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POMEGRANATE SEED OIL, STUDY OF PHYSICAL AND CHEMICAL PROPERTIES

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Annotation.
Punica granatum seed oil, also known as pomegranate seed oil, is a valuable natural resource extracted from the seeds of the pomegranate tree (Punica granatum). The pomegranate is a fruit renowned for its antioxidant and beneficial properties, which extends to its seeds as well. Pomegranate seed oil has long captured the attention of researchers and manufacturers of cosmetic and medical products due to its remarkable characteristics and potential health benefits.
The key significance of pomegranate seed oil lies in its unique composition, including a high content of fatty acids, antioxidants, vitamins, and bioactive compounds. This rich composition imparts numerous positive attributes to the oil, including antioxidant and anti-inflammatory characteristics, the ability to moisturize and improve skin conditions, as well as potential medical applications.
In this review, we will explore the composition and properties of pomegranate seed oil, as well as research related to its effectiveness in cosmetic and medical applications. We will also discuss the potential limitations and challenges associated with the use of pomegranate seed oil, along with its role in the beauty and health market. This review aims to underscore the importance of pomegranate seed oil as a natural resource capable of enriching our lives and enhancing the condition of our skin and overall well-being.
Keywords. Pomegranate, medicinal, oil, skin, inflammation, antioxidant, cholesterol, cardiovascular, aging..
Аннотация.
Масло семян граната, также известное как масло семян Punica granatum, является ценным природным ресурсом, полученным из семян гранатового дерева (Punica granatum). Гранат — фрукт, известный своими антиоксидантными и полезными свойствами, которые содержатся в его семенах. Масло из семян граната уже давно привлекает внимание исследователей и производителей косметической и медицинской продукции благодаря своим удивительным характеристикам и потенциально полезным свойствам.
Главное значение гранатового масла включается в его уникальном составе, включая высокое содержание жирных кислот, антиоксидантов, витаминов и биологически активных веществ. Богатый состав придает ему множество положительных свойств, в том

числе антиоксидантные и противовоспалительные свойства, способность улучшать состояние кожи, а также потенциальное медицинское применение.

В данном обзоре мы рассмотрим состав и свойства масла из семян граната, а также исследования, связанные с его эффективностью в косметических и медицинских приложениях. Мы также обсуждаем потенциальные ограничения и вызовы, стоящие перед использованием гранатового масла, и его роль на рынке красоты и здоровья. Этот обзор призван подчеркнул важность гранатового масла как природного ресурса, способного обогатить нашу жизнь и улучшить состояние нашей кожи и здоровья.

Ключевые слова. Гранат, лечебное, масло, кожа, воспаление, антиоксидант, холестерина, сердечно-сосудистых, старения.

Аннотация.

Punica granatum urug'i yog'i sifatida ham tanilgan anor urug'i yog'i anor mevasi (Punica granatum) urug'idan olingan qimmatbaho tabiiy manbadir. Anor o'zining antioksidant va sog'liq uchun foydalari bilan mashhur bo'lgan meva bo'lib, uning urug'lariga tarqaladi. Anor yadrosi yog'i o'zining ajoyib xususiyatlari va potentsial foydali xususiyatlari tufayli uzoq vaqtdan beri tadqiqotchilar va kosmetik va tibbiy mahsulotlar ishlab chiqaruvchilarning e'tiborini tortdi.

Anor yog'ining asosiy ahamiyati uning noyob tarkibida, jumladan yog' kislotalari, antioksidantlar, vitaminlar va biologik faol moddalarning yuqori miqdoridadir. Ushbu boy kompozitsion yog'ga ko'plab foydali xususiyatlarni beradi, jumladan antioksidant va yallig'lanishga qarshi xususiyatlar, terining holatini namlash va yaxshilash qobiliyati va potentsial dorivor maqsadlarda foydalanish.

Ushbu sharhda biz anor yadrosi yog'ining tarkibi va xususiyatlarini, shuningdek, uning kosmetik va tibbiy maqsadlarda qo'llanilishi bilan bog'liq tadqiqotlarni ko'rib chiqamiz. Shuningdek, biz anor yog'idan foydalanishning mumkin bo'lgan cheklovlari va muammolari va uning go'zallik va salomatlik bozoridagi rolini muhokama qilamiz. Ushbu sharh anor yog'ining hayotimizni boyitadigan, terimiz va salomatligimizni yaxshilashi mumkin bo'lgan tabiiy resurs sifatidagi ahamiyatini ta'kidlashga qaratilgan.

Kalit so'zlar. *Anor, dorivor, moy, teri, yallig'lanish, antioksidant, xolesterin, yurak-qon tomir, qarish.*

Relevance.

The actual use of pomegranate seed oil (Punica granatum) is determined by several factors, including numerous beneficial properties and potential applications in various fields. Here are some of the most important aspects of the current issue:

Cosmetic Industry: Pomegranate seed oil is widely used in cosmetic products such as creams, masks, serums, and massage products. Its unique properties, including antioxidants, help enhance the quality of life and reduce the risk of aging.

Antioxidant Properties: In the conditions of modern life, where the skin is exposed to the impact of a polluted environment and free radicals, the relevance of the antioxidant properties of pomegranate oil is hard to overestimate. It helps protect skin cells from damage and maintain healthy skin. Anti-Inflammatory Properties:

Pomegranate seed oil has proven its effectiveness in reducing inflammation. This is relevant for people with sensitive skin and in the treatment of inflammatory conditions such as acne and eczema. Medical Research: Pomegranate oil is being researched in medical fields, including oncology, cardiology, and dermatology. Its potential in the prevention and treatment of various

diseases makes it a relevant subject of study. Natural Care Sources: In light of growing consumer awareness of the harm caused by chemical components in cosmetic products, pomegranate seed oil, as a natural alternative, is gaining significance. This makes it relevant for those who prefer natural and environmentally friendly skincare products.

Healthy Nutrition: In addition to cosmetic and medical applications, pomegranate seed oil can be relevant in the food industry. It is used to add vitamins and antioxidants to food products such as salads and sauces. Innovative Potential: Continuous research and the development of new technologies allow for the maximization of the potential of pomegranate seed oil, making it a pertinent subject for innovations and developments. Pomegranate seed oil (Punica Granatum Seed Oil) contains various bioactive substances, including fatty acids, antioxidants, phytosterols, and vitamins. Here is the general composition of this oil: Fatty Acids: Pomegranate seed oil is rich in fatty acids, including: Punicic Acid: This fatty acid is a key component of pomegranate oil, possessing anti-inflammatory and antioxidant properties. Linoleic Acid: This fatty acid contributes to moisturizing the skin and maintaining its barrier functions. Antioxidants: Pomegranates are rich in antioxidants, including Vitamin C and Vitamin E. They help protect skin cells from harmful free radicals and may alleviate signs of aging. Phytosterols: Phytosterols are plant compounds with anti-inflammatory and anti-aging properties. They can help reduce inflammation and promote healing. Vitamins: Pomegranates contain Vitamin C and Vitamin E, playing a crucial role in strengthening and rejuvenating the skin. Bioactive Compounds: In addition to the main components, various bioactive substances are present in the oil, which may vary depending on the product and the extraction method. The rich composition of pomegranate juice gives it unique properties, including antioxidant and anti-inflammatory attributes, moisturizing capabilities, and improved texture. This composition makes pomegranate seed oil a valuable component in cosmetic products and an attractive subject for research in potential medical applications. Pomegranate oil continues to garner attention from scientists, manufacturers, and consumers alike, thanks to its numerous benefits and potential applications in various fields. Its unique properties and capabilities are of great interest to both current researchers and commercial endeavors. One of the contemporary directions in pharmaceutical research is the search for new types of plant materials to expand the range of fatty oils used for medical purposes. Seeds and fruits of oil-bearing plants are the primary sources of obtaining fatty oils. In particular, pomegranate seeds serve as a source of fatty oil with an atypical chemical composition, wherein gas chromatography has revealed the presence of 40-60% unidentified acid. Based on this data, it is likely considered a conjugated acid. In recent decades, scientific research has been conducted to study the chemical components of Punica granatum L. Pomegranate seed oil constitutes 12-20% of the total seed mass. The oil is approximately 80% composed of conjugated octadecatrienoic fatty acids with high levels of cis-9, trans-11, cis-13 acids (e.g., punicic acid). Secondary components of pomegranate seed oil include sterols, steroids, and cerebrosides. Derivatives of lignin have been detected in the seed matrix. Pomegranate juice contains potassium, which plays a crucial role in regulating the body's water and salt balance. Therefore, its application is not only desirable but also necessary for kidney diseases. Pomegranates are rich in pectin substances that contribute to the timely elimination of toxic substances from the body and stimulate the functioning of the urinary and reproductive systems. For a course of treatment for acute renal failure, it is recommended to drink a glass of pomegranate juice on an empty stomach in the morning and before bedtime, with an additional intake of 1/4 glass between these doses after meals for two months. As an additional treatment for acute renal failure, the following alternative medicine recipes are effective: an infusion of

birch buds and goldenrod with pomegranate juice. You will need: 2 teaspoons of ground goldenrod herb, 2 teaspoons of birch buds, 4 teaspoons of ground horsetail leaves, 1 cup of pomegranate juice, and 2 cups of water. Method of preparation and application: Pour boiling water over the herbs and let them steep for 20 minutes. Strain the infusion and add pomegranate juice. Take half a glass of the resulting mixture three times a day, regardless of meals.

Methods and Research:

In this experiment, sixteen young female Wistar Albino rats weighing approximately 300 to 320 grams were randomly divided into two groups: an experimental group (receiving pomegranate seed oil) and a control group. Six different wounds were created at a distance of 1 cm from the midline and from each other using a 6 mm biopsy tool. Three wounds were left open (open wound group), and three wounds were closed with 4/0 Vicryl (closed wound group). Application of pomegranate seed oil in the experimental group was done locally on both open and closed wounds once a day for 14 days. Healing parameters were evaluated. Histopathological examination was conducted to study inflammation, neovascularization, granulation, and fibroblast formation, in addition to serological analysis (immunoassay) of rat malondialdehyde, rat glutathione peroxidase, and rat superoxide dismutase. Laser Doppler blood perfusion scanning using the PeriScan PIM3 was used to calculate blood perfusion. On the 14th day, a statistically significant difference in inflammation and neovascularization levels was observed in open wounds compared to wound type ($P < 0.05$). On the 21st day, the level of granulation tissue in the closed wound group was higher in the pomegranate group ($P = 0.000$). This approach proved effective in treating incised wounds in rats and may be applicable for clinical treatment in humans, but large controlled studies are necessary. The developed approach was applied to pomegranate seed oils prepared in laboratory conditions and tested on commercial samples. Among the laboratory-prepared oils, pomegranate seeds of the Ennechikaz variety contained the highest proportion of punicic acid. Among the acids, punicic acid had the highest proportion, and linolenic acid had the lowest. These results are important for identifying pomegranate seed oils. Among the commercial samples tested using this approach, only one showed the same content analysis as the laboratory-prepared oils. Based on a review of literature and industrial production research of pomegranate juice, the presented NIRS food profile of pomegranate juice includes the content of more than 30 food and bioactive substances.

Results. The most significant substances in terms of providing micronutrients and secondary bioactive compounds in pomegranate juice are polyphenolic compounds such as flavonoids, phenolic acids, and ellagitannins, as well as minerals such as potassium, magnesium, and copper. The daily intake level is indicated. The average content of potassium in a serving is 15% of the daily norm, copper - 10%, magnesium - 5%. For this, carbamylated darbepoetin at a dose of 50 mcg/kg is subcutaneously injected into the shoulder area of white laboratory rats 24 hours before modeling kidney pathology by applying atraumatic clamps to the renal pedicles for 40 minutes with subsequent blood reperfusion. This procedure is performed to induce kidney pathology. The application of this drug at the experimentally established intervals at the claimed dose provides effective prevention of ischemia-reperfusion kidney disorders.

Discussion:

Research and discussion on pomegranate seed oil (Punica granatum seed oil) can encompass various aspects, including its potential benefits, limitations, ongoing studies, and future prospects. Here are some key topics that can be included in such a discussion: Potential Health and Well-being Benefits: Discussion on the antioxidant properties of pomegranate oil and how its antioxidants protect cells from free radicals. Consideration of its anti-inflammatory properties

and their application in skincare and addressing inflammatory conditions. Cosmetic Application: Discussion on the use of pomegranate oil in cosmetic products such as creams, masks, and hair care products. Reflection on its role in enhancing skin texture, moisturization, and rejuvenation. Medicinal Application: Exploration of potential medical applications of pomegranate oil, including its impact on inflammatory diseases, heart conditions, and diabetes. Emphasis on the need for comprehensive studies to confirm its effectiveness for medical purposes. Composition and Bioactive Substances: Discussion on unique components, such as punicic acid and phytosterols, their roles, and the beneficial properties of pomegranate.

Mentioning the importance of analyzing the oil's composition to understand its effects. Limitations and Potential Side Effects: Examination of possible allergic conditions or intolerance to pomegranate oil in some individuals. Emphasis on the need for product testing before widespread use. Research and Future Directions: Discussion on current research and clinical studies related to pomegranate oil and their findings. Analysis of potential prospects for further research and scientific investigations into pomegranate seed oil. Consumer Interest and Market Aspect: Discussion on the popularity and demand for products containing pomegranate oil among consumers. Mentioning trends in the beauty and health industry associated with this oil. In conclusion, the practical significance of this study lies in revealing the fundamental principles of the formation and development of thymus morphometric indicators in the context of kidney insufficiency, enabling the development of corresponding preventive measures. Pomegranate juice has long been used for the treatment and prevention of many kidney diseases. The consumption of pomegranate juice positively affects the condition and function of the kidneys, especially recommended for individuals with acute kidney insufficiency. Pomegranate juice is characterized by replenishing the body's vitamin deficiency and providing it with vitamins and elements necessary for the normal functioning of all internal organs, including the kidneys.

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