Title: Recent Perspectives on Phytochemical Profile, Pharmacological Activities, and Industrial Applications of Guava (*Psidium guajava*)

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Abastact: *Psidium guajava* (guava) has traditionally been used to treat diabetes, hypertension, cancer, and infections. Guava leaf extract, which contains quercetin, myricetin, saponins, triterpenoids, and phenolic acids, demonstrates powerful antioxidants, anti-inflammatory, antidiabetic, antihypertensive, hypolipidemic, anticancer, and antimicrobial effects. This review discusses in detail different phytochemicals found in *P. guajava*, the impact its leaves have on disease, and the underlying effects of their treatments against metabolic syndrome and cancer. Blood glucose regulation is mediated through the modulation of NF-κB, PPARγ, and α-glucosidase activity along with the induction of apoptosis and cell cycle arrest. Although laboratory studies have demonstrated medicinal potential, variations in phytochemical content due to differences in sourcing and processing limit the applicability of these findings to clinical settings. Most guava-based treatments have not been developed the same way or rigorously tested on many people. Limited data exists on the long-term effects of guava consumption or its interactions with conventional medications. It emphasizes 2023–2025 studies, synergistic effects with other plants, and industrial case studies (e.g., guava-based nutraceuticals). The review also explores the application of guava in functional foods, nutraceuticals, and green synthesis technologies. To more fully realize its therapeutic potential, further mechanistic studies, extensive clinical trials, and extended industrial development are needed.

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