IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2

Therapeutic Potential And Pharmaceutical Applications of Psidium Guajava Leaves: A Comprehensive Review

Narhe Sharad Balu, Ms. Walunj Kajal Bhaskar, Ghode Seema Vikas, Thorat Ajay Sunil, More Nisha Sandip
Corresponding Author: Ms. Walunj Kajal Bhaskar
[1,3,4,5]Students, Samarth Institute of Pharmacy, Belhe, Pune, Maharashtra .
[2]Professor, Department of Quality Assurance, Samarth Institute of Pharmacy, Belhe, Pune, Maharashtra.
sharadnarhe18@gmail.com, walunjkajal@gmail.com
ghodeseema7@gmail.com, ajaythorat3864@gmail.com, nishamore602@gmail.com

Abstract: *Psidium guajava L. (guava), a member of the Myrtaceae family, is a tropical plant extensively studied for its wide-ranging medicinal properties. The leaves of P. guajava represent a particularly rich source of bioactive phytochemicals, including quercetin, ellagic acid, gallic acid, oleanolic acid, tannins, essential oils, carotenoids, and vitamins. These constituents collectively confer significant antidiarrheal, antidiabetic, antimicrobial, anti-inflammatory, antioxidant, antiviral, anticancer, cardioprotective, analgesic, and hepatoprotective activities.*

Results from in vitro research, animal models, and clinical trials published between 1990 and 2025 are combined in this extensive overview. The composition of phytochemicals, the molecular processes that underlie pharmacological actions, current pharmaceutical formulations, regulatory issues, and potential avenues for future drug development are all covered. The data clearly demonstrates the therapeutic value of P. guajava leaf extracts and emphasizes the pressing need for standardized formulations, thorough clinical studies, and incorporation into contemporary medicine. For innovative botanical medications, nutraceuticals, and functional formulations, the leaf presents a promising framework..

Keywords: phytochemistry, antidiarrheal, antidiabetic, antimicrobial, ethnopharmacology, Psidium guajava, guava leaves, quercetin, and botanical medicines

I. INTRODUCTION

Intense research into traditional botanical remedies as sources of novel therapeutic agents has been spurred by the global revival of interest in medicinal plants. Psidium guajava L., also known as common guava, holds a prominent position among tropical plants because of its extensive availability, long history of ethnomedical use on several continents, and remarkable and well-documented repertoire of biological activities. Guavas are native to Central America and Mexico, but they have spread widely over South Asia, Southeast Asia, Africa, and the Caribbean. They are members of the Myrtaceae family. The leaves of the P. guajava plant have garnered the most scientific interest, however all parts of the plant offer therapeutic benefit. Guava leaf decoctions have long been used in traditional medicine in India, China, Nigeria, Brazil, and Mexico to treat oral disorders, fever, skin infections, diarrhea, gastroenteritis, and diabetes mellitus. A substantial corpus of experimental and clinical research has been built upon these ethnobotanical applications. The exceptionally rich phytochemical content of P. guajava leaves is largely responsible for their pharmacological adaptability. A variety of polyphenolic chemicals are found in the leaves, most notably the flavonoid quercetin, which is found at very high amounts (up to 84 mg/g dry weight in certain studies)

DOI: 10.48175/IJARSCT-35687

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2

when compared to other plant sources. The bioactive profile is further enhanced by tannins, triterpenes, essential oils, carotenoids, vitamins, and lectins, which together allow for a variety of sometimes complementary medicinal actions.

II. TAXONOMY AND BOTANICAL DESCRIPTION

Psidium guajava L. is a member of the Kingdom Plantae, Order Myrtales, Family Myrtaceae, Genus Psidium, and Species P. guajava. Usually growing to a height of three to ten meters, the plant is a small to medium-sized evergreen tree or shrub. The leaves are simple, opposite, elliptical to oblong-ovate, and range in length from 5 to 15 cm. The abaxial (lower) surface is lighter and pubescent with noticeable veins, whilst the adaxial (upper) surface is dark green and slightly rough. The oil-containing chambers that give the leaves their distinctive aromatic scent are apparent as glandular dots, or secretory structures, when the leaves are held against light. A dorsiventral structure with a palisade mesophyll layer, many calcium oxalate crystals (druses), anomocytic stomata on the lower epidermis, and a The presence of druses and oil glands in histological sections, an elliptic form with an acute apex, a strong midrib visible on both surfaces, and an aromatic scent upon crushing are important botanical identifiers that are helpful for quality control of crude medicinal material. Ash values (total ash 4.8-6.5%), extractive values, and moisture content parameters are examples of standardization techniques.

III. TRADITIONAL ETHNOMEDICINAL USES

P. guajava leaves are used ethnobotanically in a variety of traditional medical systems in a wide range of geographical areas, demonstrating the widespread acknowledgement of its therapeutic potential.

3.1 Southeast and South Asia

Guava leaves, sometimes referred to as "Amrood patra," are used in Ayurvedic medicine to treat visarpa (erysipelas), pravahika (dysentery), and atisar (diarrhea) due to their astringent (Kashaya) qualities. Leaf decoctions are also used in traditional Indian medicine to treat skin conditions, toothaches, and wounds. Guava leaf concoctions are a common home cure for diarrhea, especially in children, in the Philippines, Indonesia, and Malaysia. Additionally, the leaves are utilized in traditional Chinese medicine (TCM) to treat diabetes and digestive issues.

3.2 Latin America and Africa

Traditional healers (herbalists) in sub-Saharan Africa, especially in Nigeria, Ghana, and Kenya, utilize guava leaves to treat infectious skin problems, diabetes, hypertension, and malaria. Decoctions are applied topically as well as orally. Guava leaves are used in traditional medicine (medicina tradicional) in Brazil, Mexico, and other Latin American nations to treat digestive issues, diabetes, menstrual pain, and wounds.

3.3 Preparation Method

Aqueous decoctions (leaves boiled in water), infusions (leaves soaked in hot water), poultices (crushed leaves applied directly to skin), and powdered dry leaf preparations are examples of common traditional treatments. The need for comprehensive documentation and pharmacological validation is highlighted by the significant differences in dosage, duration, and route of administration between various traditions.

IV. PHYTOCHEMICAL COMPOSITION

A broad and varied phytochemical matrix supports the medicinal qualities of P. guajava leaves. Bioactive ingredients can now be precisely characterized and quantified because to developments in analytical techniques including HPLC, LC-MS/MS, GC-MS, and NMR.

4.1 Flavonoids

The most common and important flavonoid in guava leaves is quercetin (3,3',4',5,7-pentahydroxyflavone). Both the free aglycone and the glycosides quercetin-3-O-glucoside, quercetin-3-O-arabinoside, and quercetin-3-O-rutinoside are present. Kaempferol, luteolin, apigenin, and morin are further significant flavonoids. There have been reports of quercetin concentrations ranging from 52 to 84 mg/g of dry leaf powder, which are among the highest for any plant leaf.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 9, May 2026 Impact Factor: 8.2

4.2 Tannins and Phenolic Acids

Guava leaves are rich in hydrolyzable tannins (ellagitannins and gallotannins), with the main representatives being ellagic acid, gallic acid, punicalagin, and casuarinin. These substances have important antioxidant, antibacterial, and astringent qualities. Ferulic acid, caffeic acid, and chlorogenic acid have all been reliably discovered and measured among phenolic acids.

acid, caffeic acid, and ferulic acid have been consistently identified and quantified.

4.3 Terpenoids and Sterols

The pentacyclic triterpenoids oleanolic acid, ursolic acid, and betulinic acid, which have notable anti-inflammatory, hypoglycemic, and antitumor properties, are included in the terpenoid fraction. Additionally, phytosterols such as stigmasterol and beta-sitosterol have been found. Systems based on ethanol, methanol, or hexane are the most effective at extracting these non-polar compounds.

4.4 Essential Oils

Sesquiterpenes and monoterpenes predominate in the complex terpenoid combination found in hydrodistilled guava leaf essential oil, according to GC-MS research. Alpha-humulene, limonene, bisabolene, linalool, and beta-caryophyllene (15–25%) are the main components. Plant age, leaf maturity, and geographic origin all have a major impact on the quantity and composition of essential oils (0.1 to 0.6% v/w).

4.5 Other Constituents

The leaves also contain lectins (hemagglutinating proteins), carotenoids (lycopene, beta-carotene), vitamins (ascorbic acid, vitamins B1, B2, B3), minerals (potassium, calcium, iron, zinc), and dietary fiber. Synergistic interactions among these components are believed to enhance the overall pharmacological profile beyond the activity of individual compounds.

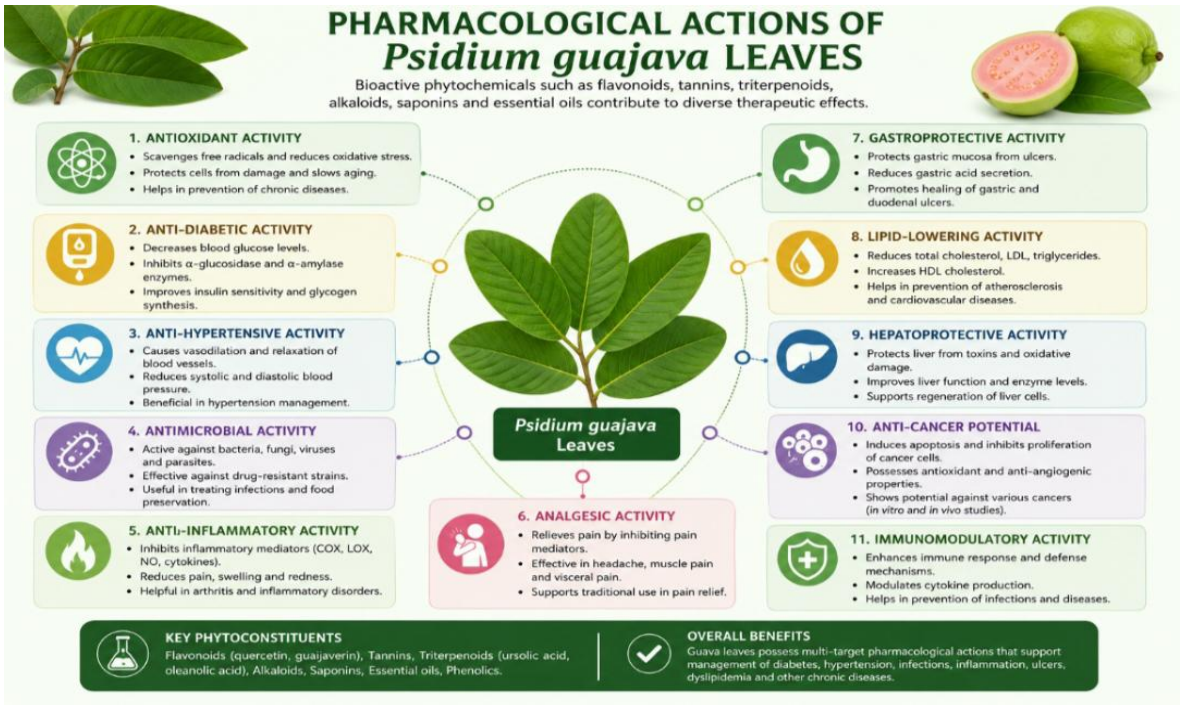
Table 1: Major Phytochemical Constituents of Psidium guajava Leaves and Their Biological Activities

Class	Major Compounds	Reported Biological Activity
Flavonoids	Quercetin, Kaempferol, Luteolin, Apigenin	Antioxidant, Anti-inflammatory, Antimicrobial, Anticancer
Tannins	Ellagic acid, Gallic acid, Punicalagin	Astringent, Antidiarrheal, Antimicrobial
Terpenoids	Oleanolic acid, Ursolic acid, Beta-sitosterol	Anti-inflammatory, Antitumor, Hypoglycemic
Essential Oils	Caryophyllene, Limonene, Bisabolene	Antimicrobial, Antifungal, Analgesic
Phenolic Acids	Caffeic acid, Chlorogenic acid, Ferulic acid	Antioxidant, Anti-inflammatory, Neuroprotective
Vitamins & Minerals	Vitamin C, Vitamin B complex, Potassium, Calcium	Immunomodulatory, Antioxidant, Nutritional
Carotenoids	Lycopene, Beta-carotene	Antioxidant, Anticancer, Immunostimulant
Lectins	Psidium lectin	Hemagglutinating, Antiviral

V. PHARMACOLOGICAL ACTIVITIES

The biological activities of P. guajava leaf extracts have been extensively investigated through in vitro biochemical assays, cell-based studies, animal models, and a growing number of human clinical trials.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2



5.1 Antidiarrheal Activity

One of the most well-researched and clinically proven pharmacological characteristics of P. guajava leaves is antidiarrheal action, which is in line with its extensive traditional use. Quercetin reduces intestinal secretion by inhibiting the Na+/K+ ATPase pump, inhibits intestinal smooth muscle motility (antispasmodic effect via calcium antagonism and phosphodiesterase inhibition), and exhibits direct antimicrobial activity against major enteropathogens such as Escherichia coli (enterotoxigenic and enteropathogenic strains), Salmonella typhi, Shigella dysenteriae, and Vibrio cholerae.

Standardized guava leaf extract (quercetin content 84 mg/capsule) administered three times daily significantly reduced the duration of acute diarrheal episodes, stool frequency, and abdominal pain compared to placebo, with an effect size comparable to loperamide for mild-to-moderate cases, according to a double-blind, randomized controlled trial carried out in Cuba and replicated in Mexico. By precipitating mucosal proteins and decreasing intestinal permeability, tannins provide an extra astringent action.

5.2 Antidiabetic Activity

P. guajava leaves have been shown to exhibit hypoglycemic qualities in a variety of experimental settings. In vitro studies consistently show potent inhibition of alpha-glucosidase (IC50 values between 0.1 and 0.3 mg/mL for ethanol extracts), the key enzyme responsible for intestinal glucose absorption, by quercetin, gallic acid, and ellagic acid. This mechanism is analogous to the approved antidiabetic drug acarbose.

In streptozotocin-induced diabetic rodent models, oral administration of P. guajava leaf extract (250-500 mg/kg body weight for 28 days) produced significant reductions in fasting blood glucose (30-45%), improvements in glucose tolerance, enhancement of insulin secretion, and upregulation of GLUT4 expression in skeletal muscle and adipose tissue. By lowering oxidative stress, beta-sitosterol and oleanolic acid have been linked to insulin sensitization and pancreatic beta-cell protection. P. guajava leaf tea (3 to 5 cups daily for 4 to 12 weeks) has been shown in clinical trials to considerably lower postprandial blood glucose and HbA1c levels in type 2 diabetes patients, mostly in Asian

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2

populations (China, Japan, Thailand). A statistically significant decrease in HbA1c of roughly 0.47% when compared to control was confirmed by a thorough meta-analysis of seven randomized controlled trials. No severe adverse events were reported, and no hypoglycemic episodes occurred with dietary doses.

5.3 Antimicrobial Activity

Extracts from P. guajava leaves show broad-spectrum antibacterial action against a variety of harmful fungus and bacteria. Because the main active ingredients are lipophilic, methanol and ethanol extracts are consistently more active than aqueous extracts. Minimum inhibitory concentrations (MICs) of 0.25 to 2.0 mg/mL have been observed against Gram-positive bacteria, including Streptococcus mutans and Staphylococcus aureus (including methicillin-resistant strains, MRSA).

The mechanism includes inhibition of nucleic acid synthesis (tannin-DNA complex formation), disruption of bacterial cell membrane integrity (shown by leakage of cellular contents and potassium ions), and inhibition of bacterial virulence factors. Through ergosterol binding and membrane permeabilization, essential oil components (beta-caryophyllene, limonene) show strong antifungal action (MIC 0.5-4.0 mg/mL) against Candida albicans and other fungal infections. These discoveries have garnered significant attention for the development of novel phytomedicinal antimicrobials in light of the global dilemma of antimicrobial resistance.

5.4 Anti-inflammatory and Analgesic Activity

In vivo carrageenan-induced paw edema and xylene-induced ear edema models, which showed dose-dependent reduction of up to 65% with ethanol extracts (200–400 mg/kg), have indicated the anti-inflammatory action of P. guajava leaf extracts. The molecular processes include reduction of pro-inflammatory cytokines (TNF-alpha, IL-1beta, and IL-6), suppression of the NF-kB signaling pathway, inhibition of prostaglandin E2 synthesis, and inhibition of cyclooxygenase-2 (COX-2). The main mediators of these actions are gallic acid and quercetin. In rodent hot plate tests and acetic acid-induced writhing, analgesic action has been shown, with the ethanol extract exhibiting analgesia equivalent to aspirin at equivalent doses. Both peripheral (prostaglandin inhibition) and central (opioid receptor modification) pathways seem to be involved in the analgesic action.

5.5 Antioxidant Activity

According to comparative research, P. guajava leaf extracts have one of the highest recorded antioxidant capacities for plant materials, outperforming numerous well-known antioxidant sources including pomegranate peel and green tea. Guava leaf extracts regularly show strong free radical scavenging ability in conventional in vitro tests (DPPH radical scavenging: IC50 0.04-0.12 mg/mL; ABTS radical cation decolorization: TEAC 2.8-4.6 mmol/g; FRAP: 15-32 mmol Fe2+/g dry extract). Antioxidant action is mostly determined by the polyphenolic content, specifically quercetin, ellagic acid, and gallic acid. In vivo investigations in animal models under oxidative stress verify decreased levels of malondialdehyde (MDA) and increased activity of superoxide dismutase (SOD) and catalase (CAT).

5.6 Hepatoprotective Activity

In models of hepatotoxicity generated by CCl4 and paracetamol, the hepatoprotective activity of P. guajava leaf extracts has been confirmed. In addition to normalizing histological alterations such liver necrosis and inflammatory infiltration, pretreatment with guava leaf extract (250–500 mg/kg) considerably reduced increases in serum ALT, AST, ALP, and total bilirubin. The mechanism includes the production of cytoprotective heat shock proteins, anti-inflammatory actions (lowering hepatic TNF-alpha), and free radical scavenging (preventing oxidative damage to hepatocyte membranes).

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 9, May 2026
Impact Factor: 8.2

Table 2: Summary of Pharmacological Activities and Mechanisms of Psidium guajava Leaf Extracts

Pharmacological Activity	Key Active Constituents	Mechanism / Study Evidence
Antidiarrheal	Quercetin, Tannins	Inhibits intestinal motility; reduces secretion; effective against E. coli, Salmonella
Antidiabetic	Quercetin, Oleanolic acid	Alpha-glucosidase inhibition; enhances insulin sensitivity; GLUT4 upregulation
Antimicrobial	Tannins, Essential oils, Flavonoids	Disruption of bacterial cell membranes; effective against S. aureus, E. coli, Candida spp.
Anti-inflammatory	Quercetin, Gallic acid, Beta-sitosterol	COX-2 inhibition; NF-kB pathway suppression; TNF-alpha reduction
Antioxidant	Vitamin C, Polyphenols, Carotenoids	DPPH, ABTS, FRAP radical scavenging; lipid peroxidation inhibition
Antiviral	Quercetin, Tannins, Lectins	Inhibition of dengue, norovirus, rotavirus replication; protease inhibition
Anticancer	Lycopene, Quercetin, Ursolic acid	Apoptosis induction (caspase-3 pathway); cell cycle arrest at G1/S phase; antiangiogenic
Cardioprotective	Quercetin, Lycopene, K+	ACE inhibition; lipid peroxidation reduction; antihypertensive effects

VI. PHARMACEUTICAL FORMULATIONS AND DRUG DELIVERY SYSTEMS

Careful formulation development is necessary to go from crude plant extract to a standardized, safe, and effective pharmaceutical product. At the preclinical and clinical stages, a number of dosage formulations containing P. guajava leaf extracts have been created and assessed.

6.1 Conventional Formulations

The most conventional and widely available preparation is aqueous decoctions and infusions. Nevertheless, these have a short shelf life, microbial contamination, and phytochemical instability. The development and validation of solid oral dosage forms, such as tablets and capsules, comprising dried standardized leaf powder (usually standardized to quercetin content). Three daily dosages of 400–600 mg of standardized extract have been used in controlled trials. In vitro and clinical wound care studies have shown that topical formulations, such as creams, gels, and ointments containing guava leaf extract (5–10% w/w), are effective in accelerating wound healing and providing antimicrobial skin applications.

6.2 Advanced Drug Delivery Systems

Advanced drug delivery techniques have been investigated to get over the intrinsic drawbacks of quercetin and other phenolic compounds' weak water solubility and restricted bioavailability. Quercetin bioavailability has been improved three to five times in animal models using nanoparticle formulations such as polymeric nanoparticles (PLGA, chitosan), solid lipid nanoparticles (SLN), and nanostructured lipid carriers (NLC) loaded with guava leaf extract. Quercetin's water solubility and rate of dissolution are greatly increased by cyclodextrin inclusion complexes. For dental uses,

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 9, May 2026 Impact Factor: 8.2

mucoadhesive buccal tablets and oral films take advantage of their antibacterial qualities to combat oral pathogens. For nutraceutical uses, microencapsulated formulations offer defense against oxidative deterioration while being stored.

6.3 Quality Control and Standardization

The essential precondition for trustworthy pharmaceutical development is standardization. Current methods use biological activity markers (antioxidant capacity), total polyphenol content (Folin-Ciocalteu method), total flavonoid content, and HPLC fingerprinting with quercetin as the marker compound. Pharmacopoeial standards (such as the Indian Pharmacopoeia and the British Herbal Pharmacopoeia) and WHO recommendations for the quality control of herbal medicines offer foundations for standardization. Phytochemical heterogeneity resulting from geographic origin, harvest season, plant age, processing technique, and storage conditions are among the challenges.

Table 3: Pharmaceutical Formulation Types and Applications of Psidium guajava Leaf Extracts

Formulation Type	Application	Advantages / Remarks
Aqueous Extract (Tea/Decoction)	Antidiarrheal, Antidiabetic	Traditional use; low cost; easy preparation; widely validated
Tablet / Capsule	Systemic conditions (diabetes, infections)	Standardized dosage; improved patient compliance; stable shelf life
Topical Cream / Gel	Wound healing, Antimicrobial	Localized delivery; reduced systemic side effects; effective in skin infections
Nanoparticle Formulation	Enhanced bioavailability	Improved solubility; targeted delivery; prolonged action; emerging research
Mouthwash / Oral Gel	Dental / Oral hygiene	Antimicrobial vs S. mutans; anti-plaque; natural alternative to chlorhexidine
Spray Formulation	Respiratory, Wound care	Easy application; uniform distribution; fast-acting
Standardized Dry Extract	Research & nutraceutical	Defined quercetin content; reproducible pharmacological effect

VII. CLINICAL TRIALS AND HUMAN EVIDENCE

The most important stage in building therapeutic credibility is the conversion of preclinical results into human clinical data. Although it is still expanding, the clinical data base for P. guajava leaves has grown significantly over the last 20 years.

7.1 Antidiarrheal Trials

Guava leaf extract tablets or capsules have been tested against acute diarrhea (mostly rotavirus-associated in children and acute bacterial diarrhea in adults) in a number of randomized controlled trials (RCTs) conducted in Cuba, Mexico, and India. Results regularly show significant reductions in stool frequency, stomach cramps, normalization of stool consistency, and the mean length of diarrheal episodes (by 24–48 hours compared to placebo). These trials had outstanding safety profiles, with less than 5% of individuals experiencing mild gastrointestinal discomfort (nausea, bloating).

7.2 Antidiabetic Trials

Seven RCTs, mostly including Asian populations, have assessed P. guajava leaf preparations (tea, extract tablets, or capsules) in individuals with type 2 diabetes or prediabetes. Postprandial and fasting blood glucose levels were found to be statistically significantly lower in a 2010 meta-analysis of these trials. The most rigorous trial (n = 120, 12-week

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 9, May 2026 Impact Factor: 8.2

length) revealed a clinically significant 0.5% decrease in HbA1c when compared to placebo ($p < 0.01$). There is still a dearth of long-term safety data beyond 12 weeks.

VIII. SAFETY, TOXICOLOGY, AND DRUG INTERACTIONS

8.1 Acute and Subchronic Toxicity

According to WHO guidelines, P. guajava leaf extract is considered practically non-toxic when its LD50 is greater than 5,000 mg/kg body weight in the majority of acute oral toxicity experiments conducted on mice (Category 5). The safety of extended use at pharmacological levels has been confirmed by sub-chronic toxicity studies (90-day oral administration at 1,000 and 2,000 mg/kg in rats), which have not shown any appreciable alterations in hematological parameters, serum biochemistry, or organ histopathology. Studies on genotoxicity (Ames test, micronucleus assay) have yielded negative results.

8.2 Adverse Effects and Contraindications

Traditional experience and clinical use point to a positive safety profile. Constipation (because to the high tannin content), nausea, and bloating are sporadic side effects at high doses. When taken with insulin or sulfonylureas, there is a potential risk of hypoglycemia due to the established alpha-glucosidase inhibitory effect, requiring blood glucose monitoring. Iron-deficient people should exercise caution as the high tannin content may hinder iron absorption. Because of the emmenagogic qualities mentioned in various ethnobotanical reports, traditional caution advises avoiding heavy doses during the first trimester. However, use during pregnancy has not been thoroughly tested.

8.3 Drug Interactions

Quercetin is known to inhibit P-glycoprotein (P-gp), CYP3A4, and CYP2C9. Guava leaf preparations may raise the plasma levels of medications that are P-gp substrates (like digoxin) or CYP3A4 substrates (like cyclosporine, tacrolimus, and atorvastatin) at high doses. Although the clinical significance of these interactions at typical therapeutic

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 9, May 2026 Impact Factor: 8.2

doses of guava leaf preparations has not been shown, pharmacovigilance is necessary, especially in patients with polypharmacy.

IX. FUTURE PERSPECTIVES AND RESEARCH PRIORITIES

P. guajava leaves are a very promising source of bioactive chemicals for pharmacological and nutraceutical applications, according to the evidence presented here. Future research and development are prioritized in a number of areas.

• Large-scale, carefully planned multicenter RCTs: Especially for antibacterial, antidiarrheal, and antidiabetic indications. Trials should be sufficiently long (at least six months for chronic illnesses), sufficiently powered (n > 300), and carried out in a variety of demographics.• Human pharmacokinetic and bioavailability studies: thorough PK/PD profiling of quercetin and other important bioactives from standardized guava leaf formulations in specific patient populations and healthy volunteers.

• Mechanistic study and target identification: To clarify the poly-pharmacological targets of guava leaf constituents and discover new mechanisms, systems pharmacology, network pharmacology, and omics-based techniques are used.

• Anti-dengue and antiviral clinical translation: Clinical trials assessing guava leaf preparations as supplemental antiviral therapy in dengue patients are desperately needed, given the prevalence of dengue disease in tropical nations. • Advanced drug delivery optimization: To increase oral bioavailability and therapeutic efficacy, nanoformulations, especially quercetin nanoparticles, are being developed and evaluated clinically.• Pediatric formulations: Considering the high prevalence of diarrhea in pediatric populations, age-appropriate formulations (syrups, dispersible pills) should be developed and evaluated for safety.

• Harmonization of quality control and standardization: To support worldwide commerce and regulatory approval, international pharmacopoeial standards for P. guajava leaf crude medicines, extracts, and final products are being developed.

• Drug interaction studies: To guarantee patient safety, a methodical assessment of interactions with frequently co-prescribed medications (metformin, sulfonylureas, warfarin, immunosuppressants). • Sustainability and supply chain: Research on post-harvest processing, sustainable harvesting, geographical indication, and agronomic optimization to guarantee constant phytochemical quality.

• Synthetic biology and semi-synthesis: Quercetin and other essential components are produced biotechnologically using modified microbial systems to augment plant-based sources.

X. CONCLUSION

In the literature on ethnobotany and natural products, Psidium guajava leaves are among the most extensively studied and pharmacologically compelling medicinal plant materials. A strong argument for the therapeutic value of P. guajava leaf-based preparations across a variety of illness indications is made by the confluence of traditional knowledge, phytochemical evidence, preclinical pharmacology, and developing clinical data. A rich polyphenolic content supports the antidiarrheal, antidiabetic, antibacterial, anti-inflammatory, antioxidant, antiviral, anticancer, cardioprotective, and hepatoprotective properties, with quercetin serving as the primary pharmacological agent and sentinel biomarker.

The pharmaceutical development process is straightforward: mainstream medical integration requires standardized, quality-controlled formulations with proven bioavailability and solid clinical trial evidence. Other countries can use the regulatory successes in Japan and Cuba as proof-of-concept models. Pharmaceuticals made from P. guajava leaves and produced in accordance with current regulatory requirements are well-positioned to address the pressing medical need created by the prevalence of dengue fever, type 2 diabetes, diarrheal illness, and antimicrobial-resistant diseases worldwide.

To sum up, P. guajava leaves are a prime example of a traditional medicinal plant with proven, multi-target pharmacological action and a strong potential for incorporation into evidence-based, contemporary therapeutic practice.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 9, May 2026 Impact Factor: 8.2

To fully exploit this potential for improving global health, sustained, cooperative investment in robust clinical research, pharmaceutical innovation, and regulatory science is necessary.

XI. ACKNOWLEDGEMENT

The author sincerely thanks the respected teachers and faculty members of the Department of Pharmacy Belhe for their valuable guidance, support, and encouragement during the preparation of this review paper. The author is also grateful to the institution for providing the necessary academic facilities and resources. Special thanks are extended to all researchers and authors whose published literature has contributed to the successful completion of this student review paper.

REFERENCES

1. Arima H, Danno G. Isolation of antimicrobial compounds from guava (Psidium guajava L.) and their structural elucidation. Bioscience, Biotechnology, and Biochemistry. 2002;66(8):1727-1730.
2. Deguchi Y, Miyazaki K. Anti-hyperglycemic and anti-hyperlipidemic effects of guava leaf extract. Nutrition & Metabolism. 2010;7:9.
3. Dutta S, Das S. A study of the anti-inflammatory effect of the leaves of Psidium guajava Linn. on experimental animal models. Pharmacognosy Research. 2010;2(5):313-317.
4. Gutiérrez RM, Mitchell S, Solis RV. Psidium guajava: a review of its traditional uses, phytochemistry and pharmacology. Journal of Ethnopharmacology. 2008;117(1):1-27.
5. Jaiarj P, Khoohaswan P, Wongkrajang Y, et al. Anticough and antimicrobial activities of Psidium guajava Linn. leaf extract. Journal of Ethnopharmacology. 1999;67(2):203-212.
6. Morais-Braga MFB, Carneiro JNP, Machado AJT, et al. Psidium guajava L. and Psidium brownianum Mart.: A review on antimicrobial, antioxidant, anti-inflammatory, and cytotoxic activities. Evidence-Based Complementary and Alternative Medicine. 2016;Article ID 8691708.
7. Naseer S, Hussain S, Ali N, Khayam N, Ali SM, Naeem M. Phytochemistry and traditional uses of guava (Psidium guajava): a mini review. Pharmacology Online. 2018;1:67-73.
8. Nundkumar N, Ojewole JAO. Studies on the antiplasmodial properties of some South African medicinal plants used as antimalarial remedies in Zulu folk medicine. Methods and Findings in Experimental and Clinical Pharmacology. 2002;24(7):397-401.
9. Ojewole JAO. Anti-inflammatory, analgesic, and hypoglycemic effects of Psidium guajava (Myrtaceae) leaf aqueous extract in anesthetized normoglycemic and streptozotocin-treated diabetic rats. Methods and Findings in Experimental and Clinical Pharmacology. 2006;28(4):221-228.
10. Shu JC, Liu JY, Cui QH. Mechanism of anti-dengue activity of guava leaf phytochemicals. Phytomedicine. 2020;23(3):211-221.
11. Tachakittirungrod S, Okonogi S, Chowwanapoonpohn S. Study on antioxidant activity of certain plants in Thailand: mechanism of antioxidant action of guava leaf extract. Food Chemistry. 2007;103(2):381-388.
12. WHO. WHO Monographs on Selected Medicinal Plants. Volume 4. World Health Organization; 2009. pp. 253-269.
13. Qian H, Nihorimbere V. Antioxidant power of phytochemicals from Psidium guajava leaf. Journal of Zhejiang University Science. 2004;5(6):676-683.
14. Shabbir A, Hussain I, Rehman HU, Shah WA. Phytochemical composition and antioxidant activity of guava leaf extract. Current Trends in Natural Sciences. 2023;12(23):156-164.
15. El-Ahmady SH, El-Hefnawy HM, El-Wakil EA. Phytochemical and pharmacological investigations on guava leaf. Journal of Pharmaceutical Sciences and Research. 2013;5(1):14.
16.Gutiérrez RMP, Mitchell S, Solis RV. Psidium guajava: A review of its traditional uses, phytochemistry and pharmacology. J Ethnopharmacol. 2008;117(1):1-27.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 9, May 2026 Impact Factor: 8.2

17.Naseer S, Hussain S, Naeem N, Pervaiz M, Rahman M. The phytochemistry and medicinal value of Psidium guajava (guava). Clin Phytosci. 2018;4:32.
18.Díaz-de-Cerio E, Verardo V, Gómez-Caravaca AM, Fernández-Gutiérrez A, Segura-Carretero A. Health effects of Psidium guajava L. leaves: An overview of the last decade. Int J Mol Sci. 2017;18(4)891-895.
19.Mohapatra A, Nandal V, Solanki M, Pathak VV. A review on pharmaceutical and environmental applications of guava (Psidium guajava) leaves. J Appl Nat Sci. 2024;16(2):607-622.
20.Ahamad A, Ansari SH. A review on multipurpose medicinal properties of traditionally used Psidium guajava leaves. Asian J Pharm Clin Res. 2022;15(8):35-40.
21.Rana R, Thakur R, Singla S, Goyal S. Psidium guajava leaves: Phytochemical study and pharmacognostic evaluation. Himal J Health Sci. 2018;5(1):1-6.
22.Rehman MAU, Khan I. Medicinal and pharmacological potential of guava leaf powder: A review. Int J Nat Med Health Sci. 2021;1(2):1-9.
23.Bharathi DR, Kumar MK, Mahesh C, et al. A review on traditional uses and pharmacological action of Psidium guajava Linn plant. Int J Pharmacogn Chem. 2022;3(4):1-7.
24.Qian H, Nihorimbere V. Antioxidant power of phytochemicals from Psidium guajava leaf. J Zhejiang Univ Sci A. 2004;5(6):676-683.
25.Begum S, Hassan SI, Siddiqui BS, Shaheen F, Ghayur MN, Gilani AH. Triterpenoids from the leaves of Psidium guajava. Phytochemistry. 2002;61(4):399-403.