

Article

Anti-Inflammatory Activity of *Calendula officinalis* L. Flower Extract

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Abstract: The use of calendula for its lenitive properties' dates to the XII century. This plant contains several bioactive compounds, including terpenoids, terpenes, carotenoids, flavonoids and polyunsaturated fatty acids. Calendula flower extract is used in soothing cosmetics, such as after-sun, sensitive skin and eye contour products. The anti-inflammatory properties of this ingredient were demonstrated in an animal model, but the mechanism of action is poorly understood. Therefore, our work explored the effect of a calendula flower extract on NO production, a pro-inflammatory radical produced by nitric oxide synthase (iNOS) and highly released by innate immune cells in inflammatory-related pathologies. NO production was evoked by the Toll-like receptor 4 agonist lipopolysaccharide (LPS) in macrophages, using concentrations that did not compromise cells viability. This ingredient exhibited a dose-dependent NO inhibition, reaching 50% at 147 μ L/mL without cytotoxicity. Together with previous literature, these results provide experimental evidence on the anti-inflammatory properties of calendula flower extract, as well as its usefulness in cosmetics with soothing properties and adjunctive skin care in the treatment of the diseases associated with dysregulation of the NO signaling cascade.

Keywords: calendula; anti-inflammatory; NO; skin care; iNOS; soothing cosmetics



Citation: Silva, D.; Ferreira, M.S.; Sousa-Lobo, J.M.; Cruz, M.T.; Almeida, I.F. Anti-Inflammatory Activity of *Calendula officinalis* L. Flower Extract. *Cosmetics* **2021**, *8*, 31. <https://doi.org/10.3390/cosmetics8020031>

Academic Editor: Enzo Berendona

Received: 8 April 2021

Accepted: 23 April 2021

Published: 25 April 2021

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1. Introduction

Calendula officinalis L. (marigold) belongs to the Asteraceae/Compositae family, which is native to Central Europe and Mediterranean. Its flower oil is the main preparation used in cosmetic products, and contains several bioactive compounds, including terpenoids and terpenes (mainly bisabolol, faradiol, chamazulene, amidiol and esters), carotenoids (mainly with rubixanthin and lycopene structures), flavonoids, (mainly quercetin, isorhamnetin and kaempferol aglycones) and polyunsaturated fatty acids, (mainly calendic acid) [1–4]. *Calendula officinalis* L. has been used for medical purposes since the XII century. The plant is reported to present several biological activities namely angiogenic, vascular regeneration, analgesic, antimicrobial, antioxidant and immunomodulatory [5–8]. In cosmetic products, calendula is used in formulations for sensitive skin and soothing products (e.g., after-sun products) among a variety of presentations, including skin, eye, hair and bath products, with recognized safety for use in cosmetics [9].

Several Calendula preparations are available for incorporation in topical formulations directed towards wound healing and for soothing inflamed and damaged skin, like extracts, tinctures, and oils [9]. There are 14 INCI designations for *Calendula officinalis* L. preparations at the European directory of cosmetic ingredients, and within the same designation, it is

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Ilhan, Tarun Belwal**



Anti Inflammatory Activity Of Flower Extract Of Calendula:

Phytopharmacy Sarah E. Edwards, Ines da Costa Rocha, Elizabeth M. Williamson, Michael Heinrich, 2015-02-17

Phytopharmacy An Evidence Based Guide to Herbal Medicinal Products Healthcare professionals including doctors pharmacists and nurses are often confronted with patients who use over the counter OTC herbal medicinal products and food supplements While taking responsibility for one's own health and treatment options is encouraged many patients use these products based on limited and sometimes inaccurate information from non scientific sources such as the popular press and internet There is a clear need to offer balanced well informed advice to patients yet a number of studies have shown that generally conventionally trained health practitioners consider their knowledge about herbal medicinal products and supplements to be weak Phytopharmacy fills this knowledge gap and is intended for use by the busy pharmacist nurse or doctor as well as the expert patient and students of pharmacy and herbal medicine It presents clear practical and concise monographs on over a hundred popular herbal medicines and plant based food supplements Information provided in each monograph includes Indications Summary and appraisal of clinical and pre clinical evidence Potential interactions Contraindications Possible adverse effects An overview of the current regulatory framework is also outlined notably the EU Traditional Herbal Medicinal Products Directive This stipulates that only licensed products or registered traditional herbal medicinal products THRs which have assured quality and safety can now legally be sold OTC Monographs are included of most of the major herbal ingredients found in THRs and also some plant based food supplements which while not strictly medicines may also have the potential to exert a physiological effect

Edible Medicinal And Non-Medicinal Plants T.

K. Lim, 2013-11-08 This book continues as volume 7 of a multi compendium on Edible Medicinal and Non Medicinal Plants It covers plant species with edible flowers from families Acanthaceae to Fabaceae in a tabular form and seventy five selected species from Amaryllidaceae Apocynaceae Asclepiadaceae Asparagaceae Asteraceae Balsaminaceae Begoniaceae Bignoniaceae Brassicaceae Cactaceae Calophyllaceae Caprifoliaceae Caryophyllaceae Combretaceae Convolvulaceae Costaceae Doryanthaceae and Fabaceae in detail This work will be of significant interest to scientists medical practitioners pharmacologists ethnobotanists horticulturists food nutritionists botanists agriculturists conservationists lecturers students and the general public Topics covered include taxonomy common English and vernacular names origin and distribution agroecology edible plant parts and uses botany nutritive pharmacological properties medicinal uses nonedible uses and selected references

Ethnopharmacological Properties, Biological Activity and Phytochemical Attributes of Medicinal Plants, Volume 2 Bharat Singh, 2023-10-24

This book covers the morphological characteristics ethnopharmacological properties isolated and identified structurally diverse secondary metabolites biological and pharmacological activities of medicinal plants Ethnopharmacology is the systematic study of folklore traditional medicines which continue to provide innovative drugs and lead molecules for the pharmaceutical industry In fact plant secondary

metabolites used as a single molecule or as a mixture are medicines that can be effective and safe even when synthetic drugs fail. Therefore the description of these secondary metabolites as well as methods for the targeted expression and purification is of high interest. In addition to surveying the morphological features, ethnopharmacological properties, biological and pharmacological activities, and studies of clinical trials, this book offers a comprehensive treatment of 56 plant species. It also presents the cell culture conditions and various methods used for increasing the production of medicinally important secondary metabolites in plant cell cultures. This volume provides the morphological features, habitat, and distribution of each species of 56 genera selected from the different regions of the world. Presents ethnopharmacological applications of various species of the 56 genera included in this book. Different species of 56 genera are used for ethnomedicinal uses by the people of various countries of the world. Describes structures of various secondary metabolites identified in 56 plant species together with their biological and pharmacological activities. Discusses strategies of secondary metabolites production such as organ culture, pH elicitation, hairy root cultures, light, and mutagenesis. Provides a complete overview of each species of 56 genera and complete information up to 2022. Ethnopharmacological Properties, Biological Activity, and Phytochemical Attributes of Medicinal Plants is an important book for undergraduate and postgraduate students, pharmacologists, phytochemists, Ayurvedic practitioners, medical doctors, and biotechnologists interested in the ethnopharmacological properties, phytochemistry, and biological and pharmacological activities of plants.

Integrative Dermatology Robert A. Norman, Philip D. Shenefelt, Reena N. Rupani, 2014-04. This title combines conventional treatment options with time-tested alternative treatment options for skin disorders. By integrating the best of Western and Eastern medicine, it aims to broaden the armamentarium of clinicians treating skin diseases.

Role of Oxidative Stress in Oral Diseases Alexandrina L. Dumitrescu, Gareth W. Davison, 2019-12-10.

Herbs and Natural Supplements, Volume 2 Lesley Braun, Marc Cohen, 2014-10-01. Herbs and Natural Supplements 4th Edition. An evidence-based guide is an authoritative evidence-based reference. This two-volume resource is essential to the safe and effective use of herbal, nutritional, and food supplements. The second volume provides current evidence-based monographs on the 132 most popular herbs, nutrients, and food supplements. Organised alphabetically, each monograph includes daily intake, main actions, and indications, adverse reactions, contraindications, and precautions, safety in pregnancy, and more. Recommended by the Pharmacy Board of Australia as an evidence-based reference work, print that pharmacists are meant to have access to when dispensing. Contributed content from naturopaths, GPs, pharmacists, and herbalists. Useful in a clinical setting as well as a reference book. It provides up-to-date evidence on the latest research impacting on herbal and natural medicine by top leaders in Australia within the fields of Pharmacy, Herbal Medicine, and Natural Medicine.

Heilpflanzenpraxis heute - Rezepturen und Anwendung Siegfried Bäumler, 2021-01-21. Krankheiten effizient und sicher mit Heilpflanzen behandeln. Die Phytotherapie birgt ein hohes Anwendungspotential mit einer großen Bandbreite therapeutischer Möglichkeiten und einem geringen Nebenwirkungsprofil.

Mittlerweile ist die Phytotherapie immer besser in der evidenzbasierten Medizin verankert Nutzen Sie pflanzliche Arzneimittel in der Therapie dieses Standardwerk leitet Sie kompetent an Das erwartet Sie in Heilpflanzenpraxis Heute Rezepturen und Anwendung ber 300 Krankheitsbilder nach Organsystemen geordnet ber 700 Rezepturen zur inneren und ueren Anwendung in Form von Tees Tinkturen Umschl gen B dern und Wickeln bergreifende Indikationenliste zum schnellen Auffinden von Erkrankungen und deren spezifischer phytotherapeutischer Behandlung Unterschiedliche Infok sten unterst tzen das Verst ndnis Neu in der 3 aktualisierten Auflage Vertiefende Darstellung der phytotherapeutischen Behandlung des Diabetes mellitus und der Fettstoffwechselst rungen Indikationsspezifische Empfehlungen zu aromatherapeutischen Anwendungen und Mikron hrstoffen Dieses Buch eignet sich f r Heilpraktiker rzte f r Naturheilverfahren Passend zum Band Rezepturen und Anwendung Heilpflanzenpraxis Heute Arzneimittelporraits ISBN 978 3 437 57276 0 *New Look to Phytomedicine* Mohd Sajjad Ahmad Khan,Iqbal Ahmad,Debprasad Chattopadhyay,2018-10-23 *New Look to Phytomedicine* Advancements in Herbal Products as Novel Drug Leads is a compilation of in depth information on the phytopharmaceuticals used in modern medicine for the cure and management of difficult to treat and challenging diseases Readers will find cutting edge knowledge on the use of plant products with scientific validation along with updates on advanced herbal medicine in pharmacokinetics and drug delivery This authoritative book is a comprehensive collection of research based scientific validations of bioactivities of plant products such as anti infective anti diabetic anti cancer immune modulatory and metabolic disorders presented by experts from across the globe Step by step information is presented on chemistry bioactivity and the functional aspects of biologically active compounds In addition the pharmacognosy of plant products with mechanistic descriptions of their actions including pathogenicity is updated with information on the use of nanotechnology and molecular tools in relation to herbal drug research Compiles up to date information on the chemotherapeutics used in the treatment of infective and metabolic disorders Presents advancements in the discovery of new drugs from plants using molecular and nanotechnology tools Examines detailed information on the use of herbals agents in cancer HIV and other ailments including diabetes malaria and neurological disorders WHO Monographs on Selected Medicinal Plants World Health Organization,1999 This is the second volume in a series of monographs which are intended to promote information exchange and international harmonised standards for the quality control and use of herbal medicines It contains scientific information on 30 selected plants and each entry includes a pharmacopoeial summary for quality assurance purposes information on its clinical application and sections on contraindications pharmacology safety issues and dosage forms It provides two cumulative indexes with entries in alphabetical order by plant name and according to the plant material of interest *Abiotic Stress in Plants* Shah Fahad,Shah Saud,Yajun Chen,Chao Wu,Depeng Wang,2021-07-21 Environmental insults such as extremes of temperature extremes of water status and deteriorating soil conditions pose major threats to agriculture and food security Employing contemporary tools and techniques from all branches of science attempts are being made

worldwide to understand how plants respond to abiotic stresses with the aim to manipulate plant performance that is better suited to withstand these stresses This book searches for possible answers to several basic questions related to plant responses towards abiotic stresses Synthesizing developments in plant stress biology the book offers strategies that can be used in breeding including genomic molecular physiological and biotechnological approaches that have the potential to develop resilient plants and improve crop productivity worldwide

The Complete Natural Medicine Guide to the 50 Most Common Medicinal Herbs Heather Boon, Michael Smith, 2004 The most current scientific information from the world's leading medical journals Although there is growing consumer awareness of alternative and complementary medicine there is a lack of comprehensive information available on herbal products While pharmacists physicians and other health care professionals sometimes offer advice their patients want more information The Complete Natural Medicine Guide to the 50 Most Common Medicinal Herbs is a comprehensive fully illustrated reference to the 50 most commonly prescribed herbs A complete description of each herb is featured along with its other common names possible adverse effects therapeutic uses for treating illness and disease as well as potential drug interactions Some of the herbs included are Aloe Vera Evening Primrose Goldenseal Scullcap Burdock Turmeric Tea Tree Oil Meadowsweet This guide is written by professional pharmacists one a naturopathic doctor using the most current research and clinical testing The authors easy to understand text combined with the latest findings and clear directions for safe dosages makes this practical reference on medicinal herbs a primary resource of data

Functional Foods and Nutraceuticals for Human Health Cristóbal Noé Aguilar, A. K. Haghi, 2021-12-15 This new volume provides important information on potential applications and new developments in functional health foods and nutraceuticals It looks at the health promoting properties in functional foods and beverages as well as nutraceuticals Some health issues that are considered in conjunction with these foods and nutraceuticals include oxidative stress obesity pharyngitis low cognitive concentration among others Research topics include the antioxidant properties of certain products the development of functional and medicinal beverages nutraceuticals and functional foods for alternative therapies and more

Nutraceuticals in Veterinary Medicine Ramesh C. Gupta, Ajay Srivastava, Rajiv Lall, 2019-05-21 This unique work compiles the latest knowledge around veterinary nutraceuticals commonly referred to as dietary supplements from ingredients to final products in a single source More than sixty chapters organized in seven sections collate all related aspects of nutraceutical research in animal health and disease among them many novel topics common nutraceutical ingredients Section I prebiotics probiotics synbiotics enzymes and antibacterial alternatives Section II applications of nutraceuticals in prevention and treatment of various diseases such as arthritis periodontitis diabetes cognitive dysfunctions mastitis wounds immune disorders and cancer Section III utilization of nutraceuticals in specific animal species Section IV safety and toxicity evaluation of nutraceuticals and functional foods Section V recent trends in nutraceutical research and product development Section VI as well as regulatory aspects for nutraceuticals Section VII The future of nutraceuticals and

functional foods in veterinary medicine seems bright as novel nutraceuticals will emerge and new uses of old agents will be discovered International contributors to this book cover a variety of specialties in veterinary medicine pharmacology pharmacognosy toxicology chemistry medicinal chemistry biochemistry physiology nutrition drug development regulatory frameworks and the nutraceutical industry This is a highly informative and carefully presented book providing scientific insight for academia veterinarians governmental and regulatory agencies with an interest in animal nutrition complementary veterinary medicine nutraceutical product development and research

Novel Drug Targets With Traditional Herbal Medicines Fatma Tuğçe Gurağaç Dereli, Mert Ilhan, Tarun Belwal, 2022-09-29 This book collects information about the most popular ethnomedicinal plants which are common in Turkey and around the world It presents the ethnopharmacological records in vivo and in vitro studies side effects chemical compositions and clinical studies of these medicinal plants Its special focus is on the novel drug targets for disease and their possible mechanisms of action It covers botanical descriptions the status of the plants and food or drug interactions including precautions and warnings about the plants and the available market products It provides an explanation of recorded and known plant administration dosages Also the gap between the traditional practice and scientific clinical evidences in the use of ethnomedicinal plant is acknowledged It is well known that traditional knowledge of the use of the medicinal plants in therapy is an important resource for the discovery of novel treatment options and drug targets The main purpose of this book is to draw attention to ethnomedicinal plant species Data on the therapeutic potentials of these medicinal plants can now be accessed from a single source It provides an important resource for future research opportunities for harnessing the full potential of these plants

The 5-minute Herb and Dietary Supplement Consult Adriane Fugh-Berman, 2003 This unique book gives health care professionals a quick reference to herbs minerals vitamins amino acids probiotics enzymes over the counter hormones and other dietary supplements commonly used by consumers The text covers claims indications scientific evidence possible benefits adverse effects contraindications and drug interactions Compatibility BlackBerry R OS 4 1 or Higher iPhone iPod Touch 2 0 or Higher Palm OS 3 5 or higher Palm Pre Classic Symbian S60 3rd edition Nokia Windows Mobile TM Pocket PC all versions Windows Mobile Smartphone Windows 98SE 2000 ME XP Vista Tablet PC

The Encyclopedia of Herbs and Spices P N Ravindran, 2017-12-28 The Encyclopedia of Herbs and Spices provides comprehensive coverage of the taxonomy botany chemistry functional properties medicinal uses culinary uses and safety issues relating to over 250 species of herbs and spices These herbs and spices constitute an important agricultural commodity many are traded globally and are indispensable for pharmaceuticals flavouring foods and beverages and in the perfumery and cosmetic industries More recently they are increasingly being identified as having high nutraceutical potential and important value in human healthcare This encyclopedia is an excellent resource for researchers students growers and manufacturers in the fields of horticulture agriculture botany crop sciences food science and pharmacognosy

Wound Healing Vlad Alexandrescu, 2016-10-12 Outstanding scientific advances over

the last decades unceasingly reveal real complexity of wound healing process astonishing in its staged progression as life is unfolding itself This natural course of tissue repair seems to bear thousands of overlapping molecular and macroscopic processes that nowadays only start to unfold to our knowledge The present volume collecting recent scientific references proposes to readers a two folded audacious goal First an updated design of intimate cellular mechanisms is entailed in tissue regeneration that emanates from the first section of the book Next a multidisciplinary therapeutic perspective that focuses on macroscopic healing throughout the second part of this work adds clinically integrated observation Practical diagnostic and treatment information is appended in each chapter that may equally help experienced clinicians or dedicated students and researchers in broadening essential breaking points of their work It is the wish of all multidisciplinary experts who gather prominent author s panel of this volume to incorporate latest medical reports and compel limits of current understanding for better tissue regeneration limb salvage and improved quality of life of our patients

Herbs and Natural Supplements
Inkling Lesley Braun, Marc Cohen, 2010-06-24 A must have health companion for herbalists naturopaths complementary medicine practitioners and students Herbs and Natural Supplements 3rd Edition An evidence based guide presents evidence based information on the 130 most popular herbs nutrients and food supplements used across Australia and New Zealand This exhaustive textbook is organised alphabetically by each herb or nutrient s common name Herbs and nutrients are then accompanied by critical information such as daily intake main actions and indications adverse reactions contraindications and precautions safety in pregnancy and more This new edition of Herbs and Natural Supplements has been expanded with new chapters on pregnancy and wellness It also features 10 new monographs for Arginine Dunaliella Elde Goji Pelargonium Prebiotics Red Yeast Rice Rhodiola Shatavari and Taurine provides current evidence based information on herbal nutritional and food supplements used in Australia and New Zealand is user friendly and easily organised by easy to find A Z herbal monographs appendices offering important additional information for the safe use of herbal and nutritional supplements including a list of poison information centres associations manufacturers and more offers clear comprehensive tables including herb natural supplement drug interactions lists the pharmacological actions of all herbs and natural supplements a glossary of terms relevant to herbs and natural supplements two comprehensive new chapters Herbs and Natural Supplements in Pregnancy and Introduction to Wellness all chapters completely updated and expanded ten new monographs taking the total to 130 now also available as an eBook A code inside Herbs and Natural Supplements 3rd Edition An evidence based guide enables a full text download allowing you to browse and search electronically make notes and bookmarks in the electronic files and highlight material

Edible Flowers Arun Kumar Gupta, Vijay Kumar, Bindu Naik, Poonam Mishra, 2024-07-12 Edible Flowers Health Benefits Nutrition Processing and Applications discusses several edible flowers and their history bioactive compounds pharmacological properties chemistry and manifold applications Composed of 20 chapters the book explores significant edible flowers which have a bioactive and pharmacological attribute apart from

preservation aspects Each of the presented flowers are analyzed by its taxonomy history nutritional properties important bioactive natural compounds pharmacological potential use in food processing and marketability Medicinal and edible flowers that are grown in the various countries and are thought to promote health are also the subject of this book thus ensuring the food security aspect Written by a team of experts in the field this book is a good support for researchers and scientists working in the fields of food science food technology and nutrition with a special interest by the study of edible flowers Covers the nutritional and pharmacological aspects of edible flowers Addresses the most popular edible flowers in the world as a source for nutraceuticals Presents application in food products and potential health benefits Discuss the various preservation techniques to improve the storage stability of edible flowers Fundamentals of Herbal Medicine Kofi Busia, 2016-11-10 This book consists of cutting edge materials drawn from diverse authoritative sources which are sequentially arranged into a multipurpose one stop shop user friendly text It is divided into four parts as follows part 1 historical overview of some indigenous medical systems an outline of the basic concepts of pharmacognosy ethnopharmacology common analytical methods for isolating and characterising phytochemicals and the different methods for evaluating the quality purity and biological and pharmacological activities of plant extracts part 2 phytochemistry and mode of action of major plant metabolites part 3 systems based phytotherapeutics discussion on how the dysfunction of the main systems of the human body can be treated with herbal remedies part 4 153 monographs of some medicinal plants commonly used around the world including 63 on African medicinal plants This book therefore demonstrates the scrupulous intellectual nature of herbalism depicting it as a scientific discipline in its own right

Decoding **Anti Inflammatory Activity Of Flower Extract Of Calendula**: Revealing the Captivating Potential of Verbal Expression

In a period characterized by interconnectedness and an insatiable thirst for knowledge, the captivating potential of verbal expression has emerged as a formidable force. Its capability to evoke sentiments, stimulate introspection, and incite profound transformations is genuinely awe-inspiring. Within the pages of "**Anti Inflammatory Activity Of Flower Extract Of Calendula**," a mesmerizing literary creation penned by way of a celebrated wordsmith, readers embark on an enlightening odyssey, unraveling the intricate significance of language and its enduring affect our lives. In this appraisal, we shall explore the book is central themes, evaluate its distinctive writing style, and gauge its pervasive influence on the hearts and minds of its readership.

https://cmsemergencymanual.iom.int/public/Resources/Documents/misty_night_blues_piano_sheet_music_pdfslibforme.pdf

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Anti Inflammatory Activity Of Flower Extract Of Calendula Introduction

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