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"Oliveriadecumbens Vent.", an Endemic Iranian Plant: Investigation of the Ethnobotany and Chemical Composition

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Abstract

Introduction*: Oliveriadecumbens*Vent. belongs to Apiaceae family grows in south and west of Iran.The plant is locally named Meshkoorakin Kohgiluyehva Boyer Ahmad province and has shown a significant potential for medicinal uses based on ethnobotanical surveys.The aim of the present study is to investigate ethnobotany and chemical composition from the essential oil of *O.decumbens*Vent. wa scollected from Kohgiluyeh va Boyer Ahmad province which has not been reported previously.

Methods*:* Ethnobotanical study on *O.decumbens*Vent. was conducted through interviews with indigenous people and traditional healers of Kohgiluyehva Boyer Ahmad province and filling out some questioners. Also, the essential oil of the plant was analyzed by gas chromatography-mass spectrometry (GC/MS).

Results*:* Consequences of the ethnobotanical study revealed that this species is used locally for treatment of different illnesses such as gastrointestinal disorders as well as a variety of infections. Moreover, analytical investigation demonstrated that thymol and carvacrol were major components of the plant. It should be considered that both of these two compounds are known with a reasonable background in treating of digestive diseases and various infections

Conclusion: It could be concluded that the essential oil of the plant could be considered as an effective natural digestive and antimicrobial source because of the high amount of thymol and carvacrol.Further studies are being done on the other remarkable ethnobotanical knowledge obtained from this species.

Keyword: Chemical composition, Essential oil, Ethnobotany, Kohgiluyehva Boyer Ahmad, *Oliveriadecumbens* Vent.

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a Comparative Study on Persian Traditional Dosage Forms and Those Outlined in Current Pharmaceutical Science

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Abstract

Introduction: The art of pharmacy and pharmaceutical sciences dates back to over 1000 years ago. (1). Based on this knowledge, Persian scholars cited numerous pharmaceutical dosage forms to make herbal preparations more effective. To draw a frame of early Persian pharmaceutical knowledge and to collect the traditional dosage forms, current work has performed a comprehensive study on a main and exclusive Persian pharmaceutical manuscript; *Qarābādin-e-Sālehi* (1765 A.D.) (2). *Qarābādin-e-Sālehi* is a Persian pharmacy textbook on pharmaceutical compounding of natural medicaments.

Conclusion: By reviewing the book, all dosage forms as well as concerned definitions, descriptions and considerations were extracted and cited in a table. In parallel, the textbook of "Aulton's Pharmaceutics; the Design and Manufacture of Medicines" (3) was considered to compare the medieval knowledge of pharmaceutics with current science. Overall, 226 different dosage forms have been cited in traditional pharmacy. As many of those are exclusively related to a preparation, the final list of dosage form was shortened to nearly 60 items encompassing numerous formulations in solid, semisolid, liquid and gaseous forms. On the other side, total current dosage forms were almost 40 forms applying via oral, topical, nasal, parenteral, vaginal and rectal routes.

Similar to the current dosage forms, Persian scholars have cited ordinary forms as oral pills, tablets, syrups and powders. However, they remarked many oral preparations in form of semisolids. Interestingly, there are 11 types of traditional nasal forms whereas, this route is still known as a novel route of administration. Also 5 different ophthalmic dosage forms are cited in the textbook. It is considerable that many of traditional dosage forms were designed selectively according to the respective medical purposes. *Laooq* and *Jawarish* are two popular dosage

forms which have been administered for respiratory and gastrointestinal ailments, respectively. Beside historical clarification, current work can make a comparison between traditional pharmacy and the knowledge of current pharmaceutical science.

Keywords: Dosage form, Persian medicine, Traditional pharmacy.

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A Proteomics Approach to Anti-Hypercholesterolemia Activity of *Glycyrrhizaglabra*

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Abstract

Introduction: Hypercholesterolemia is a high incidence disease in developed and under developing societies.In Iranian traditional medicine, *Glycyrrhizaglabra*is used for controlling and reducingblood serumcholesterol. Recent finding shows that systems biology approach and Omics techniques because of their similarity in holistic view could better decipher mechanism of action of natural products and traditional medicine. In this study we aimed to discover mechanism of action of *G.glabra* by using quantitative MS-based proteomics.

Methods: *G.glabra* extract was prepared based on Glycyrrhizin Acid dry basis 7.8% byHPLC standard.The extracts were dissolved in DMSO and added to Hela and Huh7 cells at an endconcentration of 2ug/ml. The cells were harvested 48h after treatment and proteins digested into peptides. The samples were measured by selective reaction monitoring (SRM) and 45 proteins with clear role in control of cholesterol metabolism were quantified. Analysis was performed with Skyline and MSstats and from three independent biological replicates.

Results: Our findingshows *G.glabra*significantly increased concentration of TBB (39.11%), NSDHL (41.68%) and CISD1 (53.87)proteinsand decreased concentrations of MARCKS (19.32%), Lanosterol synthase (31.77%), ACAA1(32.57%) and FASN (39.21%) proteins.

Conclusion: Herbal extract are composed form multiple compounds and it is believed multi-compound drugs can interfere by targeting multiple targets at a same time. This study shows that *G.glabra*can change the concentration of 7 different proteins which controlcholesterol metabolism.By using proteomics techniques we willhave a better holistic view on different mechanisms that are responsible for herbal remedies pharmacological activities.

Keywords: Glycyrrhizaglabra , Hypercholesterolemia , Systemsbiology, Traditional medicine.

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A Review on Natural Remedies for Treatment of Amenorrhea based on Traditional Iranian Medicine

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Abstract

Introduction: Amenorrhea, amongst menstrual disorders, is one of the common diseases of women in recent decades. It is defined as no menstruation by age 14 (either in absence or development of secondary sexual characteristics), and the absence of menstruation for at least 3 cycle intervals or 6 months in women. Traditional Iranian Medicine has introduced various approaches for treatment of amenorrhea (called Ehtebas-e Tamth). Based on Tibb-e Akbari, thick substances in the uterus leading to obstruction, and abnormal uterine deviation are two main causes of amenorrhea, whose persistence can end up in fertility. But unluckily, there are few efficient medications with least adverse effects. Current study aimed at finding natural remedies for amenorrhea based on key medicinal Persian manuscripts. The findings were compared with the result of recent researches.

Keywords such as Ehtebath-e Tamthand Ehtebath-e Heiz were searched in Makhzan al-adviyeh and a query including about twenty plants and minerals was achieved. Most of them had both warm and dry temperament. Then scientific name of plants was identified comparing botanical description in Makhzan Al-adviyehe with modern botanical system and also some books like Seydane and Iran and Iraq Useful Plants were applied for confirmation. In the next step, each plant or mineral were searched in electronic databases including PubMed, Science Direct and

Scopus to get recent researches related to usage of these natural remedies in amenorrhea and other gynecological diseases. About seventy articles were studied and the results were compared.

Conclusion: Most of the remedies (*Artemisia vulgaris, Foeniculum vulgare, and Melissa officinal)* were of herbal source and one of them (borax) was mineral. In case of their approval by recent data, it is suggested that precise-designed clinical trials be conducted to develop new medication for amenorrhea.

Keywords: Amenorrhea, Herbal therapy, Natural remedies, Traditional Iranian Medicine

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A Systems Pharmacology Study for Deciphering Anti Depression Activity of *Nardostachysjatamansi*

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Abstract

Introduction: The plant *Nardostachysjatamansi* from Valerianaceae family is a well-known antidepressant plant and has historically been used in traditional medicine. As *N.jatamansi* contains many different compounds, to identify its mechanisms of action, we need a network-based study. Network-based studies are becoming an increasingly important tool in understanding the mechanisms of actions of drugs. Systems pharmacology (SP) and bioinformatics are two emerging tools that use computation to develop an understanding of drug actions in molecular and cellular levels. SP can provide mechanistic understanding of protein-protein (drug-target) interaction involved in a common biological pathway. The present study was undertaken to identify unknown targets and mechanisms of antidepressant activity of *N.jatamansi* according to a systems pharmacology approach.

Methods: First of all a list of all the targets (receptors and metabolites) involved in depression process were provided based on KEGG and TCMSP databases. The 3D structures of protein targets were collected as PDB filesand their active sites coordinates were foundby MOE application. In the next step the structures of known compounds of *N. jatamansi* were collected. For identifying the protein-lagand interactions, a docking process was runinAtuoDock and an output was received.To complete our study, the similarity between antidepressant conventional drugs and *N.jatamansi* compounds was analyzed.A dynamic SP mapfigured by GephiSoftware, shows the relations between herbal compounds, molecular targets and depression.

Results: According to the docking results, we can suggest several important targets that we have no drugs for, or several natural compounds that play an important role in depression process. According to the similarity results we can suggest several molecules for extraction or synthesis that need more researches for their therapeutic effects.

Conclusion: This study shows that how *N. jatamansi* can effect on depression by multiple molecular targeting with multiple compounds.

Keywords: depression, Nardostachysjatamansi, systems pharmacology, traditional Iranian medicine.

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Acetylcholinesterase Inhibitory (Achei) and Antioxidant Activity of *Marrubium Astracanicum* Jacq

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Abstract

Introduction: Alzheimer's disease (AD) is the origin of dementia and common neurodegenerative syndrome among older people. The pathogenic background of AD is not comprehensively identified, but it seems that cholinergic system disturbance is involved in it. Recently, medicinal plants have attracted a great deal of attention as potential

sources of natural drugs. *Marrubium astracanicum* Jacq. (Lamiaceae) is a medicinal plant with a wide range of biological activities. In this study, we evaluated the AChEI and antioxidant activity of *M. astracanicum*.

Methods: *M. astracanicum* aerial parts were collected from Ardabil province. Total methanolic extract was prepared and AChE inhibitory activity of the extract was evaluated using the Ellman method with some modifications. Antioxidant activity was assessed by DPPH, and FRAP methods.

Results: Total methanolic extract inhibited the activity of acetylcholinesterase enzyme with IC_{50} values of 27.702±3.46 µg/ml (in comparison to donepezil as positive control). It scavenged the DPPH free radicals with IC_{50} value of 96.043±6.84 µg/ml. Moreover, the FRAP value of the methanolic extract was 1.826±0.436 mol Fe^{2+} /g dry extract.

Conclusion: In this study, total methanolic extract of *M. astracanicum* aerial parts showed promising acetylcholinesterase inhibitory and antioxidant activity. However, further investigation is needed for isolation and structure elucidation of effective phytochemicals.

Keywords: Acetylcholinesterase inhibition, Antioxidant activity, *Marrubium astracanicum.*

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Ajugalide E, an phytoecdysteroid from larvicidal fraction of *Ajuga chamaecistus* ssp. *tomentella* on malaria vector *Anopheles stephensi*

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Abstract

Introduction: The genus *Ajuga*, belongs to Lamiaceae family, is one of the exclusive subspecies in the flora of Iran. The plants of this genus are used traditionally for treatment of joints pain, gout, jaundice, and as insecticide. According to the previous results, among different fractions of *Ajuga chamaecistus* subsp *tomentella* (Boiss) Rech. F, hexane fraction showed the most larvicidal activity against malaria vector *Anopheles stephensi*

Methods: The hexane fraction of methanolic extract (80%) was chromatographed on silica gel and RP-C18 columns using different solvent systems to give compound **1**. ^{13}C-, ^{1}HNMR, and IR spectroscopic methods were employed for identification of the isolated compound.

Results: The structure of compound 1, the main phytoecdysteroid separated from hexane fraction, was determined to be ajugalide-E.

Conclusion: The results of this study suggest that ajugalide-E is the main constituents of the hexane fraction of *Ajuga* chamaecistus ssp. *tomentella.*

Key words: Ajuga chamaecistus subsp tomentella, ajugalide-E, Anopheles stephensi, larvicidal, phytoecdysteroid.

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An Ethnopharmacological Investigation of an Endemic Species of *Eremostachys* Plants in Iran

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Abstract

Medicinal plants usage is one of the most important components of traditional medical system all over the world. Iranian ethnobotonical studies have shown that members of the Lamiaceae Family like *Eremostachys* genus have been used for different purposes by Iranian tribes. In Iran, *Eremostachys* encompasses 15 species, which includes 5 endemic one. Aerial parts and the root of some local *Eremostachys* species, with the vernacular name “Gandal”, are used for snake bite, poisoning and wound healing, especially in lor tribes. In this study, cytotoxicity effect of *Eremostachys adenantha* methanol extract, one of the endemic species, was determined by MTT assay on four human cancer cell lines including A549, human lung adenocarcinoma; MCF7, human breast adenocarcinoma; HepG2, hepatocellular carcinoma and HT-29, human colon carcinoma, and a normal cell line (MDBK, bovine kidney). The results revealed that methanol extract had no significant cytotoxic activity against all cell lines, which may provide a good basic support for consumption of fresh or decocted of *E. adenantha* as vegetable in food, or other medicinal uses.

Key words: cytotoxicity, *Eremostachys adenantha*, Lamiaceae, MTT assay.

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An extensive study on plants with tonic effects documented in Persian pharmaceutical manuscripts

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Abstract

Introduction: Throughout the history, human has made numerous efforts to fight aging. Traditional tonics might have been designed for this purpose (1). Although the mysteries that control lifespan are not fully revealed, one of the theories that currently is most popular explanation for this process is free radical/oxidative stress theory of aging (2). Current work aimed to review the antioxidant and radical scavenging properties of the herbs used in Persian herbal tonics.

Method and study results: We searched 5 of the most famous Persian medical and pharmaceutical manuscripts for the herbs used in traditional tonics. Seventy herbs belonging to 19 families were found, listed and identified according to their descriptions. The evidence for their antioxidant and radical scavenging effect in modern finding was searched. The total 82.85% of these herbs had proven antioxidant and radical scavenging properties.

Discussion and conclusion: Although today there is growing evidence on clinical effectiveness of traditional medicine based-remedies, search for understanding their mechanism of action continues (3). It is accepted that antioxidants can help decrease the incidence of disease and have anti-aging properties. The diet rich in antioxidants seem to have potentials in preventing many age-related diseases (4). From the other hand there are hundreds of tonic preparations introduced by traditional medicines. Our finding suggests that antioxidant and radical scavenging properties could be the mechanism of action of traditional Iranian herbal tonics.

Keywords: Antioxidant, Herbal medicine, Persian medicine, Review, Tonic.

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an Update on the Pharmacological Activities of *Terminalia Bellirica* (Gaertn.) Roxb.

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Abstract

Introduction and background: Beleric or *Terminalia bellirica* (Gaertn.) Roxb. (Family, Combretaceae) is a medicinal plant with traditional uses in various holistic medical systems such as Indian and Persian. In Traditional Persian Medicine (TPM), fruit of Beleric has so many applications including astringent, stomach tonic, and appetizing activities as well as using against headache and hemorrhoid. Fruits of the herb are also one of the main constituents of many traditional compound medicines of which *Itrifel* (a kind of oral semisolid formulations) is the most important one. Despite continuous administration of this plant by traditional healers and carried out modern investigations, no comprehensive review has been compiled on Beleric. Therefore, current study aimed to perform a critical overview over pharmacological aspects of this medicament, modern and traditional.

Conclusion: By searching the keyword *Terminalia bellirica* through the database www.scopus.com until September 2015, appropriate related papers have been derived. In spite of numerous experimental and pharmacological assessments, there are no clinical data on almost all activities of *Terminalia bellirica*. Traditional background and respective recent studies, besides no serious reported side effects, could make this medicinal herb as a potential candidate for entering to the clinical studies and introducing new medicine in Pharmaceutical market.

Keywords: Persian Medicine, Pharmacology, Review, *Terminalia bellirica.*

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Antibacterial Activity of *Achillea* Extract against Four Standard Bacteria and Two Isolated Strains

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Abstarct

Introduction: Researchers have been trying to develop new broad-spectrum antibiotics against the infectious diseases caused by bacteria, fungi, viruses, and parasitesfor many decades. Prolonged usage of these broad-spectrum antibiotics has led to the emergence of drug resistance among bacteria. There is a tremendous need for novel antimicrobial agents from different sources. To treat infectious diseases, scientists have used plants for centuries and many of them are still used today as traditional medicines. The genus *Achillea* L. (Asteraceae) is represented by about 85 species found in the Northern hemisphere, mostly in Europe and Asia. The name of the genus originates from the ancient use as a wound-healing remedy by the Trojan hero Achilles.

Methods: The aim of this study was to evaluate antibacterial effect of *Achillea tenuifolia*. The powdered plant material was extracted by maceration method in methanol, consequently, three times for solvent at room temperature. The extracts were concentrated after removing the solvent by rotary evaporator and then lyophilized using a freeze dryer.

Results: It was tested for their inhibitory effects against four standard bacteria strains *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Enterococcus faecalis*, and two isolated strains from diseased hen including *Salmonella thyphimurium*, *E. coli* using disk diffusion method and Microdilution method to evaluate their inhibition zone diameter (IZD) and minimum inhibitory concentration (MIC), respectively.

Conclusion: The results showed that the extract of the plantwas active against *E. coli*,*P. aeroginosa*, *S. aureus* and *E. fecalis*standard strains with IZDs of 10.3±0.5, 14±0.0, 12±0.0 and 11.6±0.5respectively.

Keywords: *Achillea*, Antibacterial activity, extract

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Antibacterial Activity of Essential Oil of Ginger and Tarragon on Gram Positive and Negative Bacteria

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Abstract

Introduction: Bacteria have evolved numerous defenses against antimicrobial agents, and drug-resistant pathogens are on the rise. In general, bacteria have the genetic ability to transmit and acquire resistance to drugs, which are utilized as therapeutic agents. The presence of bioactive substances in medicinal plants may react with microorganisms and restrain microbial growth. The aim of this study was evaluation of Antibacterial activity of essential oil of Ginger and Tarragon on gram positive and negative bacteria.

Methods: In this experiment, the essential oil of tarragon (Artemisia dracunculus) and ginger (Z. officinale) on were prepared. Tests were done on 5 strains of bacteria. Well diffusion and minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) method were done for evaluate antibacterial activity of essential oils.

Results: The MIC and MBC results showed that the maximum antibacterial effects of tarragon and ginger essential oils on were Staphylococcus aureus and Salmonella tophi and S. epidermidis.

Conclusion: The results of this study had indicated that essential oils of ginger and tarragon maybe useful for treatment of bacterial infections and this component can also improve the effects of some inorganic antibiotics.

Keywords: Bacteria, Essential oli, Ginger, MBC, MIC, Tarragon.

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Antibacterial Effects of *Punica granatum* flower extract on *Salmonella typhi*

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Abstract

Introduction: Salmonellosis is an infection with Salmonella bacteria, often restricted to the gastrointestinal tract and is often a self-limiting disease. Most individuals, infected with Salmonella typhimurium experience mild gastrointestinal illness involving diarrhoea, chills, abdominal cramps, fever, head and body aches, nausea, and vomiting.This pathogenic bacteria would bring some major problems and infections if it doesn't be controlled. So as nowadays organic ways of cure is preferred and the aim of this study was evaluation of Antibacterial activity of *Punica granatum* flower extract on *Salmonella typhi*.

Materials and Methods: *Punica granatum* flower extract was prepared from it's dried flower and strain of *Salmonella typhi*. For evaluation of antibacterial activity, Disc diffusion method and measurement the inhibition zone was done.

Results: The inhibition zone in disc diffusion method had shown that the extract of *Punica granatum* flower with 13.1 mm inhibition zone had a semi-strong antibacterial activity on *Salmonella typhi.*

Conclusion: Results of the study has indicated that *Punica granatum* flower extract maybe useful either alone or in a combination with antimicrobial agents in treatment of bacterial infections. And this component can also improve the effects of some inorganic antibiotics.

Keywords: antibacterial effects, *Punica granatum, Salmonella.*

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Antidepressant Activity of Resveratrol: a Systematic Review of Mechanistic Studies

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Abstract

Introduction: Depression is a mental disease ranked as the fourth leading cause of disability. Current treatments for depression are pharmacotherapy, psychotherapy and electroconvulsive therapy; though, around 70% of treatment failure along with the endless list of side effects of current treatments leads scientists to search for better options. Medicinal plants provide a vast variety of phytochemicals with pharmacological activities including antidepressant effects which can be traced to achieve new antidepressants. Electronic databases including Pubmed, Scopus and Science direct were searched using the keywords antidepressant in title/ abstract and resveratrol in the whole text between the years 2000 until 2015 (October). References of final included articles were also screened for more relevant studies. Only English language articles were included in the present review. Final included studies were searched for behavioral model and proposed mechanism of action for resveratrol.

Conclusion: Eighteen studies met the eligibility criteria to include this review. Resveratrol showed antidepressant effect in different animal models including lipopolysaccharide-induced depression, corticosterone-induced depression, post-stroke depression, chronic unpredictable mild stress, forced swimming test and tail suspension test. Neuropsychological mechanisms of resveratrol as antidepressant include elevation of brain norepinephrine, serotonin and dopamine, decrease monoamine oxidase activity, regulation of hypothalamus-pituitary-adrenal axis, elevation of brain derived neurotrophic factor, extracellular signal-regulated kinase, cyclic adenosine monophosphate response element-binding protein and antioxidant activities. According to above mentioned results, resveratrol showed potent antidepressant activity in animal models; however, no clinical study is performed to assess the efficacy in human subjects. Due to acceptable safety profile of resveratrol, this molecule could be a suitable candidate to enter clinical trials as antidepressant.

Keywords: Antidepressant, Depression, Resveratrol.

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Antimicrobial Effect of Essential Oil and Different Extracts of *Trachyspermum Ammi* Fruits against Three Main Oral Pathogens

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Abstract

Introduction: Oral infections including dental caries and periodontitis can be caused by bacteria, viruses, or fungal growth. *Aggregaitibacter actinomycetemcomitans* (the cause of most destructive periodontal diseases), *Candida albicans* (which could be an opportunistic cause of oral infections), *Streptococcus mutans* (a significant contributor to tooth decay) are among main responsible microbes for development of oral infections and searching for antibiotics which can combat these microbes is still ongoing.

Methods: The inhibitory effect of essential oil and different extracts (i.e. fruits extracted with hexane, chloroform, ethyl acetate, methanol, 80% methanol and water) of Ajwain (*Trachyspermum ammi (*L.*)* Sprague ex Turrill) fruits were examined against two bacteria and one fungus by disk diffusion method.

Results: The MICs (minimum inhibitory concentration) of the essential oil for *C. albicans*, Aa and *S. mutans* were 0.312%, 3.75% and 1.875%, respectively. The inhibitory effect of the extracts (especially more polar extracts) were weak, comparatively (MICs were between 10 g/L to 300 g/L).

Conclusion: Due to relative safety of its main component (i.e. thymol) in therapeutic dosages and according to obtained results in this study, the essential oil of Ajwain is proposed as one of the natural sources for prophylaxis and treatment of common oral and dental infections.

Keywords: Aggregatibacter actinomycetemcomitans, Candida albicans, Essential oil, Streptococcus mutans, Trachyspermum ammi.

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Antioxidant Capacity and Total Phenolic Content of Precious Endemic Iranian Plant: *Oliveria decumbens* Vent.

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Abstract

Introduction: *Oliveria decumbens* Vent. belongs to Apiaceae family which is a rare invaluable endemic plant of Iran growing in the limited areas of the south and west of the country. This herb is locally named in some areas as Moshkoorak or Den or Denak and is used in folk medicine for treating indigestion diarrhea abdominal pains and fever. Few studies have been conducted on this species such as identification of the essential oil constituents and antimicrobial activity. The purpose of this study is to survey the antioxidant capacity and total phenolic content (TPC) of *O. decumbens* in order to achieve potent native resources of natural Iranian antioxidants.

Methods: Antioxidant activity was determined using 2 2- diphenyl-1-picryl hydrazyl (DPPH). The test was applied to the total extract and its hexane chloroform ethyl-acetate and methanol fractions. Moreover total phenolic content of the extract and fractions were assessed using Folin–Ciocalteu reagent.

Results: Among all the extract and fractions ethyl-acetate fraction demonstrated a significant antioxidant activity (IC_{50}=46.8 (µg/ml)) whereas the hexane fraction showed the weakest effect (IC_{50}=637 (µg/ml)). On the other hand TPC was observed to be the most about hexane fraction (259.9(mg/g)) with a decreasing trend toward the methanol fraction which demonstrated the least TPC (60(mg/g)).

Conclusion: The results illustrated no correlation between antioxidant property and total phenolic content of fractions. It can be considered that the level of phenolic compounds alone is not the main cause of the observed antioxidant effect in ethyl-acetate fraction. Complementary phytochemical studies and antioxidant assays are being carried out in order to identify other possible antioxidant compounds.

*Keyword***:** Antioxidant *Oliveria decumbens* Vent, Total phenolic content.

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Antioxidant Effects of Extracts of *Peucedanum Pastinacifolium* Boiss and Hausskn

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Abstract

Introduction: free radicals play a key role in the pathogenesis of many diseases, including atherosclerosis, ischemic heart disease, arthritis, cancer, Alzheimer, Parkinson, diabetes and aging process. *Peucedanum pastinacifolium* Boiss. and Hausskn. are plants from Umbelliferae family and grows in western and central areas of Iran. The studies suggested that hydroalcoholic extract of *P.passtinacifolium* has hypolipidemic effects on streptozotocin-induced diabetic rats. In Phytochemical investigation on acetonic extract of *P.passtinacifolium* one phenyl propanoid and furanocoumarin compounds have been isolated. Moreover, forty-nine volatile compounds identified in essential oil of this plant. The aim of present study was to evaluate the *in vitro* and *in vivo* antioxidant potential of *P.passtinacifolium*.

Methods: The hydroalcoholic and polyphenolic rich extracts were obtained from aerial parts of *P. pastinacifolium*. Phenolic and flavonoid contents were estimated as gallic acid and quercetin equivalents, respectively. The *in vitro* antioxidant activity of two types extracts of *P. pastinacifolium* were evaluated by radical scavenging of 1, 1-diphenyl-2-picryl hydrazyl radical (DPPH), chelating activity on ferrous ions and Ferric reducting antioxidant power (FRAP) assay. The *in vivo* antioxidant activity was investigated for hydroalcoholic extract by FRAP assay.

Results: Total phenolic contents were 117±6 and 44±1 mg gallic acid equivalents/g for polyphenolic and hydroalcoholic extracts, respectively. Furthermore, total flavonoid contents of polyphenolic extract (43±2 mg/g) were higher than hydroalcoholic extract (8±1 mg/g). In DPPH radical scavenging assay, hydroalcoholic and polyphenolic extracts showed the low antioxidant ability with 469 µg/ml and 128 µg/ml fifty percent inhibitory concentrations (IC50), respectively. Hydroalcoholic (IC50=657 µg/ml) and polyphenolic (IC50=735 µg/ml) extracts exhibited weak iron chelating activity compared to EDTA (IC50=16 µg/ml). FRAP values of both extracts were lower than standards but for polyphenolic extract was more than hydroalcoholic extract. In *in vivo* test, the hydroalcoholic extract showed a significant ($p< 0.05$) rise in FRAP level when compared with control.

Conclusion: In this study, the both extracts of *P. pastinacifolium* exhibited significant ($p< 0.05$) antioxidant activity but its low in comparison to controls.

Keywords: Antioxidants, Free radicals, Peucedanum pastinacifolium.

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Assessment of Polyphenols and Gallic Acid Stability in Myrtle Berries Syrup, a Traditional Iranian Medicine

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Abstract

Introduction: The interest in traditional and complementary medicine has increased in different countries, thus related products are extensively used by admitted patients. Standardization of these products and strengthening safety, quality and effectiveness of them is essential proceeding.

Myrtus communis L. (Myrtle) is an evergreen shrub or small tree belong to Myrtaceae family. This herb is endemic in the Mediterranean area and the Middle East. Ripe berries are eaten row and it is widely cultivated for its edible fruit (1). Myrtle fruit is a source of phytochemical compounds which can be used in both the food industry and for medicinal purposes. Essential oil, phenolic compounds like gallic acide, flavonoids and anthocyanins are the major phytochemicals in myrtle berries (2, 3).

Material and method: *Myrtus communis* L. dried berries were purchased from local market in Tehran, Iran and identified by a botanist, voucher specimen (voucher number is 6632-TEH) kept at the herbarium of faculty of pharmacy, Tehran University of Medicinal Sciences, for further reference.

Myrtle syrup was prepared according to the traditional Iranian recipe. Prepared samples of syrup was transferred in dark bottles, and stored in incubator 40 C° for three months. Monthly, samples were taken and 10 ml of each sample was poured in to petri dishes and left to dry under the hood.

The total phenol content was measured by spectrophotometric determination with Folin-Ciocalteau method (4). Free gallic acide content was measured by rhodanin assay (5).

Results : *Phytochemical analysis*

The results of total phenols and gallic acid analysis of myrtle berries syrup during 3 months of storage are shown in table 1. No significant variations were observed during three months of storage.

Table1. Total phenol and gallic acid amount of samples during three months of storage

	Average of total phenol ± SD	Average of gallic acid ± SD
0 month	6.56±0.1	0.29±0.03
1 month	6.38±0.1	0.31±0.02
2 month	6.49±0.1	0.33±0.01
3 month	6.43±0.08	0.33±0.03

Conclusion: Phenolic compound, flavonoids and anthocyanins are the major phytochemicals in *M. communis* berries, Gallic acid is a type of phenolic acid and is major compound in the extract prepared following the traditional Iranian recipe for the preparation of myrtle syrup (2, 6). In this report the evaluation of polyphenol and free gallic acid in myrtle berries syrup was investigated showing that myrtle syrup is phytochemically stable in the initial 3 months of storage period. Due to stability of polyphenol and free gallic acid in this period, these phytochemicals can be used for standardization of myrtle syrup.

Keywords: gallic acid, *Myrtus communis*, Myrtle, phenolic compounds, syrup, traditional medicine.

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Atrophic Kidney: Herbal Remediesfrom Iranian Traditional Medicine Point of View

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Abstract

Introduction: Kidney shrinkage known as atrophic kidney is a disease in which the size of one or both kidneys is smaller. This may lead to the renal insufficiency or uremia.As kidney is one of the most significant organs to detox and get rid of impurities in the body, it needs special attention to prevent irrecoverable issues.

The use of natural origins and medicinal plants in the prevention and treatment of diseases goes back to thousands years ago. In this respect, Iranian Traditional Medicine (ITM) possess various medical experiences used in the prevention, diagnosis, and treatment of diseases based on the theory of temperament and humor.

Herein, we have concentrated on the ITM recommendations for the atrophic kidney. For this purpose, reliable Iranian medical literature such as *Al QanunFilTibb*, *Makhzan-al-Aadvia*and *Tibb-i-Akbari*were carefully reviewed. It was found that plants such as "sesame", "mount atlas pistache", "safflower", "almond", "hazelnut", "pistachio", "coconut", and "camelthorn" were well documented as effective remedies for atrophic kidney.

Conclusion: According to the ITM comments, it is worthwhile to evaluate the corresponding biological activities of unreported medicinal plants for sophisticated drug discovery research to find novel and efficient candidates for the treatment of atrophic kidney.

Keywords: Atrophic kidney, Iranian Traditional Medicine (ITM), Medicinal Plants.

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Chemical Composition of Essential Oil of Colchicum Soboliferum Bulbs

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Abstract

Introduction: Plants of genus Colchicum, belonging to Liliaceae family with common Persian name of "sorenjan" or "ghole hasrat" has been known in Iranian Traditional Medicine for their biological activities. Colchicum species have been traditionally used as aphrodisiac, soothing sore joints and bones. Colchicum soboliferom with Turkish name of “ghar chichaghi” is a small herbaceous perennial plant gathered from Miyaneh in East Azarbaidjan-Iran. To the best of our knowledge, there has not been any report on essential oil constituents of this species as well as any other plants belonging to colchicum genus, so this study aimed to determine phyto- constituents of Colchicum soboliferum volatile oil.

Methods: ground and dried bulbs of Colchicum soboliferom were subjected to hydrodistillation with distilled water using a Clevenger type apparatus. The obtained essential oil was analyzed by GC-Mass. Identification of essential oil components were carried out by comparison of their mass spectra with the spectral data banks as well as using Kovats indices (KI) of phyto constituents obtained by the aid of standard n-alkanes (C8–C20) injection, under the same chromatographic conditions.

Results: Analyses of essential oil yielded 95.85% of total oil with identity of 17 components. Among identified phytochemicals 1-adamantaneacetic acid was the major and main compound (42.28%). Moreover percentage of pentadecanoic acid (16.52%), salicylic aldehyde (13.20%) and 1-adamantyl methyl ketone (6.29%), were more than other identified constituents.

Conclusion: Adamantane derivatives have been used as medicine against viral and Parkinson’s disease. Also polymers of adamantane have been patented as antiviral agents against HIV. Furthermore analgesic and anti-inflammatory activities of salicylic aldehyde derivatives have been reported. Due to high contents of 1-adamantaneacetic acid and salicylic aldehyde in essential oil of this plant, mentioned volatile oil could have the potential of further studies so other experimental investigations are recommended to be carried out on the essential oil of Colchicum soboliferum bulbs.

Keywords: Adamantane derivatives, Colchicum soboliferum bulbs, essential oil, salicylic aldehyde derivatives.

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Common Spices from Apiaceae Fruits Showed Potent Toxicity

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Abstract

Introduction: Cancer is a major threatening public health problem. Because of the fact that incidence of carcinogenesis lowers by consumption of fruits, vegetables and herbs, there is a worldwide interest for discovering new chemotherapeutic or chemoprotective agents among natural compounds(1). In spite of high prevalence of Apiaceae fruits consumption as food spices, there were not comprehensive reports about their toxicity. In this study, toxicity of methanol extracts and different fractions of some Apiaceae fruits were investigated.

Methods: The fruits of *Cuminum cyminum*, *Bonium persicum*, *Foeniculum vulgare*, *Anethum graveolens*, *Petroselinum crispum*, *Apium graveolens*, *Coriandrum sativum*, *Heracleum persicum*, *Pimpinella anisum*, *Levisticum officinale*, *Trachyspermum ammi*, *Daucus carota*(Apiaceae) were purchased in April 2015 from Tehran, Iran. The dried powders of fruits were macerated with 80% methanol at room temperature. The crude extracts were concentrated and fractionated with Petroleum ether (PE), chloroform (CL), Ethyl acetate (EA) and methanol (ME), separately.

Brine shrimp test was used for toxicity investigation of crude extracts and different fractions (10-500 µg/ml). Mortality percentages were determined following Abbot's formula, p=pi-C/1-C; where pi means the observed mortality rate and C represents the natural larvae mortality of negative control (2).

Results: The mortality percentage of 18 fractions in concentration of 10 µg/ml were upper 50%including 4 of PE, 1 of CL, 11 of EA and 2 of ME fractions. All of crude extracts showed no toxicity at the same concentration. The potent toxicity was observed from EA fractions of *H. persicum* 93.33%, *C. cyminum* 92.96% and PE fraction of *D. carota* 92.29%.

Conclusion: 11 fractions of fruits extracts with IC_{50}<10 µg/ml were belonging to EA fraction, this finding showed that most of toxic compounds of Apiaceae family accumulated in EA fraction. But it was interesting that the amount of this fraction was lower than others. Existence of natural compounds in other fractions may be the reason of not

observing toxicity in crude extract. In conclusion, the usage of fruits of Apiaceae as food spices had no harmful side effects for consumers.

Keywords: Umbelliferae, Brine Shrimp Test (BST), different fractions, seeds, methanol extract.

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Comparative Evaluation of Antimicrobial Efficacy of Pistaciaatlanticamothwashwith Chlorhexidineand Persica against Common Oral Pathogens; an In Vitro Study

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Introduction: Nowadays, the use of medicinal plants has been become one of the most common approaches to treatment of diseases. Medicinal plants are more economical as well as have fewer side effects than chemical drugs and also they are safe and accessible. Since the leaves of *Pistaciaatlantica* contain high flavonoids and other phenolic components content, it was hypothesized that their treatment might modulate the antimicrobial functions. The objective of this research is to formulate the non-toxic mouthwash solution from the extract of *Pistaciaatlantica*leaves and to compare the antibacterial effect of formulated mouthwash with those of chlorhexidine, Persicaand negative control mouthwashes against salivary *Streptococcus mutans* and *Candida albicans*.

Methods: The present study was carried out in2 phases; In Phase1, after drying the leaves, hydro-alcoholic extract was collected. The zone of inhibition of various concentrations of herbal extract against *S.mutans* and *C.albicans* was determined using the well-plate method. Minimum inhibitory concentration(MIC) for preparing a mouthwash in Phase2 was carried out by microdilution in a concentration range from0.8to200µg/ml. Second phase was mouthwash formulation as a new development to the uses of *Pistaciaatlantica.* In this process, hydro-alcoholic extract act as the active ingredient, mixing with all the chemicals needed for mouthwash formulation. As for the method of analysis,

in-vitro method used in order to test and observe the antimicrobial activities. Meanwhile to check the physicochemical properties of formulation the tests were done.To formulate the mouthwash, various weight of *Pistacia* extract was added in the formulation. The various weight added give different result for the antimicrobial test that analyze via the well-plate method. The optimum value for the weight was determined by the greatest zone of inhibition in comparison with chlorhexidine and Persica.

Results: The results showed that between antimicrobial activities had a significant effect.The inhibition zone of *S. mutans* and *C.albicans* from highest to lowest, respectively, was related to the prepared mouthwash (35 and 22 mm) Chlorhexidine and Persica mouthwash ($P<0.05$).MIC of formulated mouthwash against *C.albicans* and *S.mutans* respectively, were12.5 and 25 (µg/ml) which were significantly different with Chlorhexidine and Persica mouthwashes ($P <0.01$).Formulation containing 3% *Pistacia* extract was chosen with the best anti-microbial efficacy and stability in room temperature.

Conclusion: The results suggest that the hydro-alcoholic leaves extract of *Pistaciaatlantica* has significant inhibitory effect on *S. mutans*and *C.albicans*. Formulated mouthwash was also expected to work for the antimicrobial action.

Key words: *Candida albicanshydr-oalcoholic extract, chlorhexidine*, Mouthwash, Pistaciaatlantica, Streptococcus mutans.

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Cytotoxic Activity of Medicinal Plant *Lomatopodium staurophyllum* against *Artemiasalina* Larvae

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Abstract

Introduction: Medicinal plants are one of the most important sources of cytotoxic or anti-neo plastic agents in treatment of malignancies and cancer. *Lomatopodium staurophyllum* (Apiaceaefamily) is a native plant of Iran which grows naturally across the North and the North East and is known in Persianas"flat-feet". There have been few studies regarding phytochemical and pharmacological activities of the plant. In present study we evaluate cytotoxic activity of *L.staurophyllum* alcoholic extract using brine shrimp toxicity assay.

Methods: The powdered aerial parts of the plant were extracted with methanol by maceration technique at room temperature (3×2 days). The resulting extract was then concentrated using a rotary evaporate or and dried using freeze dryer. For brine shrimp lethality test, brine shrimp eggs were incubated in 500ml 3% sea salt water solution for 24 hours in 25-27°C. After 24 hours, the larvae were hatched. 500µl of 3% sea salt solution (pH=7.4), containing different concentrations of extract (100, 300, 500 and 1000 µg/ml) was added to 500µl of 3% sea salt solution containing about 15-20 active larvae.

Results. The results for the lethality were noted in term of deaths of larvae, compared to proper negative control after 24 hours. The mortality rate of introduced larvae were 15,70, 81 and 94% at concentrations of 100,300,500 and 1000 µg/mL, respectively.

Conclusion: The results showed a dose-related cytotoxic activity for the extract with the LD_{50} value of 46.08 µg/ml. It has been concluded that *L.staurophyllum*is a new candidate for investigation of potent natural anti-cancer compounds in the future.

Keywords: *Artemiasalina*, Cytotoxic, extract, *L.staurophyllum*is.

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Determining an Appropriate Method for Preparing Aqueous Extract of Fennel Fruit by Infusion

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Introduction: Fennel (*Foeniculum vulgare*) is one of the oldest medicinal plants that its fruit is used in Iranian traditional medicine in form of an infusion in the treatment of disorders such as abdominal pains, bloating, nausea, arthritis, cancer, infant colic, diarrhea, stomach pain, irritable bowel, kidney diseases and so on. The important active components of fennel fruit include essential oil and flavonoids. Therefore, the aim of this study is to provide a convenient method for preparing aqueous extract with the high efficiency and the maximum content of active ingredients.

Methods: In this study, for the preparation of aqueous extracts, fennel fruits were infused in boiling water with a temperature of 95-90 °C on magnetic stirrer. In the first stage, fennel fruits in two forms of whole and ground were extracted with boiling water in ratios of 1 to 5, 1 to 10, 1 to 20 and 1 to 40 for 1 hour. The extraction efficiency is calculated and the total flavonoid content of dry extracts was measured. After determining the best ratio of plant material (fennel fruit) to solvent (water) in terms of the maximum efficiency and the highest total flavonoid content, in the second phase of study, extraction was performed with the best ratio in times of 0.5 hour, 1 hour and 2 hours and again the extraction efficiency and the total flavonoid content were calculated. It should be noted that all tests were repeated three times.

Results: It was observed that the ground fruits give higher yield than whole fruits ($p<0.05$). Also, the extraction efficiency increased with increasing the amount of water to the plant material, as the maximum yield was achieved with the ratios of 1 to 20 (29.1%) and 1 to 40 (29.5%). On the other hand, the dry extract obtained from the ratio of 1 to 40 showed insignificantly the highest total flavonoid content (6.5%). In addition, it was found that by increasing the extraction time, the extraction efficiency increases insignificantly and the total flavonoid content of dry extract decreases significantly ($p<0.05$).

Conclusion: The ratio of 1 to 40 from the ground fennel fruit to boiling water was determined as the best ratio of plant material to solvent and 0.5 hour was the most appropriate time of extraction by infusion method.

Keywords: Aqueous extract, Extraction efficiency, Fennel fruit, Infusion method, Total flavonoid content.

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Echinophora Genus as a New Source of Biological Active Phytochemicals

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Abstract

Introduction: *Echinophora* (Apiaceae) is a genus with folk and traditional use in Middle East and underneath several biological experiments; however, it is virgin in phytochemical point of view. Except for essential oil, no more chemical use was performed on this genus. Our group started vast chemical and biological champagne to isolate active constituents.

Methods: Several genera of *Echinophora* were gathered and different extracts were prepared; e.g. Acetone and hydroethanolic extracts of *E. cinerea* and hexane, dichloromethane, acetone and methanol extracts of *E. platyloba* were prepared. Each extract were exposed to normal and reversed phased chromatography analyses including preparative HPLC to isolate pure compounds. Some of components were used in biological experiments such as cytotoxicity, antioxidant and antidiabetic analyses.

Results: Several pure compounds, some new, were isolated and elucidated using 1D and 2D NMR and mass spectra. Terpenoids, polyacetylenes, coumarins, flavonoids and iridoids are among pure compounds. Flavonoids could protect PC12 cells from oxidative stress of H2O2 and cisplatin in separate analyses. Novel polyacetylenes, coumarins and iridoids showed cytotoxicity against breast cancer, neuroblastoma and prostate cancer cell lines at *ca* 20 µg/ml. Iridoids were toxic on pancreatic cell lines.

Conclusion: *Echinophora* genus is a promising native source of bioactive constituents.

Keywords: acetylenics, cytotoxicity, *Echinophora*, iridoids.

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Effect of *Melissa Officinalis L* on Rat Irritable Bowel Syndrome

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Abstract

Introduction: Irritable bowel syndrome (IBS) is the most common disorder referred to gastroenterologists and is characterized by altered bowel habit, abdominal pain and bloating. Visceral hypersensitivity, abnormal gut motility and psychosocial factors are among the most important factors that play role in the pathophysiology of IBS.*Mellissa officinalis* (MO) is a medicinal plant from the family Labiatae.In traditional Persian medicine it has been claimed to have anti-nociceptive properties and be effective in both gastrointestinal and psychological disorders. The aim of the present study is to evaluate the effects of MO on visceral hypersensitivity in rat irritable bowel syndrome.

Methods: IBS was induced byintracolonic instillation of acetic acid 4%in rats.Seven days after induction of IBS, animals in the treatment group were treated with the hydroalcoholic extract of MO at doses of 100, 200 and 300 mg/kg on days 8, 9 and 10 by gavage.In the sham group, animals received normal saline.On day 11, Evaluation of visceral hypersensitivity to rectal distension was conducted in each group by determination of abdominal withdrawal reflex (AWR) score.

Results: AWR score in control group was more than shamrats. AWR scorein MO treated groups at doses of 100 and 200 mg/kg, was not significantly lower than control group.Whereas MO treated group with a dose of300 mg/kg showed significant decrease in AWR score.

Conclusion: The results indicated the extract of MO produce a dose-related decrease in visceral hypersensitivity in rat irritable bowel syndrome.

Key word: irritable bowel syndrome, Melissa officinalisL, visceral hypersensitivity.

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Effective Herbal Medicines for Treatment of Hair Loss, According To "Tohfe- Al- Momenin"

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Abstract

Introduction: "Tohfe- al- Momenin", one of the most famous Iranian traditional medicine books in the 16th AD century, presents a clear and organized summary of the medical knowledge of the time, including a long list of herbal medicines. Furthermore, several hundred substances and receipts are mentioned for treatment of different illnesses in this book. The aim of the present study was to provide a descriptive review of all hair tonic and anti-hair loss drugs presented in this comprehensive encyclopedia of medicine.

Methods: Data for this review were provided by searches of different sections of this book. Long lists of hair tonic and anti-hair loss substances used in the treatment of various conditions of hair loss are provided. The efficacy of some of these drugs, such as Emblic and Myrtle oil was investigated in novel researches and modern medicine; pointed to their potent anti-hair loss and hair tonic properties.

Results: Emblic, Myrtle oil, Celery and Valerian that have been mentioned in "Tohfe- al- Momenin" as potent herbsfor treatment of various conditions of hair loss as well as confirmed by novel invesyigations.

Conclusion: This review will help further research into the clinical benefits of new drugs for treatment of various conditions of hair loss.

Keywords: Emblic, hair loss, Myrtle oil, Tohfe- al- Momenin, traditional medicine.

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Effects of Ethanolic Extract of *Zataria Multiflora* and Closantel on *Fasciola Hepatica* Egg Hatching in In Vitro Conditions

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Abstract

Introduction: Closantel is an antiparasitc drug widely used for treatment of fascioliasis as well as other parasitic infection like haemonchosis in cow, sheep and goat. The effects of *Zataria multiflora* in treatment of bacterial, parasite and fungal infection were published by several researchers. The aim of this study was to evaluate ethanolic extract of *Zataria multiflora* and closantel on egg hatching of *Fasciola hepatica* in in vitro condition.

Method: *Zataria multiflora* extract perform with 70° ethanol and 100, 75, 50, 25, 10, 5, 2, 1 mg/ml dilution were prepared. The same dilution of closantel also prepared. For evaluation 900 µl of *Zataria multiflora* extract or drug adjacent with 100 µl egg extract for 16 days in 24°c.

Results: in comparison with control group, closantel and *Zataria multiflora* extract were significantly decreased the egg hatching ($P<0.05$). These result in correlation with extract or drug concentration. Egg hatching in closantel groups were significantly decrease in compare with *Zataria multiflora* extract groups ($P<0.05$).

Conclusion: The results show that closantel effectively decrease the egg hatching percentage of *Fasciola hepatica* and it can be used as a first choice drug for treatment of infection. However the *Zataria multiflora* extract show a significant decrease in egg hatching percentage and it seems the side effect of extract is less than closantel and it can be used as an alternative treatment protocol in *Fasciola hepatica* infection.

Keywords: Closantel, Egg hatching, *Fasciola hepatica*, In Vitro, *Zataria multiflora*.

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Ethnopharmacological study on the medicinal herbs used for headache in Qazvin, Iran

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Abstract

Introduction: All types of headache are as one of the most prevalent disorders (46% in general) in all societies whole around the world. There is not any complete satisfaction for current medications used for headache (especially for some types like migraine) as pain relief or treatment. Ethnobotany is one of the good sources to find new natural potentials based on generation by generation human experience. In this study, we aimed to consider ethnomedicines used for headache in Qazvin city in Iran.

Method: This research was based on interview and questionnaire with traditional healers (*Attar* in Persian language) worked in the traditional herbal shops (*Attari* in Persian language). Also, the samples and herbariums of the plants were collected and identified recorded by an herbalist in Herbarium center in Shiraz school of pharmacy. The gathered data was analyzed and also the reported pharmacological activities of these herbal remedies were considered.

Results: There were 22 *Attari* in Qazvin but just 19 of them cooperated with us in the study. There was 23 herbal medicines belonging to 17 family were introduce by Attars. The family of Lamiaceae with 5 cases had the most herbs among other families. The most commonly reported medicinal herbs were *Nepeta menthoides* Boiss. , Buhse, *Echium amoenum* Fisch, and C.A. Mey, *Nardostachys jatamansi* (D.Don) DC with the frequency of citation (FC) percentage of 78.95%, 42.1% and 42.1% , respectively. The most parts used were the flower (8 cases). The main method of preparation was distillate (20 cases) and oral administration was the most root of administration. Current studies support the potential effects of most of them by presenting the mechanism of actions like decreasing NO, anti-inflammatory effect, COX II inhibitory effect, etc. But, some other ones have not any current support for their effects.

Conclusion: Most of reported medicinal plants have both generations' human experience as well as current supports in the field of headache, but some other ones have not enough current studies to find their possible effects.

Therefore, there are potential candidates based on ethno-pharmacological study for further investigations and drug discovery.

Key words: Ethnopharmacology, headache, migraine, Qazvin, traditional pharmacy.

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Effects of Ethanolic Extract of *Zataria Multiflora* and Closantel on *Fasciola Hepatica* Egg Hatching in In Vitro Conditions

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Abstract

Introduction: Closantel is an antiparasitc drug widely used for treatment of fascioliasis as well as other parasitic infection like haemonchosis in cow, sheep and goat. The effects of *Zataria multiflora* in treatment of bacterial, parasite and fungal infection were published by several researchers. The aim of this study was to evaluate ethanolic extract of *Zataria multiflora* and closantel on egg hatching of *Fasciola hepatica* in in vitro condition.

Method: *Zataria multiflora* extract perform with 70° ethanol and 100, 75, 50, 25, 10, 5, 2, 1 mg/ml dilution were prepared. The same dilution of closantel also prepared. For evaluation 900 µl of *Zataria multiflora* extract or drug adjacent with 100 µl egg extract for 16 days in 24°c.

Results: in comparison with control group, closantel and *Zataria multiflora* extract were significantly decreased the egg hatching ($P<0.05$). These result in correlation with extract or drug concentration. Egg hatching in closantel groups were significantly decrease in compare with *Zataria multiflora* extract groups ($P<0.05$).

Conclusion: The results show that closantel effectively decrease the egg hatching percentage of *Fasciola hepatica* and it can be used as a first choice drug for treatment of infection. However the *Zataria multiflora* extract show a significant decrease in egg hatching percentage and it seems the side effect of extract is less than closantel and it can be used as an alternative treatment protocol in *Fasciola hepatica* infection.

Keywords: Closantel, Egg hatching, *Fasciola hepatica*, In Vitro, *Zataria multiflora*.

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Evaluation of Mono-saccharides of Zedu Gum

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Abstract

This study identifies the mono-saccharides of Gum Zedu (Cherry gum) extracted from apricot with a scientific name ***Armeniaca vulgaris*** is native to China and is grown in various parts of Iran as well. Gum Zedu in traditional medicine to stimulate appetite, kidney stones and expectorant in the industry as a suspending agent and emulsifier is used. For this purpose, samples of gum Bastam city apricot trees were collected in 1389 and was dissolved in water and resulting solution was purified and acid hydrolysis then combination of these sugars by TMS derivatization and gas-liquid chromatoghraphy and comparison with standard sugars were identified.

According to the survey results gum is completely dissolved in water and the sugars in the gum are: Arabinose 21/63%, Fucose 2/02%, Xylose 3/32%, Galactose 14/92%, Glucose 24/22% and other sugars 33/89%. Fructose and Rhamnose were not in this gum. With respect to other similar works that has done in other gum, this gum has also may contain glucuronic acid.

Key words: arabinose, *Armeniaca vulgaris*, galactose, glucose, Mono-saccharides, Zedu Gumacidic hydrolysis.

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Evaluation of *Nigellasativahexane* Extract Constituents Seeds on Apoptosis and Oxidative Stress Induced By *MPP*$^+$ in *PC12* Cell Line as a Neuronal Model

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Abstract

Introduction: *Nigella sativa*seeds have been shown to possess anti-inflammatory, antioxidant, tranquillizer, chemopreventive, and anti-neoplastic effects both *in vitro* and *in vivo*.*Nigella sativa* seeds has been an important nutritional flavoring agent and natural remedy for many ailments for centuries in ancient systems of medicine. The present work is aimed at investigating the protective effects of *N. sativa* seedhexan extract and active principles against1-Methyl-4 phenylpyridinium (MPP+). MPPis selectively accumulated in dopaminergic neurons.PC12 cells, a clonal rat pheochromocytoma cell line, possess dopamine synthesis, metabolism, and transporting systems and therefore have been used extensively a s a model for studies of M PP+ neurotoxicity and Parkinson disease.

Method: Seeds of *Nigellasativa* were extracted with hexane and purified using repeated normal phase open column chromatographieswith hexane and ethyl acetate or dichloromethane and structures elucidated by NMR. PC12 cells were cultured in DMEM medium containing 10% (v/v) fetal Bovin serum 100 unite/ml penicillin. Cell viability was determined by MTT assay. Moreover, activation of caspase-3 was evaluated by spectrophotometer.

Results: Treatment of cellwithMPP^+ reduced viability in a dose dependent manner.The IC50 value was 1.2 Mm.In order to set extract at concentrations which are nontoxic to cells but could prevent MPP+ induced cytotoxicity, we also examined the effects of different concentrations of extract on cell viability on PC12 cells. Next, PC12 cells were pretreated for different time interval with non-toxic *Nigellasativa* extract then cells were treated with MPP^+.Pretreatentof cells with *Nigellasativa*hexane extract, fractions D (H:EtOAc, :) and E (H:EtOAc, :)significantly increased the viability of cells to 120.67% , 131.69% and 139.09% compared to cells treated with IC50 concentration of MPP^+alone. It showed that unsaturated fatty acids were the most active compounds.

Conclusions: Our observation indicated that subtoxic concentration of *Nigellasativa*hexane extract and fatty acids showed protective effect on MPP^+ induced cytotoxicity in PC12 cells.

Keyword: Cytotoxicity, *Nigellasativa*MPP^+, PC12 cells.

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Evaluation of *Nigellasativahexane* Extract Constituents Seeds on Cytotoxicity Andoxidative Stress Induced by Doxorubicin in *PC12* Cell Line as a Neuronal Model

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Abstract

Introduction: *Nigella sativa*seeds have been shown to possess anti-inflammatory, antioxidant, tranquillizer, chemopreventive and anti-neoplastic effects both *in vitro* and *in vivo*.*Nigella sativa* seeds has been an important nutritional flavoring agent and natural remedy for many ailments for centuries in ancient systems of medicine. The present work is aimed at investigating the protective effects of *N. sativa* seedhexan extract and active principles against doxorubicin. Doxorubicin is a potent, broad-spectrum chemotherapeutic drug with toxic effects onnormal tissues, including brain tissue.

Method: Seeds of *Nigellasativa* were extracted with hexane and purified using repeated normal phase open column chromatographieswith hexane and ethyl acetate or dichloromethane and structures elucidated by NMR. PC12 cells were cultured in DMEM medium containing 10% (v/v) fetal Bovinserum 100 unite/ml penicillin. Cell viability was determined by MTT assay. Intracellular ROSlevels were examined using DCF-DA.The oxidation of this molecule tothe flourchrome DCF results in green florescence. The intensity of this florescence is generally considered to reflectthe level to which ROS are present.

Results: Treatment of cellwith doxorubicin reduced viability in a dose dependent manner.PC12 cells were pretreated for different time interval with *Nigellasativa* extract then cells were treated with doxorubicin. DOX induced cytotoxicity in a concentration and time dependent manner.The IC50 value was5.25 µM. We found that pretreatment with Nigella sativa hexane extract, fractions D (H:EtOAc, :) and E (H:EtOAc, :) increased cell viability to161± 3.4 ,137.25 ±4.6 and 139.30±7.7 compared to cells treated with DOX alone. As anticipated adding DOX(5 µM) TO PC12 cells cause a significant increase in ROS level (31.6%) The pretreatment with Nigella sativa hexane extract, fractions D (H:EtOAc, :) and E (H:EtOAc, :)decreased significantly intracellular ROS level compared to cells treated with IC50 concentration of DOX alone.

Conclusions: Our observation indicated that subtoxic concentration of Nigellasativahexane extract and fatty acids showed protective effect on DOX induced cytotoxicity in PC12 cells. Also, we demonstrated that protective effect of Nigella sativa hexane extract and fatty acids was mediated through the decrease of ROS level.

Keywords: Doxorubicin, *Nigellasativa*, Oxidative stress, PC12 cells.

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Formulation and Evaluation of Curative Effect of Herbal Syrup of Hydro-Alcoholic Extract of *Apiumgraveolens* on Experimental Induced Nephrolithiasis

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Abstract

Introduction: Nephrolithiasis is a common disease that refers to calculi in kidneys which may indicate symptoms such as severe flank pain, hematuria, infection and even acute obstruction. Various strategies including diuretic drugs, extra corporeal shock wave lithotripsy (ESWL) and surgery are used for treatment of the disease.

In recent years, usage of herbal medicine in treatment of kidney stone has been advised as an effective method that is safer in comparison to ESWL and surgery. However, Celery (*Apium graveolens*) is one of the indigenous plants of Iran, which is readily available and traditionally used to treatment of kidney stone. So the aim of this study was to elucidate the effect of formulated celerysyrup on an animal model of induced-nephrolithiasis.

Methods: Celery seed hydro-alcoholic extracts were prepared by maceration and concentrated by lyophilization. This extract was used further for preparation of herbal-syrup using simple syrup (66.67%w/v) as base. Formulated syrup was characterized of its various physicochemical parameters like color, odor, taste, pH, specific-gravity, and

refractive-index.Curative-effect of the above prepared syrup was evaluated as; twenty male Wistar albino rats were randomly divided into 5 groups(each group contained 4rats). Normal control-group (G0) received distilled water for 24 days. Nephrolithiasis was induced in treatment-groups (G1, G2, G3) and negative-control group (G4) by ethylene-glycol (EG) 0.75% and ammonium-chloride 1% for 24 days. Celery syrup was given 250, 500, 750mg/kg orally in groups 1, 2, 3, respectively for 2 weeks while G4 didn't receive the syrup, and G0 just received normal saline during this study.24hr urinary oxalate and volume were measured on day 0(a day before starting treatment), 1, 3, 7 and 14. Kidneys were removed, weighted and subjected to histopathological examination and calcium oxalate (CaOX) depositions counted by polarized light microscope. At last, results expressed as mean values ± standard error of the mean (SEM). All parameters were analyzed by one-way ANOVA.

Results: *Apium graveolens* showed significant improvement in renal function and kidney weight in treatment-groups as compared to ethylene-glycol controls($P < 0.05$).The formulated syrup showed significant reduction of urine CaOX concentration; kidney CaOX depositions and kidney weights in all celery treated-groups in a dose dependent manner. The activity was compared with the negative control($P < 0.05$) . Calcium oxalate was also inhibited by 33% and 57%.

Conclusion: Significant reduction of kidney weight in treatment-groups rats indicates that formulatedcelery syrup can improve kidney tissue inflammation and apoptosis and possess significant activity for treatment of renal calculi.

Keywords: Apium graveolens, Syrup, ethylene-glycol kidney calculi, nephrolithiasis

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Hepatoprotective Effect of Methanolic Extract of Zatariamultiflora Againstparacetamol-Induced Liver Toxicity in Rats

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Abstract

Introduction: *Zataria* is a genus of flowering plant in the Lamiaceae family. This study was aimed to evaluate the protective effects of Methanolic extract of Zatariamultiflora against hepatic damage induced by paracetamol-induced in Wistar male rats.

Methods: Hepatotoxicity was induced in Wistar male rats by oral administrationparacetamol, 2 g/kg body weight on 7th day after the administration of Methanolic extract of Zataria .Methanolic extract of Zataria was administered orally at doses of 100 mg/kg, 200 mg/kg and 400 mg/kg body weight daily for 7 days.

Several serum markers, aspartate transaminase (AST), alanine transaminase (ALT) and estress oxidative factor Contains CAT(catalase), SOD(superoxide dismutase), GSH-Px(glutothione peroxidase) and MDA(malondialdehyde) was measured to assess the effect of the extract on paracetamol (acetaminophen)-induced hepatic damage. The study included histopathological examination of liver sections.

Results: Blood samples from rats treated with Methanolic extract of Zataria (200 mg/kg body weightand 400 mg/kg body weight) had significant reductions in serum markers in paracetamol administered animals,indicating the effect of the extract in restoring the normal functional ability of hepatocytes.

Conclusion: The Methanolic extract of Zataria exhibits protective effects against paracetamol-induced hepatotoxicity.

Key words: acetaminophen, Hepatoprotective, paracetamol, *Zataria*.

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Hony as a Natural Miracle in Cancer Treatment: a Review of Its Mechanisms

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Abstract

Introduction: Cancer as a complex disease is one of the leading causes of mortality worldwide. The most common treatment for cancer is chemotherapy and radiotherapy which themselves are toxic to other cells of the body. Many recent investigations have focused on the use of natural product to help cancer prevention and treatment. In this regard, natural honey has been extensively researched. Honey has always been considered for its various biological and pharmacological effects- ranging from antioxidant, antibacterial, anti-inflammatory to hypoglycemic effects. In this review article we are going to focus on the role of honey in modulating the formation and progression steps of tumor cells with emphasis antimetastatic, antiproliferative and anticancer effects of honey in different forms of cancer. These mentioned effects of honey have been studied in certain cancers such as liver, breast and colorectal cell lines. Also the article underscore on the possible mechanisms that honey may inhibit development and proliferation of tumors. These mechanisms include regulation of cell cycle, DNA repair, induction of mitochondrial outer membrain permeabilization, activation of mitochondrial pathway, induction of apoptosis, modulation of oxidative stress and insulin signaling, improvement of inflammation and inhibition of angiogenesis. It is interesting that honey is highly cytotoxic against cancer cells whereas it is non-cytotoxic for other normal cells of body. This review indicated that honey can prevent carcinogenesis via modulating the cellular and molecular processes of initiation, development and progression steps. As a potential and promising anticancer agent, honey can serve to cancer treatment in experimental and clinical studies.

Conclusion: Honey as a natural product due to its potential effects can be used to cancer treatment by inhibiting or suppressing the development and progression of tumor cells. Antiproliferative, antimetastatic and anticancer effects of honey are mediated through various mechanisms such as cell cycle arrest, induction of mitochondrial outer membrain permeabilization, activation of mitochondrial pathway, induction of apoptosis, modulation of oxidative stress, *etc.* in cancer cells. Therefore, it can via modulating the cellular and molecular processes of initiation, development and progression prevent carcinogenesis.

Key words: anticancer, antiproliferative, cancer, honey

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Investigation of B-Sitosterol and Prangol Extracted From Roots of *Achilleatenoifolia*

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Abstract

Introduction: The genus *Achillea* (Asteraceae) consists of important medicinal species, growing wildly in Iran, of which *A. tenuifolia* is found in Iran-o-Turan regions. Regarding lack of information on phyto-constituents of *A. tenuifolia* underground parts, in this study extract of this plant have been investigated.

Methods: In order to find the main active components, underground parts of this plant were extracted with water and fractioned by hexane, ethyl acetate, and methanol and the separation of the main compounds were carried out *via*medium pressure liquid chromatography (MPLC).

Results: Two compounds which were isolated were identified as β-sitosteroland prangol based on the spectroscopic spectra. The root extract of this plant as well as the compound β-sitosterol showed moderate α-amylase inhibitory activitywith IC_{50} value of 18.9 ± 2.1 mg/mL, but prangol did not suppress the enzyme activity.

Conclusion: Taking together, preparations or extracts from the underground parts of this plant deserve a good candidate for further pharmacologic investigation and clinical trials.

Keywords: *Achilleatenuifolia*root, Prangol, β-Sitosterol, α-amylase inhibitory

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Isolation and Structure Elucidation of Two Iridoids from Aerial Parts of *Nepeta Teucriifolia* Willd.

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Abstract

Introduction: *Nepeta* L. is a large genus in Lamiaceae family. It is generally distributed in Europe, Asia, America and Africa. Different species in this genus showed antioxidant, anti-bacterial, fungicidal, anti-viral, anti-inflammatory and cytotoxic activities. Most of these valuable activities relate to the presence of different phytochemicals like flavonoids, phenolic compounds, diterpenes and iridoids. *Nepeta teucriifolia* Willd is a native species of Iran with a long usage history as duretic, disinfectant, antitussive and anticonvulsant in Iranian traditional and folk medicine. To the best of our knowledge, there is not any phytochemical study about this species. So, in this study we decided to investigate some of its phytochemicals.

Methods: *N. teucriifolia* aerial parts were collected from Tehran province. Total extract was prepared using methanol:pethroleum ether:diethyl ether (1:1:1). Column chromatography of this extract with different solvents (pethroleum ether, diethyl ether, chloroform, methanol) and plate chromatography of sub-fractions led to isolation of two phytochemicals as withe crystals. Structure elucidation of these phytochemicals was done using different instrumental analysis methods like MS spectroscopy and 1H and 13C NMR.

Results: MS spectroscopy, 1H and 13C NMR and NOE analysis of isolated phytochemicals showed that they were two non-glycosydic iridoid epimers with $C_{11}H_{16}O_4$ molecular formula.

Conclusion: In this study, we isolated two iridoids from aerial parts of *N. teucriifolia* but further investigation about their biological and pharmacological activities is needed.

Keywords: Iridoid, *Nepeta teucriifolia*, Phytochemical, Structure elucidation

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Isolation of Novel Polyacetylenes from *Echinophoracinerea* and Investigation of Their Cytotoxicity on PC3, SKNMC and MCF-7 Cell Lines

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Abstract

Introduction: *Echinophoracinerea* belongs to Apiaceae family. Its aerial parts are used as vegetables and seasoned yogurt and cheese, and for the treatment of digestive disorders in ChaharMahal and Bakhtiari. Despite the traditional use and dietary and pharmacological studies (approximately 13 *in vivo*, *in vitro* and clinical research) on *Echinophora*spp, no attempt has been made to isolate secondary metabolites of its non-polar (acetone) extract. So, phytochemical investigation seems to be necessary to use this plant in a better manner.

Methods: Powdered aerial parts of the plant were macerated with acetone and concentrated extract was fractionated on RP-18 sorbent using mixture of methanol and water with decreasing polarity. The resulting fractions were analyzed by NMR and promising fractions were refractionated and purified using normal phase column chromatography and reversed and normal phase preparative HPLC analyses and structures of pure compounds were determined byHNMR, COSY, HSQC, HMBC and NOESY spectra and Mass analysis.

Results: Afterextraction, column chromatography and HPLC purification of acetone extract, three novel skeletonpolyacetylene compounds (echinophorin A-C) were resulted. Cell cytotoxicity of pure compounds was evaluated by MTT assay on MCF-7, SKNMC and PC3 cell line. Echinophorin A and B show significant cytotoxicity effect on PC3 and SKNMC cell line and IC50 of these compounds are 23 and 25 µg/ml on PC3 respectively.

Conclusion: Regarding novel skeleton constituents of*E.cinerea*, this plant could be a good source of potential medicinal natural products. Considering the fact that polyacetylenes are natural protective compounds, this plant could be utilized as an antioxidant agent.

Keywords: acetone extract, cytotoxicity, *Echinophoracinerea*, MTT, polyacetylene.

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Medicinal Plants in Allergic Rhinitis Management

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Abstract

Allergic rhinitis is an inflammation of the nasal membranes caused by hypersensivity reaction with high prevalence rate in the world, accrues when a person with a sensitized immune system exposure to allergens such as pollens of specific seasonal plants, festuca, dust or mites. It can causes many sign and symptoms include runny or stuffy nose, post nasal drip, itching (nose, eyes, ears, palate) , sneezing , eye swelling and red eyes.It is also the fact that long term uses of drugs causes side effects. According to statistics provided by WHO 80% of the world's people – especially developing country- use herbal medicines for their healthcare.This review present the profile of plants used for allergic rhinitis, studies published between 1990 to 2015.Vitamin C has been found to prevent the secretion of histamines, so the fruits and vegetables with vitamin C is useful to reduce the symptoms of allergic rhinitis .The plants and natural components with high bioflavonoids have the same mechanisms, such asRosehip (*Rosa canina*) , bilberry ,curcuma and quercetin in many fruits , vegetables , leaves , grains . Khellin from *Ammivisnaga*, *Petastes hybrids* (butter bur) , *Selaginellatamariscina* , *Coriandrumsativum* , *Nigella sativa* , *Astragalusmembranaceus* and fruits of *Xanthium strumarium*are specially useful for reducing histamine and stabilize connective tissue.This review article presented the information about the uses of many plants in allergic rhinitis treatment.

Keywords: Allergic rhinitis, Medicinal plants, Natural components

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Hexan Fraction of *Astrodaucuspersicus* root Extract as Potent Cytotoxic Agent against Breast and Colorectal Carcinoma

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Abstract

Introduction: Young roots and aerial parts of *Astrodaucuspersicus* (Apiaceae) have been used as a food additive or salad vegetable in some parts of Iran and near countries.

Methods: In this study the cytotoxicity of hexan, chloroform, ethyl acetate and methanol fractions of root extract were investigated on human breast adenocarcinoma (MCF-7), colorectal carcinoma (SW480) and normal (L929) cell lines by MTT assay and its phytochemical constituents were identified.

Results: Hexan fraction demonstrated potent anticancer activities against MCF-7 (IC_{50} of 0.01 µg/ml), SW480 (IC_{50} of 0.36 µg/ml) and L929 (IC_{50} of 0.70 µg/ml). It was obvious the selectivity of hexan fraction for breast adenocarcinoma was 70 times more than normal cell line and for colorectal carcinoma was 2 times more than normal cell line. Other fractions did not show any significant toxicity. Five novel compounds containing benzodioxol structure were elucidated from *A. persicus* root fractions for the first time. In spite of cytotoxicity of fractions, only high doses of four pure compounds exhibited antiproliferative effect against MCF-7 cell line.

Conclusion: It seems potent cytotoxic activity of hexan fraction may be due to synergist effects of compounds and/or existence of minor bioactive compounds.

Keywords: *Astrodaucuspersicus*, Apiaceae, antiproliferative, benzodioxoles, MCF-7, SW480 cell lines.

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Hexan Fraction of *Astrodaucuspersicus*root Extract as Potent Cytotoxic Agent against Breast and Colorectal Carcinoma

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Abstract

Introduction: Young roots and aerial parts of *Astrodaucuspersicus* (Apiaceae) have been used as a food additive or salad vegetable in some parts of Iran and near countries.

Methods: In this study the cytotoxicity of hexan, chloroform, ethyl acetate and methanolfractions of root extract were investigated on human breast adenocarcinoma (MCF-7), colorectal carcinoma (SW480) and normal (L929) cell linesby MTT assay and its phytochemical constituentswere identified.

Results: Hexan fraction demonstrated potent anticancer activities against MCF-7 (IC_{50} of 0.01 µg/ml), SW480 (IC_{50} of 0.36 µg/ml) and L929 (IC_{50} of 0.70 µg/ml). It was obvious the selectivity of hexan fraction for breast adenocarcinoma was 70 times more than normal cell line and for colorectal carcinoma was 2 times more than normal cell line. Other fractions did not show any significant toxicity. Five novel compounds containing benzodioxol structure were elucidated from *A. persicus*root fractions for the first time. In spite of cytotoxicity of fractions, only high doses of four pure compounds exhibited antiproliferative effect against MCF-7 cell line.

Conclusion: It seems potent cytotoxic activity of hexan fraction may be due to synergist effects of compounds and/or existence of minor bioactive compounds.

Keywords: *Astrodaucuspersicus*, Apiaceae, antiproliferative, benzodioxoles, MCF-7 and SW480 cell lines.

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Investigation on Arsenic, Cadmium and Lead Contamination in Imported Rice

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Abstract

Introduction: It has been reported that as much as 75% of the daily calorie intake of the people in some Asian countries is derived from rice Lead, cadmium and arsenic are from the prevalent toxic elements in food and environment that have a long half-life after the absorption in humans and animals can make unsought and unpleasant effects such as damage to internal organs, the nervous system, kidneys, liver and lungs. The present study investigated Heavy metal content in, imported rice on sale in Tehran (the most populous city of Iran) market, and assesses daily arsenic and cadmium intake from rice.

Methods: To assess the levels of Arsenic, Cadmium and Lead in imported raw rice 100 samples purchased randomly from recognized rice market in 2014. Samples were digested and analyzed by Atomic Absorption Spectrophotometer. Analysis of variance (ANOVA) was employed to detect significances among samples from different brands.

Results: Results were determined as mean ± SD of dry weight from three replicates in each test. The samples were analyzed by wet digestion method and standardized international protocols were followed for the preparation of material and analysis of heavy metals contents and analyzed by Atomic Absorption Spectrophotometer in Research Laboratory in Pharmaceutical Sciences Branch, Islamic Azad University. The mean content of Arsenic and Cadmium in 68% and 42% samples from Indian brands were over respectively, while Lead contents were below the maximum permitted level for rice (0.2 mg/kg). Anova analysis showed that there was a significant difference in Cadmium content in different brands of rice samples ($p<0.005$).

Conclusion: JECFA has set PTWI for the Cadmium at 7 μg/kg of body weight (WHO, 2004). The total dietary exposure levels of Arsenic and Cadmium determined in this study were compared with the provisional tolerable weekly intakes (PTWLS) by the JECFA and showed higher than it. Regular monitoring of all rice varieties should be firmly continued.

Keywords: Arsenic, Cadmium, Contaminant, Imported Rice, Lead.

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Medicinal Plants for the Management of Hypertension in Type II Diabetic Patients: A Systematic Review

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Abstract

Introduction: Although type II diabetes mellitus is known as a metabolic disorder impairing the sugar metabolism, it is proved that diabetic patients are more susceptible to cardiovascular disorders like micro- and macro-angiopathy, atherosclerosis and hypertension. Medicinal plants are widely used since ancient times alone or in combination with chemical drugs for the management of metabolic and cardiovascular disorders. Current paper aims to highlight the efficacy of medicinal plant forthe management of hypertension in type II diabetic patients. For this purpose, electronic databases including Pubmed, Scopus and Cochrane library were searched with the keywords diabetes in the title/ abstract and plant, extract and herb as well as hypertension in the whole text using the human studies filter. Data were collected from 1966 to May 2015. Clinical trials assessed the efficacy of a single medicinal plant (not polyherbal formulations) on systolic and/ or diastolic blood pressure in comparison to placebo were included in this review.

Conclusions: Tenrandomized, placebo-controlled, clinical trials met the inclusion criteria of this systematic review. Four of the preparations reported a significant reduction in systolic blood pressure(SBP) and four of them demonstrated decrease in diastolic blood pressure (DBP). Four preparations including guar gum, grape seed, cranberry and feijoa failed to reduce neither SBP, nor DBP in diabetic patients. Only flaxseed and air yam were able to decrease both SBP and DBP. Overall, few number of medicinal plants were effective for the management of hypertension in diabetic patients.Several factors including severity of hypertension, duration of diabetes, concomitant drug therapy, administered dose, sample size and duration of study can affect the statistical significance in the effectiveness of medicinal plants. Future studies with proper sample size are essential to evaluate the efficacy of medicinal plants for the management of hypertension in type II diabetes.

Keywords: Hypertension, Medicinal plants, Type II diabetes.

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Medicinal Plants Used for the Treatment of Leukoplakia in Iranian Traditional Medicine

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Abstract

Introduction: Leukoplakia is a condition in which hard and white/grey patches form on the tongue and the lining of the cheeks. The exact cause of leukoplakia is unknown.Smoking is the most common cause, but other irritants can cause this condition as well.Leukoplakia usually is benign and noncancerous, but it can sometimes be serious and early signs of cancer. It has been proved that cancers on the floor of the mouth (beneath the tongue) take place next to areas of leukoplakia.There is no definite clinical trials for effective nonsurgical treatment of leukoplakia. However, consumption of carotenoids, vitamins, and bleomycin as well as photodynamic therapyare recommended.
Iranian Traditional Medicine (ITM) with a thousand years of experience has paid special attention to prevention and treatment of diseases focusing on the theory of temperament and medicinal plants. Inthisstudy, we concentrated on the medicinal plants used for the treatment of leukoplakia, known as “Ghola” in ITM. We also studied recommended treatments in modern medicine.In this respect, varioustextbooks of Iranian traditional medicinesuch as*Al Qanun-fil-Tibb*, *TibbAkbari*, *Exir-e-Azam*, and*Moalejat-e-Aghili*as well as scientific data bases including ISI web of Science, Pub Med, Scopus, SID, MEDLIN, and Google Scholarwere comprehensively studied. It was found that mouthwashes prepared from medicinal plants such as “rose”, “coriander”, “myrobalan”, “pomegranate”, and “pomegranate blossom” have been shown to be an effective treatment forleukoplakia.

Conclusion: Considering the fact that ITMnaturalremedies for the treatment of leukoplakia are easy, accessible, and effective they deserve to be considered by specialists.

Keywords: Iranian Traditional Medicine (ITM), Leukoplakia, Medicinal Plants.

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Optimization of the Extraction Process of Steviol Glycosides without Calories from *Stevia* Plant

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Abstract

Introduction: In this study, a new method named optimized "Bubble Column Extraction with Ultrasonic Bath (BCE-UB)" was used to extract Stevioside and Rebaudioside A& B from the Stevia Rebadiana leaves. These substances are diterpene glycosides named Steviol that are 350 times sweeter than sucrose (sugar) and do not increase the blood glucose.

Methods: For the qualitative and quantitative analysis of extracted Steviol glycosides, High-Performance Liquid Chromatography (HPLC) with UV detector and NH_2column were used. Several parameters including extraction time, liquor to material ratio, air flow, extraction solvent, and particle size of samples were taken into account. Among them, the first three parameters were control parameters that were stabilized in their most optimized form. Recognized as the most important parameters in the amount of extraction, the three others are signal parameters that were optimized by the method of Design Of Experiments (DOE).

Results: The most optimized condition for the highest extraction amount of Steviolglycosides was achieved by water solvent(pH 7) as extraction solvent, the mesh size 45, temperature of 343 K, a liquor to material ratio of 123 $ml.g^{-1}$, an extraction time of 58 min, and an air flow of 1.5 L/min.

Conclusion: By this new extraction method compared to other methods, highest efficiency of Steviolglygozide was achievedand process of extraction of Steviol Glycosides from Stevia plant was optimized.

Keywords: Bubble Column Reactor, Diabetes, DOE, HPLC, Stevia.

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14th IPSC Proceeding

Natural Remedies for Prostate Diseases

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Abstract

Introduction: Prostate disease like benign prostatic hyperplasia (BPH), prostate cancer (PCA) and chronic prostatitis (CP) are the most important disease in urology. In the present article some herbal medicine that are used for Prostate diseases and their effects are evaluated.Various methods are used for treatment of these kind of diseases such as chemical medicine, minimally invasive therapies or surgery. Medicinal plants are widely used for treatment of prostate disease worldwide. Various part of plant such as fruit, leaf, seed, steam or root has been used to prepare herbal drugs. Regarding previous studies there are some plants with beneficial effects in prostate disease including *Hypoxisrooperi*, *Calluna vulgaris*, *Daturastramonium*,*Silybummarianum*, *Chondrodendrontomentosum*, *Chimaphila umbellate*, *Populus species*, *Cucurbitapepo*, *Pyrolarotundifolia*, *Serenoarepens*, *Barosma species*, *Urticadioica*, *Dionaeamuscipula*, and *Epilobium*species, which will be discussed in the present review.

Conclusions: The studies show that use of herbal medicine for treatment of prostate disease is more effective and cheaper with acceptable efficiency than other treatments.

Key Words: Medicinal plants, Prostate disease, Phytotherapy.

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Pharmacognostical, Fingerprinting and Pharmaceutical Evaluation of an Alzheimer-Targeted Medicine from the Standpoints of Traditional Persian Medicine

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Abstract

Introduction: As the most common form of dementia, Alzheimer disease is known by profound memory loss and nearly affects 20 million subjects worldwide. Apart from conventional remedies, application of herbal medicines are increasing. There are numerous natural medicaments reported in traditional manuscript of Persian medicine. Accordingly, current work selected a concerned remedy and attempted to carry out the respective pharmacognostical and pharmaceutical evaluations.

Methods: By searching through the canon of medicine, one of the most popular medico-pharmaceutical textbook of Persian medicine, a simple compound remedy (frankincense and black pepper) was selected. A floating tablet was designed and formulated from those herbal components. Related pharmaceutical assessments such as weight variation, hardness, friability and disintegration tests as well as pharmacognostical evaluations such as microscopic characterization, TLC, GC/MS and FT/IR fingerprints were performed.

Results: The employed formulation as a floating tablet included 60% of frankincense gum and 15% of black pepper along with appropriate pharmaceutical ingredients (Weight variation = 0.219 ± 0.004 g; Hardness = 6.50 ± 0.67; Friability = 0.45%; disintegration time >30 min). Microscopic characterization demonstrated stone cells, calcium oxalate crystals, sclereids of endocarp and pitted cells of mesocarp of pepper fruits as well as oil drops of frankincense gum. TLC fingerprinting showed classes of secondary metabolites related to both components. GC/MS analysis revealed trans-Caryophyllene as main constituent

Conclusion: Carrying out and validating a GC method for standardization of the formulated tablet and having the backbone of the effectiveness of those medicinal herbs in Alzheimer may be a window for new Alzheimer-targeted medicine.

Keywords: Alzheimer, frankincense, Black pepper, Fingerprint, evaluation

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Phytochemical Investigation of *Cynomorium Coccineum* L.

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Abstract

Introduction: *C. coccineum* (Scarlet cynomorium), a parasitic plant of Cynomoriaceae family has various medical applications in traditional medicine for example for the treatment of male infertility, menstrual problems, peptic ulcer, sexually transmitted diseases, hypertension and Alzheimer's disease. Also, nowadays this plant has been proved to possess various biological effects such as anti-HIV protease and superoxide radical scavenging activity. In addition, recent researches on this plant show spermatogenesis enhancement in rats and blood pressure reduction in dogs. As few researches have been done on *C. coccineum* so far (in Iran merely the plant's ingredients' categories have been determined), we decided to identify active ingredients existing in the ethyl acetate extract of this plant.

Methods: *C. coccineum* was collected in May 2011 from Someeh territory in Kashmar, Razavi Khorasan, northeast of Iran. After drying and grinding, ethyl acetate extract was obtained through three times maceration. The ethyl acetate extract was then concentrated with solvent evaporation in low pressure. Afterwards, the concentrated ethyl acetate extract's ingredients were isolated with column chromatography. Fractions of petroleum ether-ethyl acetate solvent system were purified with PTLC. The chemical structure of the purified ingredient obtained was then determined with 1D (HNMR, CNMR) and 2D (HMQC, HMBC, H-H COSY) NMR techniques.

Results: The interpretations of the 1D and 2D NMR spectra suggested resemblance to triterpens. As the existence of sterol compounds in this plant had previously been proven, comparing with sterol compounds was done and complete match with beta-sitosterol was observed. in the present study, beta-sitosterol was reported from *C. coccineum* for the first time.

Conclusion: Beta-sitosterol, having been proven to have colon cancer induction reduction, anti-inflammatory, antimicrobial, antiarthritic, antipeptic ulcer, insulin release and spermatogenesis inhibitory activities, was isolated from *C. coccineum* for the first time. Beta-sitosterol is one of the most useful plant sterols and is mainly used for its cholesterol reduction activity. The fact that *C. coccineum* has been used for the treatment of male infertility for years and spermatogenesis enhancement in infertile rats has been previously proven, is in contradiction with

betasitosterol's anti-spermatogenesis effect. Thus, the possibility of *C. coccineum's* having other active ingredients calls for further evaluations.

Keywords: beta-sitosterol, *Cynomorium coccineum*, NMR (1D and 2D)

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Phytochemical Investigation and Molecular Modelling of Galbanic Acid from *Ferula pseudalliacea* as FTase Inhibitor

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Abstract

Introduction: The genus *Ferula* a member of the Apiaceae family comprises about 180 species which is well documented as a good source of biologically active compounds such as coumarins, sesquiterpenes, sesquiterpene coumarins, etc. Galbanic acid (GA) is a biologically active sesquiterpene coumarin from *Ferula* species. This compound showed various biological properties including anticancer, anticoagulant, antiviral, and antileishmanial activities. One of the promising targets of GA in chemotherapy is Farnsyltransferase (FTase). FTase is one of the three enzymes in the prenyltransferase group. The FTase regulates proper functioning of Ras protein. This signaling pathway becomes abnormally active in cancer. FTase inhibitors with the downstream effect of preventing the proper functioning of the Ras protein are a class of experimental cancer drugs.

Methods: The roots (200 g) *F. pseudalliacea* were crushed and extracted with chloroform (3 × 2 L, rt for 24 h). The chloroform extract (8 g) of *F. pseudalliacea* roots was separated by normal and reversed phase chromatography (silica gel column, Sephadex LH-20 column, Semi-preparative RPHPLC) to give a sesquiterpene coumarin (12 mg). The structure was elucidated by spectroscopic methods including 1D and 2D NMR data. The docking program AutoDock 4.2 was used to perform the automated molecular docking. The Lamarckian genetic algorithm (LGA) was applied to estimate the free binding energy of the GA-FTase complex. Docking parameters were set to default values except for the number of GA runs (100) and the energy evaluations (25,000,000).

Results and Discussion: From the chloroform extract of the roots of *F. pseudalliacea*, a sesquiterpene coumarin Galbanic acid (GA), was isolated by different chromatography method and identified by comparison of their spectral data (1H NMR, 13C NMR) with those reported in the literature. Molecular docking study showed that GA formed a sable complex with FTase (ΔG = -9.1 $kcalmol^{-1}$). Against our expectation, carbonyl moiety of coumarin ring had higher affinity with Zn than carboxylate group. GA formed hydrophobic interactions with Ser99, Trp102, Trp106, Trp303, Tyr361 and farnesyl diphosphate in the binding site of FTase.

Conclusion: In this work molecular docking study was performed to explore structural features and binding mechanism of galbanic acid to FTase, and to construct a model for designing new FTase inhibitors effective in cancer treatment.

Keywords: Cancer, *Ferula pseudalliacea*, Galbanic acid, Molecular modeling, Sesquiterpene coumarin.

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Phytochemical, Antioxidant and Cytotoxic Investigation of *Daucuslittoralis* Smith Subsp. *Hyrcanicus*Rech.F, an Endemic Species of Iran

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Abstract

Introduction: *Daucuslittoralis* Smith subsp. *hyrcanicus*Rech.f. (Apiaceae) is an endemic species in northern parts of Iran where it is commonly named Caspian carrot. The fruits have been used as condiment by the rural population.
Methods: The plant was collected from Bandar-e Anzali sea coast, province of Guilan, during the fruiting stage in June 2012. A voucher specimen of plant (6734-TEH) was deposited in the herbarium of the department of pharmacognosy, faculty of pharmacy, Tehran University of medical sciences, Tehran, Iran.The roots and fruits of plant were powdered and extracted successively with ethyl acetate, methanol, and methanol-water (1:1), at room temperature. The antioxidant activity of different extracts were evaluated using DPPH and FRAP assays. The total phenolic compounds were determined by the Folin-Ciocalteu method. Moreover, the cytotoxic activity was tested against HT29 (colon carcinoma), HepG2 (hepatocellular carcinoma), MCF7 (breast ductal carcinoma) and a normal cell line NIH-3T3 (Swiss mouse embryo fibroblast) using MTT assay. The isolation and purification of the active

compounds wereperformed on the most effective extractby various chromatographic methods and identified by spectroscopic data (^{1}H and ^{13}C NMR).

Results: Only fruit methanol extract (FME) indicated significant antioxidant activity (IC_{50}= 145.93 µg.ml^{-1} in DPPHassay and 358 ± 0.02 mmol Fe(II)/g dry extract in FRAP assay). The radical scavenging activity of FME at 400 µg.ml^{-1} was comparable with *α*-tocopherol (40 µg.ml^{-1}) and with BHA (100 µg.ml^{-1}) (p>0.05). Also, FME had the highest content of total phenols (99.1 ± 0.08 mg gallic acid equivalent/ g dry extract). FME did not show any toxicity against cancerous and normal cell lines. In contrast, fruit ethyl acetate extract (FEE) had cytotoxic activity against breast carcinoma and hepatocellular carcinoma cells (IC_{50} 168.4 and185 µg.ml^{-1}, respectively), while it did not possess antioxidant activity in comparison with α-tocopherol and BHA as the standard compounds. The phytochemical investigation resulted to the isolation of four terpenoids from FEE including *β*-sitosterol, stigmasterol, caryophyllene oxide and *β*-amyrin.

Conclusion: The screening of different extracts of *D. littoralis* subsp. *Hyrcanicus* revealed that FEE of *D. littoralis*subsp.*hyrcanicus* had the highest cytotoxic activity which is correlated with the presence of terpenoids in this extract.Furthermore, the high amount of phenolic compounds was responsible for the highest antioxidant activity of FME in comparison with other extracts.

Key words: Antioxidant, Cytotoxic activity, *Daucuslittoralis* Smith subsp. *hyrcanicus*Rech.f

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Preparation and Characterization of Myrtle Niosomal Formulation for Burn Wound Healing

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Abstract

Introduction: myrtle (*myrtus communis*) is an indigenous plant of Iran and has been traditionally used for its healing effects on burn wound. Hydro alcoholic extract of myrtle has antibacterial, antifungal, antioxidant and anti inflammatory effects.

Methods: Medium size (4-8 µm) multilamellar vesicles (MLVs) containing hydro alcoholic extract of myrtle leaf were prepared by conventional film hydration method. The combination of sorbitan esters (Spans) and their polyxylated derivatives (Tweens) with cholesterol were used as lipid phase and normal saline as hydration medium. Quantification and standardization of formulation was done by measuring total phenolic content of extract and it was assessed by the Folin-Ciocalteau assay. Size analysis was carried out by using laser light scattering method and the release of myrtle extract from niosomal suspensions was studied utilizing Franz diffusion cells. Stability of the vesicles was evaluated during 6 months storage at 25 and 4°C and encapsulation efficiencies (EE %) were measured by centrifuge technique and UV spectrophotometer.

Results: Gel state surfactants (Span 40 and 60) were formed the best niosomes in the presence of Tween 40 and 60, but liquid state surfactants, S/T 20 and 80, formed no vesicles indicating the important role of myrtle extract in bilayer forming ability of used surfactants. The total phenol content of myrtle extracts ranged between 9.0 and 35.6 mg galic acid per gram extract. The bimodal release profiles were best fitted with diffusion-based kinetic models and the EE% was 60-70% due to the hydrophilic structure of total extract. MLVs were physically stable prominently due to steric stabilization of the PEGylated vesicles.

Conclusions: Our results suggest that these niosomal formulations could constitute a promising approach for the topical delivery of myrtle in burn wound. Prolongation of drug release, an increase in amount of drug retention into skin, less complication and ease of use are among the reasons suggesting *in vivo* and clinical trial using this preparation.

Keywords: Burn, Hydro alcoholic extract, Myrtle, Niosome.

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Preparation and Physicochemical Evaluation of Herbal Semisolid Formulation of Common Malva

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Abstract

Introduction: Malva sylvestris has been used orally for inflammation of respiratory tract and as laxative and mucolytic. Furthermore, sheets of this plant have been applied for treatment of skin ulcers and skin local inflammation from long time ago. In this investigation we tried to make the best formulation of ointment for this plant in order to treat the skin ulcers in later studies.

Methods: sheets of Malva were collected and dried, and then the hydroalcoholic extract was prepared with maceration technique. Different formulations of ointment were prepared and the best formulation based on texture and appearance was chosen and physicochemical properties such as viscosity, pH, consistency and spreadability were studied. In addition, the release of extract from biological membrane and assay of ingredients were done.

Results: The best formulation of ointment was prepared applying the ingredients such as cholesterol, stearyl alcohol, petrolatum gelly, propylene glycol, paraffin, water and the plant extract. Appearance of ointment was acceptable. The physicochemical properties was according to the standard conditions and release studies was done based on phenolic compounds, the kinetics order of release was zero order and really surprising. Also, the stability studies are under investigation.

Conclusion: we aimed to prepare a semisolid formulation of the plant “Malva sylvestris”, as the traditional medicine documents claim for therapeutic effects on skin and ulcer. An acceptable formulation of plant extract was prepared and good results were achieved for physicochemical evaluation. We hope that after more stability and in vivo studies, we could present a product in the close future.

Key words: common malva, herbal formulation, ointment, physicochemical evaluation.

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Preparation and Standardization of Lavandulastoechas L. Syrup: An Antiepileptic Traditional Iranian Medicine Dosage Form

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Abstract

Introduction: Epilepsy is a brain disorder affecting 3% of the population by age 75. 30–40% of epileptic patients fail to response satisfactorily to antiepileptic drugs. Recently, there has been a growing interest in herbal medicine and traditional medical systems to cure ailments. Traditional Iranian Medicine (TIM) offers effective recommendations for the treatment of epilepsy. *Lavandulastoechas L.*syrup is an important antiepileptic medication in TIM. Pharmacological studies have revealed potent anticonvulsive and antispasmodic activities for this plant. The aim of this article is to prepare and standardize an effective dosage form containing *L.stoechas,* using the method mentioned in the greatest TIM pharmacopeia, QarabadinKabir.

Methods:*L. stoechas* syrup was prepared according to the greatest TIM pharmacopeia, QarabadinKabir, beside some innovations in order to enhance its safety, acceptability and efficacy. Physicochemical standardization of dried leaves of *L. stoechas* as well as antimicrobial challenge test was performed.

Results: The organoleptic characteristics of lavender syrup were found to be a dark green, clear liquid with sweet-slightly bitter taste and characteristic aroma. GC and GC–MS analyses revealed eucalyptol, borneol, and camphor as the main components of the lavender leaves essential oil and the hexane fraction obtained from its aqueous extract. Total phenolic and flavonoids content of the plant extract is 9.48±0.12 mg GAE and 6.51±0.049 mg QE per ml of dried extract, respectively. Total phenolic and flavonoids content in each 100 ml of syrup is 99.7 mg GAE and 68.2 mg QE respectively. The dosage form passed the antimicrobial challenge test indicating the effectiveness of the preservative agents.

Conclusion: Preparation and standardization of *L. stoechas*syrup is a step to revive and utilize TIM valuable dosage forms. Clinical trials are needed to validate antiepileptic effects of *L. stoechas* syrup in humans.

Keywords: Antiepileptic, dosage form, Traditional Iranian Medicine.

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Radical Scavenging Activity of Some Isolated Compounds from N-Butanolic Fraction of *Ajuga Chamaecistus* Ging. Ssp. *Tomentella* (Boiss.) Rech. F.

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Abstract

Introduction: The genus *Ajuga* is used for the treatment of joint pain, gout, and jaundice in traditional Iranian medicine. *Ajuga chamaecistus* ssp. *tomentella* is an exclusive subspecies of *Ajuga chamaecistus* in the flora of Iran. The aim of this study was to evaluate radical scavenging effect of some isolated compounds from n- butanolic fraction of a methanolic extract of *A. chamaecistus* ssp. *tomentella.*

Methods: Five major compounds (20-hydroxyecdysone, leonoside B, martynoside, lavandulifolioside, and *cis*-melilotoside), isolated from n-butanolic fraction of methanolic (80%) extract were assayed for their in vitro scavenging activity using the 1, 1-diphenyl-2-picrylhydrazyl (DPPH) method.

Results: The IC50 values for DPPH radicals of 20-hydroxyecdysone, leonoside B, martynoside, lavandulifolioside, and *cis*-melilotoside were 64.39±1.49, 87.72±1.37, 48.67±1.14, 43.79±0.59, 70.173±2.33 µg/mL, respectively.

Conclusions: The results of this study demonstrated that these compounds possess potential free radical scavenging activity that can be responsible to antioxidant activity of *A. chamaecistus* ssp. *tomentella* and probable basis for the treatment of diseases related to oxidative stress.

Key words: *Ajuga chamaecistus* ssp. *tomentella*, DPPH, radical scavenging effect.

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Reformulation of Traditional Chamomile Oil, Quality Controls and Fingerprint Presentation Based On Cluster Analysis of ATR-IR Spectral Data

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Abstract

Introduction: Herbal oils have been widely used as medicinal compounds dating back to thousands years ago in Iran. Chamomile oil is widely used as an example of traditional oils. According to historical pharmaceutical books, two general traditional methods have been presented to prepare chamomile oil. The first is treatment with direct heat (via fire heat) and the second is using indirect heat (via sun heat).

Method: We remade chamomile oils and tried to modify these historical methods with current knowledge and facilities. Finally, 6 types of oil (traditional and modified) were prepared. Then, to compare these six methods, Microbial Limit tests (total count and specific tests on *S.aureus*, *E.coli*, *P.aeruginosa*, *Salmonella* and *C.albicans*) and physicochemical tests (acid value, peroxide value, iodine value, saponification number) were performed. Also, Principal Component Analysis (PCA), Hierarchical Cluster Analysis and Partial Least Squares Discriminant Analysis (PLS-DA) were done on the spectral data of attenuated total reflectance infra-red (ATR-IR) in order to obtain insight based on classification pattern of the samples.

Results: The results revealed that our modified methods (modified clevenger-type apparatus method as direct heat method and microwave method as indirect heat method) contained less microbial contamination (less than 10 CFU/Gram and 20 CFU/Gram, respectively) as well as a more enhanced physicochemical condition in comparison with traditional methods. The IR pattern of these samples was comparable to that observed for traditional ones.

Conclusion: It shows that we can use modified versions of the chamomile oils with the same content of traditional ones and with less microbial contaminations and better physicochemical properties.

Key words: ATR-IR spectra, Persian Medicine, Principal component analysis, Traditional chamomile oil.

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Remedies for Poisons and Toxins in Traditional Persian Medicine (TPM)

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Abstract

Introduction and background: From ancient time, mankind has used many natural medicaments to reduce or neutralize the fetal effects of toxins or poisons (1). The term, toxicology, represents the science of antidotes, toxins and poisons, as well as chemical compositions and pharmacology (2). Similar to other holistic medical systems, Traditional Persian Medicine (TPM) provides a concepts overview on medical and pharmacological management of poisonings and intoxications. Accordingly, current work aimed to present the natural medicaments as antidotes for toxins and poisons in TPM.

Methods and study results: The largest and almost latest natural pharmacopeia of TPM, *Makhzan al-adviyah* (The Storehouse of Medicament) authored by Alavī Shīrāzī (18th century) were searched using the keyword, "*Padzahr*" (Antidote). Related medicaments were gathered and listed in a table. In addition, the specific route of administration, target of the medicament, effectiveness on either toxins or poisons, preparation and side effects were added to the table. Authentication of scientific names of extracted documents as well as the respective families were performed using official botanical textbook in pharmacognosy and traditional pharmacy. In all, 29 remedies as antidote and related to 19 families were found in the text. Lamiaceae and Rutaceae families were as the most cited families. Most

cited activities were against snakes and scorpion. The main route of administration was oral route while others were as topical and a case of nasal route. Headache was reported as the main side effect for most of the remedies.

Discussion and conclusion: Although reported remedies may be useful in such complications, there are scant information on current related activities. This study, other than historical clarification, can suggest many subjects for new experimental and animal studies in the field of toxicology.

Keywords: Antidote, *Makhzan al-adviyah* natural medicine, Persia, Poison, Toxicology.

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Rosa Damascena Mill. Extract Alleviates Hyperlipidemic Fatty Liver in Rats

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Abstract

Introduction: *Rosa damascena* Mill. from the family Rosaceace is commonly known as Damask rose. This plant is widely cultivated across the world including Europe and Middle East countries, particularly in Iran and Turkey, because of its scent and visual beauty. *R. damascena* flowers have been widely used in perfume, medicine, and food industries. In the context of traditional medicinal approaches, the flowers of *R. damascena* is worthy of attention due to its safe and efficacious history of administration in Persian medicine. The present study was conducted to investigate the efficacy of hydroalcoholic extract from *R. damascena* in experimental model of non-alcoholic fatty liver disease in term of biochemical parameters and hepatic pathological evaluation.

Methods: Induction of non-alcoholic fatty liver was performed by choline deficient diet (CCD) for 12 weeks in male Wistar rats. After 4 weeks treatment with plant extract (25, 50, 100, 200 mg/kg) and standard drug (simvastatin 10 mg/kg), Rat's blood samples were taken to measure the serum levels of AST, ALT, cholesterol, triglyceride, LDL, and HDL. For histopathological analysis, liver specimens fixed in 10% neutral-buffered formalin were embedded in paraffin and stained with hematoxylin and eosin (H&E) staining for assessing the severity of hepatic steatosis. Pathological changes were evaluated and photographed.

Results: *R. damascena* extract decreased the high level of blood parameters (AST, ALT, triglyceride, cholesterol, LDL) and increased serum level of HDL compared to the negative control group ($p<0.05$). Rats fed with a CCD for 12 weeks developed a high degree of steatosis, where hepatocytes presented with severe cytoplasmic vacuoles and swelling. CCD-fed rats treated with *R. damascena* for 4 weeks demonstrated a considerably lower hepatic lipid accumulation in comparison to negative control group, particularly those treated with 100 mg/kg and 200 mg/kg of *R. damascena* extract.

Conclusions: These findings may provide scientific evidence for the use of *R. damascena* as a complementary and alternative medicine in the management of fatty liver.

Key words: Choline deficient diet, fatty liver, pharmacology, phenolic compounds, phytotherapy, *Rosa damascene.*

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Screening of *In Vitro* Antimicrobial Activity of Extracts from Five Iranian Plants

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Abstract

Introduction: There is cumulative resistance against antibiotics of many bacteria. Therefore, the development of new antimicrobial agents is of increasing interests. In this study, we intended to evaluate different extracts from aerial parts of *Chondrilla juncea* (Asteraceae family), *Ajuga comata* (Lamiaceae family), *Nepeta ucrainica* (Lamiaceae family), *Scrophularia oxycepala* (Scrophulariaceae family) and *Delphinium speciosum* (Ranunculaceae family).

Methods: Aerial parts of plants were extracted by n-hexane, dichloromethane (DCM) and methanol. Antimicrobial activity of the extract against two gram positive strains (*Staphylococcus aureus*. *Bacillus subtilis*), three gram negative strains (*Pseudomonas aeroghinosa*, *Escherichia coli*, *Salmonella*, Proteus) and a fungi (Candida albicans)

were screened by agar diffusion method using Mueller-Hinton plates, inoculated with a 0.5 macfarland standard of the selected bacteria. 30µl of extracts (200mg/ml) were placed into 6mm well on the agar. After 24 hours incubation at 37^0C, inhibition zone diameters were read with calipers. Furthermore, Minimum Inhibitory concentration (MIC) of the potent extracts was determined against selected strains using broth dilution technique. DMSO was used as solvent and negative control.

Results: *S. ureus* and *B. subtilis* were the most sensitive bacteria in this assay. In agar diffusion assays, the n-hexane extract of *Delphinium speciosum* and DCM extract of *Chondrilla juncea* were the most active extracts against *S. ureus* (35 and 30mm, respectively) and *B. subtilis* (30 and 20 mm respectively) in comparison with positive control (Amikacin, 28mm and 32 mm for *S. ureus* and *B. subtilis*, respectively). Other extracts showed insignificant activity against different bacteria. MIC of potent extracts was recorded 200 mg/ml against *S. ureus* and *B. subtilis*.

Conclusion: The increasing prevalence of multi drug resistant strains of bacteria and the recent appearance of strains with reduced susceptibility to antibiotics raise the specter of untreatable bacterial infections and adds urgency to the search of new infection-fighting strategies and the natural sources is the best choices for this purpose.

Key words: Antimicrobial activity, *Chondrilla juncea, Delphinium speciosum, Staphylococcus aureus.*

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Study of Effects of Seaweeds from Northern Coasts of the Persian Gulf on Melanogenesis

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Abstract

Introduction: Melanogenesis is a biological process which led to the synthesis of melanin pigment. Abnormal melanin production results in melasma, solar lentigo, and post in flamatorymelanoderma.Tyrosinase is a key enzyme in melanin production. Therefore tyrosinase inhibitors are used in cosmetic & medicinal industries to prevent or treat pigmentation disorders. According to safety of natural whitening agents, in this study we selected red and brown

macro algae from Persian Gulf to evaluate their anti tyrosinase and anti melanogenesis activities and utility of them in cosmetic and medicinal products.

Methods: 20 macro algae from Persian Gulf were collected. Their methanolic extracts were used for study of inhibitory effects on diphenolase activity of mushroom tyrosinase in concentrations 100, 250 & 500 µg/mL using L-Dopa as substrate. Then we evaluated activity of macro algae with high inhibition potency on hydroxylasion of L-tyrosine by mushroom and zebra fish tyrosinase. Anti melanogenesiseffects of algae were studied on zebrafish as an alternative in vivo model. Kojic acid was used as positive control.

Results: *Padinaboergesenii*,*Colpomeniasinuosa*, *Digenea simplex* and *Sargassumswartzii* showed higher inhibitory activities than other tested samples on mushroom tyrosinase. *P.boergesenii* inhibited zebra fish tyrosinase more potent than kojic acid (83% vs 50% inhibition for kojic acid). *C.sinuosa* from Ula and Jofre provinces, *D.simplex* and *S.swartzii* showed 43, 42, 43 and 24% inhibition on zebra fish tyrosinase, respectively. Moreover, *D.simplex*reduced melanin synthesis in zebra fish more potent than other algae (47% vs 50% inhibition for kojic acid). *P.boergesenii*, *C.sinuosa* (Ula), *C.sinuosa* (Jofre)and *S.swartzii* inhibited melanin synthesis in zebra fish 42, 28, 18 and 20%, respectively.

Conclusion: These results and other skin care effects of *P.boergesenii*, *C.sinuosa*, *D.simplex*, *S.swartzii*provided that they could be used as ingredients for whiting cosmetics. More studies on active compounds of them could lead to discovery of new whitening compounds for development of skin care products.Timeand site of samples collection

Key words: Algae, Persian Gulf, melanogenesis, mushroom tyrosinase, zebra fish.

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Synergistic Effects of *Ferulago Angulata* and Tea Residue on Phytoremediation of Metal Contaminants

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Abstract

Introduction: Phytoremediation requires prudent selection of resistant, preferably native plants with the greatest possible growth. The efficacy of various plants in eliminating different heavy metal contaminants, particularly Lead and Cadmium is a major concern nowadays due to the vast soil pollution in many countries around the world especially Iran. In this research determination of the potential ability of dried aerial parts of *Ferulago Angulata* in companion of tea leaves residue for cleaning up contaminated soil and their probable capability of these dried plants to phytoextract different metals (Nickel, Lead and Cadmium) was investigated.

Methods: *F. Angulata* were collected in August 2015 from Kermanshah Province, Iran and samples was identified by the Herbarium of Faculty of Pharmacy, Pharmaceutical Sciences Branch, Islamic Azad University (IAUPS).The contaminated soil by Ni, Cd and Pb was put into the cites in a way that *F. Angulata* and tea leaves residue were mixed in different percentages up to 20%-20% (W/W) in examined soils individually and both of plants together in order to find the effect of companion them in possible potential phytoremediation . Metal contents were detected by Atomic Absorption Spectrophotometer by wet digestion method in every 10 days during 60 days in Research Laboratory.

Results: Results indicated that the rate of heavy metals uptake by *F. Angulata* is significantly affected by the presence of dried plants ($p<0.003$) . Tea leaves are more capable in absorbing nickel than *F. Angulata* and when we put both together in 20%-10% (tea leaves/ *F. Angulata)* the potential of taking up nickel significantly enhanced ($p<0.01$) .The Cadmium and Lead uptake rates by *F. Angulata* aerial parts are significantly affected by pH and companion in the contaminated soil ($p<0.001$).

Conclusion: The results of this research concluded that *F. Angulata* and tea residue in the contaminated soil have suitable ability for phytoremediation by phytoextraction method and transmitting more Lead and Nickel in pH <7 after 20-60 days of growth of plants.

Key Words: *Ferulago Angulata*, Heavy metals, Phytoremediation, Tea leaves residue.

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The Comparative Study of Antifungal Activity of Syzygium Aromaticum, Punica Granatum and Nystatin on Candida Albicans; an In Vitro Study

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Abstract

Introduction: Candida species are opportunistic fungi, among which, Candida albicans is the most important species responsible for infections in immunocompromised patients with invasive fungal disease. Resistance of Candida species to antifungal drugs has led scientists to pay more attention to traditional medicine herbs. Due to the limitations in the treatment of fungal diseases such as shortages, high prices, antifungal side effects and drug resistance or reduced susceptibility to fungal drugs we decided to study the antifungal effects of herbal extracts of Syzygium aromaticum and Punica granatum.

Methods: Twenty-one isolates of oral C. albicans in patients with denture stomatitis referred to prosthesis department, Dental faculty of Tehran University of Medical Sciences were prepared and cultured. Plant extracts were prepared from the herbs market. Tests on patient samples and standard strains 5027ATCC (PTCC10231) yeast C. albicans were performed via well diffusion method. In addition, nystatin and methanol were used as positive and negative control respectively. Finally, the antifungal effect of extracts using Statistical Repeated measurement ANOVA test was investigated.

Results: Both S. aromaticum and P. granatum showed noticeable antifungal activity in well method. Syzygium aromaticum showed better anti candida activity than nystatin ($P < 0.001$).

Conclusion: Due to increasing problems with fungal diseases, these findings suggest that the plant extracts of S. aromaticum and P. granatum showed good antifungal effects (P-value < 0.001). S. aromaticum (inhibition zone diameter: 29.62) showed better antifungal effects than nystatin (inhibition zone diameter: 28.48)

Key words: Candida albicans, Nystatin, Punica granatum, Syzygium aromaticum.

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The Effect of *Commiphora Mukul* Gum Resin on Liver of STZ- Induced Diabetic Rats

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Abstract

Introduction: *Commiphora mukul* (Burseraceae) with guggul gum as local name has several applications in alternative system of medicine, such as anti-inflammatory, anti-obesity and lipid lowering effects.

Nowadays, it is one of more recommended medicinal plants in iranian herbal stores. So evaluation of the effect of *Commiphora mukul* gum resin (COM) on liver biomarkers of normal and diabetic rats is the aim of study.

Methods: In this study 32 male rats were randomly divided into four groups. Normal Control, diabetic control, normal treated with 300 mg/kg b.w. *Commiphora mukul* gum resin extract and diabetic treated with 300 mg/kg b.w. *Commiphora mukul* gum resin extract.

Results: Diabetes was induced by intra peritoneal injection of STZ (60mg/kg b.w.). Hyperglycemia was confirmed by elevated glucose level (>250 mg/dl) after 72 h. The treatment was begun at the first day of diabetes induction. After 8 weeks of treatment with normal saline or COM, animals were anesthetized and blood samples were analyzed.

Diabetes induction caused increased level of SGOT and SGPT. COM administration to diabetic rats increased SGOT and SGPT (397 ± 83.34, 233±28.77) in comparison to normal rats (56.33± 4.33, 58.33±1.2).

Although COM administration to normal rats increased SGOT and SGPT (397± 83.34, 233±28.77) in comparison to normal rats (56.33± 4.33, 58.33±1.2) but this increase was not significant.

Conclusion: Taking together, administration of COM (300 mg/kg b.w.), not only have not good effects on hepatic biomarkers level, but also altered these markers.

Keywords: *Commiphora mukul*, Diabetes, Guggul gum, Liver, Rat.

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The Importance of Bioactive Peptides Derived From Macro or Microalgae

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Abstract

Introduction: The term algae describes a diverse collection of aquatic organisms that, in general, have the ability to do photosynthesis. Many of the macro and microalgae, commonly, live in the extreme environments of light, salinity and temperature, consequently, produce several unusual components with noticeable bioactivities. The bioactive components of algae include proteins, peptides, lipids, polysaccharides, vitamins, essential amino acids or other chemical compounds, which show valuable potential in development of pharmaceuticals, nutraceuticals and cosmetics. Cyanobacteria, as a subclass of microalgae, are a group of Gram-negative photoautotrophic prokaryotes that commonly named blue-green algae. The most secondary metabolites produced by cyanobacteria are included lipopeptides, amino acids, fatty acids, macrolides, and amides. Peptides are attractive biomolecules that extracted from different types of algae, with a wide range of pharmacological effects such as antidiabetic, anti-inflammatory, antihypertensive, antioxidant, anticoagulant, anticancer, and antimicrobial activities. Studies showed that enzymatic hydrolysis of industrially waste proteins, extracted from algae, with different proteases such as α-chymotrypsin, alcalase, papain, neutrase, and trypsin, resulted in bioactive peptides. The molecular weight of these peptides is an important factor to achieve functional features. Optimization of the hydrolysis process could influence the size and activity of the peptide products. In addition, it was found that cyanobacteria have diverse genes responsible for bioactive proteins, ribosomal and non-ribosomal peptides and peptide–polyketide hybrid molecules. At the present, different pharmaceutically active peptides and cyclopeptides have been extracted from cyanobacteria.

Conclusion: according to the clinical and commercial importance of the algae-derived bioactive peptides and a large variety of macro and microalgae in Iran, review of the related studies guides us to find new potentials and applications of these natural sources.

Keywords: algae, bioactive peptide, cyanobacteria, pharmaceutical.

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The Role of Herbal Medicine in Athletes with Emphasis on Physical Function

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Abstract

Introduction: Since demands for medicine consumption among athletes is increasing and chemical medicine have shown to have more side effects than herbal ones, this study aimed to systematically review the effect of different types of herbal medicine on athletes' physical functions. This review would improve the pharmacists and clinicians' knowledge about the possible effectiveness of herbal medicine in increasingathletes'physical functions and also would call for furtherstudies in this field.

The following 3 steps used for the current systematic review. First English papers that published between the year 2005 and 2015 we searched in Google Scholar and Pub Meddatabases by keywords "Herbal" and "Human Exercise Performance" in July 2015; and 172 papers were extracted. Second, the papers' abstracts were analyzed and unrelated studies were excluded, so that 73 papers selected for further analyses. Third, results of 22 papers out of those 73 papers thwiavailable stext full were summarized.

Conclusion: The results showed *Rhodiolarosea, Withaniasomnifera, Tribulusterrestris,Panax ginseng, Paulliniacupana and Ephedra fragilis* were the most frequently prescribed herbal medicines in the previous studies with the most positive results for *Paulliniacupana* and *Panax ginseng.*

Panax ginseng significantly improved physical function in athletes especially with 300 gr/day dosage during 8 weeks. In addition, promingis resultswere found for caffeine based supplements *Rhodiolarosea, Wit haniasomnifera* which seems to be related to their existing *Alkaloids.*

The results of this study not only inform the clinical practice about the possible usefulness of herbal medicine on improving physical functionof s athletes but also help clinicians and athletes to have an informed and evidence-based decision in selecting the most appropriate herbal medicines.However, further studies are needed to confirm the effectiveness of such herbal medicines which are free from well-known side effects of hormonal and chemical medicines.

Keywords: activity, athletes, herbal, herbal medicines, physical function.

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Topical Treatment of Cutaneous Leishmaniasis with Natural Products

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Abstract

Introduction: Leishmaniasis, an infectious tropical disease caused by *Leishmania* parasites, manifests as three types: Cutaneous, Mucocutaneous and Visceral forms. Cutaneous Leishmaniasis (CL), the most prevalent form of the disease, usually produces ulcers leaving permanent scars. Although several medications have been used to treat CL, therapy remains challenging. Much attention has been paid to discovery of natural products due to limitations related to antileishmanial regimens. Application of natural product for topical treatment of CL is an interesting option and could increase patient acceptance.

Natural products are a prestigious resource in discovery of parasiticidal agents. Herbal extracts isolated from diverse medicinal plants have demonstrated considerable leishmanicidal activity against both promastigote and amastigote forms of *Leishmania* parasites in culture media (*in vitro*) and animal models (*in vivo*) respectively. Nevertheless, most of them have not been studied in a clinical trial.

A topical herbal extract called Z-HE which demonstrated significant success rate in treatment of CL lesions of patients in Iran was denoted without any confirms from other research centers around the world. (-) mammea A/BB, a coumarin isolated from leaves of *Calophyllumbrasiliense*, was found similar to systemic Glucantime® in reduction of lesion size of BALB/c mice when applied topically, however has not been studied in a clinical trial until present time. In addition, thyme (*Thymus vulgaris)*, yarrow (*Achilleamillefolium*) and propolishydro alcoholic extracts which significantly reduced CL ulcers in animal model were not clinically trialed.

Conclusion: Topical treatment of CL using natural products is an interesting option regarding systemic toxicity of current leishmanicidal drugs. Furthermore, ease of application could remarkably increase patient acceptance.
Data obtained from studies on natural products is demonstrative of the presence of valuable alternative therapeutic options in treatment of CL in herbal extracts. Nevertheless sufficient data on their mechanism(s) of action and controlled clinical trials to confirm their efficacy and safety are not available. Further investigations on leishmanicidal herbal extracts could reveal considerable efficacy in topical treatment of CL, represent novel approaches in pharmacotherapy of CL and reduce costs associated with CL treatment.

Keywords: Cutaneous leishmaniasis, Topical, Natural product.

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Total Phenol, Total Flavonoid and Antioxidative Activity of *Lilium Candidum* L. Flowers

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Abstract

Introduction: Despite the progress in chemical products and their vast application in the treatment of different diseases, tendency toward natural products and traditional medicine is growing worldwide. *Lilium candidum* L., with the common name of Madona lily, is an herbaceous plant from the family Liliaceae with white petals. The plant is acknowledged in traditional and folkloric medicine of different countries around the world for several indications including wounds, yet there are limited information regarding the phytochemical composition of the plant. The aim of the present study is to assess the flower phytochemical composition as well as its antioxidant activity. **Method:** The plant was collected from flower market and was identified based on the prepared voucher specimen in the herbarium of faculty of pharmacy, Tehran University of medical Sciences. Extraction was performed by

percolation with ethanol 70% for 72 hours and the extract was concentrated using rotary evaporator. Solvent free extract was used to determine total phenolic compound with folin ciocalteu reagent, total flavonoid using $AlCl_3$ reagent and antioxidant activity with 2, 2- diphenyl-1-picrylhydrazyl (DPPH) radical scavenging method. **Results:** Total phenol value was equal to 157 mg gallic acid/ g dried extract. The amount of total flavonoids was measured as 32.4 mg catechin equivalent/ g dried extract. 50% Inhibitory concentration in DPPH test was equal to 248 µg/ ml.

Conclusion: Considering the above mentioned results, *L. candidum* flowers are rich in polyphenols and flavonoids with antioxidant activity and astringent properties which can explain the folkloric use of the plant for wound healing. Future *in vivo* studies are necessary to confirm the efficacy of the plant as a topical wound healing agent.

Keywords: Antioxidant, *Lilium candidum*, Total flavonoid, Total phenol.

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Use of Medicinal Plant a Non Pharmacologic Technique for HIV

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Abstract

Introduction: AIDS (Acquired immune deficiency syndrome or acquired immunodeficiency syndrome) is a disease caused by a virus called HIV (Human Immunodeficiency Virus). The illness alters the immune system, making people much more vulnerable to infections and diseases. This susceptibility worsens as the disease progresses. Studies and researchesonthe effect of medicinal plantonhumans dictate thatplantsandtraditional medicinewillplay a significant roleinstrengthening themind, humanmemory and ability.It is considerable thathow touse theseplantsunderlaboratoryis very important.

Conclusion: According to many problems and complications resulting from pharmacotherapy, it sounds logical that the use of non pharmacologic techniques that can reduce problems and improve patient's life quality with HIV. One

of this techniques is using of medicinal plant and its ingredient. It can be improved in people with HIV.With diagnosing of HIV, we should pay attention to mental disorders which are associated with HIV e.g. treatment in groups, use of some plant can be effective for them.

Key words: AIDS, medicinal plant, non pharmacologic techniques.

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Using Plants for Strong Memory

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Abstract

Introduction: Throughout history, men have always had a special affinity of medicinal plants, and medicinal effects which their use is not a privilege to anyone. The plateau contains species-rich plant communities reported that a very large number of medicinal plants for their own account. The local names of plants growing in the area and many of them have been known. In the meantime, some of them have been very helpful and useful for memory enhancement. Iran has one of the most common herbs in Asian. Public use of medicinal plants has led to a growing trend since three decades in Iran. According to the expressed statistics, we have more than 130 types of herbal remedies which the plants are the main source of them. America has 138,000 species of plants and resources, while Asia has 123,000 plant species. Among Asian countries, the largest number and variety of species are from China, Indonesia, India, Thailand, Malaysia and Iran. Studies and researches on the effect of medicinal plant on humans dictate that plants and Traditional Medicine will play a significant role in strengthening the mind and human memory. It is considerable that how to use these plants under laboratory is very important.

Conclusion: Plants that contain high levels of phosphorus, potassium, magnesium, sodium, iron, and also Lecithin, are highly effective in strengthening the central nervous system and mental energies. The high stimulatory effect which is a specification in some plants helps to stimulate the brain and mental energies, and thus increases the

efficiency of the parts which are responsible for the recovery works and also for saving the received information. The main reasons that some plants are useful to enhance memory are because of elements, Lecithin and natural sugars. Considering how much consumption and the usage method causes stimulatory brain and increases the mental energy.

Keyword: Lecithin, Medicinal plant, minerals, strengthen memory.

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Voltammetric Determination of Ni^{+2} Using Nanostructure Ni-Ion Imprinted Polymer Sensor in Medicinal Herbs

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Abstarct

Introduction: In recent years, the use of medicinal herbs has greatly increased. Traditional medicine plays an important role in the general state of health of a population. Many medicinal herbs and their mixtures can present a health risk due to the presence of toxic elements. The main purpose of this study is to electrochemical determination of Ni^{+2} in medicinal herbs, commercial mineral and tap water samples. For this reason, new nanostructure Ni^{+2} ion imprinted polymer (Ni^{+2}-IIP) was synthesized, characterized and used as a modifier to prepare a Ni^{+2} selective voltammetric sensor.

Methods: The electrochemical determination of Ni^{+2} has been performed by preconcentration Ni^{+2} at Ni^{+2}-IIP modified carbon paste (Ni^{+2}-IIP/CP) sensor; this followed by electrolysis of the accumulated Ni^{+2} by voltammetric scanning from 0 to 0.7 V. For preconcentration step, the Ni^{+2}-IIP/CP sensor was immersed in a stirred 25 mL of aqueous solution containing known amount of Ni^{+2} for 40 min where the Ni^{+2} ions were accumulated onto surface electrode in −0.8 V. Square wave voltammetry (SWV) under different conditions of pH, accumulation potential and time and amount of Ni^{+2}-IIP were investigated in order to optimize the parameters for the determination Ni^{+2} using electrochemical technique.

Results: The best conditions of analysis achieved by use of SWV and relation 3 to 1 of C: Ni^{+2}-IIP and 40 minutes in −0.8 V for accumulation potential and time. With surveying electrochemical response of Ni^{+2} and drawing a calibration curve resulted that there is a linear relation between Ni^{+2} concentration and anodic peak current of Ni^{+2} at 0.45 V in a concentration range of 10 – 200 ppm with relative standard deviation (RSD) between 0.28 – 6.21%. In presence of other foreign ions (Zn, Cu, Mn, Mg), the Ni^{+2}-IIP/CP sensor is selective for Ni^{+2} and has no interfering with these ions. Finally, with use of the Ni^{+2}-IIP/CP sensor, Ni^{+2} was determined in three medicinal herbs, commercial mineral and tap water samples.

Conclusion: The recommended method possesses low detection limit and wide linear range. Due to high selectivity shown by the Ni^{+2}-IIP/CP sensor for Ni^{+2} ions, the method has been successfully employed to the determination of Ni^{+2} in three medicinal herbs, commercial mineral and tap water samples. Moreover the imprinted polymer technique offers good characteristics, such as high selectivity, sensitivity and low cost. It is proper to mention, this method as a green, environmentally-friendly and free-Hg method.

Keywords: Medicinal herbs, Nanostructure ion imprinted polymer; Nickel ion; Voltammetry.

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