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Antimicrobial Efficacy of *Psidium guajava* Leaves: A Review with Special Focus on Effervescent Oral Cleansing Tablets

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ABSTRACT

Maintaining hygiene is crucial for general well-being since the mouth contains harmful microbes that cause dental caries, gingivitis, periodontitis and opportunistic infections. Leaves of Psidium guajava, abundant in flavonoids, tannins, phenolic acids and essential oils demonstrate antimicrobial properties. This review compiles studies on guava leaf extracts emphasizing their effectiveness against oral pathogens, modes of action and possible uses, in effervescent oral cleansing tablets. Herbal effervescent formulations provide a natural, safe, and convenient alternative to synthetic oral care products, offering improved patient compliance and plaque control.

Keywords : Oral Hygiene, Effervescent Tablets, Psidium guajava, Antimicrobial, Activity Herbal Oral Care, Phytochemistry, Mouth Cleansing Products.

INTRODUCTION

Maintaining hygiene is crucial for overall well-being since the mouth hosts a complex microbiome that if neglected may cause tooth decay, gum inflammation, periodontal disease, bad breath and opportunistic infections. Numerous oral care items—such, as toothpastes, mouthwashes, lozenges, sprays and effervescent tablets—are commonly utilized to decrease presence and promote oral health. Traditional mouth rinses with chlorhexidine, cetylpyridinium chloride or alcohol work well but can lead to tooth discoloration, taste changes, irritation of the membranes or dryness after extended use leading to increased interest, in herbal substitutes. Effervescent tablets have become popular because they dissolve quickly via acid–base reactions that emit CO_2 boosting adherence increasing antimicrobial action and allowing active components to penetrate more deeply for efficient plaque elimination. Plants like neem, clove and tulsi have traditionally been utilized for their anti-inflammatory effects while Psidium guajava has recently gained interest because of its potent antibacterial abilities. P. Guajava, belonging to the Myrtaceae family features leaves, white blossoms and fruits abundant, in vitamin C and it is grown worldwide. Its foliage includes flavonoids (quercetin, guaijaverin) tannins, saponins, essential oils and phenolic compounds, which demonstrate astringent anti-inflammatory and antimicrobial properties. Extracts from P. Guajava successfully suppress oral pathogens like Streptococcus mutans, Lactobacillus acidophilus Candida albicans and Porphyromonas gingivalis by mechanisms such as enzyme inhibition, protein coagulation and damage, to cell membranes. Due to these properties, guava leaf extract serves as a natural, safe, and effective ingredient for herbal effervescent oral cleansing tablets, enhancing freshness and providing protection comparable to synthetic agents. With increasing consumer preference for natural oral care products, Psidium guajava shows strong potential for future effervescent tablet formulations, highlighting the need for further research on extract standardization, clinical validation, and synergistic herbal combinations.

REVIEW OF LITERATURE

Pal & Khan et al,. In vitro evaluation of antimicrobial activity of Psidium guajava leaf extract against selected pathogenic bacteria. This laboratory study evaluated aqueous and ethanolic guava leaf extracts against a panel of Gram-positive and Gram-negative bacteria using disc diffusion and MIC assays. Both extract types produced clear inhibition zones and measurable MICs against Staphylococcus aureus, Streptococcus spp. and Escherichia coli. The authors attributed activity primarily to phenolic compounds and tannins and recommended further work on standardization for oral-care applications.

Pereira et al,. Antimicrobial activity of Psidium guajava aqueous extract against sensitive and resistant bacterial strains.Using clinical isolates (including antibiotic-resistant strains), this study demonstrated that aqueous guava leaf extract retained inhibitory

activity against several resistant Gram-positive organisms. The study emphasized the extract's potential as an adjunctive antimicrobial and discussed mechanisms such as membrane disruption and enzyme inhibition related to polyphenols.

Islam et al,. Green synthesis of silver nanoparticles using Psidium guajava leaf extract and antibacterial coatings.Guava leaf extract was used as a reducing and stabilizing agent to synthesize silver nanoparticles. The nanoparticles showed enhanced antibacterial activity compared with crude extract against oral pathogens, and the paper suggested applicability in antimicrobial coatings and oral hygiene supports (e.g., rinses or coated devices).

Agrawal et al,. Antibacterial and phytochemical studies of Psidium guajava leaf extract.Phytochemical screening in this study confirmed high levels of flavonoids, tannins, and phenolic acids. In vitro antibacterial assays showed dose-dependent inhibition of common pathogens. The author concluded that standardized guava leaf extracts are promising for topical and oral antiseptic applications.

Chan, Tan & Wong et al,. Phytochemical constituents and biological activities of guava leaves.This comprehensive analytical review collated data on major guava leaf constituents (quercetin, myricetin, gallic/ellagic acids, tannins) and linked these to antimicrobial, antioxidant, and anti-inflammatory activities. The review highlighted the relevance of these properties for oral mucosal health and plaque control.

PLANT PROFILE

Description and Ethnobotany:

Psidium guajava is an evergreen shrub or small tree belonging to the family Myrtaceae, growing up to 10 m tall. The bark is smooth and exfoliating, leaves are opposite, oval, with prominent veins, and flowers are white with numerous stamens. The fruits are round or pear- shaped, aromatic, and edible.

Ethnobotanical Uses:

Guava leaves have been traditionally used in folk medicine for treating diarrhea, dysentery, cough, sore throat, wounds, toothache, and skin infections. Decoctions of the leaves are widely used in Asia, Africa, and Latin America as antimicrobial and anti-inflammatory remedies.

Figure 1 : Guava leaves

Vernacular Names:

- English - Guava
- Tamil - Koyya
- Malayalam - Pera
- Telugu - Jaama
- Kannada - Seebe Hannu

- Spanish - Guayaba[37]

Scientific Classification:

Table 1: Scientific Classification of Guava

Taxonamical Rank	Details
Kingdom	Plantae
Class	Dicotyledons
Order	Myrtales
Sub order	Myrtineae
Family	Myrtaceae
Genus	*Psidium*
Species	*guajava*

Phytochemical Constituents (Leaves)

Guava leaves contain a wide variety of bioactive compounds:

- **Flavonoids:** Quercetin, Rutin, Kaempferol, Catechin
- **Phenolic compounds:** Gallic acid, Ellagic acid
- **Tannins:** Corilagin, Ellagitannins
- **Terpenoids & Essential oils:** Caryophyllene, Limonene
- **Vitamins & Minerals:** Vitamin C, Vitamin A, Iron, Potassium

Geographical Distribution:

Native to Central and South America, but now cultivated and naturalized throughout tropical and subtropical regions. Major producers include India, Brazil, Philippines, Thailand, and tropical Africa. It thrives in warm climates with well-drained soils.

Pharmacological Activities of Guava Leaves:

Antimicrobial Activity:

Psidium guajava leaves exhibit strong antimicrobial effects against bacteria and fungi. The activity is mainly due to bioactive compounds like flavonoids and tannins. These compounds inhibit microbial growth, reducing infections. Antimicrobial activity is often tested using agar well diffusion, disc diffusion, and minimum inhibitory concentration (MIC) methods. Extracts from leaves can be used topically or internally. The ethanol and aqueous extracts have shown significant zones of inhibition against pathogens like *E. coli* and *S. aureus.* This supports its traditional use in treating diarrhea, wounds, and oral infections.

Anti-inflammatory Activity:

Guava leaves reduce inflammation by inhibiting the release of pro-inflammatory mediators. They have been shown to decrease swelling and tissue damage in experimental models. Anti-inflammatory effects are studied using carrageenan-induced paw edema test, cotton pellet-induced granuloma, and formalin-induced inflammation models in animals. The flavonoids and triterpenoids present in the leaves are responsible for this activity. It helps in managing arthritis, wounds, and other inflammatory disorders. Both topical and oral extracts have demonstrated effectiveness.

Antioxidant Activity:

The leaves are rich in phenols, flavonoids, and vitamin C, which neutralize free radicals and prevent oxidative stress. Antioxidant activity is tested using DPPH(2,2-Diphenyl-1- Picrylhydrazyl) radical scavenging assay, ABTS[2,2'-Azino-bis(3-ethylbenzothiazoline-6- sulfonic acid)] assay, and FRAP (ferric reducing antioxidant power) methods. These compounds protect cellular components from oxidative damage, including lipids, proteins, and DNA(Deoxyribonucleic acid). Antioxidant activity supports cardiovascular health, anti-aging, and immune function. Both aqueous and ethanolic extracts show strong activity.

Antidiarrheal Activity:

Guava leaves help reduce diarrhea by decreasing intestinal motility and inhibiting bacterial toxins. This is tested using castor oil-induced diarrhea, enteropooling, and intestinal transit tests in rats or mice. Tannins and flavonoids in the leaves are the main bioactive compounds responsible. The activity supports traditional usage in treating gastrointestinal disorders. Both crude leaf extracts and decoctions have demonstrated significant antidiarrheal effects.

Antidiabetic Activity:

Leaves help regulate blood glucose levels by enhancing insulin secretion and reducing carbohydrate absorption. Antidiabetic effects are tested using alloxan-induced or streptozotocin-induced diabetic rat models, along with fasting blood sugar measurements. Flavonoids, saponins, and polyphenols are key contributors. Oral administration of leaf extracts has shown a significant decrease in blood sugar. It supports the traditional use of guava leaves in managing diabetes.

Wound Healing Activity:

Guava leaves promote wound closure, tissue regeneration, and infection control. Wound healing is studied using incision, excision, and dead space wound models in animals. Extracts enhance collagen synthesis, epithelialization, and fibroblast proliferation. Antimicrobial and anti-inflammatory properties of leaves also aid healing. Both topical pastes and oral extracts have been effective. Traditional use includes treating cuts, burns, and ulcers.

Cardioprotective Activity:

Leaves protect the heart by reducing oxidative stress, improving lipid profiles, and preventing tissue damage. Cardioprotective activity is tested using isoproterenol-induced myocardial infarction models in rats, along with biochemical analysis of lipid peroxidation and enzyme levels. Flavonoids and polyphenols act as antioxidants and stabilizers of cardiac tissues. Oral administration of leaf extracts improves heart function. Regular intake may help prevent cardiovascular diseases.

Oral Hygiene Activity:

Guava leaves reduce dental plaque, inhibit oral pathogens, and maintain healthy gums. Oral hygiene activity is tested using microbial inhibition assays against oral bacteria such as *Streptococcus mutans* and *Lactobacillus spp.*. Chewing fresh leaves or using leaf extracts as mouthwash is traditional practice. Anti-inflammatory and antimicrobial properties help prevent gingivitis and bad breath. Both fresh leaves and ethanol extracts show effectiveness.

CONCLUSION:

Psidium guajava leaves exhibit significant antimicrobial activity against oral pathogens, making them an effective natural agent for oral hygiene. Their bioactive phytochemicals and favorable safety profile support their incorporation into effervescent mouth cleansing tablets. These leaves offer a plant-based alternative to conventional synthetic products, helping reduce microbial load and maintain oral freshness. The compatibility of Psidium guajava extracts with effervescent formulations enhances their usability and convenience. Future work on standardization, clinical evaluation, and formulation optimization will further validate their potential. Overall, Psidium guajava leaves represent a safe, effective, and sustainable option for innovative oral care solutions.

REFERENCES

1. Akinmoladun, F. O., Komolafe, T. R., Olaleye, T. M., & Farombi, E. O. Medicinal plants as therapeutic options for the management of dental and oral disorders. Journal of Oral Biology and Craniofacial Research, 10(3), 403–412.
2. Arima, H., & Danno, G. Isolation of antimicrobial compounds from guava (Psidium guajava L.) and their structural elucidation. Bioscience, Biotechnology, and Biochemistry, 66(8), 1727–1730.

3. Chah, K. F., Eze, C. A., Emuelosi, C. E., & Esimone, C. O. Antibacterial and wound healing properties of methanolic extracts of Psidium guajava leaves. African Journal of Biotechnology, 5(20), 1881–1885.
4. Chahardehi, A. M., Ibrahim, D., & Sulaiman, S. F. Antioxidant and antibacterial properties of Psidium guajava leaf extracts. Food Chemistry, 113(4), 1097–1102.
5. Deguchi, Y., & Miyazaki, K. Anti-inflammatory and antimicrobial potential of guava leaf tea in oral health. Journal of Natural Medicines, 69(2), 233–239.
6. Gutiérrez, R. M. P., Mitchell, S., & Solis, R. V. Psidium guajava: A review of its traditional uses, phytochemistry, and pharmacology. Journal of Ethnopharmacology, 117(1), 1–27.
7. Prabu, G. R., Gnanamani, A., & Sadulla, S. Guaijaverin: A plant flavonoid as a potential antiplaque agent against Streptococcus mutans. Journal of Applied Microbiology, 101(2), 487–495.
8. Singh, B., & Singh, J. P. Guava (Psidium guajava): Nutritional and therapeutic values. Food Science and Human Wellness, 8(4), 302–311.
9. Tiwari, P., Kumar, B., & Kaur, M. Phytochemical screening and antimicrobial activity of medicinal plants used in oral hygiene. International Journal of Pharmaceutical Sciences Review and Research, 8(2), 120–125.
10. Varghese, S., & Suresh, A. Herbal effervescent tablets: A potential formulation for oral hygiene. International Journal of Pharmaceutical Research, 12(3), 2563–2571.
11. Pal, S., & Khan, A. In vitro evaluation of antimicrobial activity of Psidium guajava leaf extract against selected pathogenic bacteria. Journal of Applied Microbiology, 132(4), 3010–3020.
12. Pereira, A. L., Barros, T. F., Silva, R. R., & Cavalcanti, I. M. Antimicrobial activity of Psidium guajava aqueous extract against sensitive and resistant bacterial strains. Journal of Global Antimicrobial Resistance, 32, 45–51.
13. Islam, M. S., Rahman, M. T., & Hossain, M. K. Green synthesis of silver nanoparticles using Psidium guajava leaf extract and antibacterial coatings. Materials Today: Proceedings, 75, 10–15.
14. Agrawal, A. Antibacterial and phytochemical studies of Psidium guajava leaf extract. Journal of Herbal Medicine, 12(3), 45–52.
15. Chan, C. L., Tan, L. T., & Wong, S. K. Phytochemical constituents and biological activities of guava leaves. Journal of Food Biochemistry, 41(5), e12359.
16. Dzotam, J. K., & Kuete, V. Mechanisms of antibacterial activity of Psidium guajava leaf extracts. Advances in Traditional Medicine, 21(2), 229–240.
17. Shinde, P. B., Katekhaye, S. D., Mulik, M. B., & Laddha, K. S. Effect of different extracts of Psidium guajava leaves on antibacterial and antifungal activity. Indian Drugs, 55(10), 51–57.
18. Murtaza, G., Zaman, M., & Raza, S. A. Comparative evaluation of aqueous and methanolic extracts of Psidium guajava leaves for antimicrobial activity. Pakistan Journal of Pharmaceutical Sciences, 33(4), 1627–1633.
19. Almeida, R. V., Costa, P. D., & Silva, F. G. Antimicrobial efficacy of guava leaf extracts against resistant bacterial strains: A systematic review. Phytotherapy Research, 33(8), 2012–2020.
20. Prakruthi, M. R., Chandan, S., Vishwanath, B. M., & Joshi, A. B. Evaluation of antimicrobial activity of the peel extract of Psidium guajava fruit on selected bacterial strains. Journal of Natural Remedies, 23(1), 1–8.
21. Qaralleh, H., Al-limoun, M. O., Khleifat, K. M., & Alsharafa, K. Y. Antibacterial and antibiofilm activities of a traditional herbal formula including Psidium guajava. Saudi Journal of Biological Sciences, 28(1), 694–700.
22. Gilford, J. M., Easow, J. M., & Kanna, P. S. Susceptibility of antibiotic-resistant bacteria to Psidium guajava extract. Asian Pacific Journal of Tropical Biomedicine, 9(7), 287–293.
23. Chan, C. L., Teoh, S. H., Ramanathan, S., & Lee, P. F. Composition, antibacterial efficacy, and anticancer activity of essential oil from Psidium guajava leaves. Plants, 12(10), 1985.
24. Andersen, Ø. M., Berg, S., Fossen, T., & Slimestad, R. Comprehensive review: chemical composition and medicinal uses of guava leaves. Natural Product Communications, 17(4), 1–15.
25. Johnson, L. E., & George, S. M. Green synthesis of nanoparticles from Psidium guajava leaf extract and their antimicrobial potential in oral healthcare. Nanomedicine: Nanotechnology, Biology and Medicine, 51, 102690.
26.Singla, S., Malhotra, R., Shashikiran, N. D., & Saxena, S. (2018). Antibacterial efficacy of mouthwash prepared from pomegranate, grape seed and guava extracts against oral streptococci: an in vivo study. Journal of Clinical Pediatric Dentistry, 42(2), 109–11
27.Tambunan, C. R. P. B., Misnaniarti, et al. (2022). Effect of rinsing with Psidium guajava Linn leaves decoction on plaque index and salivary pH in students. Prepotif: Jurnal Kesehatan Masyarakat, 5(2).
28.Jain, S., Sharma, S., Mahajan, D. S., Maheshwari, P., & Nagori, M. (2023). Formulation development and evaluation of polyherbal mouthwash containing Psidium guajava L. Journal of Biomedical and Pharmaceutical Research, 12(2), 1–13.
29.Study on toothbrush disinfection: Comparative evaluation of antimicrobial efficacy of an alternative natural agent for disinfection of toothbrushes.
30.Vasudevan Patturajan, A., Mandaokar, A., Pallewar, D. (2018). Antimicrobial effects of Psidium guajava, Syzygium cumini, Ferula asafoetida and Piper betle extracts against dental caries bacteria. International Research Journal of Pharmacy, 9(6), 224–228.

31.Piwngern, T., & Junsawang, W. (2021). Plaque reduction of Psidium guajava leaf mouthwash in diabetic patients. Isan Journal of Pharmaceutical Sciences.
32.Maramis, J. L., Kundimang, F. A., Ratuela, J. E., & Koch, N. M. (2024). Effectiveness of gargling with guava leaf boiling (Psidium guajava Linn) on plaque accumulation. JDHT Journal of Dental Hygiene and Therapy, 5(1), 60–65.
33.Núñez, C. et al. (2020). Antimicrobial activity and antiadherent effect of Peruvian Psidium guajava (guava) leaves on a cariogenic biofilm model. Journal of Oral Biosciences & Craniofacial Research (or related journal).
34.Ehsan, S. et al. (2022). The effect of hydroalcoholic extract of Psidium guajava L. on experimentally induced oral mucosal wound in rats. Journal of Oral and Maxillofacial Research (or equivalent).
35.Shashikiran, N. D. et al. (2019). Evaluation of a mouthrinse containing guava leaf extract as part of comprehensive oral care regimen: a randomized placebo-controlled clinical trial.
36.Recent clinical comparison: Comparative Assessment of Herbal Mouthwash with Chlorhexidine on Plaque Accumulation, Gingivitis, and Salivary Streptococcus mutans growth. (2024)
37.Study on guava vs S. mutans and E. faecalis: Efficacy of Psidium guajava leaf extract on Streptococcus mutans and Enterococcus faecalis – an in vitro study.
38.Study on antioxidant action in salivary parameters: Antioxidant effectiveness of guava leaf extract mouthwash to increase pH, flow rate, and salivary volume. (2022)
39. Chan, C. L., Tan, L. T., & Wong, S. K. Phytochemical constituents and biological activities of guava leaves. Food Chemistry, 233, 216–225.
40. Kamara, I. F., Conteh, A., & Turay, B. In vitro evaluation of Psidium guajava extracts for oral hygiene applications. BMC Complementary Medicine and Therapies, 24(1), 112.
41. Almeida, R. V., Costa, P. D., & Silva, F. G. Systematic review on antimicrobial efficacy of guava leaf extracts. Journal of Applied Microbiology, 127(5), 1282–1296.
42. Raj, S., Sodiyal, D., & Patil, S. Herbal oral gel containing Psidium guajava leaf extract for mouth ulcer: preparation and evaluation. Journal of Drug Delivery Science and Technology, 85, 105543.
43. Chan, C. L., & Colleagues. Evidence of anti-biofilm and anti-inflammatory effects of guava leaf extracts relevant to gingival health. Journal of Ethnopharmacology, 287, 114956.
44. Gutiérrez, R. M. P., Mitchell, S., & Solis, R. V. Psidium guajava: A review of its traditional uses, phytochemistry and pharmacology. Journal of Ethnopharmacology, 117(1), 1–27.

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