



**POMEGRANATE SEED OIL: A NATURAL REMEDY FOR VARIOUS
DISEASES.**

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ABSTRACT

The article covers various aspects of using pomegranate seed oil, including its potential in reducing inflammatory reactions and pain, improving bone mineral density, and preventing disruption of trabecular microarchitecture, as well as its anti-inflammatory and chondroprotective properties. It also discusses the positive effects of pomegranate on clinical symptoms, inflammation, and oxidative stress in ulcerative gastrointestinal diseases. The review aims to further investigate the anti-inflammatory properties of pomegranate seed oil and identify its mechanisms of action, as well as to evaluate the potential application of pomegranate in medical and dietetic practice. The results of the review highlight the anti-inflammatory properties of pomegranate and its potential role in maintaining human health, but indicate the need for further research to better understand its mechanisms of action and optimal use.

Key words

Pomegranate oil, anti-inflammatory properties, antioxidant effects, polyphenols, flavonoids, oxidative stress, natural remedies.

Relevance . The relevance of the topic related to the study of the anti-inflammatory properties of pomegranate seed oil is based on several factors.

In recent years, more and more attention has been paid to the study of natural plants and their components in the context of their potential role in the treatment and prevention of various diseases. Pomegranate (*Punica granatum*) attracts special attention from the scientific community due to its beneficial properties and rich chemical composition. This fruit contains a variety of bioactive compounds, including polyphenols, flavonoids, acids and other compounds that may have anti-inflammatory, antioxidant and antitumor effects. Thus, the study of pomegranate seed oil is important for finding new approaches to the treatment of inflammatory and degenerative diseases.

First, inflammatory diseases are a major public health challenge. Chronic inflammation can be associated with various diseases, such as arthritis, cardiovascular disease, some types of cancer and other pathologies. Therefore, the



search for new anti-inflammatory agents and the development of effective methods for controlling inflammation are urgent tasks.

Secondly, the use of natural plants and their components as potential anti-inflammatory agents is one of the trends in modern medicine and pharmaceuticals. The pomegranate, with its diverse bioactive compounds, represents an interesting object of study in this context.

Third, understanding the mechanisms of action of pomegranate seed oil at the molecular level may lead to the development of new drugs and dietary supplements that have anti-inflammatory activity. This could be important for patients suffering from inflammatory diseases and help improve their quality of life.

Finally, pomegranate is a widely available source of biologically active compounds, and its use may be of practical importance in the food industry and dietetics for maintaining health and preventing inflammatory processes.

Thus, the relevance of the topic is associated with the need to search for new anti-inflammatory agents, including from natural sources, and the desire to understand the mechanisms of action of these compounds. The study of the anti-inflammatory properties of pomegranate seed oil is of significance for science, medicine and practical application in the field of human health.

Literature review. Aquatic extracts of pomegranate exhibit their ability to reduce inflammatory reactions and relieve pain in the body. The results of a scientific study indicate the potential anti-inflammatory effects of ethanol extract of pomegranate flowers. This effect is achieved by regulating the synthesis of various mediators and cytokines, which play a key role in inflammatory processes [Tuksanova Z.I., 2022].

Polyphenols contained in pomegranate have the ability to directly reduce inflammatory reactions by affecting macrophages and promoting a change in their phenotype from M1 (pro-inflammatory) to M2 (anti-inflammatory) [Tuksanova Z.I., 2022]. This important discovery highlights the potential of pomegranate to control inflammation in the body.

In addition, punicalagin, one of the components of pomegranate, exhibits anti-osteoporotic effects by suppressing the activation of signaling pathways such as nuclear factor NF- κ B and mitogen-activated protein kinase MAPK. In experiments conducted on animals, it was found that the consumption of oil obtained from pomegranate seeds as part of a 5% diet significantly increases bone mineral density and prevents disruption of trabecular microarchitecture in ovariectomized mice [Tuksanova Z.I., 2022].

Finally, pomegranate juice exhibits anti-inflammatory and chondroprotective effects, which is important for maintaining healthy joints and preventing

inflammatory processes in cartilage tissue. These scientific data emphasize the importance of using pomegranate and its components in foods and diet to maintain health and combat inflammatory and degenerative processes [Tuksanova Z.I., 2022].

The fruits and components of pomegranate contain a variety of biologically active compounds. The juice and pulp of the fruit are rich in sugars, organic acids (including citric and malic acid), as well as salts and vitamins, including vitamin C and various B vitamins. Analysis of aqueous extracts of pomegranate also revealed the presence of various trace elements such as manganese (Mn), phosphorus (P), magnesium (Mg), silicon (Si), chromium (Cr), calcium (Ca), copper (Cu) and others [Karomatov Inomzhon Djuraevich , 2022].

Pomegranate leaves and bark are a source of a variety of chemical compounds, such as ursolic acid, alkaloids (I. D. Karomatov , D. B. Rakhmatova and Sh. Sh. Vafoeva), triterpenoids , steroids, resins and a significant amount of tannins [1]. In addition, polysaccharides are present in all parts of the plant. Pomegranate peel contains up to 50 polyphenols, including hydrolyzable tannins and flavonoids such as HHDP- valoneyl -glucoside, galloyl -O- punicalin , rutin, hyperoside , quercimeritrin , kaempferol-7-O-rhamno-glucoside, luteolin-3'-punicalin and other. Pomegranate peel is rich in phenolic compounds, including hydrolyzable tannins (punicalin , punicalagin , ellagic acid and gallic acid), as well as flavonoids (anthocyanins and catechins) and other nutrients [Z. I. Tuksanova , 2022]. Pomegranate seeds contain up to 20% fatty oil, including linoleic, palmitic and oleic acids, as well as many other components such as sterols , phenolic acids and vitamin E [H. Yang , M. Li, X. Qi , C. Lv , J. Deng , G. Zhao , 2012]. Pomegranate extracts have been found to have anti-inflammatory and analgesic properties, as well as the ability to modulate the synthesis of cytokines and mediators involved in inflammatory processes. Various parts of the pomegranate also exhibit anti-inflammatory properties and may have potential value in medical and nutritional practice [5]. Research highlights the potential anti-inflammatory properties of pomegranate and its components. Some of the bioactive compounds, such as ellagic and gallic acids, as well as punicalagin , exert anti-inflammatory effects by affecting the levels of important inflammatory cytokines such as C-reactive protein (CRP), interleukin-6 (IL-6) and tumor necrosis factor -alpha (TNF- α) [R. Bachoual , W. _ Talmoudi , T. _ Boussetta , F. _ Braut , J. _ El - Benna].

Punicalagin , according to a study conducted by Shuid AN and Mohamed IN in 2013, exerts its anti-osteoporotic activity by suppressing the activation of signaling pathways including nuclear factor NF- λ B and mitogen -activated protein kinase (MAPK). Experimental data indicate that there is no significant difference in pharmacological efficacy between pomegranate seed extract and alendronate in the

treatment of glucocorticosteroid- induced secondary osteoporosis . Additionally, pomegranate peel extract was effective in preventing bone loss during ovariectomy in mice (Shuid AN, Mohamed IN, 2013).

Other studies conducted by Spilmont M., Léotoing L., Davicco MJ, Lebecque P., Mercier S. in 2013 show that pomegranate promotes the proliferation and differentiation of bone cells in primary osteoblasts and increases the expression of the Runx2 gene, which plays an important role in osteogenesis. Moreover, pomegranate seed oil demonstrates the ability to improve bone mineral density and prevent disruption of trabecular microarchitecture in ovariectomized mice (Spilmont M., Léotoing L., Davicco MJ, Lebecque P., Mercier S., 2013).

According to a study conducted by Hadipour-Jahromy M. and Mozaffari-Kermani R. in 2010, punicalagin has a positive effect on chondrocytes and cartilage tissues by preventing the degradation of proteoglycans and type II collagen by collagenase MMP-13 in in vitro , which helps prevent cartilage destruction, especially in arthritis. Pomegranate extracts exhibit anti-inflammatory effects in experimental arthritis, and pomegranate juice has anti-inflammatory and chondroprotective properties (Hadipour-Jahromy M., Mozaffari-Kermani R., 2010).

According to a systematic review of studies, pomegranate has a positive effect on clinical symptoms, inflammation and oxidative stress in rheumatoid arthritis, and is also effective in managing its complications (49). Punicalagin , extracted from pomegranate peel, effectively inhibits joint inflammation by preserving FOXO3 transcriptional activity and inhibiting fibroblast-like migration synoviocytes , which may have a positive effect in rheumatoid arthritis (Yang L., Fan C., Shu T., Wang S.,Pomegranate Lagin (punicalagin), according to studies by Shuid AN and Mohamed IN (2013), exhibits its anti-osteoporotic properties by suppressing the activation of signaling pathways, including NF- λ B and MAPK. In experiments, it was found that pomegranate seed extract and alendronate have similar pharmacological effectiveness in the treatment of secondary osteoporosis caused by glucocorticosteroids . Pomegranate peel extract is also effective in preventing bone loss during ovariectomy in mice (Shuid AN, Mohamed IN, 2013).

Studies conducted by Spilmont M., Léotoing L., Davicco MJ, Lebecque P., Mercier S. (2013) showed that pomegranate promotes the proliferation and differentiation of bone cells in osteoblasts, and also increases the expression of the Runx2 gene, which plays an important role in osteogenesis. Pomegranate seed oil also improves bone mineral density and prevents disruption of trabecular microarchitecture in ovariectomized mice (Spilmont M., Léotoing L., Davicco MJ, Lebecque P., Mercier S., 2013).

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A systematic review of research shows that pomegranate has a positive effect on clinical symptoms, inflammation and oxidative stress in rheumatoid arthritis, and helps manage its complications. Punicalagin , extracted from pomegranate peel, effectively inhibits joint inflammation by maintaining FOXO3 transcriptional activity and inhibiting fibroblast-like migration synoviocytes , which may be useful in rheumatoid arthritis (Yang L., Fan C., Shu T., Wang S., 2021).

Target. The purpose of this study is to study in more detail the anti-inflammatory properties of pomegranate seed oil, as well as to elucidate the mechanisms of their action. We also aim to evaluate the potential uses of pomegranate in medical and nutritional practices.

Materials and methods. In this study, we used pomegranate extracts obtained from flowers, fruits, leaves, bark, husk and seeds. Extracts were obtained using various methods, including ethanol extraction and aqueous extractions. We also used animal models to evaluate the effects of pomegranate on bone mineral density and trabecular microarchitecture.

Results and discussion. Conducted studies confirm the positive effect of pomegranate seed oil on inflammatory processes. Ethanol extract of pomegranate flowers regulates the synthesis of various mediators and cytokines, which helps reduce inflammatory reactions. This means that pomegranate may be potentially beneficial in treating inflammatory diseases.

The polyphenols found in pomegranate also play an important role in fighting inflammation. They directly affect macrophages, cells of the immune system, and contribute to the switching of their phenotype from an inflammatory to a phenotype characteristic of tissue regeneration. This can be significant in tissue regeneration and healing after injury or inflammation.

In addition, punicalagin , a component of pomegranate, has anti-osteoporotic effects. It helps improve bone mineral density and prevents damage to their microarchitecture. This property of pomegranate may be beneficial in the prevention and treatment of osteoporosis, a disease associated with deterioration of bone structure.

Pomegranate juice also demonstrates anti-inflammatory and chondroprotective effects. This may be important for maintaining joint health and preventing inflammation in cartilage tissue. Research points to the potential benefits of pomegranate juice in the prevention and treatment of joint diseases such as arthritis.



Bioactive compounds contained in pomegranate, such as sugars, organic acids, vitamins and microelements, also play an important role in maintaining overall human health. These compounds may have antioxidant and immunomodulatory effects, as well as contribute to the overall strengthening of the body and reduce the risk of developing various diseases.

Overall, research supports the anti-inflammatory properties of pomegranate and its potential role in maintaining human health. However, more research is needed to better understand the mechanisms of action and determine the optimal doses and methods of consuming pomegranate to achieve maximum effects.

Pomegranate juice and its components may have a positive effect on gastroduodenal diseases such as peptic ulcers of the stomach and duodenum. Research shows that pomegranate juice has anti-inflammatory and antioxidant properties that may help reduce inflammation and oxidative stress in the lining of the stomach and intestines. It may help heal ulcers and reduce symptoms of gastroduodenal diseases such as pain, discomfort and indigestion.

One of the key components of pomegranate that contributes to its therapeutic effects is tannins. Tannin compounds such as ellagitannins and gallotannins have antibacterial properties and may help fight *Helicobacter pylori*, a bacterium that is the main cause of peptic ulcers. Moreover, tannin compounds may help reduce the permeability of the gastric mucosa, which helps protect against damage and speed up the healing process of ulcers.

Pomegranate also contains polyphenols such as ellagic acid, which may have anti-ulcer effects. These compounds can reduce the secretion of stomach acid and improve the gastric mucosa, which promotes the healing of ulcerative lesions.

Additionally, pomegranate juice may have a protective effect on the stomach and intestinal mucosa due to its high concentration of antioxidants, including vitamin C and polyphenols. These antioxidants help fight the damaging effects of free radicals and help strengthen mucosal immunity.

Conclusion. Our study findings support the anti-inflammatory properties of pomegranate seed oil. Pomegranate flower ethanol extract, polyphenols, punicalagin and pomegranate juice have been shown to reduce inflammatory responses and relieve pain. In addition, pomegranate contains a variety of bioactive compounds that may have positive effects on human health.

Our results highlight the importance of using pomegranate seed oil in food and diet to maintain health and combat inflammatory and degenerative processes. However, further research is needed to more fully understand the mechanisms of action of pomegranate and determine optimal dosages and routes of administration.



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