



International Journal of Pharmacognosy and Chemistry

Open Access

Review Article

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

Article History

Received on: 29-10-2022

Revised on: 18-11-2022

Accepted on: 30-11-2022

Keywords: Traditional medicines, *Psidium guajava L.*

DOI:

<https://doi.org/10.46796/ijpc.v3i4.369>



Abstract

Traditional medicines cure cancer, inflammation, and other illnesses using the leaves of *Psidium guajava L.* (Myrtaceae). The hypoglycemic, antibacterial, anti-inflammatory, antioxidant, and anticancer effects of guava are well established. Triterpenoids, sesquiterpenes, and flavonoids were investigated in this study as possible targets of guava leaf components. The goal of the current review is to raise awareness among the general public about this substance's enormous potential for both preventing and treating a number of prevalent ailments.

This article is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License. Copyright © 2022 Author(s) retain the copyright of this article.



*Corresponding Author

Marati Kiran Kumar

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 (*Psidium 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, anti-obesity, 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 fragrant. 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].

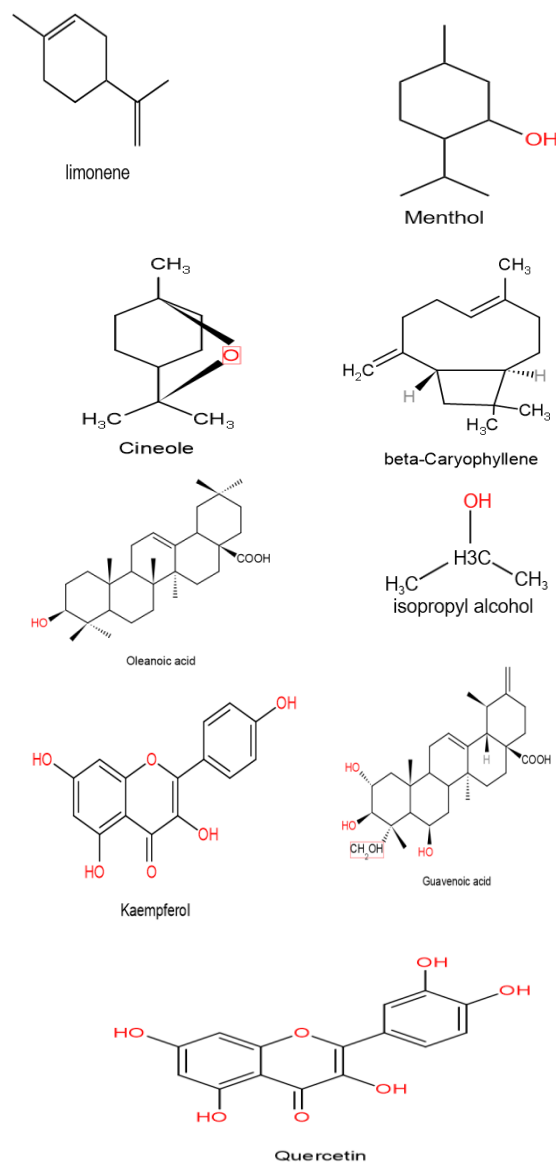
Its slightly darker pulp contains slightly yellowish seeds and is pulp. Seeds have a relatively small size and are simple to eat. Their number ranges from 112 to 535, and they are grouped in predictable patterns [10, 11].

Chemical Constituents

Leaves contain essential oil with the main components being α -pinene, β -pinene, limonene, menthol, terpenyl acetate, isopropyl alcohol, longicyclene, caryophyllene,

γ -bisabolene, cineol, caryophyllene oxide, δ -copanene, farnesene, humulene, selinene, cardinene and curcumen (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, β -sitosterol, ursolic, crotogolic, 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) [16]. Two triterpenoids, guavanoic acid and guavacoumaric acid, along with six known compounds 2-hydroxyursolic acid, jacoumaric acid, isoneriuoumaric 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 prevention¹⁸.

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, leukocyte 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

1. Rupesh kumar M, Kavitha K, Dhanaraj SA. Role of flavonoids in human nutrition as health promoting natural chemicals-a review. *Journal of Applied Pharmacy*. 2014 Jun 27;6:228-34.
2. Kumar M, Tomar M, Amarowicz R, Saunabh V, Nair MS, Maheshwari C, Sasi M, Prajapati U, Hasan M, Singh S, Changan S. Guava (*Psidium guajava* L.) leaves: nutritional composition, phytochemical profile, and health-promoting bioactivities. *Foods*. 2021 Apr 1;10(4):752.
3. Laily, N.; Kusumaningtyas, R.W.; Sukarti, I.; Rini, M.R.D.K. The potency of guava *Psidium guajava* (L.) leaves as a functional immunostimulatory ingredient. *Procedia Chem*. 2015, 14, 301–307.
4. Chen, H.Y.; Yen, G.C. Antioxidant activity and free radical-scavenging capacity of extracts from guava (*Psidium guajava* L.) leaves. *Food Chem*. 2007, 101, 686–694.
5. Uppugalla S, Male U, Srinivasan P. Design and synthesis of heteroatoms doped carbon/polyaniline hybrid material for high performance electrode in supercapacitor application. *ElectrochimicaActa*. 2014 Nov 10;146:242-8.
6. Jiang, L.; Lu, J.; Qin, Y.; Jiang, W.; Wang, Y. Antitumor effect of guava leaves on lung cancer: A network pharmacology study. *Arab. J. Chem*. 2020, 13, 7773–7797.
7. Arima H, Danno GI. Isolation of antimicrobial compounds from guava (*Psidium guajava* L.) and their structural elucidation. *Bioscience, biotechnology, and biochemistry*. 2002 Jan 1;66(8):1727-30.
8. Rouseff RL, Onagbola EO, Smoot JM, Ste-linski LL. Sulfur volatiles in guava (*Psidium guajava* L.) leaves: possible defense mechanism. *Journal of agricultural and food chemistry*. 2008 Oct 8;56(19):8905-10.
9. Das AJ. Review on nutritional, medicinal and pharmacological properties of guava (*Psidium guajava* Linn). *J Biol Act Prod from Nat*. 2011;1(4):216-28.
10. Uppugalla S, Boddula R, Srinivasan P. Methyl triphenylphosphonium permanganate as a novel oxidant for aniline to polyaniline-manganese (II, IV) oxide: material for high performance pseudocapacitor. *Journal of Solid State Electrochemistry*. 2018 Feb;22(2):407-15.
11. Kumar KV, Pillai MS, Thusnavis GR. Seed extract of *Psidium guajava* as ecofriendly corrosion inhibitor for carbon steel in hydrochloric acid medium. *Journal of Materials Science & Technology*. 2011 Dec 1;27(12):1143-9.
12. bin Zakaria M. Traditional Malay medicinal plants. ITBM; 2010.
13. Li J, Chen F, Luo J. GC-MS analysis of essential oil from the leaves of *Psidium guajava*. *Zhong yao cai= Zhongyaoacai= Journal of Chinese medicinal materials*. 1999 Feb 1;22(2):78-80
14. Arima H, Danno GI. Isolation of antimicrobial compounds from guava (*Psidium guajava* L.) and their structural elucidation. *Bioscience, biotechnology, and biochemistry*. 2002 Jan 1;66(8):1727-30.
15. Iwu MM. African medicinal plants. CRC Press, Maryland; 1993.
16. Male U, Uppugalla S, Srinivasan P. Effect of reduced graphene oxide–silica composite in polyaniline: electrode material for high-performance supercapacitor. *Journal of Solid State Electrochemistry*. 2015 Nov;19(11):3381-8.
17. Sanches NR, Garcia Cortez DA, Schiavini MS, Nakamura CV, Dias Filho BP. An evaluation of antibacterial activities of *Psidium guajava* (L.). *Brazilian Archives of Biology and Technology*. 2005;48:429-36.
18. Ryu NH, Park KR, Kim SM, Yun HM, Nam D, Lee SG, Jang HJ, Ahn KS, Kim SH,

- Shim BS, Choi SH. A hexane fraction of guava leaves (*Psidium guajava* L.) induces anticancer activity by suppressing AKT/mammalian target of rapamycin/ribosomal p70 S6 kinase in human prostate cancer cells. *Journal of medicinal food*. 2012 Mar 1;15(3):231-41.
19. Uppugalla S, Srinivasan P. High-performance supercapacitor coin cell: polyaniline and nitrogen, sulfur-doped activated carbon electrodes in aqueous electrolyte. *Journal of Solid State Electrochemistry*. 2019 Jan;23(1):295-306.
20. Biswas B, Rogers K, McLaughlin F, Daniels D, Yadav A. Antimicrobial activities of leaf extracts of guava (*Psidium guajava* L.) on two gram-negative and gram-positive bacteria. *International journal of microbiology*. 2013 Oct 20;2013.
21. Manikandan R, Anand AV. A Review on Antioxidant activity of *Psidium guajava*. *Research Journal of Pharmacy and Technology*. 2015 Mar 28;8(3):339-42.
22. Lakshmi BV, Sudhakar M. Screening of *Psidium guajava* leaf extracts for antistress activity in different experimental animal models. *Pharmacognosy research*. 2009;1(6).
23. Padron-Marquez B, Viveros-Valdez E, ay-Cardenas A, Carranza-Rosales P. Antifungal activity of *Psidium guajava* organic extracts against dermatophytic fungi. *Journal of Medicinal Plants Research*. 2012 Oct 25;6(41):5435-8.
24. Uppugalla S, Srinivasan P. Polyaniline nanofibers and porous Ni [OH] 2 sheets coated carbon fabric for high performance super capacitor. *Journal of Applied Polymer Science*. 2019 Nov 5;136(41):48042.
25. Oktavia S. Potential anti-inflammatory effects of *Psidium guajava* L.: A review. *Asian Journal of Pharmaceutical Research and Development*. 2021 Apr 15;9(2):47-52.
26. Lozoya X, Reyes-Morales H, Chávez-Soto MA, del Carmen Martínez-García M, Soto-González Y, Doubova SV. Intestinal antispasmodic effect of a phytodrug of *Psidium guajava* folia in the treatment of acute diarrheic disease. *Journal of ethnopharmacology*. 2002 Nov 1;83(1-2):19-24.
27. Akinola OB, Oladosu OS, Dosumu OO. Spermatoprotective activity of the leaf extract of *Psidium guajava* Linn. *The Nigerian Postgraduate Medical Journal*. 2007 Dec 1;14(4):273-6.