



“Exploring the Therapeutic Potential of *Psidium guajava*: A Comprehensive Review”

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ABSTRACT

The guava tree (*Psidium guajava* Linn.) is native to tropical and subtropical regions and belongs to the Myrtaceae family. It is a vital fruit in tropical regions such as India, Indonesia, Pakistan, Bangladesh, and South America. Guava (*Psidium guajava* Linn.) is not only consumed as food but also used for medicinal purposes in subtropical regions around the world due to its pharmacological properties. The ability pharmacologic sports of the extract from the fruit, leaf, bark or roots; those sports consist of antioxidant, hepatoprotective, anti-allergy, anti-microbial, anti-spasmodic, cardioactive, anti-cough, anti-diabetic, anti-inflammatory, anti-nociceptive activities, anticancer, antidiabetic, antioxidant, antidiarrheal, anti-microbial, lipid-lowering, and hepato-protection activities. The fruit is rich in Vitamin A and Vitamin C. A variety of plant chemicals, including quercetin, catechin, and kaempferol flavonoids, have shown promising activity, as well as gallic acid, rutin, naringenin, and other compounds.

Keywords: *Psidium guajava*, anti-nociceptive, anti-spasmodic

INTRODUCTION^[1,2]

Kingdom: Plantae **Clade:** Angiosperms

Class: Magnoliopsida **Order:** Myrtales

Family: Myrtaceae **Genus:** *Psidium*

Species: *Psidium guajava*

VERNACULAR NAMES^[3]

Common name – Guava

Botanical – *Psidium guajava* Linn

English – Guava, Abas, Govavier, Kautonga, KuaHPa

Hindi – Amrud

Sanskrit – Amratafalam, Perala

Punjabi – Amrut

Tamil – Sepagu, Koyyo, Koyapalam

Telugu – Goya-pandu, jam-pandu, jama

Bengali – Piara

PHYTOCHEMICAL CONSTITUENTS

Guava fruit is a rich source of essential nutrients like vitamin A, vitamin C, iron, phosphorus, and calcium. It also contains saponin, oleanolic acid, lyxopyranoside, arabopyranoside, guaijavarin, quercetin, and flavonoids. The fruit's anti-mutagenic activity is mainly attributed to the presence of ascorbic acid and citric acid.^[4] The pores and skin of fruit consist of ascorbic acid in a very excessive amount; however, it can be destroyed through heat. Guava fruit carries terpenes, caryophyllene oxide, and p-selinene in big amounts which produce rest effects. The flavonoid content material is better inside the methanolic extract of the guava. There are forty- one hydrocarbons 25 esters, thirteen alcohols, and nine fragrant compounds in guava. Guajadial is also present in guava.^[5,6]

Essential oil is found in leaves that incorporate α -pinene, limonene, β -pinene, isopropyl alcohol, menthol, terpenyl acetate, caryophyllene, longicyclene, and β -bisabolene. Oleanolic acid is likewise located inside the guava leaves. Leaves have high content of limonene about 42.1% and caryophyllene about 21.3%. Leaves of guava have quite a few risky compounds.^[7]

The bark includes 12–30% of tannin and one source declares that it includes tannin 27.4%, of polyphenols, resin, and the crystals of calcium oxalate. Tannin is also present in roots. Leukocyanidins, gallic acid, and sterols also are found in roots. Tannic acid is also its part.^[8]

DESCRIPTION

Psidium guajava is a shrub or small tree typically developing 1-6 m tall, however now and again attaining 10 m in height. The older stems are included in a mild reddish-brown, easy bark that peels off in flakes. Younger stems are greenish, hairy (pubescent), and truly four-angled (quadrangular). The plants are generally borne singly inside the top leaf forks (axils).^[9] These plant lifes are approximately 25 mm throughout and are borne on a furry stalk (pubescent peduncle) 1-2.5 cm long. Each flower has four or five green sepals that are fused at the base and four or five white petals (10-20 mm long). They additionally have big numbers (200-250) of small white stamens (6-10 mm long) and a style (6-12 mm long) crowned with a stigma. The fruit is rounded (globose), egg-shaped (ovoid), or pear-shaped (pyriform) and turns from inexperienced to yellowish in colouration because it matures. These berries (2.5-10 cm long) are crowned with the remains of the persistent sepals (calyx lobes) and have a juicy pink, white, or yellowish colored pulp containing numerous seeds. The seeds are yellowish in shade and kidney-shaped (reniform). The leaves are oppositely arranged along the stems and are borne on short stalks (petioles) 4-10 mm long. The leaf blades (7-15 cm lengthy and 3-7 cm wide) are rather oval (ovate-elliptic or

oblong-elliptic) with rounded or pointed tips (obtuse or acute apices) and rounded (obtuse) bases. They have hairy (pubescent) undersides (especially when young are generally dull green), and have entire margins. Each leaf has an outstanding imperative vein (midrib) and 10-20 pairs of facet veins (lateral veins).^[10]

BIOLOGICAL PROPERTIES

1) HEPATOPROTECTIVE PROPERTIES

Guava leaf extract enhances liver lipid metabolism by boosting AMPK and PPAR α activity, while ameliorating hepatic insulin resistance. It also limits fatty liver by decreasing ALT and AST levels. Guajaverin and avicularin in guava leaves inhibit dipeptidyl-peptidase IV and glucose transporter 4-mediated glucose uptake, respectively, which can increase blood glucose levels.^[11]

2) ANTICANCER ACTIVITY

The aqueous extract of *Psidium guajava* leaves bears an extremely high content of polyphenolic and iso-flavonoids, it could be used as an anti-tumor chemo-prevention, anti-angiogenesis and anti-migration. Using morphology of cells, cell cycle characteristics and apoptosis, performing immunostaining, differentiation and western blot analyses, the results showed that the *Psidium guajava* extract exerted anti-cancer control on both haematological and solid neoplasias. Guava extract's anti-tumor properties were found to be tightly bound to induction of apoptosis and differentiation.^[12,13]

3) HYPERTENSION AND CVS

Guava leaves contain high level of antioxidants and vitamins it helps to protect heart damage by free radicals. Its leaf extract lowers blood pressure, decreases bad LDL cholesterol which is linked to higher risks of heart diseases and stroke. It rises good HDL cholesterol. Higher level of potassium and soluble fibers in Guava improves heart health. By eating ripe guava before meals decrease in blood pressure 9.9%. Guava fruit or leaf extract may have a positive effect on heart health by lowering blood pressure, decreasing bad cholesterol, and increasing good cholesterol.^[14,15]

4) ANTIMICROBIAL ACTIVITY

Guava has a high antimicrobial activity. Guava leaf extract doses can lessen the quantity of cough because of its anti-cough activity. Aqueous, chloroform and methanol extract of leaves can lessen the boom of various bacteria. Due to its anti-cough activity, it is recommended for the condition of cough.^[16] Extracts from the bark of *P. guajava* shown a notable antibacterial activity. In the aqueous extracts of *P. guajava* stems, tannins, lowering sugar, and saponins have been all present. *P. guajava* ethanolic stem extracts revealed the presence of saponins, reducing sugar, and tannins. *P. guajava* stems have phytoconstituents that function an anti-microbial with the aid of using stopping the increase of *E. coli* and *S. mutans*.^[17]

5) ANTI-INFLAMMATORY ACTIVITY

It is also observed that the extract of *Psidium guajava* is very beneficial in treating various inflammatory diseases. The anti-inflammatory action is due the presence of polyphenolics and triterpenoids compounds.^[18] Guava leaf has great potential to be developed as a functional ingredient. Firstly, they are widely available, with a guaranteed supply. Secondly, guava leaf obviously happening compounds, and their extraction is exceptionally cost-effective. Lastly, they contained high levels of antioxidant, phenolic compounds and biological activities as immunostimulatory agents.^[18] Based on the measurements results of phenol total content, antioxidant and immunostimulant activity, the active compounds of the guava leaf expected to have immunostimulatory activity were probably not only polyphenolic antioxidant compounds. Further research is needed to determine the active compounds that act as immunostimulatory agents from an extract of guava leaves.^[19,20]

6) ANTIMALARIAL EFFECT

Leaf extracts from *P. guajava* showed good antimalarial efficacy. The presence of bioactive secondary metabolites in the plant material has been linked to the antimalarial activity of ethanolic and methanolic extract.^[21] Extract from guava leaves has the potential to permanently suppress the malaria vector. According to reports, *P. guajava*'s aqueous extract at excessive concentrations proven fine larvicidal action. Guava leaves extract containing flavonoids and flavonoid glycosides showed promising antimalarial activity compared to chloroquine and amodiaquine positive controls in vitro. In comparison to chloroquine and amodiaquine positive controls, guava leaves extract including flavonoids and flavonoids glycosides shown potential antimalarial efficacy.^[22]

7) ANTIOXIDANT ACTIVITY

A study has been done to identify the antioxidant properties of guava and compared with other fruits like orange and banana. It has been observed by DPPH assay and Fe assay that due to high phenolic compounds presence and ascorbic acid guava has more primary antioxidant potential than other fruits. Antioxidant potential of seed extract (acetone, methanol, ethanol, iso-propanol) has been determined.^[23,24]

Various parts of the plant has been used in traditional medicine :

Bark: The bark in the form of decoction and poultice is used as an astringent in the treatment of ulcers wounds and diarrhea in Philippines while in Panama, Bolivia and Venezuela, the bark is utilized in remedy of dysentery and pores and skin ailments. In the form of decoction and poultice, it is used to expel the placenta after childbirth and in infections of the skin, vaginal hemorrhage wounds, fever, dehydration and respiratory disturbances.^[25]

Root: The root is utilized in West Africa as a decoction to alleviate diarrhea, coughs, belly ache, dysentery, toothaches, indigestion and constipation; even as in Philippines, Fiji and South Africa, The roots are used withinside the shape of decoction and poultice as an astringent in ulcers wounds and in remedy of diarrhea.

Whole plant: In general, the entire plant or it shoots

are used withinside the shape of infusion, decoction and paste as pores and skin tonic in Tahiti and Samoa and as Analgesia in painful menstruation, miscarriages, uterine bleeding, untimely hard work and wounds.^[26]

The leaves are utilized in USA as an antibiotic withinside the shape of poultice or decoction for wounds, ulcers and enamel ache. Bronchitis, asthma attacks, cough, pulmonary diseases could be also treated with guava teas.^[27]

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