



Original article

Phytochemical and antimicrobial properties of different plants and *in silico* investigation of their bioactive compounds in wound healing and rheumatism

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ABSTRACT

In the current study the assessment of the antimicrobial and phytochemical properties of *Cassia fistula*, *Musa paradisica*, *Ficus religiosa* and *Murraya koenigii* plants extracts was carried out. The antibacterial potential of these plants extracts was tested against *S. aureus* and *E. coli*. The *Cassia fistula* and *Ficus religiosa* leaves showed the larger zone of inhibition in aqueous and butanolic extract respectively against *Escherichia coli*. *Musa paradisica* and *Murraya koenigii* leaves showed larger zone of inhibition in ethanolic extract against *S. aureus*. Qualitative phytochemical analysis showed the presence of alkaloids, flavonoids, phenols, terpenoids, steroids, glycosides, saponins, carbohydrates, proteins and tannins in all extracts while phylobutannins, emodin, anthocyanins and leucoanthocyanins were not present in these extracts. Quantitative phytochemical analysis showed the highest alkaloid content in the *Murraya koenigii* leaves. Highest tannin content and flavonoid content was found in *Ficus religiosa* leaves, while highest phenolic content was found in case of *Cassia fistula*. In addition to this antioxidant potential of all the extracts was determined. *Musa paradisica* leaves showed highest antioxidant potential as compared to other plant extracts. *In silico* analysis of bioactive components present in plant extracts was performed by molecular docking. The rutin and Gln from *Musa paradisica* and *Murraya koenigii* respectively, were docked with Glycogen Synthase Kinase 3 beta (GSK-3beta) protein. Quercetin and rutin from *Cassia fistula* and *Ficus religiosa* respectively, were docked with C-reactive protein (CRP). The tested bioactive compounds showed good binding affinity with significant number of hydrogen bonds and can be used as a good alternative of synthetic drugs to treat rheumatism and wounds.

1. Introduction

The production of antibiotics is one of the most effective weapons against microbial illnesses. The need for new medicines has arisen from the evolution of antibiotic resistance by harmful microorganisms. It is important for the production of novel medications with fewer adverse impacts and resistance-building properties. Since ancient times, the plants have been used medicinally, especially in Asia (Seyyednejad et al., 2014).

Any chemical that destroys microbes including bacteria or prevents their proliferation is said to have antibacterial effect. Numerous chemical elements found in medicinal plants have antibacterial properties. These plants are abundant in bioactive molecules, which can be

converted into valuable medicines and other bio-reactive compounds that treat a wide range of ailments. Many compounds found in plant parts are the cause of antibacterial properties (Mamta et al., 2023).

Cassia fistula generally regarded as golden shower tree belongs to the family Leguminosae. To cure rhinosinusitis disease, the *Cassia fistula* is utilized by many tribes. It aids in the management of rheumatism, hemoptysis, itching, leukoderma and gastrointestinal issues. A huge number of investigators from all around the globe have investigated how plant extracts influence microorganisms. Numerous secondary metabolites found in plant including tannins, terpenes, flavones, carbohydrates and others, have been reported to show antimicrobial effects (Sagpute et al., 2014).

There is evidence that the leaves of *Cassia fistula* have anti-

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Phytochemical Investigation And Antimicrobial Properties

Mital Kaneria, Kalpna Rakholiya



Phytochemical Investigation And Antimicrobial Properties:

Evaluation of anti-microbial and anti-oxidant and phytochemical activity of Eupatorium triplinerve Vahl against wound infections Prem Jose Vazhacharickal, John Joseph, Athira Vasanthan, 2018-07-19 Medicinal plants have bioactive compounds which are used for various human disease and also an important role in wound healing The present study is to investigate about the Antimicrobial phytochemical and antioxidant activity of Eupatorium triplinerve Vahl The extracts are studied against human wound and burn pathogenic bacterial stains E coli Klebsiella species Pseudomonas species Staphylococcus aureus Enterobacter species From the phytochemical study is shows the presence of steroids glycosides tannins phenols saponins and flavonoids Plant extracts compounds were separated by thin layer chromatography and identification based on Rf values The presence of vitamin C play and important role of antioxidants

Ethnomedicinal Plants with Therapeutic Properties V.R. Mohan, A. Doss, P.S. Tresina, 2019-02-11 Ethnomedicinal Plants with Therapeutic Properties provides detailed information on locally important medicinal plants discusses the pharmacological properties of selected medicinal plants and looks at the phytodrug aspects of selected plants In 24 important chapters the volume covers ethnomedicine pharmacology and pharmacognosy of selected plants Medicinal plants are an important part of our natural health They serve as important therapeutic agents as well as valuable raw materials for manufacturing numerous traditional and modern medicines The history of medicinal plants used for treating diseases and ailments dates back to the beginning of human civilization Our forefathers were compelled to use any natural substance that they could find to ease their suffering caused by acute and chronic illnesses wounds and injuries and even terminal illness This volume highlights recent scientific evidence of therapeutic properties of traditionally used medicinal plants in relation to clinical outcomes and remedies for promotion of human well being The authors have endeavored to convey the therapeutic knowledge of ethnomedicinal plants clearly and concisely

Phytoceuticals in Food for Health and Wellness Tanmay Sarkar, Slim Smaoui, Wing-Fu Lai, 2025-09-01

Phytoceuticals in Food for Health and Wellness Harnessing Plant Therapeutics emphasizes the growing interest of the potential health benefits of phytochemicals in wellness and product development by uncovering innate bioactive compounds found in plants Highlighting the diverse classes of phytochemicals including flavonoids carotenoids polyphenols antioxidants and alkaloids the book explores the sources chemical structures and distribution in various plants and what role they play in nutrition and disease prevention Phytoceutical and phytochemical approaches targeting immunity obesity cancer respiratory gut cardiovascular and eye health and more will be discussed Through traditional and modern extraction methods

Phytoceuticals in Food for Health and Wellness Harnessing Plant Therapeutics also demonstrates how plant bioactives can be used for fortifying foods for optimal nutrition innovating in product development and developing the use of phytochemicals in culinary and food manufacturing applications to maximize flavor and extend shelf life Discusses plant based compounds and their role in food health and disease Explores distribution of flavonoids carotenoids and phenolic compounds for optimal

bioactive content Provides insights to plant antioxidant anti inflammatory anticancer and neuroprotective properties Explains interactions between phytochemicals and the human body Integrates phytochemicals into culinary practices for flavor enhancement and functional food development **Journal of Nano Research Vol. 75** Efstathios I. Meletis,2022-09-21 This

volume of the Journal of Nano Research contains peer reviewed articles reflecting the practical research results in the synthesis and properties analysis of nanomaterials and nanoparticles for various engineering applications The presented achievements will find practical use in microelectronics corrosion protection waste and water treatment technologies nanomechatronics heat engineering and biomedicine Herbal Formulations, Phytochemistry and Pharmacognosy Mital

Kaneria,Kalpna Rakholiya,2024-06-17 Herbal Formulations Phytochemistry and Pharmacognosy combines the principles of natural medicines with refined modern technology to illustrate and promote the development of more ecofriendly better effective easily available and affordable drug discovery processes The book provides classical and applied knowledge in drug discovery to broadly cover related aspects like herbal formulations phytochemistry and pharmacogenetic research The drug discovery process accelerates the design of new leads for various life threatening diseases and natural medicines and has been an integral part of drug discovery playing a major role as a template and offering holistic approaches for the management of various diseases Explores natural products as potential source of novel drugs with new modes of action Covers recent developments reporting up to date methods Combines principles of natural medicines with refined modern technology Ferns Johnson Marimuthu,Helena Fernández,Ashwani Kumar,Shibila Thangaiah,2022-05-06 Ferns are

representative of genetic inheritance of great value as they include species of ancient vascular plants which have direct connection with the evolution of plant life on Earth This volume brings a selection of chapters covering a range of themes on fern biology its development and growth useful protocols for propagation and conservation purposes genetic diversity as well as medicinal and environmental applications The content is organized into four parts Biotechnology of Ferns Propagation of Ferns Ferns in Medicines Environmental Regulation This wide spectrum of the contributions provides quick access to information on the enormous potential of this plant group This book brings together most recent research work and novel techniques which is far from the traditional perspective usually followed It is of interest to teachers researchers and botanists Also the book serves as additional reading material for undergraduate and graduate students of agriculture botany forestry and ecology **An Experimental Text Book on Phytochemical Analysis and Antimicrobial Activity of**

Mentha Piperita Naveen Gaurav,2016-05-20 Mentha also known as mint from Greek m nthā Palaeolexicon is a genus of plants in the family Lamiaceae mint family Harley et al 2004 The species are not clearly distinct and estimates of the number of species varies Bunsawat et al 2004 Hybridization between some of the species occurs naturally Many other hybrids as well as numerous cultivars are known in cultivation The genus has a subcosmopolitan distribution across Europe Africa Asia Australia and North America Brickell et al 1997 Mints are aromatic almost exclusively perennial rarely annual herbs They

have wide spreading underground and overground stolons and erect square Rose Francis 1981 branched stems The leaves are arranged in opposite pairs from oblong to lanceolate often downy and with aserrated margin Leaf colors range from dark green and gray green to purple blue and sometimes pale yellow The flowers are white to purple and produced in false whorls called verticillasters International Journal of Advanced Research in Biotechnology & Nanobiotechnology Volume 2 Issue 2

International Journal of Advanced Research in Biotechnology & Nanobiotechnology,2021-01-01 ABOUT IJARBN International Journal of Advanced Research in Biotechnology Nanobiotechnology is a Peer reviewed Quarterly Scientific Research Journal Published from Amity Institute of Biotechnology Amity University Madhya Pradesh Gwalior **Plants with Antimicrobial**

Properties: Antiviral and antibacterial properties D. J. Cousins,1995 **Re-emergence of Natural Products for Drug Discovery in Honor of Prof. Dr. M. Iqbal Choudhary** Hidayat Hussain,Hina Siddiqui,Ioannis P. Gerothanassis,2024-02-29

This Research Topic will honor Prof M Iqbal Choudhary for his pioneering contribution in the field of Bioorganic Synthetic and Natural Product Chemistry Prof M Iqbal Choudhary is Director and Professor of Bioorganic and Natural Product Chemistry at the International Center for Chemical and Biological Sciences H E J Research Institute of Chemistry and Dr Panjwani Center for Molecular Medicine and Drug Research Pakistan and Coordinator General COMSTECH Since 1990 Prof Choudhary has been among the world leaders in the field of natural product chemistry and has made pioneering contributions in the discovery of novel natural products Prof Choudhary has 1 212 publications cumulative impact of 2500 with 33 550 citations h index 76 in the fields of organic and bioorganic chemistry He also published 94 patents 64 US Patents 90 books and 40 chapters in books published by major U S and European presses He discovered many potent anti epileptic and anti leishmanial compounds from indigenous medicinal plants that are under clinical trials His contributions to reverse bacterial resistance to antibiotics represent seminal contributions in this important field He has trained hundreds of young researchers especially women from across the Afro Asian region in natural product chemistry and established several research centers in Pakistan and helped to setup research units in Africa and South and Central Asia His scientific contributions have been recognized by prestigious national and international awards and honors and fellowships of several academies of science *Sustainable Materials for Food Packaging and Preservation* Tabli Ghosh,Ruchir Priyadarshi,Swarup Roy,2024-09-20 Sustainable Materials for Food Packaging and Preservation Food Security and Sustainability discusses the recent trends and development of bio based sustainable materials focusing on their fabrication and application in food packaging and food preservation This book brings together fundamental information and the most recent advances in the characterization processing and modification of sustainable materials and their impact on food packaging and storage of food products for improving their shelf life Special attention is given to smart active and edible packaging and the utilization of nanoemulsion and nanoencapsulation in the food industry is also discussed In addition the book reviews the use of proteins polysaccharides and microbial and chemically derived materials for food preservation Discusses recent trends and

advancements in the applications of sustainable materials in food packaging and preservation providing an overview of various sustainable materials such as agro based and microbial and chemically derived materials Covers fabrication techniques characterization and processing of various sustainable materials used for food packaging and preservation Includes a thorough discussion of the current sustainable solutions for extending the shelf life of food products in the packaging process

Antibacterial activity of four plant species used in traditional medicine practice of South Omo Zone, Southern Ethiopia Sintayehu Gobeze, 2021-01-27 Master's Thesis from the year 2019 in the subject Biology Micro and Molecular Biology grade 4 Arba Minch University course Medical Microbiology language English abstract The aim of this study was to determine the antibacterial activity of crude extracts of four medicinal plants *A. pirottae*, *G. schweinfurthii*, *K. begoniifolia* and *U. leptocladon* against ATCC and MDR clinical isolates of bacteria Based on ethnobotanical data four plants were collected from different areas of South Omo through several field trips followed by taxonomic identification Leaves of *A. pirottae*, *K. begoniifolia* and *U. leptocladon* and root of *G. schweinfurthii* parts of plants specimens were subjected to extraction process using six different organic solvents through maceration and subsequent filtration The resultant crude extracts were screened for primary in vitro antibacterial activity against ATCC bacterial strains using agar well diffusion assay The plants that showed the highest activity indices were further screened against MDR bacterial isolates MIC was performed on the most active plant extract Results of antibacterial activities were analyzed using statistical software SPSS for Windows version 20 The antibacterial activity significantly varied among the plant species type of solvents used for the extraction and strains of bacteria tested Ethyl acetate and ethanol was highly effective for extracting antibacterial principles irrespective of plant species The results of primary screening revealed that two plants *K. begoniifolia* and *U. leptocladon* were highly active against ATCC strains The results of the extended screening showed that among the two plants ethyl acetate extract of *U. leptocladon* efficiently inhibited the growth of MDR bacterial isolates The MIC values of *U. leptocladon* were varied in inhibiting MDR bacteria tested The overall findings of this study demonstrated that all the four plants have antibacterial activities in varying degrees *U. leptocladon* showed the widest and highest spectrum of antibacterial activities as per agar well diffusion assay and analysis of MIC However further ongoing and in depth studies are mandatory in order to prove and understand in vivo efficacy mechanism of action and toxicological profile of these plants In many regions of the world particularly Ethiopia the vast majority of traditional medicines are plant based However these plants were neglected and scarcely explored Therefore screening of plants used in traditional medicine could provide the chance of discovering antimicrobials that fight against infectious diseases

Evidence-Based on Health Benefits: Probiotics, Micronutrients, and Edible Plants Surasak Saokaew, Piyameth Dilokthornsakul, Bey Hing Goh, Learn-Han Lee, 2023-10-27 Submission closed Guidelines Nutrition is regarded to be critical in the prevention treatment and prognosis of both acute and chronic disorders The field of nutritional epidemiology which evolved from epidemiology and other public health sciences has served as the foundation for nutrition

research for several decades and has had a significant impact on dietitian practice and dietary counseling across the world. Evidence based nutrition involves conscientiously working with patients values and preferences to help them prevent, resolve or cope with problems related to their physical, mental and social health by combining the best available nutrition evidence with clinical experience. **Proceedings of the 5th SAAT Annual Conference (Akure-Humboldt Kellogg 2009)** Federal

University of Technology, Akure (Nigeria). School of Agriculture & Agricultural Technology. Annual Conference, 2009

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