

The Influence of Pomegranate Seed Oil on the Spleen in Case of Kidney Insufficiency

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Abstract Pomegranate oil has many beneficial properties and can be effective in improving health. Some of these properties include: Antioxidant action: Pomegranate oil is rich in antioxidants, which help protect cells from damage caused by free radicals. This can help prevent various diseases and slow down the aging process. Improvement of heart health: Studies have shown that pomegranate oil can help lower cholesterol and blood pressure levels, which can reduce the risk of developing cardiovascular diseases. Improvement of skin health: Pomegranate oil can help improve skin health due to its antioxidant properties. It can help reduce inflammation, heal wounds, and reduce the appearance of wrinkles. Improvement of joint health: Studies have shown that pomegranate oil can help reduce inflammation and pain in joints in arthritis conditions.

Keywords Pomegranate, Medicinal, Oil, Skin, Inflammation, Antioxidant, Cholesterol, Cardiovascular, Aging

1. Introduction

The spleen is an organ located in the upper left part of the abdominal cavity. It plays an important role in the immune system and blood formation.

Anatomically, the spleen has an oval shape, approximately the size of an adult human fist. It is situated in the left upper quadrant of the abdominal cavity, below the diaphragm and behind the stomach. The spleen is covered by a capsule made of connective tissue, and its surface is lined with a thin layer of epithelial cells.

The spleen consists of two types of tissue: white pulp and red pulp. The white pulp contains lymphoid cells and white fibers that participate in the immune defense of the body. The red pulp contains red blood cells, white blood cells, and platelets, which are involved in blood formation and breakdown.

2. The Main Results and Findings

The spleen has a rich network of blood vessels that are integral to its structure and provide a constant blood supply. These vessels also serve to remove damaged or old cells from the blood.

Overall, the spleen performs vital functions in the immune system and blood formation, making it a crucial organ for

maintaining health and well-being.

There are several factors that can negatively impact the health of the spleen, such as:

Alcohol: Consuming large amounts of alcohol can lead to inflammation of the spleen, as well as enlargement.

Infections: Certain infections, such as malaria, Epstein-Barr virus, cytomegalovirus, and others, can cause inflammation of the spleen.

Trauma: Injuries that can damage the spleen can be caused by a blow or trauma during sports activities or accidents.

Certain medications: Some medications can cause damage to the spleen, so it's important to discuss their use with a doctor.

High-fat food: Overeating fatty foods can lead to gallstone disease, which can block the bile ducts and potentially damage the spleen.

Smoking: Smoking can increase the risk of developing inflammatory conditions that can damage the spleen.

Overall, maintaining a healthy lifestyle is important for the health of the spleen. This includes avoiding alcohol consumption, smoking, moderate consumption of fatty foods, managing infections, and avoiding trauma. If you experience any spleen-related health issues, it is important to consult a doctor for diagnosis and treatment.

Kidney failure can have an impact on the spleen as the kidneys and spleen are closely interconnected. Kidney failure can lead to changes in blood composition, iron levels, calcium, and other substances, which can affect the functioning of the spleen.

In the case of kidney failure, blood iron levels may decrease, leading to the development of anemia. The spleen plays an important role in blood formation and may become

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more active in producing red blood cells to compensate for the iron deficiency in the blood. This can result in an enlargement of the spleen and discomfort.

Additionally, kidney failure can disrupt the balance of fluids and electrolytes in the body, which can affect the functioning of the spleen. For example, if there is an imbalance of potassium and sodium in the blood, the spleen may increase its activity to participate in regulating the levels of these substances in the blood.

Overall, kidney failure can have an impact on the functioning of the spleen, but this depends on many factors, such as the degree and cause of the kidney failure.

One of the modern directions in pharmaceutical research is the search for new types of plant materials to expand the range of fatty oils used for medical purposes. The main source of obtaining fatty oils is the seeds and fruits of oil-producing plants. In particular, pomegranate seeds are a source of fatty oil with atypical chemical composition, in which we previously identified the presence of 40-60% unidentified acid using gas chromatography. Based on this data, it is most likely considered to be 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 weight of the seeds. The oil consists of approximately 80% conjugated octadecatrienoic fatty acids with a high content of cis-9, trans-11, cis-13 acids (for example, punicic acid). Secondary components of pomegranate seed oil include sterols, steroids, and cerebrosides. Derivatives of lignin have been found in the seed matrix.

Pomegranate juice contains potassium, which plays an important role in regulating water and salt balance. Therefore, its use is not only desirable but also necessary in kidney diseases. Pomegranate contains a lot of pectin substances, which contribute to the timely removal of toxic substances from the body and stimulate the functioning of the urinary and reproductive organs. To undergo a course of treatment for acute kidney failure, it is recommended to drink a glass of pomegranate juice on an empty stomach in the morning and before bed in the evening, and between these intakes, consume 1/4 glass after meals for two months. The following unconventional medicine recipes are also effective as additional treatments for acute kidney failure: 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 cinquefoil leaves, 1 cup of pomegranate juice, and 2 cups of water.

Preparation and Application Method: Pour boiling water over the herbs and let them steep for 20 minutes. Strain the infusion and add the pomegranate juice. Take the resulting mixture, half a glass, three times a day regardless of meals.

In this experiment, sixteen young female Wistar Albino rats weighing approximately 300 to 320 grams were randomly divided into two groups: the experimental group (receiving pomegranate seed oil) and the control group. Six different wounds were created 1 cm apart from the

midline and each other using a 6 mm biopsy instrument. Three wounds were left open (open wound group), and three wounds were sutured with 4/0 Vicryl (closed wound group). The application of pomegranate seed oil in the treatment group was performed locally on both open and closed wounds once a day for 14 days. Healing parameters were evaluated.

3. Methods and Study

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. The PeriScan PIM3 System Laser Doppler Blood Perfusion Imager was used to calculate blood perfusion. On the 14th day, there was a statistically significant difference in the levels of inflammation and neovascularization in the open wounds compared to the 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 proves effective for treating incised wounds in rats and may be suitable for clinical treatment in humans, but large controlled studies are needed. The developed approach is applied to pomegranate seed oils prepared in the laboratory and tested on commercial samples. Among the laboratory-obtained oils, pomegranate seeds of the EneXhikaz variety contained the highest proportion of pomegranate acid. Among the acids, pomegranate acid had the highest proportion, while linolenic acid had the lowest. These results are important for the identification of pomegranate seed oils. Among the commercial samples tested using this approach, only one showed the same content analysis as the oils obtained in the laboratory. Based on the analysis of literature data and the results of industrial production studies on pomegranate juice, the Food Profile of pomegranate juice presented by the RSPS includes the content of more than 30 food and biologically active substances. The most significant substances in terms of providing micronutrients and minor biologically active 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 provided. The average potassium content in serving size is 15% of the daily requirement, copper is 10%, and magnesium is 5%. For this purpose, carbamylated darbepoetin at a dose of 50 mcg/kg is subcutaneously injected into the area of the scapula of white laboratory rats within 24 hours before modeling kidney pathology by applying atraumatic clamps to the renal pedicles for 40 minutes followed by reperfusion of blood flow into the kidneys. The administration of this drug within the experimentally established time frames at the claimed dose provides effective prevention of ischemic-reperfusion kidney disorders.

4. Conclusions

Thus, the practical significance of this study lies in the fact that it reveals the main principles of formation and development of morphometric indicators of the spleen in case of kidney insufficiency, which allows for the development of appropriate preventive measures. Pomegranate juice has long been used for the treatment and prevention of many kidney diseases. Consuming pomegranate juice has a beneficial effect on the condition and function of the kidneys, and is especially recommended for individuals with acute kidney insufficiency. Pomegranate juice is notable for 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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