



PHALSA (GREWIA ASIATICA): AN UNDEREXPLORED FRUIT WITH EMERGING NUTRACEUTICAL AND THERAPEUTIC POTENTIAL

Dr. Vineeta Singh¹, Dr. Mangalagowri V. Rao^{2*}

¹ Ph.D. Scholar, Dept. of Swasthavritta and Yoga, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi – 221005 [Orchid Id - 0000-0003-4885-856X](#)

Email id – vinita.vinni28@gmail.com

^{2*} Associate Professor, Dept. of Swasthavritta and Yoga, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi – 221005 [Orchid Id- 0000-0002-3549-3576](#)

Email ID - mangowri@gmail.com

***Corresponding Author:** Dr. Mangalagowri V. Rao

Associate Professor, Dept. of Swasthavritta and Yoga, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University, Varanasi – 221005 [Orchid Id- 0000-0002-3549-3576](#)

*Email ID - mangowri@gmail.com

Phone no - 8178704037

ABSTRACT

Background: *Grewia asiatica* Linn. (*Phalsa*), commonly known as *Parushaka* in Ayurvedic classics. It is an important nutritious and therapeutic fruit widely used in traditional systems of medicine. In Ayurveda manuscripts this fruit acts as anti-inflammatory, cardiogenic, nutritious, and protective, with significant relevance in dietetic and therapeutic practices.

Objective: This review highlights the nutritional composition, Ayurvedic attributes, and pharmacological activities of *Grewia asiatica*, reflecting its potential as a functional food and therapeutic applications.

Methods: Detailed information about the *Phalsa* (*G. asiatica*) has been searched from classical Ayurvedic literature, AYUSH Portal and Namaste Portal and contemporary scientific research focussing on phytochemistry, nutritional value, therapeutic potential by databases such as DHARA, Scopus, Web of Science, PubMed, PubMed Central, Medline, Springer, Google scholar, and Wiley.

Results: *Phalsa* (*Grewia asiatica*) fruits are rich in vitamins (A, B-complex, and C), minerals (Ca, Fe, K, Mg), dietary fibre, and bioactive phytochemicals including flavonoids, anthocyanins (particularly cyanidin-3-glucoside), sterols, tannins, and triterpenoids. In Ayurveda texts, *Phalsa* demonstrates *Madhura*, *Amla*, *Kashaya rasa*, and *Sheeta veerya* exhibiting *Pittavatahara* and *Hridya* properties. Preclinical as well as clinical studies show an extensive range of pharmacological properties, i.e. antioxidant, antidiabetic, cardioprotective, anti-inflammatory, analgesic, antimicrobial, anticancer, immunomodulatory, and radioprotective effects.

Conclusion: *Grewia asiatica* represents a valuable integrative therapeutic fruit with rich in nutritional content with potent Ayurvedic properties and evidence-based pharmacological activities.

Keywords: *Parushaka*, Anticancerous, Anti-inflammatory, Antioxidant, Anthocyanins

Introduction

Grewia asiatica L. (family: *Malvaceae*), also known as *Phalsa* or *Parushaka*, is a medicinal plant and a fruit that is native to Southeast Asian countries like India, Pakistan, and Cambodia¹. In India it grows especially in the states of Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, West Bengal etc. Taxonomically it is classified under Class, *Magnoliopsida* and Order: *Malvales*². In Ayurveda, *Phalsa* (*Parushaka*; *Grewia asiatica*) is described in major classical texts. In *Charaka Samhita*, it is included under *Virechanopaga*, *Shramahara*, *Mahakashaya*, and *Phalavarga*³. In *Sushruta Samhita*⁴, *Ashtanga Samgraha*, and *Ashtanga Hridaya*, it is placed under *Parushakadi Gana* and *Phalavarga*. In later Nighantus such as *Bhavaprakasha*⁵, *Dhanvantari*⁶, and *Raja Nighantu*, it is classified mainly under *Amradi/Phala Varga*. From pharmacological aspects it acts as analgesic, anti-inflammatory, antioxidant, and radioprotective⁷. This review emphasized the nutritional value, Ayurvedic attributes, and pharmacological actions of *Grewia asiatica*.

Methodology - A comprehensive literature search was conducted across electronic databases including PubMed, Scopus, Web of Science, ScienceDirect, DHARA, and Google Scholar to identify relevant studies published up to January 2025. The search strategy incorporated keywords such as “*Grewia asiatica*,” “*Phalsa* phytochemistry,” “*Parushaka* Ayurveda,” “*Grewia asiatica* antioxidant,” “*Grewia asiatica* antidiabetic,” and “*Grewia asiatica* anticancer.” Boolean operators were applied where appropriate to refine search outputs.

Studies were included if they comprised original research articles reporting *in vitro*, *in vivo*, or clinical investigations, as well as phytochemical analyses of different parts of *Grewia asiatica*. Relevant review articles were also consulted to provide contextual and background information. Articles were excluded if they were non-English publications without accessible translations, unverified ethnobotanical reports lacking scientific validation, or duplicate publications identified across databases.

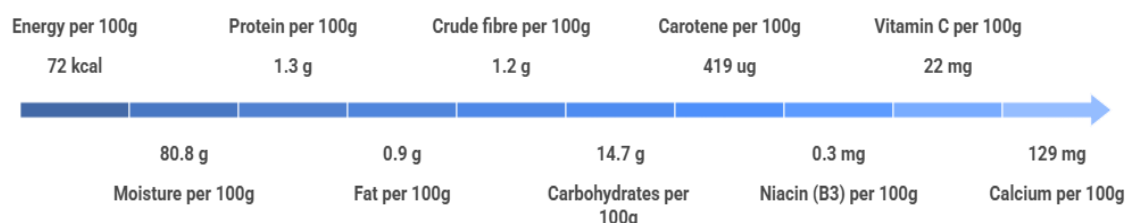
Results

The systematic review of classical Ayurvedic literature and contemporary scientific databases identified substantial evidence supporting the nutritional richness and pharmacological potential of *Grewia asiatica* (*Phalsa*). The findings are organized into phytochemical composition, traditional Ayurvedic attributes, and experimentally validated pharmacological activities.

Nutritive and Phytoconstituent Composition of *Phalsa* Fruit

Phalsa fruit is enriched in carbohydrates, dietary fiber, vitamin C, provitamin A carotenoids, iron, calcium, potassium, and magnesium (fig 1).

Nutritional Composition of *Phalsa* Fruit (*Grewia Asiatica*)



Mineral composition of *Phalsa* fruit⁸

Mineral	mg/100 g Fresh Fruit
Chromium	1.08
Cobalt	0.99

Copper	0.48
Iron	3.1
Nickel	2.61

Phytoconstituent Composition of *Phalsa* Fruit

Phalsa rich in high polyphenol and anthocyanin content, responsible for its deep purple coloration and potent antioxidant capacity. LC-MS/MS and GC-MS have identified key bioactive constituents including delphinidin-3-glucoside, cyanidin-3-glucoside, myricetin, quercetin, naringenin, pelargonidin, gallic acid, ferulic acid, and linoleic acid-rich seed oil fractions. These compounds collectively contribute to *Phalsa*'s multifaceted biological activity. The major bioactive compounds in *Phalsa* are as follows:

Anthocyanin

Phalsa indigenous fruit is rich in seven anthocyanins, namely cyanidin-3-O-(6"-acetylglucoside) present abundantly at 44–63 %, delphinidin-3-O-glucoside, malvidin-3-O-glucoside pyruvic acid, pelargonidin-3-O-(6"-acetylglucoside), pelargonidin-3-O-malonyl glucoside, peonidin-3-O-(6"-acetylglucoside), and peonidin-3-O-glucoside occurring in proportions of 8–14 % and 3–30 %, respectively⁹. These anthocyanins have strong antibacterial properties against gram-negative and gram-positive species of bacteria.

Flavonoids

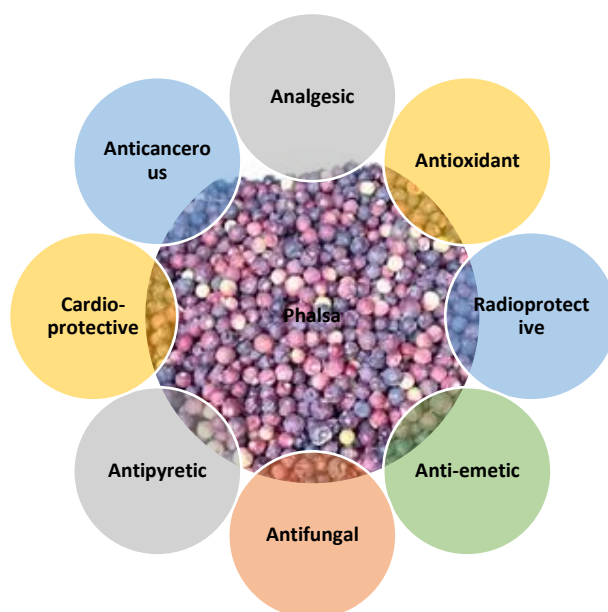
In *Grewia asiatica* (*Phalsa*), flavonoids are present in various plant parts including callus, stem, bark, leaves, fruit, and pomace. They are broadly classified into six major groups: anthocyanins, flavones, isoflavones, flavanones, flavan-3-ols, and flavonols¹⁰. Both in vivo and in vitro studies have demonstrated significant flavonoid content in stem and leaf extracts. Quantitative analyses report approximately 12.42 ± 0.56 mg catechin equivalents (CE)/g in *phalsa* pomace and 39.11 ± 4.65 mg/g in the rind or bark¹¹.

Tannin

Tannins are water-soluble polyphenolic compounds with strong protein-binding capacity and astringent properties¹². In *Grewia asiatica* (*Phalsa*), tannins are present in the fruit, leaves, stem, bark, roots, and seeds¹³. The fruit contains approximately 1.13–2.46% tannins, while pomace contains about 0.5 g/100 g. Methanolic and acetone extracts rich in tannins exhibit antimicrobial activity and may contribute to protective effects against chronic diseases such as cancer, cardiovascular disorders, diabetes, and kidney diseases.

Properties and therapeutic Action of *Phalsa* (*Grewia Asiatic*) mentioned in Ayurvedic Texts¹⁴:

Rasa (Taste)	<i>Madhura</i> (sweet), <i>Amla</i> (sour), <i>Kashaya</i> (Astringent)
Guna (Properties)	<i>Laghu</i> (light), <i>Snigdha</i> (Unctuous)
Veerya (Potency)	<i>Sheeta</i> (cold)
Vipaka (Post digestive effect)	<i>Madhura</i> (sweet)
Dosha-Prabhava	<i>Pittavatahara</i> (alleviate <i>pitta</i> and <i>vata dosha</i>)
Karma (Therapeutic Action)	<i>Brihana</i> (Nourishment), <i>Hridya</i> (Cardiac-tonic), <i>Rochana</i> (Appetite enhancer), <i>Vishtambhi</i> (Constipation)



Anti-cancerous - Methanolic extract of *Grewia asiatica* fruit demonstrated selective cytotoxicity against lung and breast cancer cell lines, with no effect on normal cells or certain other cancer types¹⁵. Methanolic extract of *Grewia asiatica* showed significant anticancer effects, prolonging survival in EAC-bearing mice and exhibiting notable cytotoxicity against multiple cancer cell lines¹⁶.

Analgesic and antipyretic activity - The aqueous extract of *Grewia asiatica* fruits exhibits significant analgesic and antipyretic activities. At doses of 200–300 mg/kg, it effectively reduces pain in acetic acid-induced writhing and tail immersion tests. At 400 mg/kg, it shows a stronger antipyretic effect than aspirin (100 mg/kg) against lipopolysaccharide-induced pyrexia¹⁷.

Antihyperglycemic activity - Different solvent extracts of *Grewia asiatica* fruit variably influence ROS production, and the fruit exhibits a low glycemic response with antioxidant modulation in healthy non-diabetic humans¹⁸. Ethanolic extracts and solvent fractions of *Grewia asiatica* (fruit, stem bark, and leaves) significantly lowered blood glucose levels in alloxan-induced hyperglycaemic rabbits, demonstrating strong antidiabetic activity¹⁹.

Antioxidant Activity – *Grewia asiatica* contains abundant antioxidants such as vitamin C, anthocyanins, flavonoids, tannins, and total phenolic compounds²⁰.

Radioprotective Properties – The study demonstrated the in-vitro cytotoxic potential of aqueous extracts of *Grewia asiatica* fruits and leaves using the MTT assay. The extracts were evaluated against various cancer cell lines, including HEK-293 (human embryonic kidney), NCI-H522 (lung cancer), HeLa (cervical cancer), Hep-2 (laryngeal cancer), and MCF-7 (breast cancer). The results showed that both fruit and leaf extracts exhibited significant cytotoxic activity, with distinct effects particularly against liver and breast cancer cell lines²¹. Treatment with *Grewia asiatica* fruit pulp extract in mice subjected to 5 Gy gamma irradiation significantly reduced the increased lipid peroxidation levels²².

Antiemetic Activity – A study conducted in dogs as an experimental model demonstrated that the alcoholic fruit extract of *Phalsa* (*Grewia asiatica*) possesses significant antiemetic properties. An oral dose of 120 mg/kg produced a marked antiemetic response within three hours and effectively suppressed apomorphine-induced vomiting (0.044 mg/kg). The observed effect was comparable to that of standard antiemetic drugs such as metoclopramide (Maxolon) and chlorpromazine (Largactil)²³.

Anti-fungal Activity - Methanolic leaf extract of *Grewia asiatica* showed strong antifungal activity, especially against *Candida albicans*, whereas *Aspergillus niger* was resistant²⁴.

Antiplatelet Activity: Methanolic extract of *Grewia asiatica* inhibits platelet aggregation in a dose-dependent manner (1–10 mg/mL), indicating potential benefits in preventing cardiovascular and inflammatory disorders²⁵.

Immunomodulatory Effects - In one study, the ethanolic extract of *Grewia asiatica* fruit at doses of 200 and 400 mg/kg exhibited significant immunostimulatory activity. It reversed cyclophosphamide-induced suppression of immunity by restoring total WBC count, percentage of neutrophils, and haemoglobin levels, and also increased the phagocytic index in the carbon clearance assay²⁶.

Discussion

Phalsa (*Grewia asiatica*) represents a whole convergence of traditional wisdom and contemporary pharmacology, underpinned by its rich nutritional and phytochemical profile. The fruit's high anthocyanin content, particularly cyanidin-3-O-(6"-acetylglucoside) at 44–63%, alongside flavonoids like quercetin and myricetin, directly correlates with its observed antioxidant potency, as evidenced by DPPH scavenging and ROS modulation in preclinical models. These bioactives validate Ayurvedic attributes such as *Sheeta veerya* and *Pittavatahara* properties, which align with anti-inflammatory effects surpassing aspirin in writhing and pyrexia assays (200–400 mg/kg doses)²⁷. Similarly, the *Hridya* (cardiotonic) action finds support in antiplatelet activity (1–10 mg/mL inhibition) and radioprotective benefits against 5 Gy gamma-induced lipid peroxidation, likely via Nrf2-mediated pathways that mitigate oxidative stress in vital organs like the heart and liver

Conclusion

Grewia asiatica represents a promising nutraceutical fruit supported by extensive preclinical evidence. Its antioxidant, anti-inflammatory, antidiabetic, cardioprotective, and anticancer properties justify further investigation. Rigorous clinical trials and standardization are essential for translational advancement.

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