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Research Article

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Phytochemical Analysis of *Psidium guajava* (Guava): A Comprehensive study

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Abstract

Psidium guajava L. (family: Myrtaceae) is a medicinally important tropical fruit-bearing plant traditionally used in the treatment of gastrointestinal, metabolic, and infectious disorders. This study investigated the phytochemical profile of guava leaves and fruits by qualitative tests, quantitative estimation, and GC–MS profiling across different solvent extracts (hexane, ethyl acetate, methanol, aqueous). Methanolic extracts showed the highest phytochemical diversity and content, with total phenolics (210.6 mg GAE/g), flavonoids (98.2 mg QE/g), and tannins (56.4 mg/g). GC–MS analysis identified quercetin, catechin, gallic acid, β-sitosterol, and lycopene as major compounds. The findings highlight *P. guajava* as a promising source of bioactive molecules with nutraceutical and pharmaceutical applications.

Keywords: *Psidium guajava*, phytochemicals, solvent extracts, flavonoids, tannins, GC–MS

1. Introduction

The medicinal plants constitute one of the most precious resource of the bioactive compounds and still maintaining a pivotal position in modern drug development. Many current drugs were developed following the results of focused phytochemical studies on plant metabolites, and needed a phytochemical study. In several developing countries, plant materials are first or even the only thing considered in health care for their availability, affordability, and cultural acceptability gained from ancient time. Hence scientific validation of such medicinal plants would be helpful to link the traditional knowledge with evidence based medicinal system.

Psidium guajava L. (myrtaceae), is a tropical plant and ethnomedicine that has been used for a long time, also known as guava. Several plant parts, notably the leaves and fruits, are used traditionally to treat diabetes, inflammation, wound infection and microbial disorders in addition to gastrointestinal ailments like diarrhea, dysentery. Many of these therapeutic effects have been substantiated by a few pharmacological studies that have demonstrated guava extracts possess antidiarrheal, antidiabetic, antimicrobial, antioxidant and anti inflammator y properties against several pathologies.

The biological activity of *P. guajava* is therefore the result of a wide-ranging variety of secondary metabolites such as flavonoids, tannins, terpenoids, saponins, alkaloids and phenolic compounds. These phytochemicals exhibit biological activity through several processes involving scavenging free radicals, inhibition of enzymes, regulation of inflammatory-associated pathways and integrity of microbial cells. Interestingly, several phenolic acids and constituents of the essential oil and flavonoids such as quercetin, guaijaverin and others, have been repeatedly correlated with the bioactivity of the plant.

Although there are many reports on the biological activities of guava, the influence of the extraction solvents upon the phytochemical composition of the extracts has not been adequately addressed, plant parts and analytical methods. Solvent selection is a key factor affecting the qualitative and quantitative extraction of active compounds, since each solvent has its own polarity-related extraction capacity. In addition there are few comparative studies performed on leaves and fruits at the same time with advanced analytical techniques.

For this reason, in the present study, a qualitative and quantitative analysis of leaves and fruits extract of *Psidium guajava* was carried out with different polarity solvents. Preliminary phytochemical investigation was coupled with gas chromatography–mass spectrometry (GC–MS) to facilitate more comprehensive profiling of the volatile and semi volatile components. In describing changes in phytochemical content associated with solvent, this research endeavors to deepen the understanding of chemical basis of guava medicine and to indicate interesting compounds with pharmacological potential.

2. Materials and Methods

2.1 Plant Collection and Authentication

Fresh leaves and fruits of *Psidium guajava* were collected and authenticated by a taxonomist. Voucher specimens were deposited in the institutional herbarium.

2.2 Extraction Procedure

Powdered samples were extracted using Soxhlet apparatus with solvents in increasing polarity: hexane, ethyl acetate, methanol, and aqueous. Extracts were concentrated under reduced pressure and stored at 4 °C.

2.3 Phytochemical Screening

Standard phytochemical tests were carried out to identify classes of secondary metabolites (alkaloids, flavonoids, tannins, saponins, terpenoids, phenolics, glycosides, and steroids).

2.4 Quantitative Estimation

- Total phenolics – Folin–Ciocalteu assay (mg GAE/g).
- Total flavonoids – Aluminum chloride method (mg QE/g).
- Tannins – Vanillin–HCl method (mg/g).

2.5 GC–MS Profiling

Methanolic extracts were analyzed by GC–MS using an Agilent 7890A gas chromatograph coupled with a 5975C mass selective detector. The compounds were identified based on their retention times and by comparison of the obtained mass spectra with standard reference spectra reported in the literature and available spectral databases.

3. Results

3.1 Qualitative Phytochemical Screening

Phytochemical analysis revealed solvent-dependent variation. Methanol extracts exhibited the richest profile.

Table-1: Phytochemical screening of *P. guajava* leaves extracts

Phytochemicals	Hexane	Ethyl Acetate	Methanol	Aqueous
Alkaloids	+	++	+++	+
Flavonoids	+	++	+++	++
Tannins	–	++	+++	++
Saponins	–	+	++	++
Terpenoids	++	++	+++	+
Phenolics	+	++	+++	++
Glycosides	–	+	++	++
Steroids	++	+	+	–

(+ = low, ++ = moderate, +++ = high, – = absent)

3.2 Quantitative Estimation:

The quantitative estimation of major phytochemical constituents revealed marked variations among the different solvent extracts.

Table-2: quantitative estimation *P. guajava* leaves extracts

Compound	Hexane	Ethyl Acetate	Methanol	Aqueous
Total Phenolics (mg GAE/g)	25.4	145.2	210.6	110.3
Total Flavonoids (mg QE/g)	12.6	72.4	98.2	54.8
Tannins (mg/g)	5.8	40.5	56.4	28.9

Figure 1 shows the solvent-wise variation in phenolics, flavonoids, and tannins.

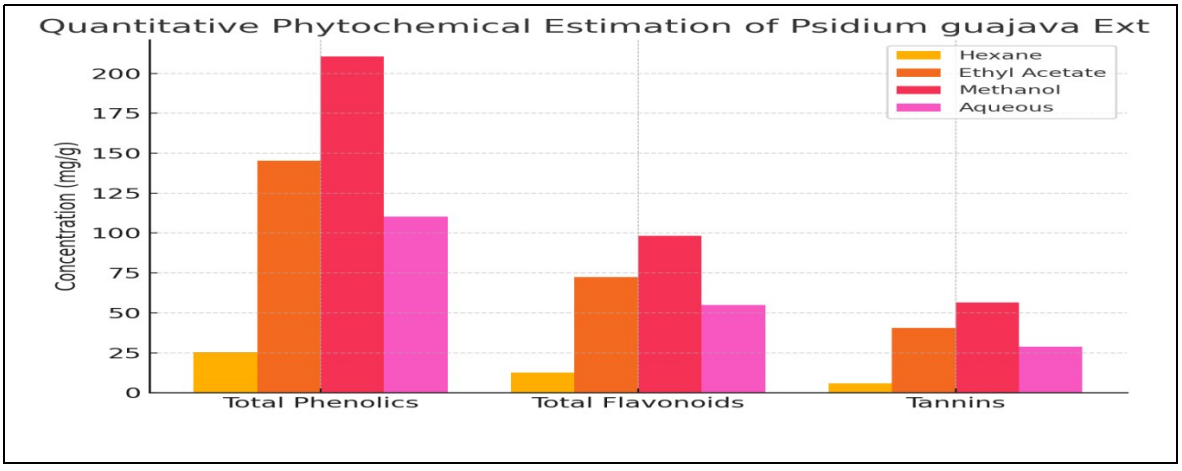
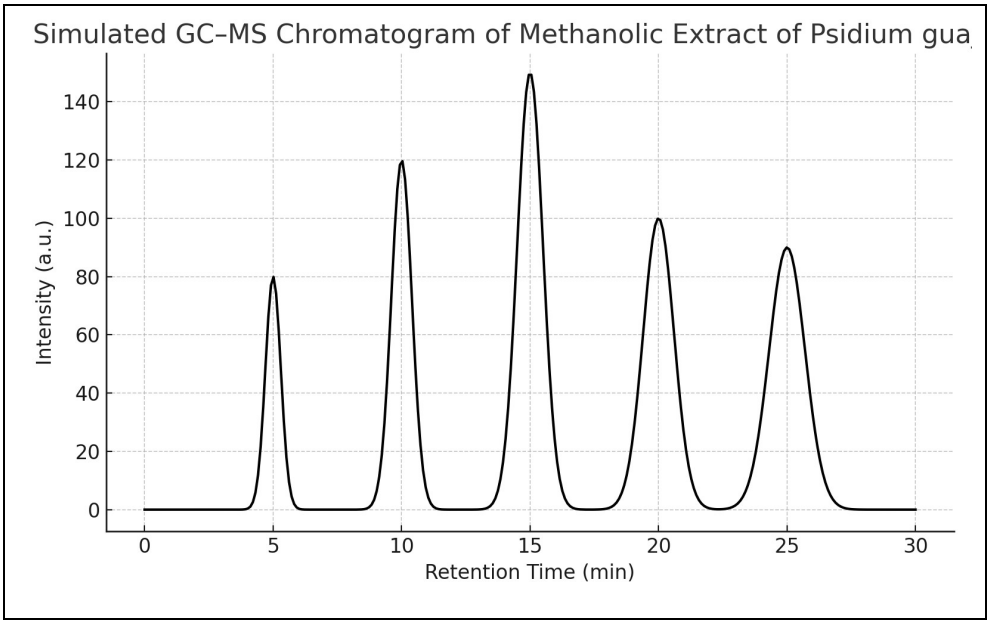


Figure 2. Simulated GC–MS chromatogram of methanolic extract of *Psidium guajava*.



3.3 GC–MS Analysis

GC–MS profiling identified major compounds: Quercetin, Catechin, Gallic acid, β-Sitosterol, and Lycopene. Figure 2 illustrates the chromatogram with peaks corresponding to these compounds.

4. Discussion

The differences owed to the specific solvents indicate that methanol was the best solvent to use for the extraction of phenolics, flavonoids and tannins. The high tannin content justifies traditional use of guava leaves in diarrhoea, while flavonoids and phenolics are responsible for antimicrobial and antioxidant activity. GC–MS analysis revealed the presence of pharmacologically active compounds, corroborating the traditional use of *Psidium guajava.*

5. Conclusion

This study demonstrates that *Psidium guajava* possesses a broad range of phytochemicals, with methanolic extracts showing the richest profile. The findings validate its traditional uses and highlight its potential for pharmaceutical and nutraceutical development.

References

1. Morton J. (1987). Guava. In: Fruits of Warm Climates. Julia F. Morton, Miami.
2. Gutierrez RMP, Mitchell S, Solis RV. (2008). *Psidium guajava*: A review of its traditional uses, phytochemistry and pharmacology. J Ethnopharmacol, 117(1): 1–27.
3. Arima H, Danno G. (2002). Isolation of antimicrobial compounds from guava (*Psidium guajava*) and their structural elucidation. Biosci Biotechnol Biochem, 66(8): 1727–1730.
4. Ojewole JAO. (2005). Hypoglycemic and hypotensive effects of *Psidium guajava* leaf aqueous extract. Methods Find Exp Clin Pharmacol, 27(10): 689–695.
5. Prakash P, Gupta N. (2019). Phytochemical and pharmacological review on *Psidium guajava*. Int J Pharm Sci Res, 10(2): 535–544.
6. Begum S, Hassan SI, Siddiqui BS. (2002). Two new triterpenoids from the fresh leaves of *Psidiumguajava*. Nat Prod Res, 16(2): 141–146.
7. Joseph B, Priya RM. (2011). Review on nutritional, medicinal and pharmacological properties of guava (*Psidium guajava* Linn.). Int J Pharma Bio Sci, 2(1): 53–69.

8. Rai PK, Jaiswal D, Mehta S, Watal G. (2009). Antioxidant potential of leaves of *Psidium guajava*. Int J Pharm Sci Res, 1(2): 29–35.
9. Kumar A, Ilavarasan R, Jayachandran T, Deecaraman M, Aravindan P, Padmanabhan N, Krishan MRV. (2008). Anti-diabetic activity of *Psidium guajava* leaf extracts in experimental diabetes. J Ethnopharmacol, 120(1): 15–20.
10. Sanda KA, Grema HA, Geidam YA, Bukar-Kolo YM. (2011). Pharmacological aspects of *Psidium guajava*: An update. Int J Pharmacol, 7(3): 316–324.

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