



Review Article

A COMPREHENSIVE REVIEW ON *Psidium guajava* LINN (AMARATAFALAM)

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ABSTRACT

Plants for thousands of years have been used to enhance health and for medicinal purposes. *Psidium guajava* is one which has an enormous wealth of medicinal value. *Psidium guajava* Linn, belonging to the Myrtaceae family, has been reported anti-diarrheal, hepatoprotective, hypoglycemic, lipid lowering, antibacterial and antioxidant activities. *Psidium guajava* is an important food crop and medicinal plant in tropical and subtropical countries is widely used like food and in folk medicine around of the world. The phytochemical screening of bark of *Psidium guajava* revealed the presence of metabolites and compounds tested for such as flavonoids, tannins, reducing sugar, terpenes, saponin, anthraquinones and alkaloids. The proximate analysis of dried bark gave a moisture content of 0.41 %, ash value of 11.5 %, acid insoluble ash of 4.5 %, Water soluble ash of 9.5 %, alcohol soluble extractive value of 20.8 % and water extractive value of 24.8 %.

KEYWORDS: *Psidium guajava* L., Myrtaceae, Phytochemical constituents, Pharmacological actions.

INTRODUCTION

The use of plants as medicines predates written human history. Ethno botany (the study of traditional human uses of plants) is recognised as an effective way to discover future medicines [1]. The World Health Organisation (WHO) estimates that 80% of the population of some Asian and African countries presently uses herbal medicine for some aspect of primary health care. Studies in the United States and Europe have shown that their use is less common in clinical setting but has become increasingly more in recent years as scientific evidence about the effectiveness of herbal medicine has become more widely available [2].

Psidium guajava Linn. known as Guava is a medicinal plant belonging to the family Myrtaceae family and is represented by approximately 120 - 150 species [3]. *P. guajava* is a well-known traditional medicinal plant used in

various indigenous systems of medicine. It is widely distributed throughout India [4]. In the local traditional settings, plant parts such as the roots or leaves are used without recourse to phytochemical isolates [5]. The leaves and bark of guava tree have a long history of medicinal uses. In India, decoction of the leaves and bark of guava is used to cure diarrhea, dysentery, vomiting and sore throats, and to regulate menstrual cycles. Guavas are free from fat and cholesterol. They are also an excellent source of fiber, potassium and vitamin A [6]. It is a native of Central America but is now widely cultivated, distributed and the fruits enrich the diets of millions of people in the tropics of the world [7, 8].

Vernacular Names [7, 9]

- i. Hindi- Amrood, Amarut
- ii. English- Guava
- iii. Sanskrit- Draksa, Perala, Amaratafalam
- iv. Gujarat- Jamrukh
- v. Mexico- Arryan



- vi. Spanish- Guayaba
- vii. Arabic- Pear

ANATOMY

A small tree to approximately 33 ft (10 in) high, with spreading branches, the Guava is easy to recognize because of its smooth, thin, copper-colored bark that flakes off, showing the greenish layer beneath and also because of the attractive, "bony" aspect of its trunk which may in time attain a diameter of 10 in (25 cm). Young twigs are quadrangular and downy. The leaves, aromatic when crushed, are evergreen, opposite, 2 3/4 to 6 in (7-15 cm) long to 2 in (3-5 cm) wide. The fruit, exuding a strong, sweet, musky odor when ripe, may be round, ovoid, or pear-shaped, 2 to 4 in (5-10 cm) long. Guavas are rich in dietary fiber and vitamin C, with moderate levels of folic acid. Having a generally broad, low-calorie profile of essential nutrients, and a single common guava (*P. guajava*) fruit contains about four times the amount of vitamin C as an orange [10].

Figure 1: Fresh fruits and bark of *Psidium guajava* L.

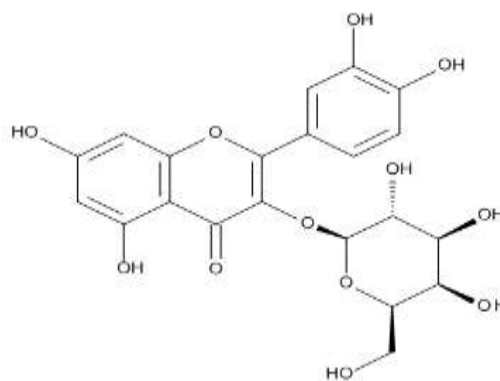


PHARMACOLOGICAL ACTIVITIES OF *Psidium guajava*

Antimicrobial activity of *Psidium guajava* by Mendez Deena *et al* (2016)

The guava (*Psidium guajava*), belonging to family Myrtaceae, the *Psidium guajava* leaves extracts (aqueous and methanolic) show antimicrobial activity against on bacterial elastase from *Pseudomonas aeruginosa* and human neutrophil elastase (HNE) but the methanolic extract of the leaves showed good inhibitory capacity, more than that of the aqueous extract against both enzymes, elastase of *P. aeruginosa* and HNE. Because methanol as a solvent had extracted many of the active compounds present in the leaf more than that of water. [11].

Figure 2: Chemical structure of Guajaverin as anti-microbial activity.



Anti-diabetic activity of *Psidium guajava* by Joseph Lincy *et al* (2016)

The objective of the study was to perform phytochemical screening of alcoholic and aqueous extracts of various parts of *Psidium guajava* showed the presence of glycosides, flavanoids, alkaloids, saponins, vitamin, carbohydrate, amino acid in the extracts and perform pharmacological screening for anti-diabetic activity using alloxan induced diabetic rats and anticonvulsant activity by using PTZ induced seizure model. The aqueous leaf extracts showed significant anticonvulsant activity and more reliable anti-diabetic activity compared to other extracts [12].

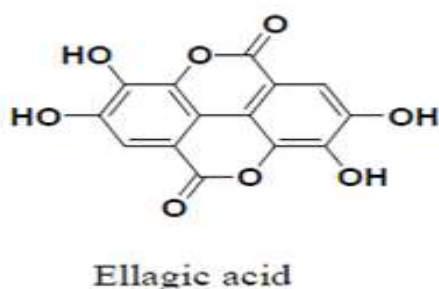
Radiomodulatory Role of *Psidium guajava* by Kumar Amith *et al* (2016)

In the present study we investigated the radioprotective activity of hydroalcoholic leaf extracts of *Psidium guajava* (P.G) against rats exposed to X rays. The X rays damage normal tissues leading to their death or transforming them into cancerous tissues. The different doses (50, 100, 200, 400 mg/kg body weight) of *Psidium guajava* leaf extracts gives to rats daily for five consecutive days. P.G leaf extract increased the levels of antioxidant enzymes which prevent the tissue damage, so that the P.G have powerful antioxidant activity in vitro and could be beneficial in combating radiation induced damage in living systems [13].

Anti-inflammatory Activity of *Psidium guajava* by Sherweit H *et al* (2013)

Psidium guajava L. (Myrtaceae) has been used traditionally against gastrointestinal disturbances and respiratory ailments. The chemical composition of the essential oil of both leaves and fruits were recorded by gas-liquid chromatography/mass spectrometry (GLC/MS). The inhibition of lipoxygenase by both oils can rationally explain their pharmacological use in the form of inhalation to improve several upper respiratory tract ailments associated with inflammation. [14].

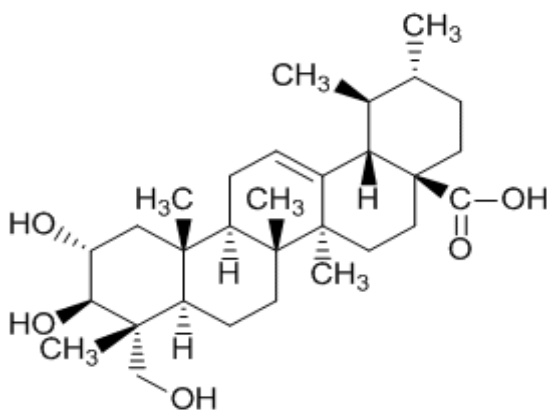
Figure 3: Chemical structure of Ellagic acid as Anti-inflammatory activity.



Hepatoprotective activity of *Psidium guajava* by Tajua G *et al* (2011)

The present study was carried out to evaluate the hepatoprotective and antioxidant effect of the aqueous extract of *Psidium guajava* leaf (PGJ) in Wistar albino rats. Hepatotoxicity induced by acetaminophen (2 g/kg, bw, p.o.). Liver function tests were assayed in serum and antioxidant status was assessed in liver tissue. Histopathology was also studied. Silymarin (100 mg/kg, bw,p.o.) are used in standard for this study. For the antioxidant activity glutathione (GSH), catalase (CAT), glutathione Peroxidase (GPx) and superoxide dismutase (SOD) methods are used. From this study it can be concluded that the PGJ leaf showed significant hepatoprotective and antioxidant action [15].

Figure 4: Chemical structure of Asiatic acid as Hepatoprotective activity.



CHEMICAL ACTIVITIES OF *Psidium guajava*

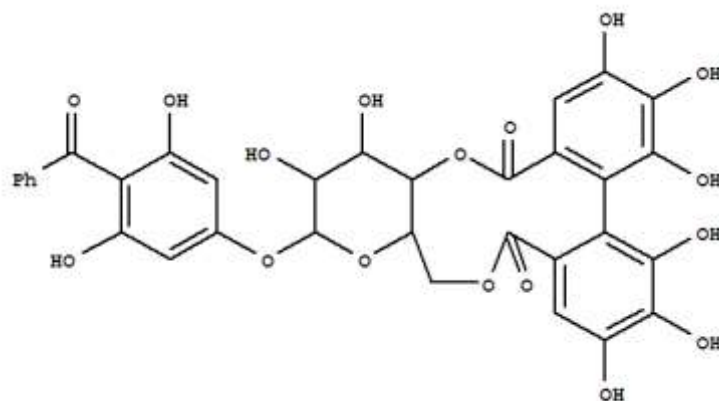
Antibacterial Activity of *Psidium guajava* by Jiraphorn Katewaraphorn *et al* (2016)

Psidium guajava Linn. Leaf extract containing phenolic compounds are known for antibacterial activity. The objective was to prepare antibacterial cotton fabric by using microcapsules containing *Psidium guajava* Linn. Leaf extract. The qualitative antibacterial assessment of the fabric was performed against *Escherichia coli* and *Staphylococcus aureus* as test organisms. Leaf extract showed antibacterial activity against *Staphylococcus aureus*, but was not effective against *Escherichia coli* [16].

Antioxidant, Antitumor, Anticancer Activity of *Psidium guajava* by Ashraf A *et al* (2016)

Psidium guajava L. (Myrtaceae) leaves are used in traditional medicines for the treatment of cancer, inflammation and other ailments. The ferric-reducing antioxidant power (FRAP) and 2, 2-diphenyl-1-picrylhydrazil (DPPH) assays to estimate antioxidant activity of *P. guajava* leaf extracts (methanol, hexane and chloroform), the antitumour and anticancer were determined using potato disc assay (PDA), brine shrimp lethality assay and MTT assay methods are used. Conclusion The present study demonstrates that *P. guajava* leaf extracts play a substantial role against oxidant, cancer and tumour [17].

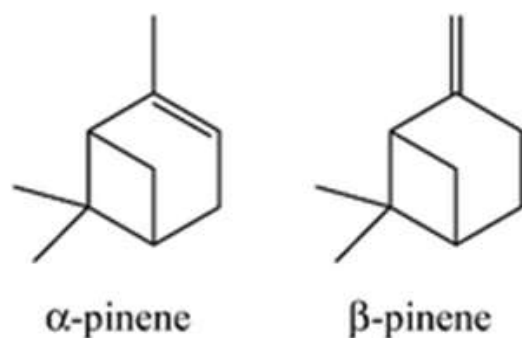
Figure 5: Chemical structure of Guavin B as antioxidant activity.



Antimicrobial activities of *Psidium guajava* by Ana cristina rivas da silva *et al* (2012)

The antimicrobial activities of the isomers and enantiomers of pinene were evaluated against bacterial and fungal cells. The agar diffusion test showed that only the positive enantiomers of the α - and β -isomers of pinene were active against the *Staphylococcus aureus*. The minimal inhibitory concentration (MIC) and minimal microbicidal concentration (MMC) of monoterpenes were also determined, confirming that the positive enantiomers exhibited microbicidal activity against all fungi and bacteria tested. Finally, the cytotoxicity of the positive enantiomers of pinene was reduced the cell viability respectively [18].

Figure 6: Chemical structure of α -pinene and β -pinene constituent of *Psidium guajava* as antimicrobial activity.



MATERIALS AND METHODS

Plant material

The bark of *Psidium guajava* was collected from the local area of Jhalwa, Allahabad and Uttar Pradesh, India in the month of November 2015. And the plant specimen is authenticated by “BOTANICAL SURVEY OF INDIA, ALLAHABAD”.

Preparation of plant extract

The bark was dried under the shade, powdered with a mechanical grinder and passed through a 40 mesh sieve. The successive solvent cold extraction method used to obtain various extracts including Petroleum ether, chloroform, ethyl acetate, ethanol and distilled water extracts. The solvents were removed from the extracts under reduced pressure by using a rotary vacuum evaporator. The percentage of yield of extract was obtained and is dissolved in their respective solvents for pharmacological studies shows in table no. 1.

Table 1: Percentage yields of various extracts of barks of *Psidium guajava*.

Sr. No.	Solvent extraction for	Extracts obtain (In gm.)	Extract obtain percentage (In % w/w)
1.	Petroleum ether extract	0.128	0.0512
2.	Ethyl acetate extract	0.204	0.0816
3.	Chloroform extract	0.262	0.1048
4.	Ethanol extract	1.719	0.6876
5.	Distilled water extract	4.858	1.94

Physicochemical analysis

Physicochemical evaluation of *Psidium guajava* in table 2, shows the constitutes different classes of nutrients present in the samples such as total ash value, acid insoluble ash value, water soluble ash value, alcohol soluble extractive value and water soluble extractive value [19].

Table 2: Physicochemical analysis of barks of *Psidium guajava*.

Sr. No.	Parameter	(% w/w)
1.	Ash values Total ash values Acid insoluble values Water soluble values	11.5 4.5 9.5
2.	Extractive values Alcohol soluble extractive Water soluble extractive	20.8 24.8
3.	Loss of drying	0.41

Preliminary phytochemical examination

The phytochemical screening of the extracts of *Psidium guajava* indicated in table 3 that shows the presence of alkaloids, glycosides, reducing sugar, phenolic compounds, steroids and terpenoids, carbohydrate, amino acid, flavonoids, tannins and saponin glycosides. Therefore, the most important chemically active (bioactive) constituents: alkaloids, tannin, flavonoids and phenolic compounds were present in the extracts of *A. vera* but cyano-genic glycosides were absent [20].

Table 3: Preliminary phytochemical studies of the extracts of barks of *Psidium guajava*.

Sr. No.	Test and reagents	Petroleum ether extract	Ethyl acetate extract	Chloroform extract	Ethanol extract	Distilled water extract
1.	Alkaloids	---	---	--	+++	++
2.	Steroids	---	++	--	++	++
3.	Tannins and phenolic compounds	---	--	++	++	+++
4.	Carbohydrates	--	---	--	++	+++
5.	Cardiac glycosides	---	--	++	++	+++
6.	Saponin	---	--	--	++	+++
7.	Anthraquinone	--	---	---	--	++
8.	Proteins	---	---	---	--	--
9.	Flavonoids	---	---	++	+++	++
10.	Amino acid	---	---	---	--	--
11.	Starch	---	--	---	--	++
12.	Volatile oil	---	---	--	---	--

+ = Presence; - = Absence;

Amazing guava benefits: heart healthy, weight loss friendly and more

- i. **Immunity booster:** Guavas contain 4 times the vitamin C content present in oranges. Vitamin C helps improve immunity and protects you against common infections and pathogens [21].
- ii. **Lowers risk of cancer:** “Lycopene, quercetin, vitamin C and other polyphenols act as potent antioxidants which neutralise free radicals generated in the body, preventing the growth of cancer cells. Guavas have shown to be widely successful in reducing prostate cancer risk and also inhibit the growth of breast cancer cells since it is rich in lycopene [21].
- iii. **Diabetes-friendly:** Due to the rich fibre content and low glycaemic index, guavas prevent the development of diabetes. While the low glycemic index inhibits a sudden spike in sugar levels, the fibre content ensures the sugar levels are well regulated.
- iv. **Heart healthy:** Guavas improve the sodium and potassium balance of the body, thereby regulating blood pressure in patients with hypertension. Guavas also help lower the levels of triglycerides and bad cholesterol (LDL), which contribute to the development of heart disease. This magical fruit improves levels of the good cholesterol (HDL).

- v. **Treats constipation:** It is one of the richest sources of dietary fiber in comparison to other fruits and just 1 guava fulfills about 12% of your daily recommended intake of fibre, which makes it extremely beneficial for your digestive health. Guava seeds, if ingested whole or chewed, serve as excellent laxatives too, helping the formation of healthy bowel movements.
- vi. **Good for your brain:** Guavas contain vitamin B3 and vitamin B6, also known as niacin and pyridoxine respectively, which help in improving blood circulation to the brain, stimulating cognitive function and relaxing the nerves [21].
- vii. **Weight loss:** Without compromising your intake of proteins, vitamins and fiber, guava helps you lose weight by regulating your metabolism. Guava makes for a very filling snack and satisfies the appetite very easily. Guava, especially raw guava, also has far less sugar as compared to apples, oranges, grapes, and other fruits.
- viii. **Anti-ageing properties:** Guavas are rich in vitamin A, vitamin C and antioxidants like carotene and lycopene which help protect the skin from wrinkles. A guava a day, keeps fine lines away! [21]



CONCLUSION

In the present study, it shows that the phytochemical screening of bark of *Psidium guajava* revealed the presence of metabolites and compounds like alkaloids, glycosides, reducing sugar, phenolic compounds, steroids, terpenoids, carbohydrate, amino acid, flavonoids, tannins and saponin glycosides. Due to the presence of number of phytoconstituents it may show so many medicinal and pharmacological properties. The proximate analysis of dried bark gave a moisture content of 0.41 %, ash value of 11.5 %, acid insoluble ash of 4.5 %, Water soluble ash of 9.5 %, alcohol soluble extractive value of 20.8 % and water extractive value of 24.8 %.

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