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REVIEW

Bioactive Compounds of *Psidium guajava* Leaves and Their Role in Attenuating Postprandial Glucose Excursions: A Systematic Review

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Abstract

Postprandial hyperglycemia is a key metabolic disturbance associated with the progression to Type 2 Diabetes Mellitus, highlighting the need for effective preventive strategies. *Psidium guajava* leaves contain bioactive compounds, including flavonoids, tannins, and polyphenols, that have been investigated for their antihyperglycemic potential. This systematic review, conducted in accordance with PRISMA guidelines, synthesized evidence from 12 included studies comprising two in vitro studies, six in vivo studies, three clinical studies, and one mixed review–experimental study. The findings suggest that guava leaf preparations may attenuate postprandial glycemic responses through complementary mechanisms, including inhibition of carbohydrate-digesting enzymes, enhancement of cellular glucose uptake, improvement of insulin sensitivity, and reduction of oxidative stress. Clinical studies reported reductions in postprandial glucose responses, while experimental investigations provided supporting mechanistic evidence. However, methodological heterogeneity, limited clinical evidence, and uncertainties in study quality restrict the strength of these findings. Overall, *Psidium guajava* leaf preparations demonstrate potential as a complementary approach to postprandial glycemic management, although further well-designed clinical trials are required to establish their efficacy, optimal dosage, and long-term safety.

Introduction

Disturbances in glucose metabolism, particularly elevated postprandial blood glucose levels, represent an early and critical feature in the progression toward Type 2 Diabetes Mellitus. Increasing evidence indicates that postprandial glucose excursions contribute significantly to oxidative stress, endothelial dysfunction, and the development of cardiovascular complications, even in the prediabetic state [1–4]. Therefore, controlling postprandial glycemia has emerged as a key target in preventive strategies aimed at delaying or mitigating the onset of diabetes.

Conventional pharmacological approaches, such as α-glucosidase inhibitors (e.g., acarbose, voglibose), have demonstrated well-established efficacy in reducing postprandial hyperglycemia by delaying carbohydrate hydrolysis and intestinal glucose absorption [5]. However, their clinical utility is frequently limited by gastrointestinal adverse effects, including flatulence, diarrhea, and abdominal discomfort, which contribute to reduced patient adherence, particularly with long-term use [5]. These considerations have prompted growing interest in complementary or adjunctive therapeutic strategies, particularly plant-based interventions that may offer multitarget mechanistic action with more favorable tolerability profiles, rather than as replacements for established pharmacological treatment.

Among medicinal plants, *Psidium guajava* (guava) has gained considerable attention due to its diverse pharmacological properties. Guava leaves, in particular, are rich in bioactive

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phytochemicals, including flavonoids (such as quercetin and kaempferol), tannins, saponins, and phenolic acids, which exhibit significant biological activities [6,7]. These compounds have been shown to modulate glucose metabolism through multiple mechanisms, including inhibition of carbohydrate-digesting enzymes such as α-amylase and α-glucosidase, enhancement of insulin sensitivity, and reduction of oxidative stress [8–10].

Experimental studies have reported that *Psidium guajava* leaf preparations influence cellular glucose uptake and glycemic regulation through several potential mechanisms. In vitro findings suggest enhanced glucose uptake and GLUT4 translocation [9,11], while animal studies provide evidence of reduced blood glucose levels and attenuated postprandial glycemic responses [6,12]. Preliminary clinical evidence suggests that guava leaf tea may reduce postprandial glucose responses in humans [5,8,13]. However, the limited number of clinical studies and methodological differences among investigations prevent definitive conclusions regarding clinical efficacy. Proposed mechanisms include modulation of carbohydrate digestion, enhancement of peripheral glucose utilization, and reduction of oxidative stress.

Despite the growing body of experimental evidence supporting the antihyperglycemic potential of guava leaves, the existing literature is characterized by considerable methodological variability in terms of study design (in vitro, in vivo, and clinical), extraction methods, administered doses, study duration, and outcome measurement approaches. This variability limits the ability to draw definitive conclusions and underscores the need for a structured, systematic approach to synthesizing the available evidence.

Accordingly, this systematic review was guided by the following research question: Among individuals or experimental models at risk of postprandial hyperglycemia or impaired glycemic regulation, do bioactive compounds or extracts derived from *Psidium guajava* leaves, compared with control conditions or other relevant comparators, reduce postprandial blood glucose levels, inhibit carbohydrate-digesting enzymes, or improve insulin sensitivity? By integrating evidence from experimental and clinical studies, this review aims to provide a comprehensive and mechanistically grounded understanding of the potential of guava leaf bioactive compounds to attenuate postprandial glucose excursions, particularly in prediabetic and at-risk populations.

Methods

Search Strategy

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A comprehensive literature search was performed on March 15, 2026, across multiple electronic databases, including PubMed, Scopus, ScienceDirect, and the Cochrane Library. The search strategy was designed to identify relevant studies investigating the role of bioactive compounds derived from *Psidium guajava* leaves in modulating postprandial glucose levels. The search terms consisted of a combination of Medical Subject Headings (MeSH) and free-text keywords, including: "*Psidium guajava* leaves", "guava leaf extract", "bioactive compounds", "phytochemicals", "flavonoids", "quercetin", combined with "postprandial glucose", "postprandial hyperglycemia", "glycemic response", and "blood glucose control". Boolean operators "AND" and "OR" were applied to refine and broaden the search strategy. An example of the search string used was: ("*Psidium guajava*" OR "guava leaves") AND ("bioactive compounds" OR "phytochemicals" OR "flavonoids") AND ("postprandial glucose" OR "postprandial hyperglycemia" OR "glycemic response"). All identified articles were imported into a reference management tool, and duplicate records were removed. Initial screening was conducted based on titles and abstracts to exclude irrelevant studies. Subsequently, full-text articles were assessed for eligibility according to predefined inclusion and exclusion criteria. In addition, the reference lists of included studies were manually screened to ensure comprehensive identification of relevant literature.

Inclusion and Exclusion Criteria

The inclusion criteria for this systematic review were as follows: (1) original research articles published in English; (2) studies investigating bioactive compounds or extracts derived from *Psidium guajava* leaves; (3) studies evaluating effects on postprandial glucose levels, glycemic response, or carbohydrate metabolism; (4) experimental studies (in vitro and in vivo) as well as clinical studies involving human subjects; (5) studies reporting relevant outcomes such as inhibition of α-glucosidase or α-amylase, reduction in postprandial blood glucose, improvement in insulin sensitivity, or antioxidant activity related to glycemic control; and (6) articles with accessible full text.

Meanwhile, the exclusion criteria included: (1) review articles, systematic reviews, meta-analyses, editorials, letters, and conference abstracts; (2) studies not specifically focusing on *Psidium guajava* leaves; (3) studies not assessing glucose metabolism or postprandial glycemic outcomes; (4) studies with insufficient or incomplete data; (5) duplicate publications; and (6) non-English articles. Studies involving animal or in vitro models were included only when they provided mechanistic insights into the antihyperglycemic effects of guava leaf bioactive compounds, particularly in relation to postprandial glucose regulation.

Data Extraction

Data were extracted from the included studies using a standardized data extraction form. The extracted information included the first author and year of publication, study design, experimental model or study population, type and preparation of *Psidium guajava* leaf extract or bioactive compound, intervention dose or concentration, treatment duration, and relevant outcome measures. These outcomes included postprandial blood glucose levels, glycemic response, inhibition of carbohydrate-digesting enzymes, insulin-related outcomes, and other mechanistic findings relevant to glucose regulation. Quantitative results and key findings were recorded where available. Any discrepancies in data extraction were resolved through discussion and consensus.

Quality Assessment and Risk of Bias

The methodological quality and risk of bias of included studies were assessed using tools appropriate to each study design. Animal (in vivo) studies were evaluated using the SYRCLE Risk of Bias Tool, which appraises selection bias, performance bias, detection bias, attrition bias, reporting bias, and other potential bias domains. Clinical studies were assessed using the Newcastle-Ottawa Scale (NOS), evaluating study quality across the domains of selection, comparability, and outcome assessment. In vitro studies were appraised using a structured quality checklist adapted from published frameworks, assessing clarity of experimental design, concentration ranges tested, use of appropriate controls, and reproducibility. All assessments were performed independently by two reviewers with discrepancies resolved by consensus.

Data Synthesis

The included studies exhibited substantial methodological heterogeneity in terms of study design, biological models, intervention type and preparation method, dose and duration, and outcome measurement approaches. Consequently, quantitative synthesis through meta-analysis was not considered methodologically appropriate and was not performed. Results are instead presented as a qualitative narrative synthesis, stratified by study design (in vitro, in vivo animal, and clinical studies) and organized according to the primary mechanisms of antihyperglycemic action reported.

Results and Discussion

Data Selection

The literature search identified 134 records from PubMed, Scopus, ScienceDirect, and the Cochrane Library. After removing 32 duplicate records, 102 articles remained for title and

abstract screening. Of these, 76 articles were excluded because they did not meet the objectives of the review, leaving 26 articles for full-text eligibility assessment. Following full-text evaluation, 14 articles were excluded for the following reasons: studies did not specifically investigate bioactive compounds derived from *Psidium guajava* leaves (n = 5), did not assess postprandial glucose or related glycemic outcomes (n = 4), were not original research articles (n = 3), or had inaccessible full texts (n = 2). Finally, 12 studies met the eligibility criteria and were included in the qualitative synthesis. These comprised two in vitro studies, six in vivo animal studies, three clinical studies, and one study combining review and experimental components. The study identification, screening, eligibility assessment, and inclusion process is summarized in Figure 1.

Table 1. Search strategies and number of records retrieved from the literature databases.

Keyword	Total of Articles
((((*"Psidium guajava*"[Title/Abstract]) OR ("guava leaves"[Title/Abstract])) AND ("postprandial glucose"[Title/Abstract]))))	30
((((*"Psidium guajava*"[Title/Abstract]) OR ("guava leaf extract"[Title/Abstract])) AND ("postprandial hyperglycemia"[Title/Abstract] OR "glycemic response"[Title/Abstract]))))	36
((((*"Psidium guajava*"[Title/Abstract]) AND ("bioactive compounds"[Title/Abstract] OR phytochemicals OR flavonoids OR quercetin))))	39
((((("guava leaves"[Title/Abstract]) OR (*Psidium guajava*[Title/Abstract])) AND ("alpha-glucosidase"[Title/Abstract] OR "alpha-amylase"[Title/Abstract]))))	29
Total Articles	134

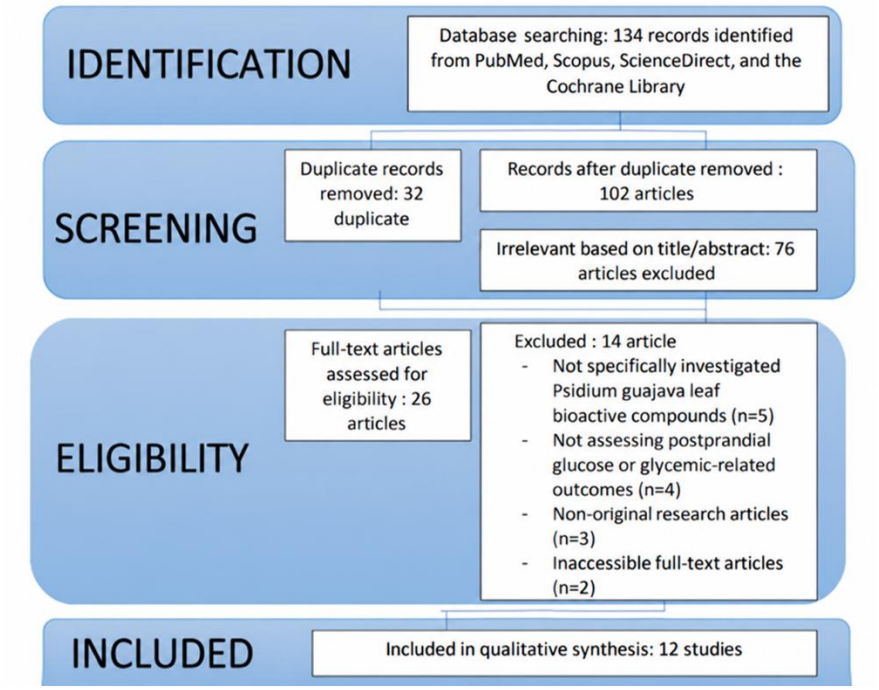


Figure 1. PRISMA flow diagram of the study identification, screening, eligibility assessment, and inclusion process.

Study Characteristics

The characteristics of the 12 included studies are presented in Table 2. The studies were published between 2007 and 2021 and comprised two in vitro studies, six in vivo animal studies, three clinical studies involving human participants, and one study combining review and experimental components. The interventions included guava leaf extracts, ethanolic extracts, quercetin-rich preparations, and guava leaf tea. The in vitro studies primarily investigated

cellular glucose uptake and GLUT4 translocation, whereas the animal studies evaluated blood glucose regulation, postprandial glycemic responses, insulin resistance, oxidative stress, lipid profiles, and glycated hemoglobin (HbA1c). The clinical studies focused on postprandial glucose levels, glycemic responses, and meal glycemic index following guava leaf tea consumption. The mixed-design study examined phytochemical constituents and their potential antidiabetic mechanisms, particularly enzyme inhibition and antioxidant activity. Overall, the included studies reported findings consistent with potential antihyperglycemic effects of *Psidium guajava* leaf preparations. However, differences in experimental models, intervention formulations, and outcome measurements limited direct comparisons across studies. Importantly, only a subset of the included studies directly evaluated postprandial glycemic outcomes, while the remaining studies provided supporting evidence concerning broader metabolic and cellular mechanisms.

Table 2. Characteristics of the included studies investigating the antihyperglycemic effects of *Psidium guajava* leaf extracts and bioactive compounds.

Ref	Study Design	Sample/ Model	Intervention	Outcome Measured	Results
[9]	Clinical trial	Humans (prediabetes)	Guava leaf tea	Postprandial glucose	Guava leaf tea significantly reduced postprandial glucose levels compared to control, suggesting delayed carbohydrate absorption and inhibition of intestinal glucose transporters, alongside improved insulin sensitivity observed after repeated intake.
[7]	In vivo	Diabetic mice	Leaf extract	Blood glucose	Significant reduction in blood glucose levels was observed, attributed to both enzyme inhibition and enhanced peripheral glucose uptake mediated by flavonoids.
[6]	Review + experimental	Mixed	Phytochemicals	Antidiabetic activity	Identified multiple bioactive compounds (quercetin, tannins) contributing to glycemic control via antioxidant and enzyme inhibition pathways.
[14]	Clinical	Humans	Guava tea	Glycemic response	Demonstrated reduced postprandial glucose spikes with repeated administration, indicating cumulative metabolic benefits.
[15]	In vitro	Cell culture	Quercetin-rich extract	GLUT expression	Increased GLUT4 translocation, enhancing glucose uptake in muscle cells.
[11]	In vivo	Diabetic rats	Ethanolic extract	Oxidative stress	Reduced oxidative stress markers, indirectly improving glycemic control.
[16]	In vivo	Rats	Extract	Lipid & glucose	Improved lipid profile and glycemic control, suggesting metabolic syndrome benefit.
[12]	In vivo	Mice	Extract	Postprandial glucose	Reduced glucose spike after carbohydrate intake.
[13]	Clinical	Humans	Tea	Glycemic index	Lowered glycemic index of meals.
[17]	In vivo	Rats	Extract	HbA1c	Reduced long-term glycemic marker HbA1c.
[18]	In vitro	Cell	Extract	Glucose uptake	Increased cellular glucose uptake significantly.
[19]	In vivo	Mice	Extract	Metabolic profile	Improved glucose metabolism and reduced insulin resistance.

Quality Assessment Results

The methodological quality and risk-of-bias assessments of the 12 retained studies are presented in Table 3. The evidence comprised two in vitro studies, six in vivo animal studies, three clinical studies, and one study combining review and experimental components.

Both in vitro studies were classified as having low-to-moderate methodological concerns, primarily due to uncertainty in performance or detection domains. Among the six animal studies assessed using the SYRCLE framework, one was classified as low risk, two as low-to-moderate risk, and three as moderate risk. Unclear ratings were particularly evident in the performance and detection domains. Among the three clinical studies, the existing Newcastle–Ottawa Scale

(NOS)-based assessments classified two as low risk and one as moderate risk. However, the appropriateness of this tool requires confirmation against the actual clinical study designs.

Gutiérrez et al. [6], which combined review and experimental components, was classified separately because its methodological structure differed from that of conventional primary experimental studies. Its quality assessment remained unclear across all evaluated domains. Consequently, findings from this study should be interpreted cautiously and distinguished from independently assessed experimental evidence.

Table 3. Methodological quality and risk-of-bias assessment of the included in vitro, in vivo animal, and clinical studies using design-specific assessment tools.

Ref	Tool	Selection	Performance	Detection	Attrition	Reporting	OverallRisk
In vitro studies (n = 2)							
[15]	Checklist	Low	Low	Unclear	Low	Low	Low–Moderate
[18]	Checklist	Low	Unclear	Low	Low	Low	Low–Moderate
In vivo studies (n = 6)							
[7]	SYRCLE	Low	Unclear	Unclear	Low	Low	Moderate
[19]	SYRCLE	Low	Unclear	Low	Low	Low	Low–Moderate
[11]	SYRCLE	Unclear	Unclear	Unclear	Low	Low	Moderate
[16]	SYRCLE	Low	Unclear	Unclear	Unclear	Low	Moderate
[17]	SYRCLE	Low	Low	Unclear	Low	Low	Low–Moderate
[12]	SYRCLE	Low	Low	Low	Low	Low	Low
Clinical studies (n = 3)							
[9]	NOS	Low	Low	Low	Low	Low	Low
[14]	NOS	Low	Unclear	Low	Unclear	Low	Moderate
[13]	NOS	Low	Low	Low	Low	Low	Low
Mixed review and experimental study (n = 1)							
[6]	Adapted checklist	Unclear	Unclear	Unclear	Unclear	Unclear	Unclear

Summary of Findings by Study Type

In vitro studies (n = 2). Two studies investigated the effects of guava leaf-derived preparations on cellular glucose regulation. Huang et al. [15] reported increased GLUT4 translocation following treatment with a quercetin-rich extract, suggesting a potential mechanism for enhanced glucose transport into muscle cells. Similarly, Rahman et al. observed increased cellular glucose uptake following extract administration [18]. Together, these findings suggest that guava leaf-derived compounds may influence peripheral glucose utilization. However, the available summaries do not establish whether the observed effects are mediated by identical signaling mechanisms. Furthermore, these cellular findings cannot be directly extrapolated to clinical glycemic outcomes.

In vivo studies (n = 6). Six animal studies investigated the metabolic effects of guava leaf extracts. Chen et al. reported reductions in blood glucose levels in diabetic mice, with enzyme inhibition and enhanced peripheral glucose uptake proposed as contributing mechanisms [6]. Luo et al. demonstrated reductions in oxidative stress markers in diabetic rats, suggesting a possible indirect contribution to improved glucose regulation [11]. Rai et al. reported improvements in both glycemic control and lipid profiles [16], while Ali et al. observed reductions in glycated hemoglobin (HbA1c), indicating potential effects on longer-term glycemic regulation [17]. Wang et al. specifically reported attenuation of postprandial glucose increases following carbohydrate administration in mice [12]. Additionally, Rajput et al. reported improvements in glucose metabolism and insulin resistance [19]. Although these findings support the metabolic activity of guava leaf extracts, differences in animal models, extraction methods, and measured outcomes limit direct comparisons across studies.

Clinical studies (n = 3). Three clinical studies evaluated guava leaf preparations in human participants. Deguchi and Miyazaki reported reductions in postprandial blood glucose following guava leaf tea consumption in individuals with prediabetes and described improvements in

insulin sensitivity after repeated intake [9]. Shen et al. similarly reported attenuation of postprandial glycemic responses following repeated guava tea administration [14]. Lee et al. reported a reduction in the glycemic index of test meals following tea consumption [13]. These findings provide preliminary human evidence supporting the potential role of guava leaf preparations in postprandial glycemic regulation. However, the available study summaries do not provide sufficient information on sample sizes, effect magnitudes, treatment durations, or between-group variability to determine the strength and clinical significance of these effects.

Mixed review and experimental study (n = 1). Gutiérrez et al. [6] described the phytochemical composition and antidiabetic potential of guava leaves, particularly the possible contributions of quercetin, tannins, and other bioactive constituents [7]. The reported mechanisms included antioxidant activity and inhibition of carbohydrate-digesting enzymes. Because the study combined literature review and experimental components, its findings were considered separately from conventional primary experimental studies. Its contribution is therefore principally contextual unless the independent experimental observations can be clearly identified and appraised.

Discussion

This review synthesizes evidence from 12 studies investigating the potential role of *Psidium guajava* leaf preparations in glycemic regulation, with particular emphasis on postprandial glucose responses. The available findings suggest that guava leaf-derived compounds may influence glucose metabolism through several complementary processes, including modulation of carbohydrate digestion, enhancement of cellular glucose uptake, and reduction of oxidative stress. Nevertheless, the direct evidence for postprandial glucose attenuation is concentrated in the three clinical studies and one animal study specifically assessing glucose responses after carbohydrate intake [9,12–14]. Other studies provide supporting evidence related to broader metabolic outcomes rather than directly measuring postprandial glucose excursions.

One proposed mechanism involves the inhibition of enzymes responsible for carbohydrate digestion. Gutiérrez et al. [6] identified phytochemical constituents, including quercetin and tannins, with potential antidiabetic activity involving enzyme inhibition and antioxidant pathways. Chen and Yen [7] also associated the glucose-lowering activity of guava leaf extracts with possible effects on carbohydrate metabolism. Inhibition of intestinal carbohydrate-digesting enzymes could theoretically delay carbohydrate hydrolysis and glucose absorption, thereby attenuating postprandial glycemic responses. However, the retained studies do not provide sufficient comparative enzyme-inhibition data to establish the potency of specific preparations or their equivalence to established pharmacological inhibitors. Accordingly, this mechanism should be regarded as biologically plausible rather than conclusively established across the included studies.

Another potentially important mechanism is the enhancement of peripheral glucose utilization. Huang et al. [15] reported increased GLUT4 translocation in muscle cells exposed to a quercetin-rich extract, while Rahman et al. [18] reported enhanced cellular glucose uptake following extract treatment. These observations suggest that guava leaf-derived bioactive compounds may influence cellular glucose transport. The findings are also directionally consistent with the improvements in glucose metabolism and insulin resistance reported by Choi et al. [19] in an animal model. Nevertheless, the cellular and animal studies differ in experimental models and outcomes, and they do not establish a common molecular pathway. Additional mechanistic investigations are therefore needed before attributing the observed effects to a specific insulin-signaling process.

Oxidative stress regulation may represent another contributing mechanism. Luo et al. [11] reported reductions in oxidative stress markers following guava leaf extract administration in diabetic rats. Gutiérrez et al. [6] also described antioxidant activities associated with guava

phytochemicals, particularly flavonoids and tannins. These observations suggest that antioxidant properties may contribute to improved metabolic regulation. However, reductions in oxidative stress markers should not automatically be interpreted as evidence of improved insulin sensitivity or postprandial glycemic control. Direct associations between antioxidant responses and glycemic outcomes would be required to establish the contribution of this mechanism.

The animal studies provide additional evidence of metabolic effects beyond the immediate postprandial period. Chen and Yen [7] reported reductions in blood glucose concentrations in diabetic mice, while Rai et al. [16] observed improvements in both glucose regulation and lipid profiles. Ali et al. [17] reported decreased HbA1c concentrations, suggesting potential effects on longer-term glucose regulation. Rajput et al. [19] also reported improvements in glucose metabolism and insulin resistance. Of particular relevance to the primary objective of this review, Wang et al. [12] demonstrated attenuation of postprandial glucose increases following carbohydrate administration. Although these studies collectively suggest antihyperglycemic potential, their different endpoints should not be treated as interchangeable indicators of postprandial efficacy.

The clinical studies provide preliminary support for the possible application of guava leaf preparations in humans. Deguchi and Miyazaki [9] and Shen et al. [14] reported reductions in postprandial glycemic responses following guava leaf tea consumption. Lee et al. [13] additionally reported a lower glycemic index for test meals associated with tea administration. These outcomes suggest that guava leaf tea may influence the glycemic response to carbohydrate-containing meals. However, the available evidence remains insufficient to establish an optimal dose, the duration of any sustained benefit, or long-term clinical effectiveness. Furthermore, the reduction of an acute postprandial response should not be interpreted as direct evidence that guava leaf consumption prevents progression to type 2 diabetes.

A distinction should be made between the different forms of evidence included in this review. The in vitro studies primarily address cellular glucose handling, whereas the animal investigations examine broader physiological responses involving glucose metabolism, insulin resistance, oxidative stress, and lipid regulation. The clinical studies, in contrast, provide more directly relevant evidence concerning postprandial glycemic responses. Although the findings across these experimental levels are generally compatible, their methodological and biological differences limit the extent to which they can be integrated into a single causal explanation. The available evidence is therefore more appropriately interpreted as supporting several potential mechanisms rather than demonstrating a uniformly established antihyperglycemic pathway.

Methodological limitations further affect the interpretation of these findings. The included studies differed in experimental models, intervention formulations, and outcome measurements. In the animal studies, uncertainty concerning performance and detection bias was identified in several assessments, including Chen and Yen [7], Luo et al. [11], and Rai et al. [16]. The mixed review and experimental structure of Gutiérrez et al. [6] creates additional challenges for distinguishing primary observations from previously published evidence. Moreover, the existing clinical quality assessments require verification using tools appropriate to the actual study designs. These limitations reduce confidence in the overall evidence and prevent strong conclusions concerning clinical effectiveness.

The heterogeneity of guava leaf preparations represents an additional challenge. Extracts, quercetin-rich preparations, and guava leaf teas cannot be assumed to contain equivalent concentrations of active constituents. Differences in extraction procedures and formulation may influence biological activity and the reproducibility of experimental outcomes. Consequently, the findings from cellular and animal studies cannot be directly translated into clinically effective doses. Standardized phytochemical characterization, clearly described intervention protocols,

and appropriate dose–response assessments would improve comparability between future investigations.

The reviewed evidence also leaves several important questions unresolved. The contribution of individual phytochemicals to the observed effects remains insufficiently established, and the available summaries provide limited information on bioavailability and pharmacokinetics. Future studies should therefore evaluate standardized guava leaf preparations, characterize their active constituents, and investigate mechanisms relevant to intestinal carbohydrate handling and peripheral glucose uptake. Well-controlled clinical trials are also needed to determine whether the observed reductions in postprandial glucose are reproducible, clinically meaningful, and sustained with repeated consumption. Evaluation of adverse effects and potential interactions with glucose-lowering medications should form part of these investigations.

Overall, the 12 retained studies provide preliminary evidence that *Psidium guajava* leaf preparations may contribute to glycemic regulation through complementary biological mechanisms. Clinical findings suggest potential attenuation of postprandial glucose responses, while cellular and animal studies provide supporting evidence of effects on glucose utilization, metabolic regulation, and oxidative stress. Nevertheless, the limited direct clinical evidence, methodological heterogeneity, and uncertainties in quality assessment prevent definitive conclusions regarding therapeutic efficacy. Further standardized experimental investigations and adequately designed clinical trials are required before guava leaf-based interventions can be recommended as established strategies for controlling postprandial hyperglycemia.

Conclusions

This systematic review of 12 studies provides preliminary evidence that *Psidium guajava* leaf preparations may help attenuate postprandial glycemic responses. Clinical studies reported reductions in postprandial glucose levels or meal glycemic index following guava leaf tea consumption, while in vitro and animal studies suggested complementary mechanisms involving enhanced cellular glucose uptake, modulation of carbohydrate digestion, and reduced oxidative stress. However, these mechanistic findings do not directly establish clinical efficacy. The limited number of human studies, heterogeneity in intervention preparations and outcome measurements, and methodological uncertainties restrict the strength and generalizability of the evidence. Although guava leaf preparations show potential as a complementary approach to postprandial glucose management, their long-term effectiveness and safety remain insufficiently established. Future research should prioritize standardized extract formulations, dose–response evaluation, and adequately powered randomized controlled trials to determine clinical efficacy, safety, and the mechanisms underlying their glycemic effects.

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