A review on traditional uses and pharmacological action of *Psidium guajava* Linn plant

Bharathi D R, Marati Kiran Kumar*, Mahesh C, Ajay BV, Meera V, Rupesh Kumar M, B Ramesh

Department Of Pharmacology, Sri Adichunchanagiri College Of Pharmacy, Adichunchanagiri University, B.G. Nagar, Mandya, Karnataka

**Introduction**

In numerous disease states, such as cancer, cardiovascular disease, and neurodegenerative illnesses, flavonoids have been proven to have positive benefits. Many of the biological effects of flavonoids can be attributed to their antioxidant qualities, reducing abilities either directly or indirectly, or both, depending on how they may affect intracellular redox status [1].

The majority of naturally occurring bioactive chemicals come from plants. Since ancient times, folk medicine has used a range of plant preparations to treat a number of diseases, and at the moment, the cosmetic, pharmaceutical, and nutraceutical sectors are focusing more on plant preparations and pure phytochemicals. Of all plant organs, leaves are the one that stores bioactive substances like secondary metabolites the most. In a number of recent investigations, leaf extracts from diverse cultivated plants were found to have biological activity and phytochemical profiles. Thus, despite being regarded as agricultural waste, plant leaves are a significant source of high-value nutraceutical compounds [2].

The *Psidium guajava* L. tree (Figure 1), a member of the Myrtaceae family, is a particularly distinctive and long-established plant that is cultivated for both its nutritional and therapeutic benefits. Guava is a tropical fruit that has been grown and used extensively in South America, Bangladesh, Pakistan, India, and Indonesia. Many countries have used the roots, leaves, bark, stem, and fruits of the guava tree to cure stomach aches, diabetes, diarrhoea, and other health issues. Dark green, elliptical, and oval in shape, guava leaves (*Psidii guajavae folium*; GL) are distinguished by their obtuse-type apex. Guava leaves, combined with the pulp and seeds, are used to treat several gastrointestinal and respiratory...
conditions as well as to boost platelets in dengue fever patients [3]. The antispasmodic, cough sedative, anti-inflammatory, anti-diarrheic, anti-hypertension, antidiabetes, and antidiabetic effects of GLs (Guava leaves) are also commonly utilized [4]. Studies using animal models have confirmed the effectiveness of GL isolates as cytotoxic, antitumor, and anticancer agents [5, 6].

Fig 1. (A) Guava fruit and leaves, (B) Bunch of guava leaves with dorsal view on the left and ventral view on the right, (C) Guava leaf with dorsal view on the left and ventral view on the right.

Plant Profile
The species belongs to the *Psidium guajava* Linn.

Family: *Myrtaceae.*

Morphological Features
*Psidium guajava* is an evergreen shrub-like tree that grows anywhere between 6 and 25 feet tall. The plant’s network of branches spreads far. Most of its branches are bent, showing off opposing leaves with short petioles measuring between 3 and 16 cm. The leaves are broad, clearly green, and have noticeable, obvious veins [7, 8].

The plant produces white blooms with petals that are incised and have a lovely fragment. Flowers feature four to six petals, yellow anthers, and insects are used for pollination. Guava fruits range in size from tiny to larger, measuring 3 to 6 cm. It has a pear-like shape and is yellow when fully ripe [9]. When fully mature, it has a distinct musky odour that is powerful but enticing [9]. Its slightly darker pulp contains slightly yellowish seeds and is pulp. Seeds have a relatively small size and are simple to eat. Their number ranges from 112 to 535, and they are grouped in predictable patterns [10, 11].

Chemical Constituents
Leaves contain essential oil with the main components being -pinene, -pinene, limonene, menthol, terpenyl acetate, isopropyl alcohol, longicyclene, caryophyllene, -bisabolene, cineol, caryophyllene oxide, -copanene, farnesene, humulene, selinene, cardinene and curcumene (Zakaria and Mohd, 1994; Li et al., 1999) [13]. Flavonoids, and saponins combined with oleanolic acid have been isolated from the leaves (Arima and Danno, 2002) [14]. Nerolidiol, -sitosterol, ursolic, crategolic, and guayavolic acids have also been identified (Iwu, 1993) [15].

In mature leaves, the greatest concentrations of flavonoids were found in July: Myricetin, quercetin, luteolin and kaempferol (Vargas et al., 2006). Two triterpenoids, guavaonic acid and guavacoumaric acid, along with six known compounds 2-hydroxyursolic acid, jacoumaric acid, isomeriucoamicaric acid, asiatic acid, ilelatifol D and β-sitosterol-3-O-β-D-glucopyranoside, have been isolated from the leaves of *Psidium guajava*. guajavolide and guavenoic acid, were isolated from fresh leaves of *Psidium guajava*.
Pharmacological Actions

1. **Anti bacterial activity**
   Sanches NR et al., reported that In comparison to aqueous extracts, the ethanol:water extracts had greater antibacterial activity. Based on these results, *P. guajava* leaf ethanol:water extract was separated using silica gel column chromatography in a bioassay-guided fractionation, resulting in a flavonoid mixture, triterpenes (- and -amyrin), and sterol (-sitosterol). With a MIC of 25 g/ml, the flavonoid mixture demonstrated good efficacy against *S. aureus*. All of the microorganisms examined did not respond to -sitosterol [17].

2. **Anti cancer activity**: Ryu NH et al., reported that The guava leaves can disrupt a number of signalling pathways that are connected to carcinogenesis, and they are a source of potential medicinal substances for both cancer treatment and cancer prevention [18].

3. **Anti diabetic activity**
   Rupesh kumar M et al., reported that The effects of PGE and PGAg NPs on pancreatic and liver cells were indicated by the histopathological findings. All doses of PGE and PGAg NPs showed a strong effect, although PGAg NPs showed a more encouraging outcome. As a consequence of the findings, it can be said that the produced PGAg NPs have strong antidiabetic effect because of their increased surface area and decreased nanoparticle size [19].

4. **Anti microbial activity**
   Biswas B et al., reported that *P. guajava* leaves have the potential to be a strong contender in the quest for a natural antibacterial agent against infections and/or diseases brought on by *B. cereus* and *S. aureus*, according to the current finding [20].

5. **Anti oxidant activity**
   Manikandan R et al., reported that The extracts are said to contain a variety of properties, including antibacterial, antimalarial, antidiarrheal, and antihyperglycemic ones. This review’s objective is to compile information on *P. guajava* extract’s antioxidant activity during the past several years [21].

6. **Anti stress activity**
   Lakshmi BV et al., reported that According to the findings, *Psidium guajava*‘s ethanolic extract has strong adaptogenic activity against a range of biochemical and physiological disturbances in several stress models. The extracts are said to contain a variety of properties, including antibacterial, antimalarial, antidiarrheal, and antihyperglycemic ones. This review’s objective is to compile information on *P. guajava* extract’s antioxidant activity during the last few years [22].

7. **Anti fungal activity**
   Padron-Marquez B et al., reported that The findings of this study suggest that the leaves of *P. guajava* contain bioactive substances, such as flavonoids and terpenoids, which inhibit the growth of dermatophytic fungi, thereby offering a further alternative source of antifungal compounds [23].

8. **Anti diarrhoeal activity**
   Ojewole JA et al., reported that This discovery gives pharmacological support to anecdotal, ethnomedical claims that *Psidium guajava* leaf can treat, manage, and/or control diarrhoea in some rural populations of southern Africa [24].

9. **Anti inflammatory activity**
   Oktavia S et al., reported that According to the studies, *Psidium guajava*‘s anti-inflammatory efficacy largely involves inhibiting PGE2, COX-2, NO, iNOS, ERK1/2, leucocyte cell migration, and suppressing edoema and paw withdrawal latency. It also appears to have a stabilising impact on the membrane. *Psidium guajava* L. is significant because it possesses natural anti-inflammatory properties, as this review has shown [25].

10. **Anti spasmodic activity**
    Lozoya X et al., reported that As a result, our findings imply that the *P. guajava* phytodrug used in this study at the flavonoid concentration previously described produced an effective substitute for an antispasmodic medication that was well-accepted and tolerated by adult patients [26].

11. **Spermatoprotective activity**
    Akinola OB et al., Our research suggests that guava leaf ethanol extract has a protective
impact on sperm toxicity related to gossypol and may thus increase male fertility, probably because of its abundant natural antioxidant constituents [27].

Conclusion
Guava is a tropical fruit that has been grown and used extensively in South America, Bangladesh, Pakistan, India, and Indonesia. Many countries have used the roots, leaves, bark, stem, and fruits of the guava tree to treat stomach aches, diabetes, diarrhoea, and other health issues.

References


