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Gulnar (*Punica granatum* L. Flowers): A comprehensive review of phytochemistry, pharmacological properties, and Unani perspectives

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Abstract
Introduction: Gulnar, the dried flower buds of *Punica granatum* L. (pomegranate), has been widely used in Unani, Ayurvedic, and Persian traditional systems of medicine for the management of inflammation, gastrointestinal ailments, oral diseases, and wound healing. Classical texts describe its actions as *Qabid* (astringent), *Mohallil-e-Warm* (anti-inflammatory), and *Mundammil-e-Qurooh* (ulcer healing). Growing scientific interest has focused on validating these traditional claims, particularly regarding its anti-inflammatory and antioxidant effects.
Methods: A comprehensive review of classical Unani literature and scientific databases (PubMed, Scopus, Google Scholar, Web of Science) was conducted. Studies on botany, ethnopharmacology, phytochemistry, and pharmacological activities of Gulnar were examined, with particular focus on *in vitro*, *in vivo*, and limited clinical studies assessing anti-inflammatory, antimicrobial, antioxidant, and wound-healing effects.
Results: Gulnar contains abundant bioactive compounds, notably polyphenols, ellagitannins, flavonoids, tannins, ellagic acid, gallic acid, and anthocyanins. Experimental evidence supports its strong anti-inflammatory potential via inhibition of COX-2, TNF-α, NO synthase, and oxidative stress. Additional activities include antimicrobial, astringent, gastroprotective, and wound-healing effects.
Discussion: The available evidence supports the traditional Unani claims regarding Gulnar's anti-inflammatory and tissue-healing properties. A clear correlation exists between its phytochemical composition and pharmacological activities. However, standardization of extracts, dose optimization, and clinical validation remain major research gaps.
Conclusion: Gulnar represents a promising natural anti-inflammatory and therapeutic agent, bridging traditional knowledge with modern scientific validation. Further well-designed preclinical and clinical studies are essential for its incorporation into evidence-based herbal medicine.

Keywords: Gulnar, *Punica granatum* L., pomegranate flower, Unani medicine, anti-inflammatory, antioxidant, phytochemistry, pharmacology, traditional medicine

1. Introduction
Medicinal plants remain vital in traditional medicine and serve as important sources of novel therapeutic agents. Among them, *Punica granatum* L. (pomegranate), belonging to family Lythraceae, has been valued for centuries for its extensive medicinal and nutritional uses. The dried flowers of this plant, commonly known as Gulnar, are widely employed in Unani, Ayurvedic, and Persian traditional systems for treating inflammatory and ulcerative disorders [1-7]. Classical Unani literature attributes several therapeutic properties to Gulnar, such as *Qabid* (astringent), *Mohallil-e-Warm* (anti-inflammatory), *Mundammil-e-Qurooh* (wound and ulcer healing), and *Habiss-ud-Dam* (styptic) [8, 9]. It has traditionally been used for stomatitis, gingivitis, diarrhea, dysentery, menorrhagia, leucorrhoea, skin inflammation, and chronic ulcers [5-7].
Phytochemical analyses reveal that Gulnar contains diverse bioactive constituents including flavonoids, tannins, polyphenols, ellagitannins, anthocyanins, gallic acid, and ellagic acid-all of which exhibit significant antioxidant and anti-inflammatory activities [1-4]. Pharmacological studies indicate that its extracts inhibit inflammatory mediators, modulate COX and LOX pathways, reduce oxidative stress, and promote tissue repair [3, 10].
Despite extensive traditional usage, the scientific data available on Gulnar remain scattered and require systematic presentation.

This review compiles classical Unani knowledge, botanical features, phytochemistry, pharmacology, and current research on Gulnar, aiming to establish a comprehensive understanding and identify future research needs.

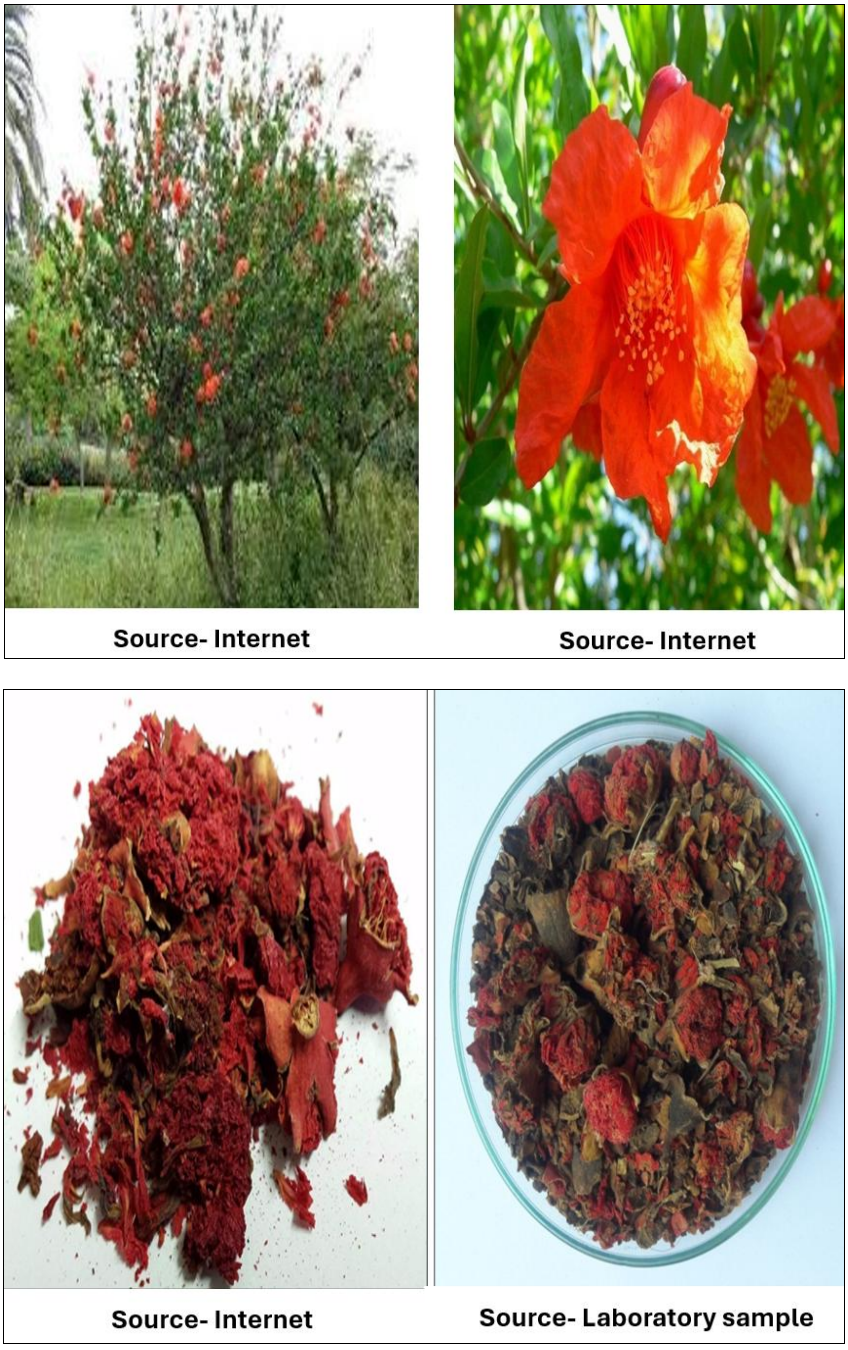

Fig 1: *Gulnar (Punica granatum* Linn.*)*

2. Botanical Overview of *Punica granatum* L.

2.1 Botanical Description

Punica granatum is a deciduous shrub or small tree (2-5 m), much-branched and often spiny. Leaves are opposite or sub-opposite, entire, glabrous, and shiny green. Flowers are large, bright red to orange-red, with a persistent tubular leathery calyx and numerous stamens. The ovary is inferior and multilocular [1, 2]. The fruit is a globose berry with a leathery rind and numerous aril-covered seeds.

2.2 Unani Medicine Concept

In Unani medicine, the plant is called *Rumman*, and its dried flowers are known as Gulnar. Gulnar is recognized for its *Qabiz* (astringent), *Mubarrid* (cooling), and *Habiss* (styptic) effects. It is used to manage diarrhea, bleeding disorders, ulcers, and inflammation [2].

The presence of tannins correlates with its astringent and anti-inflammatory actions.

3. Taxonomical Classification

Taxonomic Rank	Classification
Kingdom	Plantae
Subkingdom	Tracheobionta
Division	Magnoliophyta
Class	Magnoliopsida
Order	Myrtales
Family	Lythraceae
Genus	*Punica*
Species	*Punica granatum* L.

4. Flowering, Cultivation, and Collection

4.1 Flowering

Flowering occurs between April-July, varying by climatic region. In warmer climates, multiple flowering cycles may occur annually [1-3].

4.2 Cultivation

The plant thrives in hot, dry climates with well-drained soil. Propagation is mainly via stem cuttings. It is drought tolerant but sensitive to waterlogging. Regular pruning enhances flowering [1-3].

4.3 Collection

Medicinal flowers (Gulnar) are collected at full bloom, hand-picked, and shade-dried to preserve phytochemicals. They are stored in airtight containers away from heat and moisture [1-3].

5. Vernacular Names

A multilingual summary of names demonstrates its widespread cultural usage:

- **Arabic:** Rumman, Zehwarurumman
- **Persian:** Anar, Gul Anar Dashti
- **English:** Pomegranate
- **Hindi:** Anar, Daram
- **Urdu:** Anar
- **Tamil:** Madulai
- **Bengali:** Dalim
- **Sanskrit:** Dadima-phalam and many others.

6. Chemical Composition

Punica granatum contains a broad spectrum of bioactive compounds:

6.1 Polyphenols and Tannins

- Punicalagin
- Punicalin
- Ellagitannins
- Gallotannins

These contribute to strong astringent and antioxidant actions [1, 4].

6.2 Phenolic Acids

- Ellagic acid
- Gallic acid
- Caffeic acid
- Chlorogenic acid

These compounds have proven antioxidant and anti-inflammatory activities [1-3].

6.3 Flavonoids

- Quercetin
- Kaempferol
- Luteolin

Present primarily in flowers and rind, they exhibit anti-inflammatory and cytoprotective properties [2, 3].

6.4 Anthocyanins

Responsible for red coloration; include:

- Delphinidin
- Cyanidin
- Pelargonidin derivatives

These are potent antioxidants.

6.5 Other Constituents

- Organic acids (citric, malic, tartaric)
- Sugars (glucose, fructose)
- Pelletierine alkaloids (in bark)
- Sterols, triterpenoids, vitamins, minerals

7. Unani Perspective (Mahiyat, Mizaj, Actions, Uses)

7.1 Mahiyat (Description)

Gulnar consists of wild pomegranate flower buds, red to dark orange, used medicinally for their astringent and styptic properties.

7.2 Parts Used

- Gulnar (flowers)
- Anardana
- Post Anar
- Post Beekh Anar

7.3 Mizaj (Temperament)

Cold and Dry (2°)

7.4 Therapeutic Dose

3-7 g orally

7.5 Adverse Effects

- Headache
- Intestinal obstruction

7.6 Correctives

Gum Kateera

7.7 Substitutes

- Chal Anar
- Jaft Baloot

7.8 Medicinal Actions

Unani texts describe Gulnar as:

- *Qabid* (astringent)
- *Mujaffif* (desiccant)
- *Habissuddam* (hemostyptic)
- *Muhallil* (resolvent)
- *Muqavvi Dandan-o-Lissa* (gum tonic)

7.9 Medicinal Uses

Indicated in:

- Diarrhea, dysentery, ulceration
- Hemorrhoids, hemoptysis
- Gingivitis, stomatitis, gum bleeding
- Leucorrhoea
- Infantile diarrhea
- Nasal hemorrhage
- Boils, erysipelas

8. Phytochemical Studies

Studies confirm presence of:

- Pelargonidin-3,5-diglucoside
- Sitosterol and ursolic acid

- Maslinic and asiatic acids
- Gallic and ellagic acids
- D-mannitol

This diverse profile supports antioxidant, antimicrobial, and anti-inflammatory actions.

9. Pharmacological Activities

9.1 Anti-inflammatory Activity

Gulnar extracts inhibit:

- COX-2 enzyme
- Nitric oxide synthase
- TNF-α
- Pro-inflammatory cytokines

They reduce edema, oxidative stress, and tissue inflammation [1, 3, 4].

9.2 Antimicrobial Activity

Studies report:

- Effective inhibition of *Candida albicans*
- Strong antibacterial effects against *Streptococcus mutans*, *S. sanguinis*, *Enterococcus faecalis*
- Activity against *Bacillus* species and enteric pathogens

9.3 Wound Healing

Topical extracts accelerate:

- Collagen formation
- Epithelialization
- Neovascularization

Burn wounds in rats showed faster healing with Gulnar extract than silver sulfadiazine [5, 7].

9.4 Antioxidant Activity

Punicalagin, ellagic acid, anthocyanins, and tannins prevent oxidative stress, lipid peroxidation, and cellular damage.

9.5 Gastroprotective & Antidiarrheal

Tannins strengthen the intestinal mucosa, reduce secretions, and support ulcer healing.

9.6 Anticancer Potential

Extracts modulate:

- Apoptosis
- Angiogenesis
- Tumor cell proliferation pathways

9.7 Cardioprotective and Antidiabetic

Regular use reduces LDL oxidation and improves glucose metabolism.

10. Discussion

The extensive phytochemical diversity of Gulnar explains its broad pharmacological profile. The presence of bioactive compounds such as ellagic acid, gallic acid, punicalagins, and flavonoids strongly correlates with its anti-inflammatory, antioxidant, antimicrobial, and wound-healing effects.

Traditional Unani descriptions align remarkably well with modern pharmacological findings. The astringent and styptic properties attributed to tannins, as well as the anti-inflammatory and ulcer-healing actions noted in classical texts, are validated by experimental studies.

However, despite robust preliminary evidence, research gaps remain:

- Lack of standardized extract preparations
- Insufficient dose-response and toxicity studies
- Very limited clinical trials
- Need for mechanistic insights into bioactive pathways

Future research should focus on advanced molecular studies, pharmacokinetic profiling, and controlled clinical evaluations to support therapeutic integration.

11. Conclusion

Gulnar (*Punica granatum* L. flowers) represents a pharmacologically rich natural therapeutic agent with strong anti-inflammatory, antimicrobial, antioxidant, and wound-healing activities. Its traditional usage is well supported by modern research. However, further scientifically rigorous studies are necessary to establish standardized formulations, clinical efficacy, and safety profiles.

12. Conflict of Interest

Not available.

13. Financial Support

Not available.

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