanisms of action, and future aspects with a focus for maintenance of quality and safety of food and pharmaceuticals. Also directs the safe use of natural preservatives and the potential consequences of removing chemically synthesized preservatives in food and pharmaceuticals.

Keywords: Antimicrobial preservatives, Antioxidant preservatives, Natural sources, Food and Pharmaceuticals.

PCP251

Comprehensive Insight on Herbo-Metallodrug *Velvanga parpam*, a Micro-Nano Sized Siddha Formulation and its Characterization Methods

AP0141
Nanthini. B
nandhini5483@gmail.com

Mother Theresa Post Graduate & Research Institute of Health Sciences, Puducherry-605006, India

Abstract:
Plants act as a reservoir of metals and convert the metals in palatable form in the food chain. In modern system of medicine metals are being prescribed as therapeutics (eg. Cisplatin as an anticancer drug) and used as radiopharmaceuticals for diagnostic aid. Metals are also formulated in various dosage forms in Indian system of medicines. Metals are calcinated (Thermal treatment of chemical compound) form of purified metals with the aid of herbs in Siddha and Ayurveda system of medicine. In siddha system the formulation is named as Parpam and in Ayurveda named as Bhasma with two traditional terms. The traditional Indian system of medicine acts as a reservoir of metallodrugs and only few scientific studies were underwent so far. This scientific presentation will give the updated information in a futuristic pharmaceutical and pharmacognostical perspective about the orthodox complex metallodrug different formulation and characterization methods on *Velvanga parpam* in siddha medicine. Additionally this presentation will deliver the potential application of metallodrug *Velvanga parpam* from traditional Indian system of medicine similar to the usage of metallodrugs in modern medicine.

Keywords: Metallo drugs, *Velvanga parpam*, Siddha Medicine.

PCP237

Formulation and Optimization of Liquid Crystalline Nanoparticles of Flavonoid Fisetin and Study of its *in-vitro* Anticancer Activity

AP0075
Mr. Tukaram K. Kedar
tukaram.kedar@mail.com

AP0120
Dr. Sunil S. Jalalpure
jalalpuresunil@rediffmail.com

KLE College of Pharmacy, Nehru Nagar, Belgavi

Abstract:
Bioactive flavonoid fisetin reported for anticancer activity *in-vitro* as well as *in-vivo* study but limits its therapeutic activity due to low solubility and bioavailability as it is BCS class II drug. In this study, we prepared and optimized a nano formulation of fisetin to enhance its anticancer activity as nano formulations are reported for improved solubility and bioavailability of many bioactive phytoconstituents. Lipid glyceryl monooleate and stabilizer poloxamer 407 was used and for preparation of liquid crystalline nano particles, top-down method was used. After pilot study, the concentration range of GMO 2 to 6 % and Poloxamer 0.5 to 1.5 % were selected and using design expert software (2 Independent and 2 dependent parameters) 9 batches were prepared and evaluated for particle size, PDI, entrapment efficiency, zeta potential and visual observations. Formulation B2 selected as optimized batch and tested for three-month stability study. Characterization of optimized formulation were done by DSC, Rheological, pH, TEM and XRD study. DSC peakes suggest no interaction between drug and excipients used, its entrapment in nano particles. TEM and XRD results confirms formation of nano particles and its particle characteristics. For *in-vitro* anticancer study cell line A549 (Human lung adenocarcinoma) was selected and received from NCCS Pune. Various cell culture study like MTT assay, DAPI staining, dead and live cell assay with acridine orange and ethidium bromide staining, clonogenic assay and flow cytometry study for quantitative apoptosis detection were done. IC50 Values in mcg/ml for fisetin 16.59, optimized fisetin nano-formulation 12.18 and cisplatin 2.131 were reported. Results of the above *in-vitro* study reported increased anticancer potential of fisetin in its nano formulation than pure fisetin.

Keywords: Liquid crystalline nano particles, Fisetin.

PCP232

Insights into Role of Phtomedicine in Remodelling Gut Microbiota to Promote Health: A Future Prospect in Veterinary Medicine

AP0115
Harshit Saxena
srhiharshit@gmail.com

AP0116
Nikhil Kumar Singh
rustynikiwiki@gmail.com

BVSc & AH, CoVSc & AH, DUVASU, Mathura

Abstract:
Modern medicine aims at development and refinement of approaches that are sustainable in context of efficacy, potency, feasibility, economics, safety and formulation of preparations that possess minimum adverse effects. One such approach is the recognition of cross-talk between gut microbiota, pathophysilogy of various ailments in Humans/Animals & Phytomedicine which establishes synchrony between two. Several mechanisms have been identified that show how microbial population of gut influence overall physiology of a living being. It has been seen that by alteration of microbial population in gut, diseases that possess biggest challenge to health sector in this era like diabetes, obesity, hyperlipidemia, cardiovascular diseases, and hyperuricemia, immunological diseases and even cancer & Alzheimer 's disease can be tackled and managed efficiently. Role of phytomedicine which are extracted from plants like *Asparagus, Mentha, Plantago, Cymbopogon, Aloe, Pogostemon, Phyllanthus, Terminilia, Ocimum, Zingiber, Tinospora* has been exemplary in this regard that remodels gut microbiota which produces health benefits. It has been seen that either the gut microbiota digests the herbal medicine which then produces metabolites that triggers therapeutic cellular response inside the animal or they regulate the composition of gut microbiota and its secretions. Many phytochemicals with potential biological activity have been identified in plants under which ACNP (Purified Inulin type Fructan obtained from Asparagus), PWPS & PLP (from Plantago), LGEO (lemongrass essential oil from Cymbopogon) are being used therapeutically. Not only therapeutic implications but phytomedicines/phtochemicals are being used as Prebiotics & also as agents that mitigate adverse effects of other drugs like those used to treat cancer. Recent research in Veterinary Medicine possess immense opportunity to identify the candidates present in nature that can bring novel reforms not only in treatments of various disease conditions in animals but also to upscale their overall health status by improving nutrient profile in their diet. They also reduce our dependence on Antimicrobial agents and thus reduce chances of development of resistance against them which is one of the important aspect in Veterinary Practice. Commercialization, legal regulations & incorporation of Phytomedicines in Veterinary Clinical Practice is need of hour.

Keywords: Phytomedicine, Gut Microbiota, Veterinary Medicine, Therapeutics, Prebiotics.

PCP195

Bioactivity-Guided Formulation Development from a Common Weed: *Commelina benghalensis*

AP0027
Pooja A. Kansagara
phsmile12@gmail.com

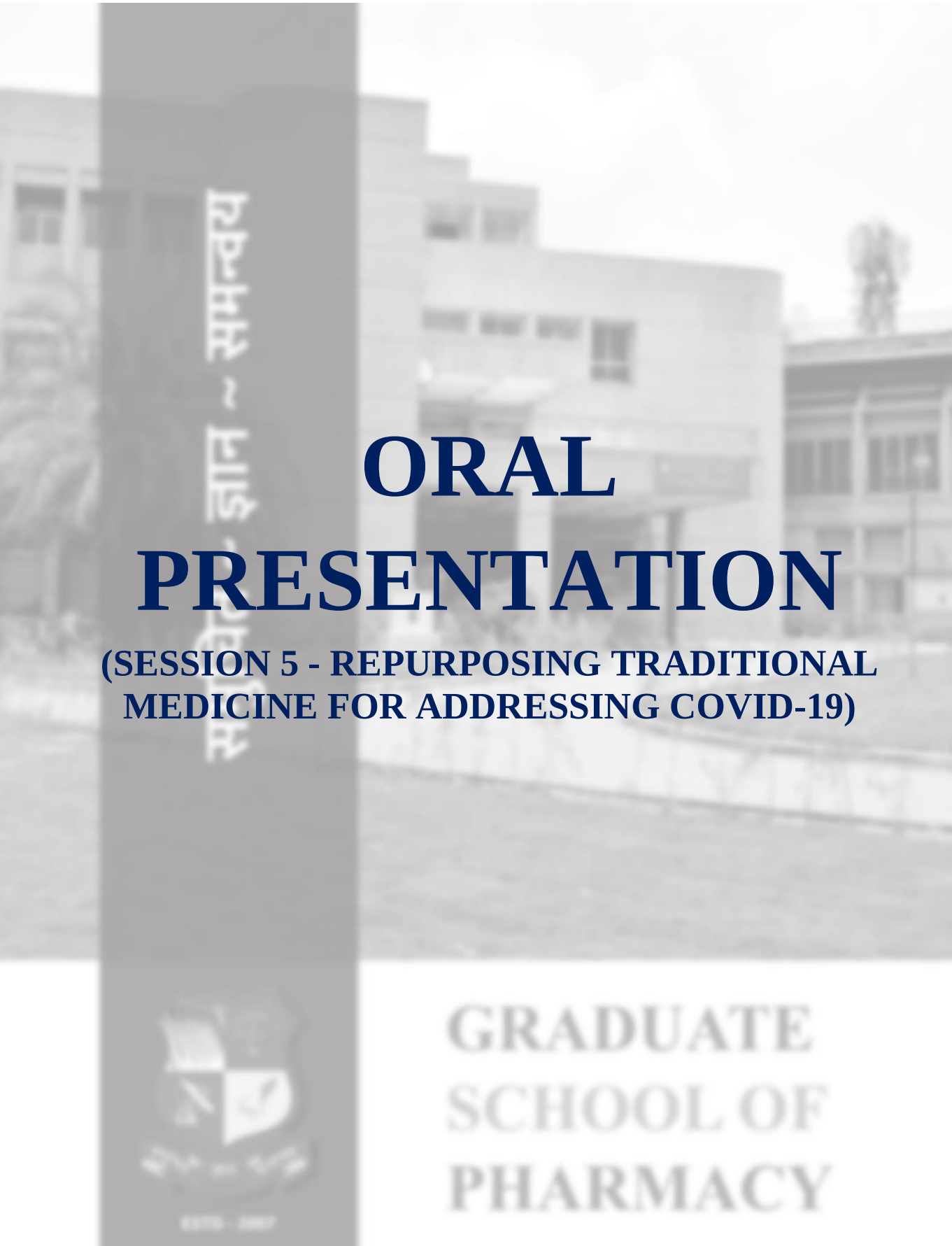
AP0019
Dr. Devang J. Pandya
director.sop@rku.ac.in

School of Pharmacy, RK University

Abstract:
Ulcer as well as constipation is a major disease prevailing in worldwide. *Commelina benghalensis*, also known as Benghal dayflower which is a perennial common weed inhabitant to tropical Asia and Africa. It is an unexplored plant, wasted (either burnt or left to dry) after monsoon each year. *Commelina benghalensis* is a widely used ethno-medicinal weed which shows many pharmacological activities and also treat various diseases like ulcer and constipation in India, but very few studies have been conducted on it. The present work deals with investigation of anti-ulcer and laxative effect of various extract of whole plant of *Commelina benghalensis* Linn. (Commelinaceae). Plant was successively extracted with petroleum ether, chloroform, methanol and water, which served as the test extracts. Various parameters like ulcer index and ulcer protection for anti-ulcer activity and fecal output (g) at 8 hrs. and 16 hrs. for laxative activity were measured by using appropriate animal models. The methanolic extract was found more effective for both anti-ulcer and laxative activity thereby supporting the traditional claim of the plant. Phytochemical screening, TLC, GC-MS and HPTLC fingerprinting of this extract revealed the presence of important classes of phytoconstituents like alkaloid, tannin, flavonoid, lignan, terpenoid, steroids and phenolics. An effervescent granules which is dual acting formulation, which is till date not available in the market. This formulation give potent/fast action, lesser side effect with low cost to the patient. These experimental results will establish an evidence for the folkloric use of *Commelina benghalensis* from pharmacological and phytochemical perspective, thereby emphasizing on making best use of weeds which we usually consider as waste.

Keywords: Common weed, *Commelina benghalensis*, Anti-ulcer, Laxative, Effervescent granules.

This page was intentionally left blank



ORAL PRESENTATION

(SESSION 5 - REPURPOSING TRADITIONAL MEDICINE FOR ADDRESSING COVID-19)

This page was intentionally left blank

PCP358

In-Vitro Cell Culture Evaluation of Satavari for Anti Osteoporotic Activity

AP0083
Kunjal Vegad[1]
Kunjalvegad11@gmail.com

AP0319
Niranjan Kanaki[2]
niranjanskanaki@yahoo.co.in

[1] Sharda School of Pharmacy
[2] K. B. Inst. of Pharmaceutical Edu. & Research

Abstract:
Osteoporosis is a silent disease as it lead to fracture with minimal trauma or without severe stress to bone due to decreased bone mineral density mostly in female after menopause. Osteoporotic fractures results in increased morbidity, disability, mortality and decreased quality of life. In *Ayurveda*, many herbs are mentioned for the treatment of bone fracture.*Asparagus racemosus* (Ar) commonly known as satavari which belongs to the family *Liliaceae* is one of the Indian medicinal plants used in *Ayurveda* female rejuvenation and post menopausal symptoms. However no scientific study has been done to validate its use for the treatment of osteoporosis. Aim of current research was to evaluate the roots of satavari for treatment of osteoporosis by *in-vitro* cell culture assay. *In-vitro* primary cell culture studies were performed on the aqueous and ethanolic extract of Ar. Activity of both extracts of satavari were evaluated for different targets of bone remodeling, bone formation-cell proliferation by MTT assay, conversion of primary Mesenchymal stem cells to osteoblast means cell differentiation by ALP assay, matrix mineralization assay by Alizarin Red S, and antiosteoclastic activity by TRAP assay for bone resoption. All assays were carried out in triplicate and the mean and standard error of the mean of replicate values were taken. Statistical analysis of the data was determined by one- way ANOVA using GraphPad Prism software version 5.3. Aqueous and ethanolic extracts of satavari shows significant cell proliferation, cell differentiation compared to standard alendronate. However it shows no significantmatrix mineralization and anti osteoclastic activity compared to standard. Results of the present study shows that both aqueous and ethanolic extracts of satavari can be used for the treatment of osteoporosis.

Keywords: Osteoporosis, satavari, *in-vitro* culture

PCP343

Quantification of Selective Herbal Marker from SamshamaniVati Using HPTLC-MS Method

AP0297
Brinda Limbani
Brindalimbani98@gmail.com

AP0025
UdaykumarVegad
udaykumar@gtu.edu.in

Gaduate School of Pharmacy, Gujarat Technological University, Ahmedabad

Abstract:
The worldwide outbreak of covid-19, makes people leads to use herbal medicines to fight against the novel virus. Herbal medicines provide an alternative solution for the survival in this pandemic. But this alternative way also should assure safety for the mankind use.This work represents a sensitive, rapid and precise HPTLC method for quantification of Berberine content in Samshamanivati.The separation was performed on TLC aluminium plates precoated with silica gel F_{254}. Good separation was achieved in mobile phase using Ethyl acetate: n-Butanol: AceticAcid: water (5:3:1:1 v/v/v/v). Saturation time of mobile phase was 20 min. Determination and quantification were performed by densitometric scanning at 366 nm in fluorescence mode. The method was validated as per ICH $Q_2(R_1)$ in terms of Specificity, Linearity, Precision, Accuracy, Robustness, LOD and LOQ.Linearity range for Berberine was 10-60 ng/band with correlation coefficient (R^2) 0.996. The LOD and LOQ were found to be 1.78 ng/band and 5.94 ng/band. The % recovery range was found to be 104% to 106%. The content of Berberine in Dabur Samshamanivati, DhootpapeshwarSamshamanivati, DhanvantariGiloyGhanvati, Patanjali GiloyGhanvati, and Uma SamshamaniVati was found to be 41.08ppm, 55ppm, 11.70ppm, 12.84ppm, 14.30ppm and ZanduSamshamaniVati was found below detection limit.Qualitative identification of Berberine content also determined by LC-MS.

Keywords: Covid-19, SamshamaniVati, HPTLC-MS, Berberine.

PCP268

The Potential Antioxidant Bioactivity of *Jasminum Elongatum* Extract against Acetaminophen Mediated Hepatotoxicity in Male Albino Rats.

AP0162
Dr Sabeena Hussain Syed
School of Pharmacy,
Vishwakarma University,
sabeena.syed@vupune.ac.in

Abstract:
The present study was envisaged to evaluate theantioxidant effect of *Jasminum elongatum* (*J.elongatum*) extract against acetaminophen induced hepatic toxicities in male albino rats. Ethanolic extracts of *J. elongatum* was given in doses of 50 mg/kg and 100 mg/kg for 7 d and toxicity was induced by acetaminophen (2 mg/kg) on Day 8. Silymarin (50 mg/kg) was used as reference standard. After 24 h of toxicity induction blood samples were collected from retro-orbital plexsus and analyzed for antioxidant parametersand serum parameters. Livers isolated were studied for histopathological changes. Prior administration of *J.elongatum* extracts restored the elevated levelsMalondialdehyde levels and increased the levels of Glutathione and Superoxide dismutase antioxidant parameters .The serum parameters also restored as compared to toxic group in dose dependent manner, which is also confirmed by the histopathological changes observed. The present study showed that extracts of *J.elongatum*possess hepatoprotective action against acetaminophen induced hepatotoxicity

Keywords: Polyherbal, Hepatoprotective, Serum markers, Histopathology

PCP252

Kabasura Kudineer against Covid-19

AP0150
Dr. S.Sivakrishnan
Department of Pharmacy, Annamalai University,
sivacdm82@gmail.com

Abstract:
COVID-19 is a disease caused by SARS-CoV-2. It can affect either the upper or lower respiratory system. SARS-CoV-2 is one of seven coronaviruses that can cause serious illnesses such as Middle East Respiratory Syndrome (MERS) and Sudden Acute Respiratory Syndrome (SARS). It spreads in the same way that other coronaviruses do, primarily through direct contact between people. Infections range from mild to fatal. KabasuraKudineer is a polyherbal mixture derived from India's Siddha School of medicine, consisting of 15 herbal constituents, each with its own distinct characteristics. But this Churnam is extensively aimed for strengthen the lungs, improve respiratory function, and cure infectious disorders like as cough, cold, fever, and other respiratory infections. It is one of the drugs included in advisory of Govt. of India, released by the Ministry of AYUSH for symptomatic management of COVID-19. KabasuraKudineer significantly reduced SARS-CoV-2 viral load among asymptomatic COVID-19 cases and did not record any adverse effect, indicating the use of *Kabasura Kudineer* in the strategy against COVID-19. The phytocompounds attach to the coronavirus spike protein, preventing infectious cells from growing in human cell membrane receptors. As a result of these compounds, the human body is free of hazardous bacterias and viruses. Though there are not proper medications for this pandemic, the research shows that KabasuraKudineer is the best immunity booster but it is not a medicine for treating COVID-19.

Keywords: COVID-19, *Kabasura Kudineer*, Siddha, Efficacy, Formulation

PCP202

Survey on the Use of Traditional Medicine for Covid-19 Infection

AP0038
Punitkumar R. Bhatt
Dharmsinh Desai University
Nadiad (Gujarat) India
punitbhatt.ph@ddu.ac.in

Abstract:
An online survey was conducted on social media platformsduring June 2021 to August 2021on the use of various traditional medicine during the coronavirus pandemic. Questionnaire contained different questions related to demographic information along with how respondents are taking various traditional medicines like Haldi (*Curcuma longa*), Tulsi (*Ocimumsantum*), Giloy (*Tinosporacordifolia*), Aadu (*Gingiber officinalis*), Lahsun (*Aliumsativum*), Ashwagandha (*Withaniasomnifera*) and Sunth (dried powder of *G. officinalis* rhizomes) and Triphala (Mixture of *Emblica officinalis* (Amala), *Terminalia bellerica* (Baheda), and *Terminalia chebula* (Harde)). Questions related to how frequent respondents were taking these medicines, whether taking traditional medicines with allopathic drugs or not were also included and safety of the traditional medicines. Out of 516 respondents, 61.82% (n=319) were male and 38.18% (n=197) were female. About 98% (n=501) respondents were from India. Total 42.44% (n=219) respondents were belong to age range 31 to 40 years. In case of education level, more than 92% respondents had a bachelor's degree or above. Haldi (*C. longa*) was cited highest (n=392) by the respondents. However, many respondents have cited mixture of two or more herbs. About 33% (n=170) respondents were taking such medicines when they feel unhealthy, 42.64% (n=220) respondents took such medicines less frequently, whereas 24.42% (n=126) respondents take such medicines on a regular basis.About 38.18% (n=197) respondents never took traditional medicine with allopathic drugs, 28.49% (n=147) were taking both medicines simultaneously. 78.68% (n=406) respondents believes that traditional medicines are safe whereas 21.32% (n=110) do not think the same.

Keywords: COVID-19; coronavirus; Herbal; Traditional medicine; Medicinal plants

PCP194

Development and Standardization of a Novel All-Purpose Herbal Hair Cosmeceutical

AP0026
Nidamanuri Manju Bhargavi
School of Pharmacy
RK University
manjunidamanuri@gmail.com

Abstract:
Appearance of hair makes an important impact on the total body feature. The current lifestyle has brought up several challenges against hair health. Many formulations for this are available in the market. However, these formulations usually treat a limited spectrum of the hair problems. Medicinal plants have been used for the treatment of hair since millenniums. The main objective of present study is to develop an all-in-one herbal formulation to treat various problems related to hair, simultaneously. Materials and Methods: *Ksheerapaka* method using different herbs like *Psidium guajava* leaves, *Moringa oleifera* leaves, *Trigonella foenum-graecum* seeds, *Carica papaya, Allium cepa*bulbjuice, *Nigella sativa*seed oiland*Salvia rosmarinus*essential oil, will be employed to develop the formulation. The formulated herbal oil will be standardized as per official guidelines using various chromatographic, physiochemical and biological methods. Development of an herbal formulation which will cover all aspects of the health of the hair.

Keywords – *Psidium gujava* leaves, *Moringa oleifera* leaves, *Carica papaya* leaves, *Trigonella foenum-graecum* seeds, *Allium cepa*bulbjuice, *Nigella sativa*seed oiland*Salvia rosmarinus*essential oil, new hair follicle, Prevent premature grey hair.

POSTER PRESENTATION

(RESEARCH BASED)

This page was intentionally left blank

PCP320

Effect of Herbal Polymer on Development of Gastro-Retention Effervescent Floating Matrix Tablet

AP0057
Patel Hiren J.
hirenpatel1859@gmail.com

AP0100
Bhavin. K Jotania
Parshotambhil05@gmail.com

AP0254
Dr. Krishna Koradia
k.koradia@yahoo.co.in

Saurashtra University Rajkot.

Abstract:
Gastric emptying time play an important role in oral drug of delivery. Gastric emptying of dosage form is an extremely variable process and ability to prolong and control emptying time is valuable asset for dosage form which reside dosage form for longer period of time in stomach. The application of gastro-retentive floating system issustained drug delivery, site specific drug delivery, absorption enhancement, minimize adverse activity at the colon, reduce fluctuation of drug. Diltiazem hydrochloride selected as a model drug which has short elimination half-life & narrow absorption window which absorbed in proximal areas of GIT. According to research to improve the solubility and absorption of drug by effervescent floating tablet for drug delivery. The research work is onPreparation of various batch of Diltiazem effervescent floating tablet bydifferent concentration of polymer HPMC K100M/K15M/K4M, psyllium husk and effervescent agent sodium bicarbonate& other excipients. Psyllium having a swelling and gelling properties so when used in floating matrix tablet it forms a swollen gel & it able to give control release of drug.Psyllium husk are preferred over synthetic material due to their non-toxicity, low cost, ease of availability, high affinity of water which having swelling index is about 20 times in volume & it chemically inert in nature. The advantage of Indian psyllium husk in world market are that it available at lower price, mucilage content is more than other species, it yields practically colorless mucilage & the husk of psyllium cracks off under slight mechanical pressure so it selected for the preparation of floating matrix tablet. The pre-compression parameters are evaluated for powder mixture are angle of repose, Carr's indexand hausner's ratio. The post-compression parameter for floating tablet are thickness & diameter, hardness, friability, weight variation, drug content, floating lag time, total floating time, in-vitro dissolution study are evaluated for all batches of floating tablet. Applying 3^2full factorial optimization design the F9 batch was the optimize batch which taken for the pre-formulation evaluation like micromeritic study of powder was given good flow-property. Developing the matrix tablet of F9 batch the physicochemical parameter such as hardness, friability, drug release, weight variation, drug content, swelling index & floating properties which giving the optimize data for the formulation. The drug release followed Higuchi diffusion kinetics. The in-vivo gastric retention study by X-ray imaging in rabbit was taken up to 6 hours which indicate gastric retention of prepared dosage form. The research study concluded that combination of HPMC K100M(100mg), psyllium husk(40mg) and sodium bicarbonate(60mg) can be used to increase the gastric residence time of the dosage form up to 12h.

Keywords: Diltiazem hydrochloride, gastro-retentive floating matrix tablet, psyllium husk, evaluation parameter, kinetic model, in-vivo X-ray imaging.

PCP319

Formulation and Evaluation of Floating Matrix Pellets of Mono Ammonium Glycyrrhiznate for Treatment of Gastric Ulcer.

AP0052
Kukreja Pavan M
pavankukreja.1041@gmail.com

AP0101
Bilal Khudhur EESAA
anandnimavat1@gmail.com

Dept. of Pharmaceutical Sciences, Saurashtra University

Abstract:
Gastric ulcer, Gastroparesis, Gastritis, Dyspepsia, Indigestion, Stomach Cancer, Gastroenteritis these all are the Stomach disease. The present study is only focus on the gastric ulcer that causes the harm to the deeper layer of the normal gastric muscular mucosa.Mono ammonium glycyrrhizinate is the natural drug isolated from the liquorice plant used in the treatment of the gastric ulcer. The present study was aimed to formulate and evaluate the sustained release matrix pellets of mono ammonium glycyrrhizinate.Pellets are the spherical particulate produced by the agglomeration of fine powders or granules of drug and excipients. The objectives of the present studywasto prepare, screening of various factors affecting parameter and evaluation of the prepared pellets. In the present study the pellets were prepared by the Extrusion Spheronization method. Preformulation study was done for identification of the drug, to check Drug-Excipients compatability and for the estimation of the drug.Mono ammonium glycyrrhizinate pellets were formulated and screened for the diluent concentration(Lactose,MCC Ph 101,MCC ph102)polymer concentration(HPMC K15m, HPMC K4m, HPMC K100m, PVP K30, HPC), floating concentration(Sodium Bicarbonate, Sodium Carbonate, Potassium Bicarbonate, Potassium Carbonate), binder concentration (Strach Paste- 0.5 ml, Starch Paste- 1ml, Starch Paste- 2ml), plasticizerconcentration(PEG-400 with 0.5ml, 1ml,2ml & PEG-600 with 0.5 ml, 1ml, 2ml),rotating speedof the device(500RPM, 100RPM, 1500RPM,) for Processing time(20min, 30min, 40min). By applying the OFAT approach of optimizationthe final batch was selected. The final batch was formulated bytaking drug Mono Ammonium Glycyrrhiznate, Lactose as a Diluent, HPMC K15m as a Polymer, sodium Bicarbonate as a Floating agent, Starch paste as a Binder, PEG-400 as a Plasticizer.Result shows that optimize batchgives the uniform size, spherical shape, and good strength to the pellets than other batches formulated by Extrusion Spheronization technique.From the result optimized batch was concluded.

Keywords: Mono ammonium glycyrrhizinate, Pellets, Extrusion Spheronization.

PCP309

Formulating Ready to Disperse Lyophilized Prickly Pear Fruit Juice for Nutritional Deficiency in Childrens

AP0209	AP0188	AP0187	AP2051
Rishi Bhavsar*	**Dr. Sanjay Chauhan**	**Dr. Manju Misra**	**Mayur bheda**
bhavsarr786@gmail.com	prof_sanay_chauhan@gtu.edu.in	asso_manju_misra@gtu.edu.in	Mayurbheda108@gmail.com

Graduate School of Pharmacy - GTU

Abstract:
The development of pediatric nutritional supplements is a difficult undertaking for the food andpharmaceutical sectors all over the world. Various initiatives and nutrition strategies have beenintroduced to reduce and prevent micronutrient deficienciesincluding information based ontraditional knowledge. Supplements for children havedemonstrated to be the most effective in preventing and controlling micronutrient deficits duringchildhood. In this regard prickly pear (*Opuntia Ficus Indica*,Cactaceae family), has been widely reported in traditional practice and is reported to be rich in several bioactive compounds such as polyphenols, vitamins,polyunsaturated fatty acids, carotenoids, andsterols, which have been linked to functional andbiological activities like anti-inflammatory, hematinic, immunomodulatory properties etc. As it is consumption of fruits is cumbersome owing to presence of spikes on the surface and some processing needs to be done in order to get rid of the same. To overcome this limitation we intend to propose, ready to disperse lyophilized fruit juice of*Opuntia Ficus Indica* to meet the nutritional requirements of children. The work involves screening of different additives (maltodextrin, sucrose, and mannitol) to achieve desirable powder attributes and characterization studies like microscopy, flow properties, angle of repose, palatability, aesthetic attributes etc of the same. Based on the results of lyophilization studies we intend to rank the cryoprotectants used in decreasing order of stability and propose the best possible additive for the same.It is predicted that such powder would appeal to children and will meet their dietary needs while also providing immunoprotection& enhanced stability.

Keywords: Prickly pear, hematinic, cryoprotectants, immunoprotection

PCP302

Formulation and *In-Vivo* Evaluation of Silver Sulfadiazine Loaded Nanogel for Treatment of Severe Burn

AP0219
Anand S. Nimavat
anandnimavat10@gmail.com

AP0224
Dhara K. Viradia
chaudharichandresh5@gmail.com

AP0232
Dr. Priya Patel
pvpatel@sauuni.ac.in

Department of Pharmaceutical Sciences, Saurashtra University

Abstract:
The goal of this study was to create and describe a Silver sulfadiazine (SSD) and honey-loaded nanogel for severe burns wounds, as well as to conduct an in vivo burn healing investigation utilising a rat as an animal model.Nanosuspension wasprepared using a top-down technique and optimized by 3^2 factorial design.The response surface was produced by doing multiple regression analysis. The feasibility and grid search methods were used to choose the optimization formulation. Optimized nanosuspension was incorporated in nanogel form by high-speed homogenization approach. FTIR and DSC was performed to characterise the nanogel. Physical qualities such as colour, homogeneity, pH, rheological properties, in vitro diffusion research and microbiological assay, in vivo wound healing study along with the stability study were characterized for the nanogel.By optimization it was found that particle size and PDI of nanosuspension found to be in range between 297-1011nm and 0.02072-0.941 % Entrapment efficiency found to be 79.066-88.333. The nanogel also possess favourable viscosity and also good in-vitro diffusion of drug. The in vivoburns healing study in rats revealed that the prepared optimized nanogel containingSSD and honey had superior burns healing rate and antiscaring property.

Keyword: Silver sulfadiazine, Honey, High speed homogenization, 3^2 factorial design.

PCP288

Development And Evaluation of Quercetin Loaded Cubosome Nano-Particles Against Skin Burn Infections.

AP0015
Sunil SatyappaJalalpure
Jalalpuresunil@reddifmail.com

AP0203
Bhaskar KallappaKurangi
Bhaskarkurangi19@gmail.com

AP0010
Namit Madan Kudatarkar
Namitkudatarkar18@gmail.com

KLE College of Pharmacy Belagavi, KLE academy of higher education and research, Nehru Nagar, Belagavi 590010.

Abstract:
Skin burn infections are major causes of death and skin graft failures. Quercetin is proven for its antimicrobial effect. The current research work was performed with the objective to develop quercetin loaded cubosome nano particles to treat skin burn infections. Quercetin loaded cubosome nanoparticles were prepared by top down approach using glyceryl monooleate (GMO) and poloxamer 407. The formulations were characterized by their particle size, PDI, entrapment efficiency, X-ray diffraction study, transmission electron microscopy and in vitro release in pH6.4 phosphate buffer saline (PBS) containing 1% tween 80. The formulation was tested against the ATTC strains of organisms prevailing in skin burn infections i.e.*Escherichia coli, Staphylococcus aureus, Klebsiella Pneumonia* and *Staphylococcus Epidermidis*.Minimum inhibitory concentration and minimum bactericidal concentration were used for the testing the antmicrobial effect of the formulation.The antibacterial test was performed using brain heart infusion agar and broth. Anti biofilm activity of the formulation was also evaluated The results showed that quercetine loaded cubosome nanoparticles shows antibacterial effect against skin burn infection causing microbes

Keywords: Cubosome, Nano-Particles, Skin Burn Infections

PCP284

A Systematic Network Pharmacology approach of *Terminalia Chebula* Retz. for Type II Diabetes Mellitus, PCOD and Metabolic Syndrome

AP0128	AP0132	AP0197	AP0198	AP0129
Chaitrali Bidikar[1]	**Pramod H.J[1]**	**Vishal Patil[2]**	**Harsha V. Hegde[2]**	**Shrikrishna Nandanwadkar[1]**
chaitralibidikar.10@gmail.com	pramodhurakadle@yahoo.com	vishalpatil6377@gmail.com	drhvhegde@gmail.com	wadkar1252@gmail.com

[1]KLE College of Pharmacy, Belagavi, Karnataka 590010
[2]ICMR- National Institute of Traditional Medicine

Abstract:
Terminalia Chebula Retzis widely used in traditional medicine and as importantsupplement in ancient organized systems like Ayurveda in India. It appears as an ingredient in variouscommercial polyherbal formulations labelled for the management of diabetes, obesity, dementia, etc.The present computational study is a modest attempt to identify possible molecular interactions ofknown phytocompounds from *T. Chebula* with protein targets involved in the pathogenesis ofmetabolic disorders like Poly-Cystic Ovarian Syndrome (PCOS), Type 2 Diabetes Mellitus (T2DM)and Metabolic Syndrome (MetS).Detailed characteristics of known phytocompounds of *T. Chebula* was obtained from thephytochemical database and published literature. Binding DB ($p \geq 0.7$) was queried for their targetprediction. Enriched molecular pathways and functions modulated by the set of predicted proteinmolecules were analyzed using STRING and KEGG pathway databases. Interaction betweencompounds, proteins, were deduced and pathway network was constructed using Cytoscape v3.6.1.Docking was performed with PyRx 0.8v. Drugability and side effects of compounds were predictedthrough molsoft and ADVERpred respectively.Out of 42 compounds listed from *T.Chebula*, 41 were predicted to modulate 171 targets. Theenrichment analysis of 171 targets identified 38 molecular pathways and 50 highly enriched molecularfunctions associated with PCOS, T2DM, and MetS. Steroid hormone biosynthesis pathway andovarian steroidogenesis followed by metabolic pathways, PI3K-Akt, MAPK, Ras, HIF-1, Rap1,cGMP-PKG, AMPK, AGE-RAGE, p53, estrogensignaling, and insulin resistance pathways wereidentified as highly enriched within the network. Except for five compounds, 29 potential compoundsdisplayed positive drug-likeness scores, and were found to be non-toxic ($p \leq 0.5$). Among 171 targets,PTPN1/PTP1B was identified as a highly modulated target by the phytocompounds of *T.Chebula*.Tercatain was identified as a potent inhibitor of PTPN1 that formed six bonds with active site residueswith -8.4kcal/mol binding energy (BE), while standard molecule 4-[3-(Dibenzylamino)phenyl]-2,4-dioxobutanoic acid formed one bond with -7.1kcal/mol BE. The current study supports thebeneficial effects of *T. Chebula* against PCOS, T2DM, and MetS by elucidating the possible molecular roles of its phytocompounds and is the first steptowards validation of this important traditional medicine. It should help in designing further wet labstudies for laboratory confirmation of the activity

Keywords: Metabolic Syndrome, Network Pharmacology, Polycystic Ovary Syndrome, Tannins, Tercatain, Terminalia chebula Retz. Type 2 Diabetes Mellitus

PCP281

In-Vitro Antioxidant HPTLC-DPPH Assay and Toxicity Profiles of Natural Food Pigments by ICP-OES

AP0129 ShrikrishnaNandan wadkar	AP0132 Sagar Nitturkar	AP0130 Pramod H.J	AP0128 ChaitraliBidikar	AP0131 Madan Godbole
wadkar1252@gmail.com	Nsagar266@ gmail.com	pramodhurakadle@ yahoo.com	chaitralibidikar.10@ gmail.com	madangodbole@ yahoo.co.in

KLE College of Pharmacy, Belagavi, Karnataka 590010

Abstract:

A simple, highly sensitive, precise and reliable HPTLC was developed for phytochemical fingerprinting of phyto-pigments in extract form. The DLLME technique was put to task for effective extraction from extract form. The anti-oxidant/biological assays developed like DDPH radical scavenging, Total Phenolic Content (T.P.C) Total Flavonoid content (T.F.C) and H_2O_2 assay double confirmed the antioxidant activity. The study also highlights the associative linkage with up-to-date dossiers of quality assurance of articles of botanical origin in accordance with USP-203/1064 as well as its quality control protocol USP 232 for determination of heavy metal content like Arsenic, Cadmium, and Mercury in phyto-pigments. From the findings, it was found that an amount of Total Phenolic Content (32.18±4.84)mg/gm Gallic acid equivalent, Total Flavonoid content (120.85±3.45) mg/gm Rutin equivalent and H_2O_2 assay (90.30%). The plasma spectroscopy (ICP-OES) findings revealed that phytopigments selected for study were found to be not only free from Heavy metals but also were enriched with micro, macro-minerals like Mg, P, Zn, Fe in varying amounts in each of Natural pigments. Both the HPTLC-DPPH and ICP-OES protocols were in accordance with 21 CFR guideline and passed the SST as per guidelines specified in regulatory guidelines and showed reproducible and reliable results.The pigment extracts were stable throughout benchtop and post-experimentation stability studies. With % RSD and R values, the methods developed demonstrates high degree of robustness and selectivity enabling its utilization in routine monitoring quality control analysis for food additives from natural resources.

Keywords: HP-TLC-DPPH, ICP-OES, T.P.C, T.F.C

PCP276

Biological Evaluation of Gokshuradi Guggulu for Its Action on Male Infertility

AP0186

Kanan Gamit

kanangamit.ph@charusat.ac.in

Ramanbhai Patel College of Pharmacy, Charotar University of Science and Technology, CHARUSAT Campus, At-Changa, Dist-Anand 388 421

Abstract:

Infertility is the inability of a sexually active, non - contraception couple to achieve pregnancy in one year.A review showed that the distribution of infertility due to male factor ranged from 20% to70% and that the percentage of infertile men ranged from 2·5% to 12%.There is a list of VajikaranaAushadhi in Ayurveda, which are used to treat various male infertility related disorders. *GokshuradiGuggulu*is official in Ayurvedic Formulary of India, indicated as aphrodisiac and spermatogenic.Biological evaluation was carried out to assess aphrodisiac and spermatogenic potential of the formulation, using rats as an experimental animal. The formulation showed significant aphrodisiac activity in male wistar rats as observed in behavioral studies. Biochemical evaluation showed significant increase in serum testosterone level at significance level $p<0.001$. The histological study provided evidences of enlargement of seminiferous tubule, presence of sertoli cell and Leydig cell, and different stages of spermatogenesis.

Keyword: Male infertility, Gokshuradiguggulu, aphrodisiac

PCP274

Phytochemical Profile and Antioxidant Activity of Sweet Lime (*Citrus Limetta*) and Lemon (*Citrus Limon*) Peels

AP0142
Nidhi Parmar
parmarnidhi730@gmail.com

AP0143
Viraj Roghelia
virajshalin@gmail.com

Laboratory of Foods and Nutrition P.G. Department of Home Science Sardar Patel University

Abstract:
Citrus fruits are most commonly consumed fruits. The pulp of citrus fruits as well as the peels contain important phytoconstituents. The present study aimed to investigate the phytochemical profile and antioxidant activity of peels of two selected citrus fruits namely sweet lime (*Citrus limetta*) and lemon (*Citrus Limon*). The peels were sun dried, powdered and extracted using four solvents namely methanol, ethanol, acetone and distilled water. The extracts were qualitatively analysed for phytochemical constituents as well as fortotal phenolic content, flavonoid content and ferric ion reducing antioxidant power (FRAP).The result revealed that the all the extracts of both the peelsshowed the presence of terpenoids, steroids, carbohydrates, reducing sugar, glycosides, flavonoids and quinones. Methanol extracts of both the peels showed a significant higher value of total phenol, flavonoid and FRAP as compared to other extracts. The extracts of sweet lime peel showed higher total phenol, flavonoid and FRAP than extracts of lemon peel. Ferric reducing antioxidant power was attributed mainly to total phenolics as compared to flavonoids for both the peels. The higher antioxidant potential of peels of selected citrus fruits make them key ingredient for the development of functional foods and other supplementary products.

Keywords: Sweet lime peel, lemon peel, phytochemicals, antioxidant activity

PCP233

Formulation Development and Characterization of Prickly Pear Based Chewable Sticks for Pediatrics Subgroups

AP0037
JayvinRameshbhaiRaval*
jayvinraval@gmail.com

AP0188
Dr. Sanjay Chauhan
Prof_sanjay_chauhan@gtu.edu.in

AP0187
Dr. Manju Misra
Asso_manju_misra@gtu.edu.in

Graduate School of Pharmacy-GTU

Abstract:
The development of pediatric nutritional supplements is a difficult undertaking for the food and pharmaceutical sectors all over the world. Various initiatives and nutrition strategies have been introduced to reduce and prevent micronutrient deficiencies. Subsidies, enhanced food distribution, and vitamin supplementation are among them. Supplements for children have demonstrated to be the most effective in preventing and controlling micronutrient deficits during childhood. Consumers are becoming increasingly interested in meals that provide health benefits in addition to their nutritional value. The prickly pear is a member of the Cactaceae family, which comprises around 1500 cactus species.Furthermore, it is gaining popularity among consumers due to the presence of bioactive compounds such as polyphenols, vitamins, polyunsaturated fatty acids, carotenoids, and sterols, which have been linked to functional and biological activities like anti-inflammatory, hematinic, and immunomodulatory properties. Our goal in this project is to create prickly pear chewable sticks for nutritional purpose, primarily for pediatric population. The base of chewable stick is made up of colostrum using sucrose as binder; enriched with prickly pear juice. Chewable stick is characterized for several parameters like appearance, betanin content, palatability and aesthetic attributes. It is predicted that such chewing sticks would appeal to children and will meet their dietary needs while also providing immunoprotection.

Keywords: Nutraceuticals, Immunomodulatory, Pediatric, Colostrum, Prickly Pear, Hematinic

PCP218

Development and Validation of Stability Indicating High-Performance Thin-Layer Chromatographic (HPTLC) Method for Quantification of Asiaticoside from *Centellaasiatica* L. and Its Marketed Formulation

AP0102	AP0081	AP0090	AP0074
Mr. Manish Nandpal*	**Dr. Samir Patel**	**Dr. Archita Patel**	**Dr. Manan Raval**
21drfph007@charusat.edu.in	samirpatel.ph@charusat.ac.in	architajpatel@gmail.com	mananraval.ph@charusat.ac.in

Ramanbhai Patel College of Pharmacy, Charotar University of Science and Technology

Abstract:

Herbal medicine is often used to cure and prevent diseases, as well as extending and improving one's life span and quality of life. Synthetic products are widely available with toxicity and side effects. Thus, people are moving towards the traditional way of curing illness or injuries.*Centella asiatica* L. is more often used in Ayurvedic formulations for the treatment of CNS disorders.A stability test was developed using an HPTLC method for estimating an important marker asiaticoside (ASI) from *C. asiatica* powder and marketed formulation.The marker compound ASI was isolated from plant powders and marketed formulations and then resolved using toluene: ethyl acetate: methanol: glacial acetic acid (2:7:3:1, % v/v/v/v) as the mobile phase.Stability tests were also performed on the plant powder and the marketed formulation.The R_f values were found to be in the range of 0.43–0.47 for standard ASI, plant powder, and marketed formulation.The plant powder and formulation were found to have first-order degradation kinetics.The amount of ASI in the formulation (Churna) and its flow characteristics decreased at the end of a 6-month accelerated stability study.The developed methodwas able to quantify ASI in the presence of its degradation products.The developed method will be helpful in quality control of herbal formulations containing ASI.

Keywords: *Centella asiatica,* Validation, HPTLC, Accelerated stability study

PCP212

Studies on Effect of Extract and Fraction Prepared from *Argyreia Nervosa* on Bull Sperm Motility

AP0088	AP0078	AP0080	AP0079	AP0074
Pooja Gori*	**Hardi Shah**	**Nandini Bhatt**	**YeshaSoni**	**Manan Raval**
Poojagori24@gmail.com	hardivshah1997@gmail.com	nandinibhatt4599@gmail.com	ymsoni89@gmail.com	mananraval.ph@charusat.ac.in

Ramanbhai Patel College of Pharmacy

Abstract:

Natural plants have been considered as a revolutionary breakthrough in the management of stimulants of sexual activities and enhance testosterone level, spermatogenesis, and have become known worldwide. *ArgyreiaNervosa* (*A. Nervosa*) A. *Speciosa* (Burm.Fil.) Bojer *(Family: Convolvulaceae)* root extract showed a diversified biological activity, notably it showed aphrodisiac and spermatogenic potential. Roots of *A. nervosa* was found to contain scopoletin, quercetin, kaempferolalong with few triterpenoids and ergoline type of alkaloids. The present study is envisaged to evaluate the effect of ethanolic extract,ethyl acetate fraction and aqueous extract prepared from the roots of*A.Nervosa*ontransmembrane sperm motility (TMMR) and protecting the sperm motility *in-vitro*.The results showed that *A.Nervosa*ethanolic extract had significant effect on bull sperm motility at 100 (54.15%), 200 (61.19%) and 400 (60.85%) µg/mL,aqueous extract 100 (54.15%), 200 (61.19%) and 400 (60.85%) µg/mL, ethyl acetate fraction 400 µg/mL (47.55%) dose levels at 60 minutes holding time compared with the control group (33.86%). The extracts and fraction promoted TMMRat 100 (60.79%), 200 (71.17%) and 400 (79.01%) µg/mL, aqueous extract 100 (51.73%), 200 (66.16%) and 400 (77.53%) µg/mL, ethyl acetate fraction TMMR100 (69.80%), 200 (63.40%) and 400 (73.20%) µg/mL dose levels at 120 minutes compared with the control group (52.82%).It was concluded from the studies that flavonoids and other bioactive phytoconstituents might exert antioxidant potential, moreover the constituents might interact with the protein kinase assembly mechanism which enhanced the phosphorylation of amino acids essential for imparting the motility to sperm flagella. The results suggested the potential role of the roots of *A. Nervosa* in treating the male factor infertility with poor sperm motility.

Keywords: Male infertility; *ArgyreaSpeciosa*; Transmembrane migration ratio; Sperm motility

PCP211

Standardized Methanolic Extract and Fraction from Roots of *Asparagus Racemosus* (Wild) UP-Regulated Testosterone Biosynthesis in Rat Testis

AP0076	AP0091	AP0081	AP0074
Nishit Patel*	**AkshayModha**	**Samir Patel**	**Manan Raval**
17drphs001@charusat edu.in	akshaymodha@gmail. com	Samirpatel.ph@charusat.ac.in	Mananraval.ph@charusat.ac.in

Ramanbhai Patel College of Pharmacy

Abstract:

Asparagus racemosus (Wild) (Family: *Liliaceae*) used as general tonic, spermatogenic and is incorporated in many *Ayurvedic* and herbal formulations indicated as galactagogue. Saponin glycosides present in the plant were found to possess most of therapeutic activities. N-butanol fraction of methanolic extract; enriched in saponin, was subjected to vacuum column chromatography using alumina (AL_2O_3-IV) as stationary phase. N-butanol saturated with water used for elution. The TLC plates showing similar TLC profile were mixed together and subjected to open column chromatography using silica gel as a stationary phase. The column was eluted with chloroform followed by increasing proportion of methanol. Two spirostanol type steroidal saponins were isolated. Spectra studies revealed one of them to be Shatavarin-IV. A new HPLC-ELSD method was developed and validated as per ICH Q2 (R1) guideline to estimate Shatavarin-IV. The stationary phase was Phenomenex Hyperclone^{TM} (250 × 4.6 mm i.d.; 5 µm) C_{18} column and mobile phase was methanol: water (95:5 % v/v). The amount of Shatavarin-IV was found to be 0.23±0.01 % w/w of *Asparagus racemosus* calculated on dried weight basis. The therapeutic activity of methanolic extract (MeAR), n-butanol fraction (BTF), Shatavarin-IV (SIV) on the testosterone biosynthesis was evaluated using TM-3 cell line. Male Wistar rats were used to evaluate the potential effect of methanolic extract and n-butanol fraction in altering the testicular testosterone levels along with mRNA expression corresponding to 3β-Hydroxy-Δ^5-steroid dehydrogenase (3β-HSD), Acute Steroid Regulatory Protein (StAR). The studies concluded that, methanolic extract and butanol fraction elevated testosterone biosynthesis in the Leydig cells by elevating the expression of mRNA corresponding to StAR and 3β-HSD. This findings suggested the potential scaffold to be explore further in developing drug molecule to enhance testosterone biosynthesis.

Keyword: *Asparagus racemosus*, Shatavarin-IV, 3β-HSD, StAR, HPLC-ELSD.

PCP209

Estimation of Sarsasapogenin from *Aspragus Racemosus*. Wild.

AP0071	AP0078	AP0076	AP0074
Ms. TatveeMendha*	**Ms. Hardi Shah**	**Mr. Nishit Patel**	**Dr.MananRaval**
20mphpqa005@charusat.edu.in	hardivshah1997@gmail.com	17drphs001@charusat.edu.in	mananraval.ph@charusat.edu.in

Ramanbhai Patel College of Pharmacy, Charotar University of Science and Technology

Abstract:

The roots of *AsparagusRacemosus* (Wild) is used traditionally as galactogouge and general tonic. It is also mentioned as a *Rasayana* drug in *Ayurveda*, and extensively used in many formulations with diversified indications. Sarsasapogenin is an aglycone present in bio-active saponins isolated from the roots of *Asparagus Racemosus*. Estimation of sarsasapogenin would serve as one of quality assessment parameter for the plant drug represents the total amount of sapogenin. An attempt was made to develop a sensitive HPTLC based analytical method for estimation of sarsasapogenin from the root powder of *Asparagus Racemosus*. The optimized mobile phase was hexane: ethyl acetate: formic acid (7:1.9:0.35, v/v/v) while the stationary phase was Silica gel G_{60} F_{254} coated on Aluminum sheet. The plates were subjected to post chromatographic derivatization and scanned using TLC scanner. The developed method was found linear, selective, sensitive, precise, accurate and robust. The optimized and validated HPTLC based analytical method was employed for the estimation of sarsasapogenin from the hydrolysed extract of dried root powder of *Asparagus Racemosus*; showed that the dried root powder contained 2.31% w/w sarsasapogenin.

Keywords: Analytical Method, Sarsasapogenin, Root Powder, HPTLC.

PCP201

Computational Designing of Spermatogenic Molecules from Plant Metabolites.

AP0048

AvaniChokshi

avanichokshi.ph@charusat.ac.in

Department of Pharmaceutical Chemistry, Ramanbhai Patel College of Pharmacy, CHARUSAT Campus, Changa.

Abstract:

Male sexual dysfunction and infertility is a major problem world-wide. The primary reason behind the same is reduced libido and sperm count. Testosterone is a key hormone, responsible for sexual desire as well as initiation and maintenance of spermatogenesis and is synthesized from dehydroepiandrosterone (DHEA) in Leydig cells. Several medicinal plants have been extensively studied for their action on male reproductive system. One such plant viz. *Argyreia Speciosa* has been studied exhaustively in our laboratory and a novel compound (N-methyl ergometrine) had been isolated from the plant. This compound had also been found to stimulate Leydig cells, present in testis, for testosterone production *in vitro*. The binding site for the isolated compound was postulated to be 3-β- hydroxyl steroid dehydrogenase, the enzyme which is responsible for testosterone biosynthesis from DHEA. As the amount of phyto-constituents is very less in this plant and extracts, present study was planned to design and synthesize the structural derivatives of N-methyl ergometrine. Through the molecular modeling techniques, structural derivatives of the N- methyl ergometrine have been designed. The designed molecules were docked on the 3-β- hydroxyl steroid dehydrogenase enzyme (PDB ID: 3DHE and 1DHT). From the series of the compounds, better scoring molecules are selected for synthesis, characterization and pharmacological screening. In the present paper, we report the molecular modelling studies of some synthetic spermatogenic agents.

Keywords: Docking, 3-β- HSD, N- methyl ergometrine, Spermatogenic, Testosterone

PCP193

Interaction Studies of Natural Products on Human Serum Albumin: Isothermal Titration Calorimetry and Molecular Docking Approach

AP0014
RushaliHaridas Dudure[1]
rushaligh94@gmail.com

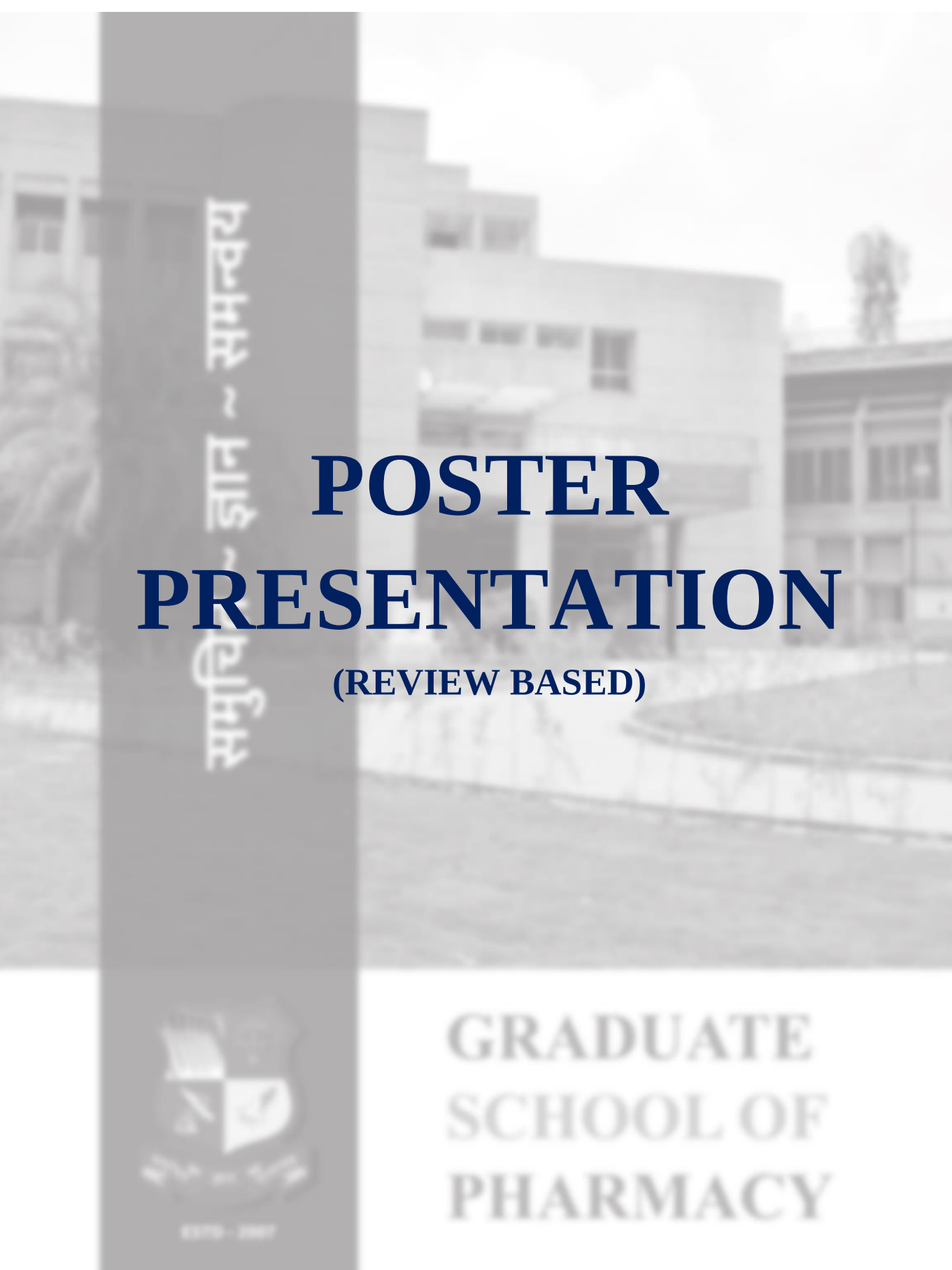
AP0011
Vishal Gokul Beldar[2]
vishalbeldar1994@gmail.com

AP0012
Dr Manojkumar Jadhao[3]
manojjadhao04@gmail.com

[1]Department of Chemistry, Institute of Chemical Technology Mumbai, Marathwada Campus, Jalna
[2]Department of Pharmaceutical Sciences and Technology, Institute of Chemical Technology Mumbai, Marathwada Campus, Jalna
[3]Department of Analytical Sciences, Institute of Chemical Technology Mumbai, Marathwada Campus, Jalna

Abstract:
Natural products such as flavonoids, alkaloids, triterpenoids etc. have been used for various medicinal applications for centuries. One of the major factors that govern the efficacy of any molecule as a drug is its ability to interact with Human Serum Albumin (HSA). To understand the drug-HSA interaction, molecular docking and Isothermal Titration Calorimeter (ITC) are being commonly used techniques. In this background, this paper epitomizes *in silico* and thermodynamics studies of medicinally active different natural products with HSA using molecular docking and ITC techniques. The value of the binding constant, Ka obtained for the natural products-HSA system suggested strong affinity. Analysis of the ITC data revealed the feasibility of the binding reaction due to favourable enthalpy and entropy changes. The obtained thermodynamic data enabled a quantitative analysis of the affinity of these natural products with HSA. These experiments may be used to determine the thermodynamic parameters of the ligand to a protein as well as the progress of new empirical scoring functions to evaluate protein-ligand affinity. The results obtained from the ITC experiments suggested the strong interaction of Natural Products (NP) with HSA. This information will be helpful for the development of the new therapeutic molecules based on NP skeleton where HSA is involved as a carries tool. The molecular docking results also support the ITC experiment, which shows selected compounds strongly interacted with HSA mostly via hydrogen, hydrophobic and pi-pi stacking interactions.

Keyword: Natural products, Isothermal Titration Calorimetry, Molecular docking, Human Serum Albumin



POSTER PRESENTATION

(REVIEW BASED)

This page was intentionally left blank

PCP339
Herbal Medicine System in Japan

AP0294
Avani H Rana
Ranaavani12@gmail.com

AP0233
Bhumika Maheriya
ra_pharmacy@gtu.edu.in

Graduate School of Pharmacy –GTU

Abstract:
For decades in Japan, two overlapping forms of traditional herbal remedies coexisted. The traditional Japanese and Chinese medicine was the first. The second form of herbal medicine utilised in Japan is from Europe and Southeast Asia, and it gained popularity after the law was passed in 1874. Physicians in general practise prescribe ethical Kampo formulations within the National Health Insurance reimbursement scheme. Kampo formulations are available over-the-counter (OTC) and can be used for self-medication in primary health care settings. In Japan's healthcare system, kampo drugs play a significant role. The Ministry of Health and Welfare released "The Internal Assignments on the Review for Approval of OTC Kampo Products," also known as "210 OTC Kampo Formulae," in the early 1970s (currently the Ministry of Health, Labour and Welfare). "210 OTC Kampo Formulae" was changed and published as "The Approval Standards for OTC Kampo Products" in 2008, and the standards now list 294 Kampo formulae. In the Japanese Pharmacopoeia, quality requirements for certain herbal items were developed. Approval Standards and Quality Standards are important in Kampo product regulation.

Keywords: kampo drug, regulation, japan

PCP334

Role of Natural Polymer as Thermoresponsive Hydrogel Based Drug Delivery System

AP0281
Arati Patel
patelaaru7043@gmail.com

AP0025
Mr. UdayVegad
udaykumar@gtu.edu.in

Graduate School of Pharmacy –GTU

Abstract:
Polymers are part of our day to day diet and also possess important scope in drugs, pharmaceuticals, food and cosmetic industries.The past few decades have witnessed rapid progress in hydrogel.More recently natural polymer based hydrogel have received more attention due to their inherent physicochemical and biological features, as well as numerous biomedical applications (*e.g.*, wound healing, drug delivery, and tissue engineering). Various synthetic approaches, including ester or amide formation, radical polymerization, Michael addition, "Schiff-base", and disulfide crosslinking have been introduced for the synthesis of natural polymers-based hydrogels.Here development of Thermo-responsive hydrogel which gelation at physiological temperature, gift the delivery system with excellent spatial and temporal control, and have a widely application in drug delivery, tissue engineering, imaging, and wound dressing Extensively used thermoresponsive natural polymers are chitosan, cellulose, xyloglycanand dextran. By using these polymers, thermo-responsive hydrogel can also be prepared for bio-medical applications including cancer treatment, transdermal, buccal drug delivery and bone regeneration.

Keywords: Natural Polymer, thermoresponsive, hydrogel, drug delivery system**.**

PCP325

Bhasma for the Treatment of Breast Cancer

AP0261	AP0263	AP0262	AP0113
Ritu Patel[1]	**Rajan prajapati[1]**	**Dr. Brijesh Shah[1]**	**Dr. Dignesh khunt[1]**
ritupatel544@gmail. com	rajanprajapati1898@gmail. com	Brijesh.shah@unthsc.edu	digneshkhunt@gtu.edu.in

[1]Graduate School of Pharmacy
[2] UNTHSC, Fort Worth, Texas, USA

Abstract:
Nowadays, Breast cancer is amongst commonly diagnosed cancer in women. From different cancer, it is second-ranked caused for death in a woman. Despite the advances in the treatment of cancer, mortality is still high. Complementary and alternative medicine is emerging as a potent modality in cancer treatment. In Ayurveda, numerous remedies are used for Breast cancer. Modern science now a day uses metallic nanoparticles for the targeted treatment of cancer and also diagnosis purposes. In Ayurveda, metal nanoparticles are known as Bhasama. AyurvedicBhasma has incinerated herbo-metallic/mineral preparations that consist of particles in the range of nano/micrometers with therapeutic effects against Breast cancer. The current poster presented the role of different types of Bhasma for the treatment and diagnosis of Breast cancer.

Keyword: Bhasma, Nanoparticles, Breast Cancer

PCP324

Bhasma; A Ayurvedic Metalic Particle for the Treatment of Rheumatoid Arthritis

AP0261
Ritu Patel
ritupatel544@gmail.com

AP0263
Rajan prajapati
rajanprajapati1898@gmail.com

AP0113
Dr. Dignesh khunt
digneshkhunt@gtu.edu.in

Graduate School of Pharmacy-GTU

Abstract:
Rheumatoid Arthritis (RA) is an auto-immune illness characterized by persistent joint inflammation. In Ayurveda, Amavata is referred to as Rheumatoid Arthritis. Amavata are compose of two words: Ama and Vata. Ama is known as toxic or maldigested waste. It leads to the illness when it accumulates into body tissue or joints. Vata is known as an energy that is made of air and space, as per Ayurveda. Dosha is responsible for all mental and physical activity. It regulates blood flow, waste removal, respiration, and, most notably, the passage of ideas through our minds. When Ama and Vata dosh are not working efficiently, then leads to RA. In RA treatment, the primary focus is on reducing pain, inflammation and preventing joints' deformity. A drawback of current medication is the toxicity and reoccurrence of symptoms after discontinuation of the medicine. The development of new drugs is problematic, so indigenous treatment is a good alternative. As per Ayurveda for the treatment of RA, restore the Ama and Vata dosh. For that, different types of remedies are available in Ayurveda. Bhasma is one of the medication-based treatments for RA. Godanti (Gypsum) and Swarna (gold) Bhasma are used. Currently, the review focus on how Bhasma is helpful for the treatment of RA. The current poster is highlighted on how bhasma is helpful for the management of RA.

Keywords: Rheumatoid Arthritis, Swarna bhasma.

PCP321

A Concise Review on "*Insitu* Gelling System" Comprising of Bio Actives from Natural Origin

AP0214
Prachee Audichy*
audichyprachee99@gmail.com

AP0187
Dr. Manju Misra
asso_manju_misra@gtu.edu.in

Graduate School of Pharmacy -GTU

Abstract:
Insitu gelling system offers the unique advantage of sol-to-gel transition on receipt of biological stimulus such as temperature, pH change, solvent exchange, UV radiation etc. Owing to this unique feature they have been extensively explored for administration of drug at target sites over the past few decades thus offering bio-adhesion and enhanced penetration, especially in case of conventional drug delivery. Several natural polymers such as chitosan, guar gum, karaya gum, gelatin, pectin having inherent properties of biocompatibility, biodegradability and biologically recognizable moieties had been explored for such systems. Similarly, in-situ gelling system of bio actives from natural origin like moringa olifera, embelia ribes,curcumin, fruits of Quercus infectoria Oliv etc have been delivered by nasal,ocular,gastric,vaginal route for treatment of allergic rhinitis, enhance ocular performance,treating gastric ulcer,vaginal infection respectively. However, a concise review highlighting the insitu system comprising of herbal or natural bio actives is missing.
In this review we have tried to compiled in-situ gelling system of bio actives derived from natural sources for different therapeutics application. It is expected that such data will be of immense use for further studies on in-situ gelling system comprising of other bio actives in future.

Keywords:*In situ* gel, Novel drug delivery, Natural polymer, Herbal, Bioactive agent

PCP313

Macroalgae Products as Food Supplements: A Regulatory Outlook in Europe

AP0243
Prakruti Pandya
pakuscidoc@gmail.com

AP0233
Bhumika Maheriya
ra_pharmacy@gtu.edu.in

Graduate School of Pharmacy-GTU

Abstract:
Demand for macroalgae-based products is rising around the globe including Europe. Macroalgae having many diverse properties makes them potentially interesting for developing innovative products. Macroalgae products can be marketed as traditional herbal medicines or macroalgae foods, feed and feed additives, cosmetics, packaging materials, fertilizers, biostimulants or biofuels. Here, we discuss the legislation in the European Union for macroalgae as foods including food supplements and food additives. Macroalgae foods that have not previously been used as food are regulated as novel food.There is also organic macroalgae, a specific regulatory category. Getting health claims approved for foods based on macroalgae is difficult and one of the barriers can be the high levels of heavy metals. Moreover the elements of the general regulatory environment like agricultural/aquacultural subsidies, aquaculture licensing, public procurement criteria, taxes and trade agreements. EU directives have set forth common objectives for all member states, but states may decide these goals can be achieved. Overall, we have identified and discussed the current EU legislation on macroalgae products along with the limitations or uncertainties from a company perspective.

Keywords: Food supplements, Macroalgae, regulation, European Medicine Agency

PCP312

Simultaneous Estimation of Ursolic Acid and Oleanolic Acid in Chloroform Fraction of Fruit Pulp of *Randiadumetorum* by High-Performance Thin-Layer Chromatography (HPTLC) Densitometry Method

AP0255
Nisha patel
Patelnisha8155@gmail.com

AP0007
Ms jigna Vadalia
jigna.vadalia@gmail.com

Graduate School of Pharmacy-GTU

Abstract:
Randiadumetorum family Rubiaceae, is highly reputed ayurvedic medicinal tree commonly known as mainphal, mindhal. *Randiadumetorum* cures abscess, ulcer, inflammation, wounds, tumors, skin disease,antimicrobial activity and pulp of fruits also have anthelmintic properties.The present study was focus on the simultaneous quantification of ursolic acid and oleanolic acid in chloroform fractionof fruit pulp of *Randiadumetorum*by HPTLC. The plate were developed with solvent system toluene: ethyl acetate: acetone (7.5:2:0.2). The result showed that the presence of oleanolic acid and ursolic acid in chloroform fraction, content werefound 153µg and 96.49µg per mg of dry fraction, respectively. An excellent, very simple and effective HPTLC method developed for ursolic acid and oleanolic acid separation after iodine derivatization. Present method could be used for quality control analysis and quantification of oleanolic acid and ursolic acid in different plants and herbal formulations.

Keyword: *Randiadum etorum,* HPTLC, ursolic acid, olenolic acid.

PCP311

Analytical Method for Determination of Pyrrolizidine Alkaloids in Marketed Herbal Tea Formulations

AP0252
Chandni Gadhiya
chandnih19@gmail.com

AP0239
Ms. Hardi D. Joshi
ap_gsp_hardijoshi@gmail.com

Graduate School of Pharmacy-GTU

Abstract:
Herbal tea formulations are widely consumed world-wide as it is believed to have advantageous health effects and contained high amount of antioxidant. Intake of herbal tea has proven to be a major route for human exposure to Pyrrolizidine alkaloids(PAs).PAs are the natural plant toxins having hepatotoxic, mutagenic and carcinogenic effect if ingestion with lifetime exposure. Recently a number of studies have performed a risk assessment for PAs in herbal teas. The normal value for daily intake of PA should not be exceed 0.007µg/kg body weight. Study suggests, Liquid Chromatography tandem mass spectroscopy(LC/MS) method were used to determination of PAs in the different marketed formulations of herbal teas. Herbal Tea formulation include Nettle(*Urtica dioica* L.), Fennel(*Foeniculum vulgare* Mill.), Chamomile(*Matricaria recutita* L.), Melissa(*Melissa officinalis* L.),Peppermint(*Mentha piperita* L.) ,mixture of components and also herbal tea infusions.Among them most of all marketed formulations contains level of PAs up-to 5647µgPA/kg, more than the daily intake level as per German Federal Institute for Risk Assessment. Tea mixtures contains >300µg/kg, also some herbal tea infusion contains 13 and 1080 µg/kg. This kind of review will help to demonstrate that marketed herbal tea formulations may contain high amounts of PAs exceeding current recommendations. Specific for that reason they are advised to carry out more rigorous Quality Control tests devoted to detection of PAs.

Keywords: Pyrrolizidine Alkaloids, Herbal tea, LC/MS

PCP307

Metabolomics Using LCMS: A Tool for Standardization of Herbal Drugs

AP0226	AP0249	AP0025	AP0239
Ms.Diva Chetanbhai Purohit[1]	**Mr.Dhruvil Patel[2]**	**Mr.Udaykumar Vegad[1]**	**Ms.Hardi Joshi[1]**
divapurohit886@gmail.com	drpatel22298@gmail.com	udaykumar@gtu.edu.in	ap_gsp_hardijoshi@gtu.edu.in

[1]Graduate School of Pharmacy - GTU
[2] Emcure Pharmaceutical

Abstract:
The recent global resurgence of interest in herbal medicines has led to an increase in the demand for them. Commercialization of the manufacture of these medicines to meet this increasing demand has resulted in a decline in their quality, primarily due to a lack of adequate regulations pertaining to this sector of medicine. The qualitative and quantitative analysis of herbal medicines, which is a prerequisite for pharmacokinetic and metabolic evaluations, remains a great challenge because of the intrinsic complexity of herbal medicines.WHO encourages standardization of herbal crude drugs. Metabolomics has been used as a powerful tool for the analysis and quality assessment of the herbal drugs. It is increasingly being used in the quality control and standardization of herbal drugs because they are composed of hundreds of natural compounds.LC-MS is widely use for metabolomics study of herbal drugs because of better sensitivity.wide range of metabolites including polar, semi-polar, and non-polar compounds and secondary metabolites can be detected by LC-MS.

Keywords: herbal drugs, standardization, Metabolomics, LC-MS.

PCP295

A Comprehensive Review of the Aphrodisiac Activity of the Plants *Pueraria Tuberosa* Dc. and *Moringa Oleifera* Lam.

AP0228
Kirati Shah
Shahkirati97@gmail.com

AP0016
Niraj Vyas
nirajvyas.ph@charusat.ac.in

Ramanbhai Patel College of Pharmacy, Charotar University of Science and Technology, CHARUSAT Campus.

Abstract:
Pueraria tuberosa DC. (Fabaceae), also known as Indian Kudzu (vidarikand), is a perennial herb distributed throughout India and other Asian countries.It containsdifferent classes of phytoconstituents including alkaloids, carbohydrates, steroids, glycosides, tannins, terpenoids, flavonoids, coumarins and anthocyanidins.*Morinaga oleifera* Lam. (Moringaceae), also known as Drum Stick (Sigru) is a perennial plant broadly used in South Asia and Africa as a traditional folk medicine and it contain various phytoconstituents such as alkaloids, saponins, tannins, steroids, phenolic acids, glucosinolates, flavonoids, and terpenes.According to Ayurvedic Pharmacopoeia, the tuber root part of Pueraria tuberosa and the leaves part of Moringa oleifera are used as Shukala (increases sperm).*Pueraria tuberosa* ethanolic extract of the tuber showed improvement in sexual performance and Possess androgenic activity in rats. The result of experiment showed that significantly increased weight of sexual organs, increased mount frequency, increased diameter of seminiferous tubules & improved spermatogenesis, increased sperm count, increased testosterone, FSH, and LH hormone level.*Morinaga oleifera* Hydroalcoholic extract of leaves showed significantly increased body weight and sexual organ weight. Increased serum Testosterone, FSH and LH levels which possesses aphrodisiac activity in male rats.In male rats, leaves powder of *Moringa oleifera* significantly increased mounting number, increased intromission number, had no significant changes in testosterone level, and was a potential sexual enhancer.

Key Words: *Pueraria tuberosa*DC. *Moringaoleifera*Lam. Shukala; Testosterone; Aphrodisiac.

PCP293

Herbal Fumigation: An Approach of Sterilization for Prevention of Air Born Infection with Mosquito Repellent Action

AP0216 Akanxa D. Patel	AP0218 Twisha A. Modi	AP0215 Drashti G. Patel	AP0220 Sneha P. Dave	AP0221 Dr. Kaushik B. Kanada
dg9428833@gmail.com	pakansha118@gmail.com	moditwisha511@gmail.com	snehaoza23@gmail.com	kaushikkanada27@gmail.com

Dept. of Pharmacognosy, Saraswati Institute of Pharmaceutical Sciences, Dhanap, Gandhinagar.

Abstract:

With the reference of Covid-19 Pandemic, Airborne transmission of pathogenic microorganisms to humans from the environment, animals, or other humans can result in diseases. Inhalation is an important route of exposure as the lung is more susceptible to infection than the gastrointestinal tract. Moreover, Mosquito borne diseases like Chickenguniya, Dengue and malaria etc. are major human health problem in many countries by affecting millions of people each year.Herbal fumigation (Medicated smoke/Dhoopana) is one of the procedures described in Ayurveda for sterilization, disinfection and killing or removing the insects. Dhoopana is a method by which drugs of herbal, herbo-mineral or animal origin are used for fumigation so as to heal wound, diseases related to Vagina, Ear, Nose, Ano-rectal; to disinfect Medicine preparation rooms, Dressing rooms, Gynac wards, Operation theatres, Neonatal and pediatric wards and also to sterilise Asavas and Aristas. Dhoopana is an integral part of Rakshavidhi, which ensures protection against microbes. The effect of smoke of drugs may be repellent for mosquitoes. Most dhoopana drugs like Savan, Ushir, Bhallatak, Tejpatra, Arjun, Neem leaves, Agaru, Benzoin, Guggul, Colphony, and Sandalwood etc. contain different types of phytoconstituents which have action like anti-microbial and mosquito repellent. Fumigation with such drugs is safe, natural and cost effective technique. Commercial repellents like Allethrin, DEET have been reported many harmful effects for humans. Proper utilization of herbal fumigation for household and commercial premises in regular practice may provide the protection against the air as well as mosquito borne diseases which will improve the physical, mental and social health of the person as well as society. In the current review, an attempt has been made to compile the data for antimicrobial and mosquito repellant activities of Dhoopana Dravyas.

Keywords: Dhoopana, herbal fumigation, microbial infections, mosquito repellent.

PCP283

Turmeric and Liquorice Used for the Management of Oral Sub-mucous Fibrosis: A Systematic Review

AP0195	AP0188	AP0056	AP0196
Monika sorathiya	**Dr Sanjay Chauhan**	**Renita Nagani**	**Hinal Harkhani**
Monikasorathiya421999@gmail.com	Prof-sanjay-chauhan@gtu.edu.in	renitanagani@gmail.com	Hinakharkhani1999@gmail.com

Graduate School of Pharmacy-GTU.

Abstract:
Oral submucous fibrosis (OSMF) is a precancerous condition that most commonly affects the buccal mucosa and is linked to the eating of betel nuts. Submucous fibrosis, ulceration, a burning sensation, and a limited mouth opening are all symptoms of this OSMF condition. This issue is being treated using a variety of therapy options. A cost-effective, safe, and efficient solution is required for the management of OSMF. Turmeric and liquorice, which are both safe and effective, are utilised in the treatment of OSMF. Curcumin is obtained from the rhizomes of Curcuma longa while glycyrrhizic acid and Glabridin is derived from the root of Glycyrrhiza glabra (liquorice) which both ingredients are isoflavonoid or natural phenolic compounds with antioxidant properties.

Keywords: oral submucous fibrosis, premalignant condition, turmeric, liquorice.

PCP282

Introduction to Phytopharmaceutical and Its Regulation in India

AP0196
Hinal Harkhani
hinalharkhani1999@gmail.com

AP0007
Ms Jigna Vadaliya
Ap_jigna@ gtu.edu.in

AP00195
Monika Sorathiya
Monikasorathiya421999@gmail.com

Graduate School of Pharmacy – GTU.

Abstract:
Phytopharmaceutical are plant derived compounds that are purified and standardised fractions of an extract of a medicinal plant or its parts with defined minimum four bioactive or phytochemical compound for internal and external use of human or animal for diagnosis,treatment,mitigation or prevention of any disease or disorder but do not include parentral administration. The new phytopharmaceutical regulation allows for the use of advanced procedure such as Solvent extraction, fractionation, potentiating processes, current formulation development for the production of drugs. After CDSCO approval of NDA, the novel phytopharmaceutical medicine would have same marketing status as a new chemical entity based drugs. The newly added Appendix 1(B) to schedule Y covers the data that must be supplied with an application to conduct clinical study, import, or manufacture a phytopharmaceutical medication in the country. CDSCO gazette notification defines regulatory provisions for phytopharmaceutical, as well as regulatory submission requirement for scientific data on quality, safety, and efficacy to evaluate and permit marketing of herbal drug in the same way that synthetic, chemical moieties are marketed.

Keywords: Phytopharmaceutical, regulation in India.

PCP279

Management of Oral Sub-mucous Fibrosis by Two Herbal Drugs: Ginger and Cinnamon.

AP0056	AP0188	AP0195	AP0196
Renita Nagani	**Dr Sanjay Chauhan**	**Monika sorathiya**	**Hinal Harkhani**
renitanagani@gmail.com	Prof-sanjay-chauhan@gtu.edu.in	Monikasorathiya421999@gmail.com	Hinakharkhani1999@gmail.com

Graduate School of Pharmacy-GTU.

Abstract:
Oral submucous fibrosis (OSMF) is oral precancerouscondition that affect most part of the oral cavity, pharynx and upper third of the oesophagus. The abnormal fibrosis causes stiffness of the mouth, with eventual immobility of the lips, cheeks, tongue, soft palate, and uvula. Treatment of OSMF is difficult so that effective intervention is needed which is safe, efficient and cost effective. Natural ayurvedic treatment of OSMF along with life style modification can help in lowering the symptoms of OSMF and may help in curing the disease. Ginger and cinnamon use are possible because they have constituent which have potent anti-oxidant and anti-inflammatory pharmacological action. *Zingiber officinale* that containing gingerol which shown anti-oxidant properties and another is 6-shagaol and 6-paradol which shown anti-inflammatory and anti-cancer activity. Another herbal drug Cinnamomum *zeylanicum* that containing cinnamaldehyde which shown anticancer activity. So that basis of pharmacological action of the both drug that may be use for treatment of OSMF.

Keywords: oral submucous fibrosis, precancerous disorder, ginger, cinnamon.

PCP278

Role of Natural Polymer as pH Sensitive Hydrogel Based Drug Delivery System

AP0189
Megha Patel
meghapatel2985@gmail.com

AP0025
Mr. Uday Vegad
udaykumar@gtu.edu.in

Graduate School of Pharmacy – GTU.

Abstract:
There has been a significant increase in demand for biomaterials over the last decades. According to this fact, the design and development of more efficient and sophisticated biomaterials have attracted a great deal of interest. In this context, natural polymers-based hydrogels have received more attention due to their inherent physicochemical and biological features, as well as numerous biomedical applications (*e.g.*, wound healing, drug delivery, and tissue engineering). Various synthetic approaches, including ester or amide formation, radical polymerization, Michael addition, "Schiff-base", and disulfide cross linking have been introduced for the synthesis of natural polymers-based hydrogels. Here development of pH-sensitive hydrogel for drug delivery, their mechanism of action, drug release as a function of pH changes along the GI tract. Extensively used pH sensitive natural polymers are chitosan, alginate, Hyaluronic acid, gum tragacanth and dextran. By using these polymers, pH sensitive hydrogel can also be prepared for drug delivery of wound healing, fungal infection, colorectal cancer treatment and intestinal targeting of neutraceuticals.

Keywords: Natural polymer, pH sensitive, hydrogel, drug delivery system.

PCP248
A2 Milk for Better Health Management

AP0059	AP0047	AP0117	AP0138	AP0113
Aarti Bodar[1]	**Mehul Prajapati**[1]	**Dr. Rajesh Patel**[1]	**Dr. Swapnil Borse**[2]	**Dr. Dignesh Khunt**[1]
38.aarti@gmail.com	prajapatimehul452@gmail.com	rajeshpatel@gtu.edu.in		digneshkhunt@gtu.edu.in

[1]Graduate School of Pharmacy – GTU.
[2] AYUSH-Centre of Excellence, Centre for Complementary and integrative health, Interdisciplinary school of health sciences, SavitribaiPhule Pune University, Pune, India.

Abstract:
Currently, the lifestyle related disease in population are increasing day by day because of consumption of unhealthy food and lack of nutrition in the diet. Milk has been considered as perfect nutrition diet because it is important source of nutrients and micronutrients. Milk is a common drink of all age group. Cow milk is being used since ancient time with referecens in *Vedas* too. Ayurveda, the Indian system of medicine, have also described in detail the innumerable benefits of cow milk. It is also being used as *Anupana Dravya* (~drug vehicle) in Ayurvedic practices. Casein is the chief component of milk protein in which 30-35 % is beta-casein. Purpose of the present poster are the highlight the type of cow milk and their relation with different disease. Cow milk contain 209 amino acids, different mutation in beta casein gene have leads to genetic variance and out of these A1 and A2 most common. Difference only in 67 position of amino acid which is histidine in A1 or proline in A2. Indian cows except Maland Gidda and Kherigarh breeds, all the native cow breeds (Milch as well as non-milch cows) gives pure A2 type milk. While Holstein and AyrshirePredominantly produce A1 Milk. A2 milk more health beneficial than A1 milk. BCM-7 releases during digestion of A1 beta-casein which is interact with human gastrointestinal track, internal organ and brain stream. A1 type milk important risk factor for type 1 diabetes, coronary heart disease, infant death, autism etc. so, A2 milk considered as safe for human consumption. The Agri-economical and pharmaco-economical strategies need to be developed to support the translational and sustainable public health approaches focusing use of A2 type milk and milk products.

Key words: Nutrition, cow milk, lifestyle related disease, A1 and A2 cow mi.

PCP246
Black Wheat for Metabolic Disorder

AP0047 Mehul Prajapati[1]	AP0059 Aarti Bodar[1]	AP0117 Dr. Rajesh Patel[1]	AP0138 Dr. Swapnil Borse[2]	AP0113 Dr. Dignesh Khunt[1]
prajapatimehul452@gmail.com	38.aarti@gmail.com	rajeshpatel@gtu.edu.in		digneshkhunt@gtu.edu.in

[1]Graduate School of Pharmacy – GTU.
[2] AYUSH-Centre of Excellence, Centre for Complementary and integrative health, Interdisciplinary school of health sciences, SavitribaiPhule Pune University, Pune, India.

Abstract:
In the wake of modernization, excess energy intake, rising obesity, and changing lifestyle are leading cause for the metabolic disorder. It occurs due to disruption of normal metabolism process. Disorders in metabolism can be inherited or acquired during your lifetime.Recently, Black colour wheat are explore for the treatment of metabolic disorder. Black wheat gets its colour from the presence of a naturally occurring antioxidant called Anthocyanins. Anthocyanins are the pigments that give the colour red, purple, and blue to plant-like berries, jamuns, etc. They are the pharmaceutical ingredients and which have properties of Builds up immunity, controls weight, relieving one of bloating, cramps, and uneasiness, cholesterol levels improve. Due to these types of properties black wheat will help in metabolic disorder like obesity, type 1 diabetic, constipation etc. In comparison to yellow wheat, Black wheat contain higher amount of protein, fibre, vitamin K, calcium, flavonoid components etc, Clinical trial suggests that black wheat helpful for the prevention of the diabetes mellitus. Overall, Black wheat is combinationa of the biological active components with nutrition and work as function food.

Key word: Black wheat, metabolic disorder, Anthocyanins

PCP224

Current Regulatory Aspects of Herbal Medicine in India

AP0062
Swati Patel
Swatipatel1298@gmail.com

AP0233
Bhumika Maheriya
ra_pharmacy@gtu.edu.in

Graduate School of Pharmacy – GTU.

Abstract:
Herbal medicine and treatment with herbs are not new to humanity, and it has been in practice since thousands of years back and still going on. India is the country of herbs, and the Indian traditional treatment system was also based on herbs and medicinal plant that is known as Ayurveda.Plants and herbs are used as medicine and people prefer it due to fewer side effects. In fact in developed countries, alternative medicine is gaining popularity and it is increasing day by day because of their efficacy, safety, and lesser side effects. In India, herbal medicines are regulated by AYUSH, CDSCO (Central Drugs Standard Control Organization), and D&C Act 1940 & 1945(amendment).Schedule "T" of the act gives Good Manufacturing Practice (GMP) requirements that is carried for the manufacture of herbal drugs.About 8000 herbal medicines have been organized in AYUSH systems in INDIA. Herbal medicine is also called botanical medicines or phytomedicine.

Keywords: AYUSH, herbal medicine, GCP, D&C Act.

PCP221
Drug Development of Ayurvedic Formulation

AP0106
Himanshu Mehta
Harshmehta7574@gmail.com

AP0227
Ms. Asmatbanu Pathan
ap-gsp-asmatbanu@gtu.edu.in

Graduate School Of Pharmacy-GTU.

Abstract:
Quest for healthy and long life are perhaps as old as human existence and efforts are unremitting to address the challenges and triumph over the bottlenecks across this journey. Ayurveda -the science of life, evolved as a comprehensive system of healthcare systematically through scientific experimentations of high order backed by sound and reproducible evidence base and stood the test of the time. Several strategies and road maps are being drawn to carry forward merits of this science so as to meet the current day health needs and mainstream its core strengths alongside through research & development in this country and across the globe. The fundamental aspects of holistic systems needs adequate positioning while designing clinical trials to examine the safety and efficacy of Ayurveda approaches. Furthermore, the other challenges and issues related to quality and safety viz. dosage forms/delivery system, diverse concepts and complex approaches in trial design, diagnosis and therapy, outcomes of clinical efficacy and drug interactions also pose certain limitations in research. A systems approach may be adopted to validate the therapies and approaches with integration of principles of Ayurveda and bio-medicine without losing the vital fundamentals of both systems. Such an approach with well designed research plans could possibly facilitate to generate tangible evidence.

Keyword: Ayurveda, Clinical trials, Ayurveda approaches, Dosage forms, Drug interactions.

PCP215

Cancer Preventive and Therapeutic Potential of Banana

AP0085
Yash Khodia[1]
Yashkhodiya24@gmail.com

AP0000
Dr. J. B. Dave[2]
drjbdave@yahoo.co.in

[1]Graduate School of Pharmacy-GTU.
[2]L.M. Collage of Pharmacy.

Abstract

Cancer, The Second Most Frequent Cause Of Mortality, Is A HyperProliferative Disorder That Involves Cellular Transformation, Deregulation Of Apoptosis, And Excessive Proliferation, Invasion, Angiogenesis, And Metastasis. The Banana (Musa Spp.) Plant Produces Elongated And Edible Fruit. The Two Main Parthenocarpic Species Of Banana Are Musa Accuminata Colla And Musa Balbisiana Colla. There Are Several Health-Promoting And Disease-Preventing Effects Of Musa Accuminata Colla, Which Are Attributed To Its Important Bioactive Compounds,Including Phenolics, Carotenoids, Biogenic Amines, Phytosterols, And Volatile Oils, Found In The Stem, Fruit, Pseudostem, Leaf, Flower, Sap, Inner Trunk, Root, And Inner Core. Banana Possesses Numerous Pharmacological Activities, Such As Antioxidant, Immunomodulatory, Antimicrobial, Antiulcerogenic, Hypolipidemic, Hypoglycemic, Leishmanicidal, Anthelmintic, And Anticancer Properties. Various Banana Extracts, Fractions, And Phytoconstituents, Including Ferulic Acid,Protocatechualdehyde, 2-Pentanone,Bioactive Components Present In Bananas Have Exhibited Antiproliferative, Cellcycle Arrest-Inducing, Apoptotic, Anti-Adhesive, Anti-Invasive, And Antiangiogenic Effects Through Modulation Of Diverse, Dysregulated Oncogenic Signaling Pathways.

Keywords: Cancer, Banana, Musa accuminata Colla, Musa balbisiana Colla, Musa spp., Prevention, Therapy, Molecular mechanisms.

PCP210

Preventive Effect of *Linum Usitatissimum* Linn. on Selenite-Induced Cataract in Rat Pups

AP0086
Milap Patel*
milappatel.ph@charusat.ac.in

AP0089
Dr. Bharat G Patel
bgpatell.adm@charusat.ac.in

Ramanbhai Patel College of Pharmacy, Charotar University of Science and Technology.

Abstract:
Cataract is the leading cause of blindness associated with oxidative damage of the lens. Selenite-induced cataract is an excellent mimic of oxidative stress-induced cataract associated with oxidative stress, proteolysis and protein insolubilization in the lens. The present study was aimed to evaluate the effect of ethanolic extract of *Linum usitatissimum* Linn. (ELU) on selenite-induced cataract in rat pups. Cataract was induced by a single injection of sodium selenite (4 mg/kg, S.C.) to 9-day-old Wistar rat pups. The treatment with ELU was started on 10^{th} postpartum day and continued for 5 days. The animals were treated with ELU at the doses of 200 mg/kg and 400 mg/kg, i.p. Animals were observed for development of cataractwhen the pups first opened their eyes for daily up to the day 30^{th}. Lenses were extracted and analyzed for the estimation of total protein content, malondialdehyde, enzymatic and non-enzymatic antioxidants like glutathione, superoxide dismutase, catalase, and glutathione peroxidase. Morphological examination of lenses revealed matured cataract in selenite treated and minimal or partial nuclear opacity in ELU treated pups. ELU prevented lipid peroxidation by decreasing MDA and increasing total protein content. ELU also restored the levels of enzymatic and non-enzymatic antioxidants. The data suggests *Linum usitatissimum* Linn. Could prevent cataractinduced by sodium selenite which can be attributed to its antioxidant activity and anti-proteolytic activity.

Keywords: Cataract, Sodium Selenite, Oxidative Stress, Antioxidant.

PCP207

Isolation of Bioactive Flavonoidal Constituent from Seeds of *Blepharis Persica* (Forssk.) Pers.

AP0073	AP0077	AP0076	AP0074
Ms. Khushali Khamar*	**Mr. Abhishek Sharma**	**Mr. Nishit Patel**	**Dr.Manan Raval**
20mphpqa004@charusat. edu.in	rxabhi4695@gmail. com	17drphs001@charusat. edu.in	mananraval.ph@charusat.edu .in

Ramanbhai Patel College of Pharmacy, Charotar University of Science and Technology.

Abstract:
Seeds of *Blepharis persica* (forssk.) Pers. (family: Acanthaceae) are mentioned in *Ayurveda,* and used alone or incorporated in many *Ayurveda* and Herbal Formulations to treat male infertility. The experiments were planned to isolate chemicals from the bioactive fraction prepared from the seeds of *Blepharis persica* and characterize the isolated constituent chemically. Ethyl acetate fraction of methanolic extract of seeds of *Blepharis persica* was subjected to open column chromatography. The eluted fractions were rechromatographed to isolate constituents. TLC studies revealed that the compound to be devoid of other impurities and might possess a benzo-pyrone ring structure. IR spectra confirmed the backbone structure of the isolated constituent to benzo-pyrone. An isolated compound was found to increase testosterone concentration when incubated with TM3 cells. The studies suggest the potential scaffold for promoting testosterone biosynthesis in the Leydig cells.

Keywords: Isolation, *Blepharis persica,* testosterone.

PCP202

Survey on the Use of Traditional Medicine for Covid-19 Infection

AP0038
Punitkumar Bhatt
Dharmsinh Desai University
Nadiad (Gujarat) India
punitbhatt.ph@ddu.ac.in

Abstract:
An online survey was conducted on social media platformsduring June 2021 to August 2021on the use of various traditional medicine during the coronavirus pandemic. Questionnaire contained different questions related to demographic information along with how respondents are taking various traditional medicines like Haldi (*Curcuma longa*), Tulsi (*Ocimumsantum*), Giloy (*Tinosporacordifolia*), Aadu (*Gingiber officinalis*), Lahsun (*Aliumsativum*), Ashwagandha (*Withaniasomnifera*) and Sunth (dried powder of *G. officinalis* rhizomes) and Triphala (Mixture of *Emblica officinalis* (Amala), *Terminalia bellerica* (Baheda), and *Terminalia chebula* (Harde)). Questions related to how frequent respondents were taking these medicines, whether taking traditional medicines with allopathic drugs or not were also included and safety of the traditional medicines. Out of 516 respondents, 61.82% (n=319) were male and 38.18% (n=197) were female. About 98% (n=501) respondents were from India. Total 42.44% (n=219) respondents were belong to age range 31 to 40 years. In case of education level, more than 92% respondents had a bachelor's degree or above. Haldi (*C. longa*) was cited highest (n=392) by the respondents. However, many respondents have cited mixture of two or more herbs. About 33% (n=170) respondents were taking such medicines when they feel unhealthy, 42.64% (n=220) respondents took such medicines less frequently, whereas 24.42% (n=126) respondents take such medicines on a regular basis.About 38.18% (n=197) respondents never took traditional medicine with allopathic drugs, 28.49% (n=147) were taking both medicines simultaneously. 78.68% (n=406) respondents believes that traditional medicines are safe whereas 21.32% (n=110) do not think the same.

Keywords: COVID-19; coronavirus; Herbal; Traditional medicine; Medicinal plants

PCP190

Application of Artificial Intelligence in Microscopic Identification of Medicinal Plant Powder: A New Hope for Quality Control of Herbal Drugs

AP0016
Niraj Vyas
Ramanbhai Patel College of Pharmacy,
CharotarUniversity of Science and Technology,
CHARUSAT Campus, At-Changa, Dist-Anand 388 421.
Nirajvyas.ph@charusat.ac.in

Abstract:
It is critical to maintain the purity and quality of ayurvedic products and pharmaceuticals in the current situation, where the area of pharmacognosy (Ayurveda) dominates in the treatment of numerous diseases and disorders. Adulteration has remained a major problem in the production of herbal medications. It is most commonly observed during the collecting and processing of raw materials. As a result of this issue, products manufactured by industry employing these raw materials may be impure due to contaminants and other impurities present. This procedure of detecting adulterants is an integral part of the quality control process in any industry.There are a variety of approaches for solving this problem, including microscopic, chemical, and physical methods. For the aim of detecting adulterants, the microscopic approach is regarded the most accurate and precise. This microscopic procedure necessitates the use of trained professionals, chemicals, and a sophisticated microscope. This process requires a significant amount of time and money. To address this issue, we have proposed the development of software using artificial intelligence and machine learning to aid the identification and detection of major components and adulterants present in the raw materials.This procedure involves collection of photos of a plant's unique characteristics, then compiling, sorting, and feeding the images into a database in that software. This software would save information on a wide range of plants that are widely utilized in the herbal industry. This database will detect the presence of any type of adulterant automatically and generate a report that will help in evaluating the quality control process in any industry.This will be advantageous in terms of cost effectiveness, ease of sample processing in the laboratory, reduced human errors, time saving, and will assist in the automation of pharmaceutical labs and companies.

Keyword: Artificial Intelligence, Quality control, Microscopy, Technology

PCP186

Computational Approaches for Polypharmacological Profile of Natural Products

AP0009

Nayankumar Ratnakar

L. M. College of Pharmacy, Ahmedabad

nayan.ratnakar@lmcp.ac.in

Abstract

Polypharmacological profiles of natural products have established potential as novel therapeutics for various multifaceted diseases, including cancer and HIV. Currently, many gaps exist in the knowledge of which compounds interact with which targets, and experimentation of testing of all possible interactions is possible. Recent advances and developments of system pharmacology and computational approaches provide powerful tools for exploring the polypharmacological profiles of natural products.Recent development and advances of computational tools and systems pharmacology approaches for the identification of drug targets of natural products are discussed. Various cheminformatics, bioinformatics and systems biology resources forreconstructing drug–target networks of natural products are also summarised. Currently available computational approaches andtools for prediction of drug–target interactions by focusing on five domains: target-based, ligand-based, chemogenomicsbased, network-based and omics-based systems biology approaches are also summarised.

Keywords: Polypharmacological profile, Computational approaches, Cheminformatics,












समुचित ~ ज्ञान ~ समन्वय

ESTD - 2007

GRADUATE SCHOOL OF PHARMACY