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Review Article: Pharmacognosy and Pharmacological Uses of *Punica protopunica*

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Abstract:- Pomegranate, *Punica granatum* provides a number of health advantages. Various disease risk factors, such as hypertension, high cholesterol, oxidative, hyperglycemia, and inflammatory activity, can be prevented or treated using pomegranates. It has been established that some pomegranate constituents, such polyphenols, may have antioxidant, anti-inflammatory, and anticarcinogenic properties. Pomegranate juice has greater antioxidant potential than red wine and green tea, which are produced by hydrolysable tannins and hydrosable tannins. Pomegranate juice helps lessen lipid peroxidation, free radicals, and macrophage oxidative stress. Pomegranate fruit extract also inhibits cell division and triggers apoptosis, which may contribute to its anticarcinogenic benefits. Additionally, ellagitannins prevent the promoter suppression of several inflammatory indicators and their production.

***Keywords*:** *Punica granatum*, Botanical survey, Pharmacological and medicinal uses.

I. INTRODUCTION

The pomegranate tree, also known as anar, is a deciduous shrub or small tree that bears fruit and can reach heights of 5 to 8 metres (16-26 feet). [1] It has been mentioned in numerous ancient manuscripts due to its medicinal and culinary uses, particularly in Babylonian literature, the Book of Exodus, the Homeric Hymns, and the Quran. The word "pomegranate" comes from the Medieval Latin words "pumum" (which means "apple") and "grntum" (i.e., seeded). [2] The pomegranate fruit has a grenade-like form with a deep crimson, leathery skin. Its calyx has a crown-like structure. A tiny quantity of sour and crimson liquid surrounds the seeds, which are separated by a white, membrane pericarp. Traditional Persian medicine places a strong emphasis on changing one's diet among other lifestyle aspects, therefore eating should always come first before taking any prescription. Numerous research have examined the pomegranate's nutritional benefits, such perhaps suitable for use as food additives because to its antimicrobial and antioxidant properties, containing fibre and pectin. [3]

Fig. 1: Pomegranate (*Punica granatum)*

A. Botanical Details:

The pomegranate has just two distinct species: *Punica granatum* and *Punica protopunica*, and it is a member of the Lythraceae family (formerly known as the Punicae). These trees are planted either as ornamental trees or for their eatable fruit. *Punica granatum* var. nana is a frequently grown ornamental plant in gardens and is a dwarf variant of *Punica granatum*. It also differs by having pink blooms rather than red petals and smaller, less delicious fruit. [4]

B. Geographical Region:

P protopunica is exclusively found on the Island of Socotra, but *P grantum* is the major species and is grown everywhere. Punicae is a genus that is primarily native to Persian (modern day Iran). It has been grown for many centuries in Iran, Iraq, Azerbaijan, Armenia, Afghanistan, Pakistan, India, Russia, Bangladesh, and the Mediterranean region. It also thrives in the arid conditions of California and Arizona. [5]

II. COMPOSITION OF CHEMICAL

A. Juice and peel:

Fructose, sucrose, and glucose are all found in good amounts in pomegranate juice. Ascorbic, citric, fumaric, and malic acid are only a few of simple organic acids that are present. Additionally, it has minor concentrations of each amino acid, particularly proline, methionine, and valine. Polyphenols are abundant both in juice and the peel. The two greatest classes, tannins and flavonoids, suggest the pomegranate's medicinal potential due to its peculiar antioxidant and preservation properties.

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B. Seed:

White seeds that have been cleaned and dried contain 18% oil. Punicic acid, an 18-carbon fatty acid with triple conjugation, makes up 65 percent of the oil's composition. Pomegranate seeds contain phytoestrogens which have sexual steroid hormones identical to those in human beings. The 17-alpha estradiol is estrogen's mirror counterpart.

C. Bark and Roots:

The roots and bark of the pomegranate tree are a replete with substances known as alkaloids. They are carbon-based compounds that were once employed in traditional medicine to cure gastrointestinal worms in humans. [6] Table 1 lists the nutritional information of 100 g of raw, edible pomegranate. [7]

Table 1: Pomegranate's nutrient values for 100 g of raw edible portion

Nutrients	Units	Value per 100 g
Water	g	77.93
Energy	Kcal	83
Protein	g	1.67
Total lipid (fat)	g	1.17
Ash	g	0.53
Carbohydrates	g	18.70
Fiber	g	4.0
Sugars, total	g	13.67
Calcium	Mg	10
Iron	Mg	0.3
Magnesium	Mg	12
Phosphorus	Mg	36
Potassium	Mg	236
Sodium	Mg	3
Ascorbic acid, total	Mg	10.2
Choline, total	Mg	7.6

III. PHARMACOLOGICAL USES

A. Anti-inflammatory effect:

Acute inflammation helps the body resist tissue damage, but it can also lead to immune-related conditions such rheumatoid arthritis, inflammatory bowel disease, and cancer [8, 9]. It's interesting to note that several pathways have been found for Pg, Pg to suppress inflammation. Pg inhibits the major enzymes cyclooxygenase (COX) and lipoxygenase (LOX), which convert arachidonic acid into prostaglandins and leukotrienes (important inflammatory mediators), respectively [10].

B. Anti-mutagenicity:

A physical or chemical agent known as a mutagen permanently modifies an organism's genetic material, typically its DNA, increasing the incidence of mutations over the background level. The ability of a chemical or physical substance to bring about such long-lasting change is known as mutagenicity. [11]

C. Other Medicinal Uses:

There have been reports of numerous medicinal properties in the bark, leaves, fruit, fruit juice or extract, and fruit rind of the plant. Various ailments and disorders, such as ulcers, snakebites, liver damage, dysentery, diarrhoea, helminthiasis, acidosis, bleeding, and respiratory issues are treated with plant components. [12, 13] Gastrointestinal disorders are treated using dried, ground buds. As a defence against skin infections, *P. grantum* ashes are utilised. As well as being utilised in the beauty industry, the powder made from its rind is used as teeth powder. *P. grantum* peel extract in aqueous form exhibits action in wound healing. Additionally, low density lipoprotein might be inhibited by fruit juice. The phytoconstituents found in *P. grantum* have anti-inflammatory, antioxidant, antiparasitic, anti-antitzistosomal, antidiabetic, antiviral, antibacterial, and anticarcinogenic properties. [14]

Punica granatum rind extracts in both alcohol and water have antioxidant properties. [15] Flavonoid-rich polyphenol fractions from *Punica granatum* fruit had anti-angiogenic and anti-proliferative effects on breast and prostate cancer cells, as well as anti-invasive, anti-eicosanoid, and pro-apoptotic effects. [16] The tannin content of the fruit rind's methanolic extract resulted in a notable antibacterial activity. [17] To stop diarrhoea, dysentery, and haemorrhages, extracts of the bark, leaves, immature fruit, and fruit rind have been used. [18]

This study used mouse models of diarrhoea produced by magnesium sulphate and castor oil to examine the antidiarrheal efficacy of a methanol extract of *Punica granatum* rind. In vitro assays of different extracts of *P. granatum* fruit in three different cancer cell lines exhibited anticancer activity. [19]

IV. CONCLUSION

The natural ingredients have demonstrated great promise for the treatment of illnesses and problems. This natural ingredient gives us not only a different approach to treating illness, but also a deep understanding of how the human body naturally harmonises. This review unequivocally demonstrates the clinical significance of pomegranates in successfully treating a variety of diseases.

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