

Ethnomedicinal and Nutritional Properties of *Grewia asiatica* L.

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Abstract

Grewia asiatica L. commonly known as Phalsa which belongs to Tiliaceae family is one of the important species of genus *Grewia* originated from Southeast Asia. The species is generally grows in dry and hot arid environment. Berry or Fruits come in the month of May-June. The berry of the species is very popular generally used as raw fruit, fresh juice, medicine and food additive. The berries are rich source of antioxidants and bioactive nutrients such as phenols, flavonoids, anthocyanins, tannins, vitamins, proteins, amino acids and minerals. Pharmacologically the plant parts have antimicrobial, anti-cancer, antiplatelet, antiemetic, anticancer, antioxidant, radioprotective and antihyperglycemic, analgesic and anti-inflammatory properties. The aim of the present study was to review the ethnomedicinal properties and nutritional value of *G. asiatica*.

Keywords: *Grewia asiatica*; Ethnomedicinal; Nutritional; Pharmacological Properties

Abbreviations: DW: Dry Weight; FW: Fresh Weight

Introduction

Grewia asiatica popularly known as Phalsa in Hindi is an important shrub species of family Tiliaceae generally found in tropical and subtropical regions of South Asian countries [1,2]. The plant is popular because of its high medicinal and nutritional properties [3]. The plant is hard and bushy suitable to grow in hot arid and hilly areas. *G. asiatica* is cultivated in the month of June-July in rainy season. The plant is mostly cultivated to get fruits and use the plants for medicinal uses. The fresh ripened fruits are consumed as a cooling tonic in summer to overcome from thirst and protect from heat stroke. With the increasing interest in natural and plant-based remedies in modern health concern, the ethnomedicinal and nutritional value of *G. asiatica* can contribute to combat several diseases. Traditionally the fruits and other parts of the plant are used in the treatment of blood disorders, diarrhea and fever. The fruit is also used to cure intestinal problems, skin diseases, jaundice, rheumatism and cough. Ethnic communities apply the paste of stem and roots in the treatment of fractured bone, osteoporosis and wound healing [6,7]. Anemic patients are advised to consume the phalsa fruits regularly as it is a good source of minerals such as iron, calcium, potassium, sodium and phosphorous as well as fiber, vitamin A and C [8,18]. The fresh leaves of the plant are used as fodder. Traditional-

ly the mucilaginous bark juice of Phalsa is used in soap making, cleansing of sugar and jiggery as well as making ropes [4]. The ratio of antioxidant in *G. asiatica* is higher than *Solanum nigrum* and *Ficus carica* that prevent from toxicity and show better kidney rehabilitative capacities [42]. The aim of this review article is to document the medicinal and nutritional values, traditional use as well as pharmacological properties of *G. asiatica* for further research work.

Botanical Description

G. asiatica is one of the important deciduous shrubs of genus *Grewia*. It is a small tree growing up to the height of 4-5 m. The stem of the plant is circular, hard, woody, brittle and non-hairy. The bark colour is rough grey and mucilaginous in nature. Leaves are pale green, ovate, 5-18 cm long, sub-orbicular, double serrate, surface is rough, sub-glabrous, broad with the presence of tiny hairs on both dorsal and vertical surfaces, leaf petiole is 1-1.5 cm long and slightly cordate at the base. Flowers arise in leaf axils in clusters of 2-8 in the month of March-April, hermaphrodite, axillary cymes, individual flower is 2 cm diameter with 5 sepals and 5 petals, yellow in colour and small in size, and bracts are present beneath the pedicles.. Fruits are globose, berry, purple green to black, drupe, small, 1.2 to 1.6 cm in size, single seeded generally ripen in June and grapes like flavor [13,14].



Figure 1: *G. asiatica*: Plant, Leaf, Flowers and Fruits

Geographic Distribution

Grewia asiatica is mostly grown in India and Southeastern Asian countries including Bangladesh, Cambodia, Laos, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. The plant can be grown up to the elevation of 2500 to 3000 ft. In India, the plant is grown in the states of Bihar, Gujarat, West Bengal, Jharkhand, Odisha, Punjab, Maharashtra, Himalayan range and Southern part of India. Phalsa fruits come in the month of summer in major part of the Asian countries. The plant gives a better fruit-yield at temperatures 3° to 45°C [15].

Ethnomedicinal Properties

Ethnic people of different geographical regions have their traditional knowledge about the medicinal uses of *G. asiatica*. The plant is a natural and alternative source of herbal medicine for the treatment of various ailments of human and veterinary. The fruits of the plant are used by the tribal communities in the treatment of heart problems, blood purification, fever and joint pain. Local people use to make traditional summer drink from the ripe fruits of Phalsa. The drink functions as a cooling tonic and aphrodisiac medicine. The bark of the plant is soaked overnight to use as a substitute of soap and mucilaginous extract of the bark is used in cleansing of sugar. The bark is also used in the treatment of joint pain, diarrhea and intestinal diseases.

Leaves of the plant are effective in curing of skin diseases [16,17].

Nutritional Properties

Ripe fruits of *Grewia asiatica* contain high quantity of minerals such as iron, calcium, potassium, sodium and phosphorous as well as fiber, vitamin A and C [18]. The fruit is low in calories and fat; hence, the fruit is very useful for health and immunity. Minerals play constructive role in human body. Potassium act as a source of muscle strengthening, sodium function as an electrolyte to assist in the proper functioning of enzymes, muscles and blood circulation. Vitamin C helps in the absorption of iron, formation of collagen and healing of wounds. Proper amount of fiber intake trim down obesity and cardiac problems [19]. The details of nutrient mineral contents are mentioned in the table [18,19,31] below (Table 1).

The content of anthocyanin is rich in *G. asiatica* fruit which has potent antibacterial properties against gram-positive and gram-negative bacteria [43]. The sodium content present in the fruit, work as an electrolyte which support in the proper function of muscles and control blood circulation and enzymatic activities. Potassium and protein assist in the development of muscles strength. The fiber present in the ripened fruit supports to reduce the risk of diabetes, obesity and cardiovascular disease [44].

Table 1

Nutrients	Values/100 g
Calories (Kcal)	90.5
Carbohydrates (g)	21.1
Copper (mg)	0.48
Cobalt (mg)	0.99
Chromium (mg)	1.08
Moisture (kcal)	76.3
Protein (g)	1.57
Fat (g)	<0.1
Fibre (g)	5.53
Ash (g)	1.1
Calcium (mg)	136

Potassium (mg)	372
Sodium (mg)	17.3
Iron (mg)	1.08
Nickel (mg)	2.61
Phosphorus (mg)	24.2
Vitamin A (mg)	16.11
Vitamin B1 (mg)	0.02
Vitamin B2 (mg)	0.264
Vitamin (B3 (mg)	0.825
Vitamin C (mg)	4.385
Zinc (mg)	144

Phytochemical Constituents

Fruit of *G. asiatica* is a good source of anthocyanin which works as an antibacterial agent [20]. The leaf and stem of the species content 12.42 ± 0.56 (CE mg/g) fla-

vanoid that is effective against the growing of cancer cells. It has been reported that the fruit of *G. asiatica* contain 0.5 ± 1.25 (g/100g) tannin that inhabit the growth of bacteria [21,22].

Table 2

Plant Parts	Phytochemicals
Fruit	Pelargonidin 3,5- diglucoside, naringenin-7-O- β -D-glucoside, quercetin, quercetin 3-O- β -D-glucoside, tannins, catechins, and cyanidin-3-glucoside [23].
Flower	β -sitosterol, quercetin, quercetin 3-O- β - D-glucoside, naringenin, naringenin 7-O- β -D-glucoside and a δ -lactone 3,21,24-trimethyl-5,7-dihydroxyhentriacontanoic acid were isolated from flowers [24,25].
Stem and Bark	Betulin, lupeol, lupenone, and friedelin. β -amyrin and β -sitosterol [26].
Leaf	Quercetin, kaempferol and a mixture of their glycosides [11].

Pharmacological Properties

Grawia asiatica is one of the valuable medicinal plants which have different pharmacological properties. Recent investigations have reported a range of medicinal and nutritional benefits of the plant species [27,28]. The polyphenolic constituents such as anthocyanins, flavanols and phenolic acid present in the plant have antioxidant characteristics [29]. The fruit of the species have been used in the treatment of inflammation, rheumatism, microbial infections, cardiac problems, diabetes and fever etc [30].

Anticancer effect: The aqueous extracts of leaf

and fruit of *G. asiatica* were reported potential phytochemicals against cancers of lungs, kidney, cervical, breast and kidney [32].

Antioxidant effect: It has been proved by several scientific studies that *G. asiatica* is highly effective antioxidant as it contains flavonoids, anthocyanins, tannins, phenolic acids and vitamin C. The fresh fruits and seeds of the plant have high antioxidant effects [33].

Antimicrobial effect: The leaves extract of *G. asiatica* have antibacterial and antifungal effects in skin infections and typhoid [34,35]. The extracts of various parts of

plants are effective against *Bacillus subtilis*, *Escherichia coli*, *Shigella dysenteriae*, *Klebsiella pneumonia* and *Pseudomonas aureus* etc [36].

Antihyperglycemic effect: The different extracts of fruit, bark and leaves of *G. asiatica* was reported antihyperglycemic properties in mammals. The fruit has low GI value with modest hypoglycemic activity. It was also observed that the plant extracts are effective in controlling of blood cholesterol, glucose, triglycerides [37].

Analgesic effect: Some researchers have reported analgesic and antipyretic properties of fruit extract of *G. asiatica* [38,39].

Antimalarial effect: The leaf extracts of *G. asiatica* were significantly found antiemetic and antimalarial properties [40].

Hepatoprotective effect: The various extracts of fruits of *G. asiatica* were reported significant hepatoprotective effects in some mammals. Some of the researchers found that a significant decrease of the serum levels of bilirubin, aspartate aminotransferase and alanine aminotransferase [41].

Future Research Direction

The fruit of *G. asiatica* has good potential as a food ingredient for the development of innovative food preserves and beverages. Future research is required to develop drugs and value added products as the plant has antidiabetic, antimicrobial, antioxidant, hepatoprotective and analgesic properties. The advanced biotechnological interventions can help in the development of highly nutritious food alternatives and therapeutically valuable uses.

Conclusion

Grewia asiatica commonly known as Phalsa is a shrub mostly found in tropical and subtropical countries. The fruit, seed, leaf, stem and bark of the plant are traditionally used for the treatment of liver disorder, indigestion, heart, anorexia, cholera, diarrhoea, diabetes, fever, hiccup, piles and blood purification. Ethnomedicinally the fruits of the plant are used as nutritious summer drink, souce, and

squash, wounds, skin diseases, easy delivery, bone fracture and rheumatism, etc. *G. asiatica* is a source of high nutrition, food and beverage as well as medicines. Fruit contain high number of vitamin A and C, minerals and fiber, and low in calories and fat. The fruit and seed of the plant comprise 18 amino acids, the majority of which are aspartic acid, glutamic acid, and leucine. Pharmacologically the plant is used as radioprotective agent, antioxidant, anti-inflammatory, anticancer, antimicrobial, antimalarial, antipyretic and antidiabetic. The antioxidant properties of the fruits are found in the form of vitamin C, total phenolic, anthocyanin, flavonoid, and tannin. This review is based on the ethnomedicinal and nutritional importance of *G. asiatica* which could be a good source of further study on the nutritional and pharmacological properties of the plant to develop sources of nutrition and medicines for human use.

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Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

Informed Consent Statement

None

Ethical Committee Approval

Not Applicable.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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