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A comprehensive review of Punicagranatum Linn.

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ABSTRACT:
Pomegranate (Punica granatum Linn.) is a member of the Punicaceae family and native of Iran, known for its large, globular fruit with numerous seeds, sweet, edible pulp and rough skin. It is one of the most significant fruit crops in the world's dry and semiarid regions and is grown in India on over 1.13 lakh hectares with a production volume of 7.44 lakh tonnes and a productivity of 6.6 tonnes/ha. It has been picked and eaten due to its phytochemicals, anti-inflammatory, antiviral, and antioxidant properties, as well as the detection of microbicide activity against bacteria and fungus. However, fruit peel is not used in the treatment of the fruit. Globular fruit exports to Mexico and India are a major contributor to the global economy. Perfect fruit quality, enhanced high nutritional worth, immense therapeutic potential, massive demand on the domestic and foreign markets, and extended shelf life makesit a notable fruit crop in the modern era.

Keywords:
Pomegranate, Oral hygiene, Punica granatum Linn., Pharmacognosy and phytochemistry, Chemical constituents, Pharmacological action.

I. INTRODUCTION:

Punica granatum Linn.L. is a common fruit of the Punicaceae family, native to Iran and northern India. It has a pointed calyx and a grenade-shaped, deep crimson, leathery skin. The mature fruit is about five inches broad and has several seeds divided by a white membrane pericarp, each with a scarlet, acidic liquid[1].

The pomegranate tree must survive in both hot, dry summers and cold winters, as the climate must be hot and dry for it to mature and ripen in tropical and subtropical climates. When dormant, it can withstand cold but is hurt at temperatures below -11℃[2].

Pomegranate extract of Punica granatum Linn. It can be used to make marmalades, jellies, and ice cream, and has diuretics, cooling, sugar, fructose, tannins, and oxalic acid properties. It provides minerals, strengthens the heart and kidneys, and promotes resistance to T.B. infection[3].

The pomegranate seed extract is used to prevent nose and gum bleeding, firming up drooping breasts, and reduce cataracts. It is also used as a gargle for sore throats and eye drops to reduce the progression of cataract formation. It aids in preventing aging problems like wrinkles and enabling youthful, radiant skin.

Pomegranates are commercially disseminated over the world during the months of March and July to contain a variety of bioactive substances, including phenolics, tannins, anthocyanins, flavonoids, organic acids, and terpenoids. The fruit's edible parts (seeds, peels, and juice) are used to make drinks and preserves. Natural sciences have been shown to have antibacterial properties, with punicalagin and larger hydrolyzable Tannins like ellagic acid having the most profound effects. Research indicates that combining the active components of the fruit often offers the most effective action[5].

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Table no.1: Vernacular Names [4]

LANGUAGE	NAME
Marathi	Dalimb
Sanskrit	Phalamla, Kuchaphala, Shukavallabha, Raktabeeja, Raktapushpa, Dantabeeja.
Hindi	Anaar
English	Pomegranate
Malayalam	Matalam
Tamil	Matuli
French	Grenadier
Swedish	Granatäpple
Portuguese	Roma
Italian	Melograno
Spanish	Granada
German	Granatapfel
Latin	Punica granatum Linn.
Oriya	Dalimba
Telugu	Dadimbakaya, Dadimma
Urdu	Anar
Assamese	Dalim
Gujarati	Dadam, Dadam phala

Table no. 2: Taxonomical classification of Pomegranate.

Species	Punica granatum Linn.
Genus	Punica
Family	Puniacaceae
Order	Myrtales
Class	Vascular plant
Phylum	Dicotyledons
Kingdom	Plantae
Domain	Eukaryota
Division	Magnoliophytes
Class	Magnoliopsida
Sub-class	Rosidae

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Table no.3: Morphology of pomegranate

Odour	Earthy, fruity, and sweet
Colour	Lemon yellow to all shades of red
Taste	Sweet, astringent
Size	5-12 cm in diameter
Shape	Rounded hexagonal
Edible part	Juicy seed coat

II. MORPHOLOGY:[5 AND6]

1. **The leaves**: The leaves are between 3/4 and 3.5 inches long and 4/10 to 1.2 inches broad, with slender leaf stalks arranged in pairs or threes at an angle between 110 and 130 degrees. The young, reddish leaves turn bright green as they age, with the top of the leaf being a darker green than the bottom. The leaf stem is still reddish.
2. **The flowers:**The most important details of the phrases white, fruit, small clusters, female component, and fruit body are that pomegranate produces its own fruit, both male and female blossoms are present, and the growth of the fruit body has caused the 4 to 15 female carpels arranged in whorls. Flowers on the decorative variety range from white to scarlet, with numerous hues in between.

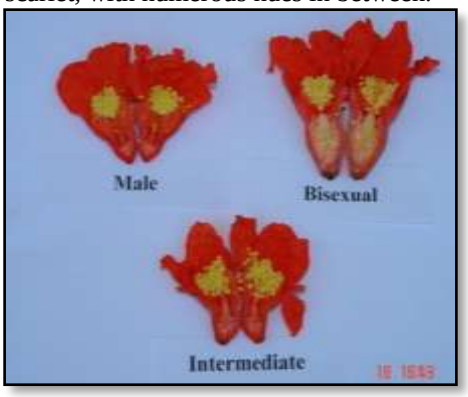

Fig. no. 1: Flowering plant of pomegranate (Male, bisexual and intermediate flowers) [5]

3. **The fruit**:

Fruit is a low-quality fruit that has a variety of fleshy seeds and is typically brown or green with reddish streaks on the surface. Americans tend to find red the most attractive skin tone because it is the most prevalent in the nation.

Figure no. 2: The mature fruit of the pomegranate[5]

4. **The bark**: With alternating open branches that are occasionally prickly at the apex, the trunk is roughly spherical, upright, and ramified. As the bark ages, it develops fissures and a greyish hue. It seems twisted and tangled[5,6 and 9].
5. **Roots**: The plant root is the simplest form of a plant's spatial arrangement. It involves the type of plant being cultivated, the composition of the soil, and the availability of nutrients are just that might affect this system, which can be highly complex. The roots of pomegranate trees or shrubs are relatively shallow, which means they have little depth. The root of a pomegranate isn't necessarily big [6 and 10].

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III. PHYTOCHEMICAL STUDIES:

Pomegranates, including their leaves, bark, and roots, may have healing qualities, such as antibacterial and antioxidant action. The therapeutic potential of many compounds, including ellagic acid, ellagitannins, catechin, punicic acid, flavonoids, anthocyanidins, anthocyanins, estrogenic flavanol, and flavones, appears to be highest when they are released. Pomegranate peels are a great source of salt, potassium, nitrogen, calcium, magnesium, phosphorus, and other minerals and polysaccharides. According to recent studies, many pomegranate components work together to prevent prostate cancer more effectively than ellagic acid alone. Peel extract contains alkaloids, which produce favorable findings in the Dragondroff assay but unfavorable results in Mayer's assay [11,12,13 and 14].

Table no. 4: Chemical constituents of pomegranate

1.	Hydroxy benzoic acid	Gallic acid, Ellagic acid
2.	Hydroxycinnamic acid	Caffeic acid, Chlorogenic acid, p-Coumaric acid
3.	Cyclitol carboxylic acid	Quinic acid
4.	Flavonoidsdes and their glycosides	Catechin, Epicatechin, Epigallocatechin-3-gallate, Quercetin, Kaempferol, Luteolin
5.	Ellagitannin	Punicallin, Punicalgin, Corilagin Penduneulagin, Granatin A, Granatin B
6.	Alkaloid	Pelleteriene
7.	Anthocyanins	Cyanidin 3,5-diglucoside, Delphinidin 3-glucoside, Cyanidin 3-glucoside, Pelargonidin 3-glucoside.
8.	Icosanoic acid	Arachidic acid, Gadoleic acid

IV. PHARMACOLOGICAL ACTIONS:

i. Rheumatoid arthritis:

Malek Mahdavi A. et al. (2021) discovered that pomegranate peel extract may inhibit the activation of NF-B and proinflammatory genes and may prevent the adverse effects of RA medications.

ii. Antibacterial:

According to Ferrazzano GF et al. (2017), P. granatum contains pharmacological properties, such as antifungal and antibacterial activity. Punicalagin was discovered to inhibit the growth of both gram-positive and gram-negative bacterial strains, including Candida albicans, Pseudomonas aeruginosa, Salmonella enteritidis, Escherichia coli, Staphylococcus epidermidis, Staphylococcus xylosus, Lactolococcus aureus, and streptococcus mutant.

iii. Blood Pressure lowering action:

According to Stockton A et al. (2017), pomegranate exhibits antihypertensive activity due to Vitamin C, which can affect Diastolic blood pressure and reduce Cardiovascular Vascular Disease risk factors. Punicalagin's primary function is to help keep blood pressure in check.

iv. Cardiotonic:

Stockton A et al. (2017) studied the presence of Antioxidants and found that Vitamin C has cardioprotective action, which is favorable for CVS health. Pomegranate juice also slows or stops the progression of ischemic lesion regions, providing further cardioprotective advantages, such as having a favorable impact on systolic blood pressure and intimal media thickness.

v. Diabetes - Glucose level lowering:

Arun KB et al. (2017) studied that the crude extracts obtained by extraction of PP (at a temperature of 28–30 °C) with different solvents were analyzed for their antidiabetic potential. Crude extracts with better activity were fractionated using hexane, ethylacetate, and methanol. These fractions were assessed for their efficacy as described for the crude extracts

vi. Anticancer:

Delgoda R. et al. (2016) studied the potential of pomegranate fruit extracts (PFE) for potential therapeutic applications in the treatment of cancer, Alzheimer's, cancer, diabetes, and male infertility. Studies have shown both therapeutic and chemopreventive effects against prostate cancer in vitro and in vivo, with PFE being effective in preventing tumor growth.

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vii. **Helpful in Digestion:**Viladomiu M. et al. (2013) and Sengul H. et al. (2014) studied that Pomegranate juice, seed, and peel extract are beneficial for gut flora;Colombo E. et al. (2013) studied that pomegranate possesses anti-inflammatory activity. As the body's primary physiological defense mechanism, inflammation may guard against harm from physical wounds, toxins, etc. Pomegranate contains high amounts of dietary fiber, which helps in regulating digestion and promote bowel movement. It also contains compounds that help in reducing inflammation in the gut, preventing conditions such as inflammatory bowel disease (IBD).

viii. **Anti-inflammatory activity:**Colombo E. et al. (2013) studied that pomegranate possesses anti-inflammatory activity. As the body's primary physiological defense mechanism, inflammation may guard against harm from physical wounds, toxins, etc

Pomegranate contains several bioactive compounds such as punicalagin, ellagic acid, and anthocyanins that possess potent anti-inflammatory properties. These compounds help in reducing inflammation throughout the body and may be beneficial in treating conditions such as arthritis, heart disease, and cancer

ix. **Memory improvement:**.Bookheimer SY.et al.(2013) The ability of dietary antioxidants to prevent memory loss and the importance of nutrition as a foundation for neurological health are both being emphasized more and more, although systematic studies examining the cognitive benefits of meals and their constituents are still uncommon. Recent animal studies have shown that the rich polyphenols in pomegranate juice are beneficial for memory and other cognitive functions.

Pomegranate contains polyphenols, which have been shown to improve cognitive function and memory in animal studies. These polyphenols also have neuroprotective effects and may be beneficial in preventing or treating neurodegenerative diseases such as Alzheimer's disease.

x. **Antiviral activity:**Arun N. et al. (2012) studied that Pomegranate polyphenolic chemicals have a wide range of applications, including the treatment of viral illnesses like influenza.Pomegranate has been shown to have antiviral activity against several viruses, including influenza, herpes simplex virus, and human immunodeficiency virus (HIV). Some studies have suggested that pomegranate extracts may have potential as a natural antiviral therapy.

xi. **Wound Healing:**Arun N. et al. (2012) studied that Gallic acid and catechin are the major components of Punica granatum Linn. which are responsible for the healing activity. The methanolic extract of dried pomegranate (Punica granatum Linn.) peels showed the presence of a high content of phenolic compounds (44.0%). extract of P. granatum peel possesses good wound-healing activity.Pomegranate contains compounds that help in promoting wound healing and tissue regeneration. These compounds stimulate the production of collagen, which is essential for wound healing and skin health.

xii. **Antioxidant activity:**Viuda-Martos M et al. (2011) studied the large percentages of natural chemicals with considerable antioxidant activity found in pomegranates making them a potential source of these moleculesPomegranate is a rich source of antioxidants, which help in neutralizing harmful free radicals in the body. These antioxidants may be beneficial in preventing or treating several chronic diseases such as cancer, heart disease

Ge S. et al (2006) studied that one class of tannins is an ellagitannin, which may be converted into hydroxybenzoic acids like ellagic acid. It is frequently used in plastic surgery because of its antioxidant action, which reduces the death of skin flaps. Punicalagin and punicalin are two additional that may be discovered in pomegranate juice and peel. Anthocyanins, flavan-3-ols, and flavanol’s are only a few of the flavonoids found in pomegranates.

V. TRADITIONAL USES:

Pomegranate is a beneficial treatment for a number of illnesses, including lowering the chance of preterm delivery, assisting expectant women in avoiding having low-weight kids, preventing age-related issues, and helping people get through a melancholy phase. With the astringent qualities of

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the flower juice, rind, and tree bark, it can also be used to treat hemorrhoids, and difficulties with erectile dysfunction, and to increase sperm quality and count. It can also be applied topically to treat hemorrhoids and used as a gargle for sore throats.

VI. CONCLUSION:

According to traditional literature, Punica granatum Linn. is effective in treating a wide range of illnesses, including kidney stones, internal bleeding, kidney, irritable bladder condition, painful urination, burning feeling, and difficulty with urine discharge. Flowers are used for cough, sterility, piles, anemia, dental problems, diarrhea, dysentery, hyperacidity, and cardiotonic conditions. Punica granatum Linn. extracts and compounds have been biologically screened and have demonstrated antioxidant, antiperoxidative, antibacterial, inflammatory, antitumor, hepatoprotective, antiatherogenic, and antidiarrheal properties. Punica granatum Linn., according to recent findings, contains a variety of polyphenols, primarily ellagitannins, gallotannins, tanninmetabolites anthocyanins, punicacortin D, punicalin, and punicalagin.

There is ongoing research into the potential benefits of pomegranate peel extract for a variety of health conditions. Some studies have suggested that the extract may have the potential as a treatment for diabetes. The extract is rich in polyphenols, particularly tannins, which have anti-inflammatory, anti-cancer, and antimicrobial properties. Future perspectives of studies will provide more information about its potential benefits and applications.Overall, the future perspectives of pomegranate peel extract studies seem to be promising and the results of ongoing research will provide more information about its potential benefits and applications.

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