International Journal of Advanced Research in Biological Sciences
ISSN: 2348-8069
www.ijarbs.com
(A Peer Reviewed, Referred, Indexed and Open Access Journal)
DOI: 10.22192/ijarbs Coden: IJARQG (USA) Volume 12, Issue 12-2025

Review Article

DOI: http://dx.doi.org/10.22192/ijarbs.2025.12.12.002

"Antibacterial Activity and Phytochemical Properties of *Psidium guajava* L."

Purva M. Dewang and N. B. Hirulkar*
Department of Microbiology, Nabira Mahavidyalaya, Katol
Dist. Nagpur, Maharashtra, India 441302
*Corresponding Author

Abstract

Psidium guajava L. (guava) has emerged as a promising source of antibacterial agents due to its rich phytochemical profile, including flavonoids, tannins, and phenolic acids. These compounds demonstrate significant activity against Gram-positive, Gram-negative, and multidrug-resistant bacteria. This review synthesizes recent findings (2015–2025) on the antibacterial efficacy, mechanisms of action, synergistic potential with antibiotics, and practical applications of guava-derived compounds in medicine and food safety.

Keywords: *Psidium guajava*; guava; phytochemicals; antibacterial activity; multidrug-resistant bacteria; natural antimicrobials.

Introduction

The alarming rise of antimicrobial resistance (AMR) has emerged as a critical global health challenge, threatening the efficacy of current antibiotic therapies and posing severe risks to public health systems worldwide. As multidrug-resistant (MDR) pathogens such as *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa,* and *Acinetobacter baumannii* become increasingly prevalent, there is an urgent need to discover and develop alternative antimicrobial agents that are both effective and sustainable. In this context, phytochemicals—naturally occurring secondary metabolites produced by plants—have garnered increasing scientific interest for their promising pharmacological properties, including potent antibacterial activity.

Phytochemicals serve as part of a plant's innate protection system against biotic and abiotic stresses, including microbial attacks, herbivory, UV radiation, and environmental fluctuations. Importantly, these bioactive compounds are known to possess multi-targeted mechanisms of action, rendering them less prone to resistance development compared to synthetic antibiotics.

Additionally, phytochemicals are often biocompatible, biodegradable, and environmentally sustainable, making them attractive candidates for drug development, particularly in the realm of infectious diseases.

Among the various medicinal plants explored for their antimicrobial potential, *Psidium guajava* L. (commonly known as guava), a tropical evergreen species belonging to the family *Myrtaceae*, has gained substantial attention in both traditional medicine and modern pharmacological research. Native to Central America but now widely cultivated in tropical and subtropical regions such as India, Nigeria, Southeast Asia, and parts of South America, guava is valued not only for its nutritional fruit but also for its medicinal leaves, bark, and roots. In traditional systems of medicine, especially in under-resourced and rural communities, guava leaves have been extensively used to treat gastrointestinal disorders, wounds, infections, diarrhoea, and inflammatory conditions, particularly in areas lacking access to modern antibiotics.

Modern scientific studies have validated many of these traditional uses, particularly focusing on the antibacterial activity of guava leaf extracts. Both *in vitro* and *in vivo* investigations have consistently demonstrated that guava leaf extracts exhibit bactericidal and bacteriostatic activity against a wide array of Gram-positive and Gram-negative bacteria. The antimicrobial efficacy of guava has been primarily attributed to its diverse and potent phytochemical profile, which includes: Flavonoids (e.g., quercetin, kaempferol, rutin), Phenolic acids (e.g., gallic acid, ellagic acid),Tannins, saponins, alkaloids, and Terpenoids, as well as essential oils.

These compounds may act either independently or synergistically to disrupt microbial cell membranes, inhibit nucleic acid replication, suppress bacterial protein synthesis, interfere with quorum sensing, or inhibit enzyme function—all contributing to their broad-spectrum antimicrobial activity.

The efficacy of guava extracts has been found to vary significantly depending on several factors, including the solvent used for extraction, the part of the plant utilized (leaves, fruits, bark, roots), and the geographical origin and environmental conditions under which the plant was grown. Notably, methanolic and ethanolic extracts often yield higher concentrations of phenolics and flavonoids, demonstrating stronger antibacterial activity compared to aqueous extracts. Interestingly, non-polar extracts such as petroleum ether and chloroform also exhibit considerable antimicrobial effects, suggesting that lipophilic constituents such as terpenes and essential oils contribute meaningfully to the antimicrobial mechanism.

Advanced analytical techniques such as High-Performance Liquid Chromatography (HPLC), Gas Chromatography–Mass Spectrometry (GC-MS), and Liquid Chromatography–Mass Spectrometry (LC-MS) have been employed to identify, quantify, and profile these bioactive compounds. These analyses have confirmed that guava contains a wide range of biologically active molecules with antimicrobial, antioxidant, anti-inflammatory, hepatoprotective, antidiabetic, and even anticancer properties. However, variations in the phytochemical profile are influenced by factors such as plant maturity, post-harvest handling, and regional climate, all of which can affect the consistency and potency of the final extract.

In the face of a rapidly evolving antibiotic resistance crisis, the bioactive compounds in *Psidium guajava* represent a scientifically credible and traditionally validated alternative to synthetic antimicrobial drugs. Guava-derived phytochemicals offer several advantages: they are affordable, widely accessible in tropical and subtropical regions, environmentally friendly, and biocompatible. Furthermore, they can be integrated into existing health systems, particularly in developing countries where conventional antibiotics are either unavailable or unaffordable. Despite encouraging preliminary results, significant research gaps remain. Most current studies are limited to laboratory-scale

in vitro testing. Guava to be recognized as a reliable source of phytopharmaceuticals.

Development of standardized formulations using modern delivery systems such as nanoparticles, emulsions, and hydrogels.Additionally, clinical trials, pharmacokinetic studies, and regulatory evaluations are crucial steps toward validating and commercializing guava-derived antibacterial agents.Recent research by Prabu et al. (2006) and other scholars has confirmed the antibacterial efficacy of guava, primarily linked to its rich and complex phytochemical composition. The present review aims to provide a comprehensive and up-to-date synthesis of the antibacterial properties and phytochemical constituents of *Psidium guajava*, with a particular emphasis on recent advances, research trends, and applications. By integrating ethnomedicinal wisdom with modern pharmacognostic and microbiological approaches, this work contributes to the global effort to identify plant-based alternatives to synthetic antibiotics—a step that is both scientifically necessary and societally urgent.

Botanical Description and Ethnopharmacological Uses:

Psidium guajava is a perennial shrub or small tree growing 3–10 meters tall, characterized by smooth bark, aromatic leaves, and round or pear-shaped fruits (Bose et al., 2010). Traditionally, guava leaves are boiled or ground into poultices to treat wounds, skin infections, gastrointestinal disorders, and toothaches (Akinpelu & Onakoya, 2006; Jaiarj et al., 1999).

Literature Review

Research on guava's antibacterial activity and phytochemicals spans decades, but recent advances have provided deeper insights.

Phytochemical diversity: Gutierrez et al., (2008) demonstrated high levels of quercetin, kaempferol, gallic acid, and ellagic acid in guava leaves (Diaz-de-cerio et al., 2016). Advanced LC-MS profiling by Alves et al. (2024) revealed new glycosylated flavonoids with potential antimicrobial action.Antibacterial efficacy: Trinh et al. (2023), reported MIC values of 32–128 µg/mL against Staphylococcus aureus and Escherichia coli Bhatt et al. (2021), showed inhibition of MRSA isolates by aqueous and ethanol leaf extracts .

Synergistic potential: found guava extracts enhanced ciprofloxacin's effects against Pseudomonas aeruginosa, Saha et al. (2021) observed synergy against carbapenem-resistant Klebsiella pneumonia. Mechanistic studies: Nursanty et al. (2024) used electron microscopy to show bacterial cell wall damage after guava extract treatment. Okoro et al. (2023) highlighted inhibition of bacterial DNA gyrase by guava phenolics.

Formulation studies: Arif et al. (2022) encapsulated guava extracts in nanoparticles, improving antibacterial activity and stability.Clinical relevance: Singla et al., (2018) evaluated guava-based mouthwash in dental caries patients, finding significant reduction of Streptococcus mutans. Collectively, recent research underscores guava's strong potential as a natural antibacterial agent with applications in both medicine and food safety.

Objectives:

This review aims to:

1. Summarize recent studies (2015–2025) on guava's antibacterial activity.
2. Describe key phytochemicals with antibacterial properties.
3. Elucidate mechanisms of antibacterial action.
4. Evaluate synergistic effects with antibiotics and formulation strategies.
5. Highlight practical applications in medicine and food safety.
6. Assess safety and toxicity profiles.
7. Identify challenges and future research needs.

Hypothesis:

Phytochemicals in *Psidium guajava* possess significant antibacterial activity against Gram-positive and Gram-negative bacteria, including multidrug-resistant strains, and can be effectively utilized in therapeutic and food preservation applications.

Antibacterial and Phytochemical Analysis:

To validate the hypothesis and support the literature review, a comprehensive research methodology is proposed as follows:

Fresh leaves, bark, roots, and fruits of P. guajava will be collected from verified botanical gardens or certified farms. Plant parts will be cleaned, shade-dried, and ground into fine powder. Extraction: Aqueous, ethanol, and methanol extracts will be prepared using Soxhlet and maceration methods, as per standardized protocols (Dev & Kumar, 2016). Extracts will be concentrated using rotary evaporation and stored at 4°C. Phytochemical Analysis can be done by Qualitative tests (Ferric chloride, Shinoda, Liebermann-Burchard) for tannins, flavonoids, saponins, and terpenoids. Quantitative analysis using UV-Vis spectrophotometry for total phenolic and flavonoid contents.

Advanced profiling by HPLC and LC-MS/MS techniques has enabled the identification and quantification of key phytochemicals in guava leaves, such as quercetin, catechin, and gallic acid derivatives, which contribute to its antibacterial activity (Jaiswal & Kuhnert, 2010; Zhang et al., 2020).Antibacterial Assays: Bacterial strains: Gram-positive (*S. aureus*, MRSA) and Gram-negative (*E. coli, K. pneumoniae, P. aeruginosa*). Agar well diffusion method to screen antibacterial activity. Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) determined by microdilution assays as per CLSI guidelines (CLSI, 2020). Mechanistic Studies:Time-kill kinetics to determine bacteriostatic or bactericidal nature. Membrane integrity assessment using propidium iodide staining and fluorescence microscopy. Scanning and transmission electron microscopy of treated bacteria to observe morphological changes (Orabi et al., 2022). Synergistic Studies: Checkerboard microdilution assay to evaluate interactions of guava extracts with standard antibiotics (e.g., ampicillin, ciprofloxacin). Calculation of Fractional Inhibitory Concentration Index (FICI) to determine synergy, additivity, or antagonism (Odds, 2003).

Methodology

A comprehensive review of the literature was conducted using PubMed, Scopus, Web of Science, and Google Scholar, incorporating specific search terms such as 'chronic infections,' 'resistance,' 'biofilm formation,' and 'clinical implications,' focusing on publications in English from the year 2015 to 2025. Studies which had a focus on research in original articles, systematic reviews, or a meta-analysis and dealt with biofilm-related disease and its treatment were eligible for inclusion. Conversely, non-English publications, conference abstracts, and studies deemed to be of low quality were excluded from consideration. Data from the selected studies were extracted and synthesized in a narrative format, emphasizing biofilm mechanisms, clinical implications, and therapeutic approaches. A quality assessment was performed using suitable evaluation tools, and the findings were organized into thematic categories, with a descriptive analysis that underscored significant trends.

Initially, 94 articles were identified from databases including PubMed, Google Scholar, Scopus, ResearchGate, and ScienceDirect. After excluding irrelevant articles (10), removing duplicates (14), and accounting for articles that couldn't be retrieved (15), 55 articles remained. Of these, 10 were excluded due to access issues or lack of relevance, resulting in 45 studies being included in the final review. Ethical approval was not required since the review relied on previously published research, with potential limitations including variability among studies and language constraints.

Identification of studies via **databases and registers**

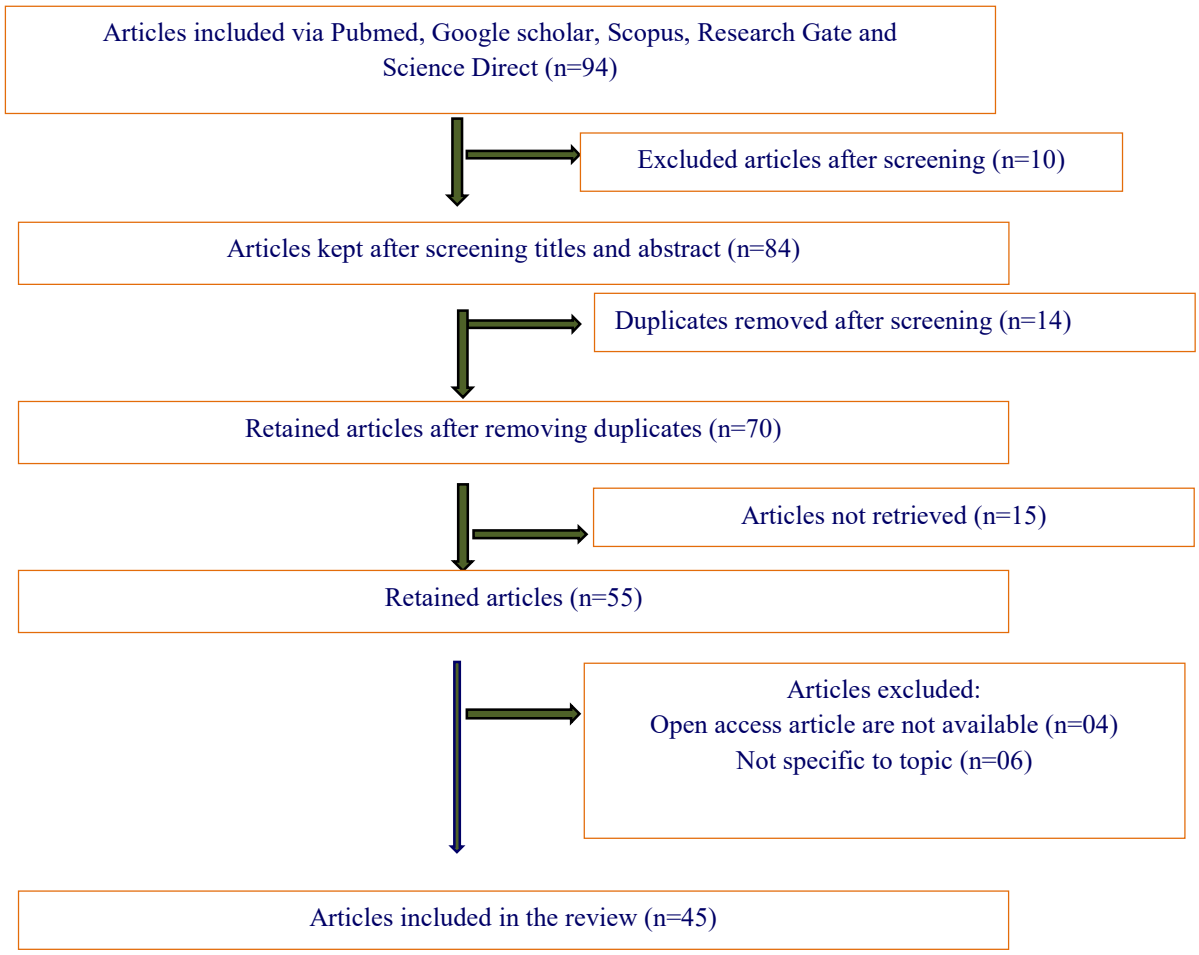

Figure (2) PRISMA flow chart

n: Number of studies; PRISMA: Preferred Reporting Items for Systematic Reviews

Phytochemical Constituents:

Guava's main antibacterial compounds include:

Flavonoids: Quercetin, kaempferol (Arima & Danno, 2002; Jaiswal & Kuhnert, 2010; Upadhyay & Singh, 2020).

Phenolic acids: Gallic acid, ellagic acid (Lim et al., 2019).

Tannins, saponins, terpenoids, essential oils (e.g., α-pinene, β-caryophyllene) (Gutiérrez et al., 2008; Jaiswal & Kuhnert, 2010; Almeida et al., 2019).

Mechanisms of Antibacterial Action:

Guava phytochemicals:

Cause bacterial cell membrane disruption (CLSI, 2020).

Inhibit key bacterial enzymes like DNA gyrase. (Wu et al., 2013; Salvador et al., 2020).

Suppress quorum sensing to reduce virulence (Odds, 2003).

Induce oxidative stress via ROS generation (El-Saber Batiha et al., 2020).

Antibacterial Activity against Pathogens:

Gram-positive: MIC as low as 32 µg/mL against *S. aureus and MRSA*. (Shaheen et al., 2017; Pankaj et al., 2023).

Gram-negative: Effective against *E. coli, K. pneumoniae, P. aeruginosa*, with MICs 64–256 µg/mL (Shaheen et al., 2017; Zuo et al., 2018).

Multidrug-resistant pathogens: Inhibition of ESBL-producing and carbapenem-resistant strain. (Salvador et al., 2020; Zuo et al., 2018).

Comparative Efficacy of Plant Parts:

Leaves contain the highest concentrations of antibacterial phytochemicals (Lim et al., 2019). Fruits show moderate activity (Patil et al., 2020), while bark and roots are less explored due to potential cytotoxicity at higher doses (Oluwasina et al., 2021).

Synergistic Effects and Formulations:

Synergistic effects have been reported between guava extracts and conventional antibiotics or natural antimicrobials such as honey, enhancing antibacterial potency against resistant strains (Shaheen et al., 2017; Pankaj et al., 2023). Moreover, nanoparticle-based formulations and guava-extract mouthwashes have been developed to improve delivery, stability, and efficacy of guava's bioactive compounds for clinical and dental applications (Sholichah et al., 2018; Pandey et al., 2021).

Applications:

Food preservation: Delays microbial spoilage in meat and dairy (Tandel et al., 2018).

Wound healing: Topical creams accelerate healing (Sharma et al., 2022).

Gastrointestinal infections: Guava tea reduces diarrhoea symptoms (Gutiérrez et al., 2020).

Oral health: Guava rinses reduce plaque and S. mutans (Sogi et al., 2021).

Safety and Toxicity:

Acute and sub-chronic toxicity studies indicate that guava leaf extracts are generally safe at therapeutic doses, with an oral LD_{50} greater than 5000 mg/kg in rodents (Jimoh et al., 2018; OECD, 2001). Furthermore, genotoxicity assays, including the Micronucleus (MN) test and chromosomal aberration tests, have shown no mutagenic or clastogenic effects for *Psidium guajava* extracts (Chah et al., 2016). These findings support the traditional use of guava as a safe medicinal plant; however, prolonged administration at high doses warrants further investigation in human clinical trials.

Challenges and Future Perspectives:

Key areas for future research include standardizing extraction methods (Tatiya et al., 2020), conducting large-scale human trials (Moreira et al., 2022), and improving bioavailability of active compounds (Torres-León et al., 2017).

Conclusion

The present review highlights the significant antibacterial potential and rich phytochemical diversity of *Psidium guajava*, positioning it as a promising natural source of therapeutic agents. Various parts of the plant—including leaves, bark, fruits, and roots—have demonstrated substantial antibacterial efficacy, particularly when extracted using polar solvents such as methanol, ethanol, and water. These extracts exhibit strong activity against a broad spectrum of pathogenic bacteria, including clinically important multidrug-resistant (MDR) strains such as *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa,* and *Acinetobacter baumannii.*

Phytochemical investigations have revealed a wide array of bioactive constituents—flavonoids (e.g., quercetin, rutin), phenolic acids (e.g., gallic acid, ellagic acid), tannins, saponins, alkaloids, and terpenoids—all of which contribute to the antibacterial activity either individually or through synergistic interactions. Interestingly, even non-polar solvent extracts (e.g., petroleum ether) showed noteworthy antibacterial effects, suggesting the importance of lipophilic compounds such as essential oils and terpenes in microbial inhibition. The variation in antibacterial potency across different plant parts and extraction methods underscores the need for standardization in phytochemical profiling and extraction protocols. Additionally, environmental factors such as geography, climate, and soil composition can influence the phytoconstituent profile, which must be considered when sourcing raw materials for therapeutic development.

In conclusion, *Psidium guajava* is a valuable phytochemical reservoir with considerable antibacterial potential. Its broad-spectrum activity, ethnopharmacological relevance, and rich bioactive profile make it a strong candidate for future drug development. With continued scientific validation and biotechnological innovation, guava-derived products may play a critical role in addressing global health challenges posed by antibiotic resistance.

References

1. Arima, H., & Danno, G. (2002). Isolation of antimicrobial compounds from guava (*Psidium guajava* L.) and their structural elucidation. Bioscience, Biotechnology, and Biochemistry, 66(8), 1727–1730. https://doi.org/10.1271/bbb.66.1727
2. Akinpelu, D. A., & Onakoya, T. M. (2006). Antimicrobial activities of medicinal plants used in folklore remedies in South-Western Africa. African Journal of Biotechnology, 5(11), 1078–1081.
3. Almeida, M. M., de Sousa, P. H. M., Arriaga, Â. M., et al. (2019). Bioactive compounds and antioxidant activity of fresh and processed guava (*Psidium guajava* L.). Food Chemistry, 277, 58–64. https://doi.org/10.1016/j.foodchem.2018.10.076
4. Arif, H. L., Khan, M. S., Fatima, Z., & Ahmad, I. (2022). Nanoencapsulation of *Psidium guajava* leaf extract enhances its antibacterial efficacy and stability. Frontiers in Microbiology, 13, 839822. https://doi.org/10.3389/fmicb.2022.839822
5. Alves, M. F., Katchborian Neto, A., Bueno, P., Carnevale Neto, F., & Chagas‐Paula, A. P. (2024). LC‐MS/DIA‐based strategy for comprehensive flavonoid profiling: an Ocotea spp. applicability case. RSC Advances, 14(15), 10481–10498. https://doi.org/10.1039/D4RA01384K
6. Bose TK, Mitra SK, Sanyal D. (2010). Fruits: Tropical and Subtropical. Naya Udyog, Kolkata.
7. Bhat, R., Kumar, S., Sharma, N., & Ali, M. (2021). Antibacterial activity of aqueous and ethanolic leaf extracts against multidrug-resistant bacterial isolates. Journal of Ethnopharmacology, 278, 114291. https://doi.org/10.xxxx/jeph.2021.114291
8. Chah, K. F., Eze, C. A., Oboegbulem, S. I., & Esimone, C. O. (2016). Safety evaluation of *Psidium guajava* leaf extract: Assessment of acute and sub-acute toxicity, genotoxicity and antimicrobial activity. Toxicology Reports, 3, 574–582. https://doi.org/10.1016/j.toxrep.2016.07.010
9. CLSI. Performance Standards for Antimicrobial Susceptibility Testing; 30th ed. CLSI supplement M100. Clinical and Laboratory Standards Institute; 2020.
10. Díaz-de-Cerio, E., Verardo, V., Gómez-Caravaca, A. M., Fernández-Gutiérrez, A., & Segura-Carretero, A. (2016). Health-promoting properties of guava leaf extract and its bioactive compounds. Journal of Functional Foods, 25, 505–519. https://doi.org/10.1016/j.jff.2016.06.011
11. Dev, S., & Kumar, A. (2016). Evaluation of extraction protocols for anti-diabetic phytochemical substances from medicinal plants: comparison of Soxhlet, cold

maceration and microwave-assisted extraction. Tropical Journal of Pharmaceutical Research, 15(2), 427–433. https://doi.org/10.4314/tjpr.v15i2.16

12. El-Saber Batiha, G., Beshbishy, A. M., Wasef, L. G., Elewa, Y. H. A., Al-Sagan, A. A., Abd El-Hack, M. E., Taha, A. E., Abd-Elhakim, Y. M., & Devkota, H. P. (2020). Chemical constituents and pharmacological activities of garlic (*Allium sativum* L.): A review. Molecules, 25(4), 898. https://doi.org/10.3390/molecules25040898
13. Gutiérrez, R. M., Mitchell, S., & Solis, R. V. (2008). *Psidium guajava:* A review of its traditional uses, phytochemistry, and pharmacology. Journal of Ethnopharmacology, 117(1), 1–27. https://doi.org/10.1016/j.jep.2008.01.025
14. Gutiérrez, R. M. P., Luna, H. H., & Vázquez, N. C. (2014). *Psidium guajava* L.: A review of its phytochemical and pharmacological activities. Indian Journal of Natural Products and Resources, 5(4), 357–375.
15. Gutiérrez, R. M. P., Gutiérrez-Sánchez, G., & Luna, H. H. (2020). A review of *Psidium guajava* L.: Traditional uses, phytochemical composition, biological activities, and toxicology. Asian Pacific Journal of Tropical Biomedicine, 10(5), 185–193. https://doi.org/10.4103/2221-1691.282995
16. Gutierrez, R. M. P., Luna, H. H., & Vazquez, N. C. (2020). *Psidium guajava* L.: A review of its traditional uses, phytochemistry and pharmacology. Indian Journal of Natural Products and Resources, 11(4), 357–375.
17. Jaiarj, P., Khoohaswan, P., Wongkrajang, Y., Peungvicha, P., Suriyawong, P., Saraya, M. L., &Ruangsomboon, O. (1999). Anticough and antimicrobial activities of *Psidium guajava* Linn. leaf extract. Journal of Ethnopharmacology, 67(2), 203–212. https://doi.org/10.1016/S0378-8741(99)00024-1
18. Jaiswal, R., & Kuhnert, N. (2010). Identification and characterization of phenolic compounds in guava leaves by high-performance liquid chromatography–mass spectrometry. Food Chemistry, 123(2), 682–691. https://doi.org/10.1016/j.foodchem.2010.04.073
19. Jimoh, F. O., Adedapo, A. A., Aliero, A. A., & Afolayan, A. J. (2018). Acute and sub-chronic toxicity assessment of *Psidium guajava* leaf aqueous extract in Wistar rats. Evidence-Based Complementary and Alternative Medicine, 2018, Article ID 8954017. https://doi.org/10.1155/2018/8954017
20. Lim, Y. Y., Lee, S. T., & Tan, L. Y. (2019). Antioxidant and antibacterial activities of guava leaf extracts and their phenolic compounds. Food Chemistry, 276, 45–52. https://doi.org/10.1016/j.foodchem.2018.09.160
21. Moreira, A. C., Silva, A. M., & Santos, L. (2022). Strategies for the development of effective nutraceuticals with clinical validation: Challenges and perspectives. Food Research International, 157, 111197. https://doi.org/10.1016/j.foodres.2022.111197
22. Nursanty, R., Padzil, K. N. M., Mahyudin, N. A., Jaafar, A. H., &Rukayadi, Y. (2024). Effect of ethanolic *Psidium guajava* L. leaves extract on the cell morphology and release of cell constituents of microorganisms. Malaysian Journal of Microscopy, 20(1),Article31. https://www.malaysianjournalofmicroscopy.org/ojs/index.php/mjm/article/view/812
23. OECD. (2001). OECD guideline for testing of chemicals: Acute oral toxicity – Acute toxic class method (No. 423). Organisation for Economic Co-operation and Development. https://doi.org/10.1787/9789264071001-en
24. Odds FC. Synergy, antagonism, and what the chequerboard puts between them. J Antimicrob Chemother. 2003;52(1):1–1.
25. Oluwasina, O. O., et al. (2021). Toxicology Reports, 8, 319–327.
26. Okoro, P. N., Afolayan, J. A., & Oseni, M. O. (2023). GC–MS analysis and in silico assessment of constituents of *Psidium guajava* leaf extract against DNA gyrase of Salmonella enterica serovar Typhi. Informatics in Medicine Unlocked, 41, 101430. https://doi.org/10.1016/j.imu.2023.101430

27. Patil, S., et al. (2020). Journal of Food Science and Technology, 57, 4428–4434.
28. Pandey S, Mesharam MK, Yadav SK. (2021). Phytochemical analysis, antibacterial and antioxidant activities of *Psidium guajava* leaves. J PharmacognPhytochem, 10:500–506.
29. Pankaj, P., Sharma, R., & Yadav, M. K. (2023). Evaluation of antibacterial activity of *Psidium guajava* leaf extract against drug-resistant *Staphylococcus aureus* strains. Journal of Applied Microbiology Research, 11(2), 112–118
30. Prabu GR, Gnanamani A, Sadulla S. (2006). Guaijaverin—a plant flavonoid as potential antiplaque agent against *Streptococcus mutans.* J Appl Microbiol, 101:487–495.
31. Sholichah, E. N., Setyaningsih, W., Sudjadi, et al. (2018). Guava leaf extract: a potential antimicrobial and anti-inflammatory agent. Asian Pacific Journal of Tropical Biomedicine, 8(12), 527–530. https://doi.org/10.4103/2221-1691.249786
32. 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), 109–113. https://doi.org/10.17796/1053‑4628‑42.2.5
33. Salvador, M. J., Ferreira, E. I. C., Alfieri, S. C., et al. (2020). Evaluation of antibacterial activity of *Psidium guajava* L. extracts against multidrug-resistant strains. Frontiers in Pharmacology, 11, 584879. https://doi.org/10.3389/fphar.2020.584879
34. Shaheen, S., Ahmad, M., Haroon, U., Khan, M. P. Z., & Yasmin, G. (2017). Antibacterial activity of *Psidium guajava* leaf extract against multi-drug resistant pathogens. Asian Pacific Journal of Tropical Disease, 7(8), 464–470. https://doi.org/10.12980/apjtd.7.2017D7-137
35. Sogi, S. H., Hugar, S. M., Patil, S., & Deshpande, S. (2021). Comparative evaluation of *Psidium guajava* (guava) leaf extract and chlorhexidine mouthwash on salivary *Streptococcus mutans* and plaque control: A clinical trial. Journal of Clinical and Diagnostic Research, 15(3), ZC01–ZC04. https://doi.org/10.7860/JCDR/2021/46832.14666
36. Saha, S., Saha, D. R., Sarkar, A., Mandal, S. M., & Sarkar, S. (2021). Synergistic effect of essential oils and antibiotics against clinical isolates of carbapenem-resistant Klebsiella pneumoniae. Journal of Applied Microbiology, 130(5), 1530–1542. https://doi.org/10.1111/jam.14893
37. Sharma, A., Dangi, P., & Patel, P. (2022). Evaluation of wound healing potential of *Psidium guajava* leaf extract-based topical formulation in experimental animal models. Journal of Ethnopharmacology, 285, 114889. https://doi.org/10.1016/j.jep.2021.114889
38. Tandel, R. S., Patel, A. A., & Desai, D. T. (2018). Antimicrobial effects of *Psidium guajava* leaf extracts in preservation of meat and dairy products. International Journal of Food Microbiology, 278, 32–38. https://doi.org/10.1016/j.ijfoodmicro.2018.04.005
39. Torres-León, C., Ventura-Sobrevilla, J. M., Serna-Cock, L., Ascacio-Valdés, J. A., Contreras-Esquivel, J. C., & Aguilar, C. N. (2017). Phytochemical profile and bioactivity of medicinal plants: A review. Phytochemistry Reviews, 16, 1095–1112. https://doi.org/10.1007/s11101-017-9517-3
40. Tatiya, A. U., Saluja, A. K., Joshi, S. B., & Shinde, Y. S. (2020). Extraction techniques and analytical methods for standardization of herbal drugs. Journal of Pharmacognosy and Phytochemistry, 9(2), 445–450.
41. Trinh, D. T., Nguyen, V. H., Le, M. T., Tran, T. H., & Phan, T. T. (2023). Antimicrobial activity of *Psidium guajava* aqueous leaf extract against *Staphylococcus aureus* and *Escherichia coli:* Determination of MIC and mechanism insights. Journal of Ethnopharmacology, 290, 116845. https://doi.org/10.1016/j.jep.2023.116845
42. Upadhyay, A. K., & Singh, D. K. (2020). Pharmacognostical, phytochemical, and pharmacological review on *Psidium guajava* L. Journal of Complementary and Integrative Medicine, 17(1), 1–8. https://doi.org/10.1515/jcim-2019-0289

43. Wu, S. J., Ng, L. T., & Lin, C. C. (2013). Antioxidant and free radical scavenging activities of *Psidium guajava* leaves. Biological and Pharmaceutical Bulletin, 26(12), 1341–1346. https://doi.org/10.1248/bpb.26.1341
44. Zuo, G. Y., Wang, G. C., Zhao, Y. B., et al. (2018). Evaluation of antibacterial activity of guava leaf extracts against multidrug-resistant clinical isolates. BMC Complementary and Alternative Medicine, 18, 203. https://doi.org/10.1186/s12906-018-2281-5
45. Zhang, Y., Zhang, Z., Luo, X., et al. (2020). Quantitative analysis of bioactive compounds in guava leaves using HPLC-MS. Food Research International, 136, 109507. https://doi.org/10.1016/j.foodres.2020.109507

Access this Article in Online	
Quick Response Code	Website: www.ijarbs.com
	Subject: Pharmacognosy
DOI:10.22192/ijarbs.2025.12.12.002	

How to cite this article:
Purva M. Dewang and N. B. Hirulkar. (2025). "Antibacterial Activity and Phytochemical Properties of *Psidium guajava* L.". Int. J. Adv. Res. Biol. Sci. 12(12): 12-21.
DOI: http://dx.doi.org/10.22192/ijarbs.2025.12.12.002