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# Efficacy of Guava Leaf Decoction in Lowering Blood Glucose in Diabetes Mellitus: A Systematic Review

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**ABSTRACT**

**Introduction:** Diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels due to insulin resistance or insufficient insulin secretion. The rising global prevalence of DM has led to increased interest in alternative therapies, including herbal remedies such as guava leaf decoction, which is believed to possess hypoglycemic properties.
**Objective:** This systematic review aims to evaluate the efficacy of guava leaf decoction in reducing blood glucose levels in patients with diabetes mellitus.
**Methods:** A comprehensive literature search was conducted across four databases—PubMed, ProQuest, Garuda, and JSTOR—for studies published between 2020 and 2024. Inclusion criteria were studies involving diabetic patients receiving guava leaf decoction as an intervention, with outcomes measured in terms of blood glucose levels using glucometers. The selection and quality appraisal of studies were independently performed by two to three reviewers, following the PRISMA guidelines. The CASP checklist was used for methodological quality assessment. Extracted data included study authors, intervention details, facilitators, setting, session frequency, duration, and delivery method.
**Results:** Eight eligible studies comprising a total of 229 participants were included. The findings consistently demonstrated that guava leaf decoction significantly reduced blood glucose levels. Effective regimens included twice-daily administration for 7 days or once daily (250 ml) for 14 days. Benefits were observed in both diabetic and obese individuals.
**Conclusion:** Guava leaf decoction shows potential as a complementary therapy in the management of diabetes mellitus by naturally lowering blood glucose levels. Further clinical trials are recommended to confirm its efficacy and safety.

**Keywords:** blood glucose, diabetes mellitus, guava leaf, herbal medicine

## Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by elevated blood glucose levels resulting from insulin resistance, insufficient insulin production, or both (Hoerunisa et al., 2023). This condition has become a major global public health concern due to its rising prevalence and the associated complications. In Indonesia alone, an estimated 10 million individuals are affected, placing the country among the top ten nations with the highest diabetes prevalence (Baidhowy et al., 2022).

Effective and affordable treatment strategies are essential to address the growing burden of diabetes. While pharmacological interventions—such as insulin and oral hypoglycemic agents—remain the mainstay of diabetes management, they are often accompanied by undesirable side effects, including hypoglycemia, gastrointestinal disturbances, and increased cardiovascular risk (Solihah et al., 2023). Furthermore, the cost of lifelong treatment imposes a significant economic burden on patients and healthcare systems (Pramasari et al., 2022; Williams et al., 2020). As a result, there has been growing interest in alternative and complementary therapies, particularly plant-based interventions, which are perceived as safer, more accessible, and cost-effective (Nurayati & Adriani, 2017).

Guava (Psidium guajava) is a tropical medicinal plant widely available in Southeast Asia, including Indonesia. The leaves of the guava plant are rich in secondary metabolites such as flavonoids, tannins, saponins, and polyphenols, which exhibit antihyperglycemic, antioxidant, and antibacterial properties (Widiastuti et al., 2023). These compounds are believed to reduce blood glucose levels by enhancing insulin sensitivity and inhibiting enzymes involved in carbohydrate metabolism (Jannah et al., 2024). Chu et al. (2022) demonstrated that guava leaf aqueous extract (GvAEx) significantly improved insulin sensitivity and regulated hepatic glucose metabolism in individuals with type 2 DM. Similarly, Jayasudha et al. (2017) reported that regular consumption of guava leaf tea effectively lowered postprandial blood glucose levels in diabetic patients.

Despite the promising evidence from preliminary studies and traditional practices, further comprehensive investigations are necessary to establish the long-term efficacy and safety of guava leaf decoction as a therapeutic intervention. Considering the increasing global demand for natural treatments and the burden of diabetes, this systematic review aims to evaluate the effects of guava leaf decoction on blood glucose levels in patients with diabetes mellitus. Additionally, it seeks to assess its potential role as a complementary therapy in diabetes management to support the development of holistic and evidence-based strategies.

## Objective

This systematic review aims to evaluate the efficacy of guava leaf decoction in reducing blood glucose levels in patients with diabetes mellitus.

## Method

### *Study design*

This systematic literature review refers to the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) statement.

***Search strategy***

The search strategy covered the period from January 1st, 2020, to December 31st, 2024, and spanned various databases, including Pubmed, ProQuest, Garuda, and JSTOR. The search strategy was limited to the last five years to ensure that researchers encompass the most recent and relevant information on a specific topic. Research and developments in a field of science can change and evolve over time, making it essential to consider the most up-to-date literature for a comprehensive understanding. Additionally, restricting the search timeframe to the last five years aims to enable researchers to manage the number of studies they need to evaluate and synthesize.

The search employed the Medical Subject Headings (MeSH system) and keywords in advanced search engines, which can be seen in the appendix (supplementary file 1). These searches were performed by two of this article's co-authors (SO, DGR) who independently searched the electronic databases previously referenced.

Tabel 1. MeSH term on search strategy phase

| Source | Link | Keywords | Num |
|---|---|---|---|
| Pubmed | https://tinyurl.com/yxrmzarc | ((guajava, psidium[MeSH Terms]) AND (blood glucose[MeSH Terms])) AND (diabetes mellitus[MeSH Terms]) | 100 |
| ProQuest | https://tinyurl.com/rn68dhyr | mainsubject(psidium guajava) AND mainsubject( blood glucose) AND (diabetes mellitus) | 150 |
| Garuda | https://tinyurl.com/39xj9n4j | Jambu biji AND glukosa AND diabetes melitus | 50 |
| JSTOR | https://tinyurl.com/mrxy8xz5 | (((guajava psidium) AND (diabetes mellitus)) | 100 |
| | | **Total** | **400** |

**Inclusion Criteria**

The criteria were designed to ensure relevance to human clinical outcomes while minimizing confounding factors. Only studies involving adult patients with clearly diagnosed Type 1 or Type 2 diabetes were included.

*Participant*

The participants involved in this study are individuals with Type 1 and Type 2 Diabetes Mellitus. There were no restrictions based on sex, religion, and race.

*Intervention*

Guava leaf decoction is a liquid extract derived from boiling the leaves of *Psidium guajava*, which are rich in bioactive compounds such as flavonoids, tannins, and quercetin. These constituents possess antihyperglycemic properties, including enhancing insulin sensitivity, inhibiting carbohydrate-digesting enzymes, and reducing blood glucose levels. This intervention aims to evaluate the effectiveness of guava leaf decoction in regulating blood glucose levels in patients with diabetes mellitus (DM).

The preparation involves thoroughly washing either fresh (10–15 grams) or dried (5–7 grams) guava leaves, which are then boiled in 250–500 mL of water over low heat for 10–15 minutes to extract the active compounds. After cooling to a safe temperature, the decoction is strained and administered to participants. The typical dosage is 200–250 mL, consumed once or twice daily, over a treatment period ranging from 4 to 12 weeks.

*Control*

Eligible controls were required to receive standard care or usual care, or placebo.

*Outcomes*

We include studies that measure blood glucose levels using various instruments, such as glucometers and laboratory test methods, to assess changes in blood glucose levels before and after the intervention.

*Study design*

We include Quasi-experimental studies, Pre-experimental studies, and Case studies to assess the effect of guava leaf decoction. Articles based on descriptive studies, literature reviews, systematic reviews, and opinion articles will be excluded. Only studies written in English and Bahasa will be included.

***Exclusion criteria***

Studies on pediatric populations or individuals with complex comorbidities were excluded to reduce heterogeneity and increase comparability across interventions. Studies were not English and Bahasa language. Individuals under the age of 12 years and families with chronic illnesses or mental disorders in individuals over 65 years old were excluded from the study. Articles focusing on single case report, editorial, Letter to Editor, correspondence, narrative review, scoping review, descriptive studies, literature reviews, systematic reviews, proceeding abstract, book chapter and opinion articles were excluded from consideration in this analysis.

***Study selection and data extraction***

Two authors (GNN, SO) independently reviewed all titles and abstracts according to the previously described design. If consensus between the two authors could not be reached, the senior researchers (HS, EMJW) decided on the inclusion of the questioned article. Two other authors (DGR, PG) independently extracted data from each study included in the dataset. The reports of the studies selected for inclusion included information on authorship, year, country, design, sample size, interventions, instruments, results, and findings.

***Assessment of quality***

Two researchers (GNN, PG) independently conducted quality assessments of the included studies. Differences in assessments were discussed together, and if further clarification or resolution was needed, it was consulted with senior researchers (HS, EMJW). This meticulous process ensures that the quality evaluation is conducted rigorously and in accordance with scientific standards.

***CASP evaluation***

We used the Critical Appraisal Skills Programme (CASP) to assess the quality of primary and secondary outcomes based on the following domains: study design, risk of bias, inconsistency, indirectness, imprecision, and other considerations.

**Result**

Across the selected studies, variations in the preparation (fresh vs dried leaves), dosage (ranging from 200–250 ml), frequency (once or twice daily), and duration (3 to 14 days) of guava leaf decoction administration were observed. These factors likely influenced the magnitude of the glucose-lowering effects.

*Study selection*

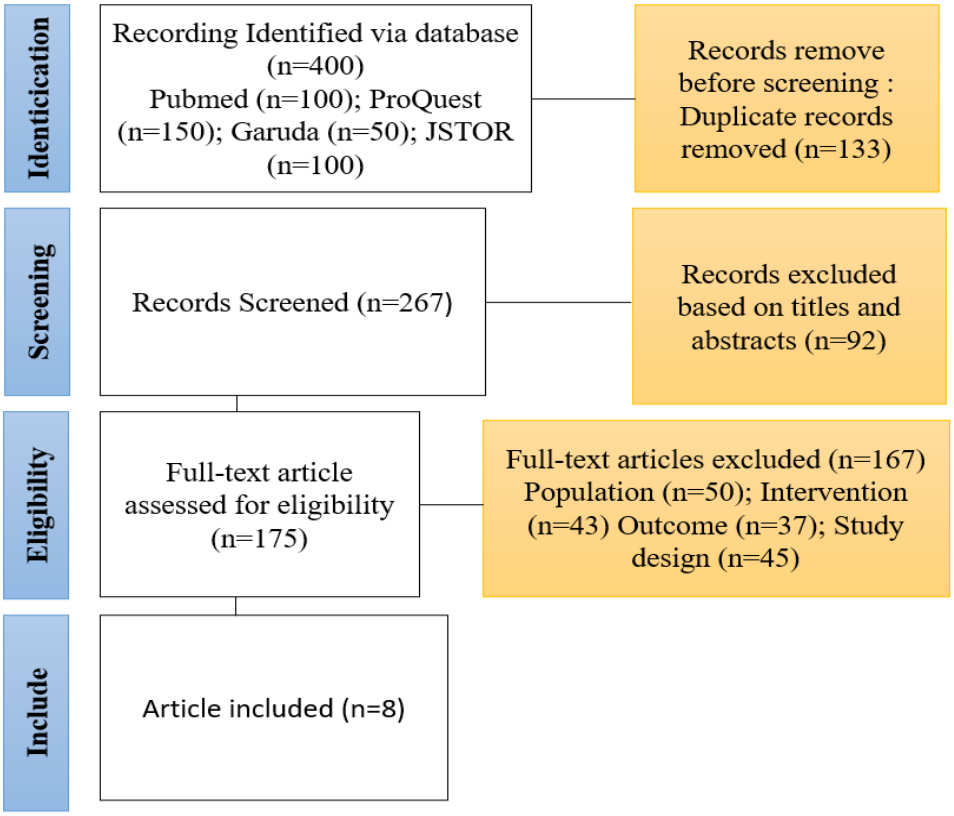


Figure 1. Screening process flowchart by PRISMA

In the initial database search phase, 400 articles were found. After an initial screening process to remove duplicates, 133 articles were identified as duplicates and excluded, leaving 267 articles for the next evaluation phase. Subsequently, two researchers (GNN, DGR) independently conducted a further screening based on titles and abstracts, resulting in 175 selected articles. These articles were then further screened based on full-text evaluation, considering the inclusion and exclusion criteria. The final result of this selection process left 8 articles that met the established criteria. More detailed information about the selection process can be seen in Figure 1.

***Study characteristics***

Tabel 2. Characteristic of studies

| Author | Intervension Facilitator, Setting | Number of Session | Duration | Method or Media |
|---|---|---|---|---|
| Hidayati and Cumayunaro (2020) Indonesia | The Administration of Guava Leaf Decoction in Patients with Type 2 Diabetes Mellitus, the facilitators for the researchers were set in the Kubu Dalam Padak Karakah sub-district, Andalas Health Center, Padang. | not explained | not explained | not explained |
| Buheli and Ratnawati (2021) Indonesia | The Administration of Guava Leaf Decoction in Patients with diabetes mellitus, the facilitator for the researchers is a researcher, the setting was conducted at the South City Health Center in Gorontalo City. | 1 week | twice a day | not explained |
| Priya and Priya (2021) India | The administration of guava leaf tea to patients with type 2 diabetes mellitus, the facilitator is the researcher,the setting was conducted in Thirumazhisai, Thiruvallur District, India. | 1 week | Once a day | not explained |
| Fithriana et al. (2021) Indonesia | The Administration of Guava Leaf Decoction the facilitator is the researcher, the setting was conducted at the Jatibaru Health Center in Bima City. | 14 hari | Once a day with a dosage of 250ml | Seven fresh guava leaves are boiled with 750 ml of water until the guava leaf extract is obtained. |

| | | | | |
|---|---|---|---|---|
| Nugroho and Handono (2022) Indonesia | The Administration of Guava Leaf Decoction the facilitator is the researcher, the setting was conducted in Gemantar Village, Selogiri District, Wonogiri Regency. | 1 week | twice a day | Five to ten guava leaves are boiled in 450-500 ml of water. |
| Afiyati and Widyaningsih (2023) Indonesia | The Administration of Guava Leaf Decoction the facilitator is the researcher the setting was conducted at Widya Husada University, Semarang. | For three days | twice a day, in the morning and evening | not explained |
| Faidhil (2024) Indonesia | The Administration of Guava Leaf Decoction the facilitator is the researcher the setting was conducted in Reukih Dayah Village, Aceh Besar Regency. | 1 week | twice a day, in the morning and evening | Ten guava leaves are then added to 500 cc of water and boiled. The resulting decoction of guava leaves will be reduced to 250 cc. |
| Amin et al. (2024) Indonesia | The Administration of Guava Leaf Decoction the facilitator is the researcher, the setting was conducted at Ponre Health Center, Bulukumba Regency. | 2 week | Once a day | not explained |

The studies reviewed examined guava leaf (*Psidium guajava*) decoction as a complementary therapy for type 2 diabetes mellitus. All were facilitated by researchers and conducted in various settings, such as health centers, villages, and universities in Indonesia and India. Most interventions lasted one week, with decoction given once or twice daily. While some studies did not explain the preparation method, others boiled 5–10 guava leaves in 450–

750 ml of water, often reducing the volume to concentrate the extract. These differences highlight variations in dosage and preparation, which may affect outcomes.

Table 3. Data Extraction

| Author, year, country | Design (Sample size) | Intervention (Case) | Instrument (outcomes) | Findings |
|---|---|---|---|---|
| Hidayati and Cumayunaro ( 2020 ) Indonesia | Quasy Experimen Sample of 15 people | Guava Leaf Decoction ( Diabetes Mellitus ) | ET for Blood Glucose Level | After the administration of boiled guava leaf water (Psidium guajava), there was a decrease in blood sugar levels in patients with type 2 diabetes mellitus. This indicates its effectiveness in lowering blood glucose levels in type 2 diabetes mellitus patients. |
| Buheli and Ratnawati ( 2021 ) Indonesia | Pre Experimen Population 64 people with diabetes Sample 37 people | Guava Leaf Decoction ( Diabetes Mellitus ) | N for Blood Glucose Level | After the administration of boiled guava leaf water (Psidium guajava) therapy, conducted twice daily for 7 days, there was a decrease in blood sugar levels in patients with diabetes mellitus. This indicates the potential of using guava leaves as a herbal therapy for managing diabetes. |
| Priya and Priya ( 2021 ) India | Pre Experimen Sample 35 people | Guava Leaf tea ( Diabetes Mellitus ) | GM for pain intensity | This the findings of the present study revealed that, assess the effectiveness of guava leaf tea in reducing postprandial blood glucose among type -2 diabetic clients that blood glucose level was reduced significantly in the post test after the administration Guava Leaf Tea. |

| | | | | |
|---|---|---|---|---|
| Fithriana et al. ( 2021 ) Indonesia | Pre Experimen Sample 40 people | Guava Leaf Decoction ( Diabetes Mellitus ) | GM for Blood Glucose Level | After administering boiled guava leaf water once a day in the afternoon at a dose of 250 ml for 14 days, this therapy proved effective in lowering blood glucose levels in patients with type II diabetes mellitus and obesity. This study recommends the use of this therapy as an alternative in the management of diabetes. |
| Nugroho and Handono ( 2022 ) Indonesia | Quasi Eksperimen Sample 30 people | Guava Leaf Decoction ( Diabetes Mellitus ) | GM for Blood Glucose Level | After the administration of boiled guava leaf water (Psidium guajava) therapy for 7 days, there was a decrease in blood sugar levels in patients with diabetes mellitus. This indicates the potential of using guava leaves as a herbal therapy for managing diabetes |
| Afiyati and Widyaningsih ( 2023 ) Indonesia | Case Study Sample 2 people | Guava Leaf Decoction ( Diabetes Mellitus ) | GM for Blood Glucose Level | After administering boiled guava leaf water for 3 days, with 6 treatments in the morning and evening, a decrease in blood glucose levels was observed. Thus, the results of this study indicate that, to assess the effectiveness of guava leaf tea in lowering blood glucose levels in type 2 diabetes patients. |

| | | | | |
|---|---|---|---|---|
| Faidhil ( 2024 ) Indonesia | Case Study Sample 2 people | Guava Leaf Decoction ( Diabetes Mellitus ) | GM for Blood Glucose Level | After administering boiled guava leaf water for 7 consecutive days, consumed every morning and evening in 250 cc per glass, a decrease in blood glucose levels was observed. Thus, the results of this study can be concluded that there was a reduction in blood glucose levels when applying boiled guava leaf water in patients with type 2 diabetes mellitus. |
| Amin et al. (2024 ) Indonesia | Quasy Experimen Sample 70 people Intervention 35 people Control 35 people | Guava Leaf Decoction ( Diabetes Mellitus ) | GM for Blood Glucose Level | he average blood glucose level before being given guava leaf decoction water in people with diabetes mellitus was obtained with an average blood glucose level of 257.06 mg/dl. In comparison, the local glucose level after being given guava leaf decoction water in patients with diabetes mellitus was obtained with an average blood glucose level of 176.26 mg/dL, so it can be concluded that there is an effect of giving guava leaf decoction *water (Psidium Guajava Leaf)* on changes in blood glucose levels in people with diabetes mellitus. |

The reviewed studies consistently demonstrate the effectiveness of guava leaf (*Psidium guajava*) decoction in reducing blood glucose levels among patients with type 2 diabetes mellitus. Most studies employed pre-experimental or quasi-experimental designs with sample sizes ranging from 2 to 70 participants, conducted primarily in Indonesia and one in India.

Interventions involved administering guava leaf decoction or tea over periods ranging from 3 to 14 days. Instruments used to measure outcomes included glucometers or enzymatic tests for blood glucose levels. Across all studies, a significant reduction in blood glucose was observed post-intervention, indicating the potential of guava leaf decoction as a complementary therapy in diabetes management. Despite variations in study design and sample size, the findings consistently support its hypoglycemic effect.

Table 4. CASP Checklist for the quality of studies

| Author/Year | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Hidayati and Cumayunaro (2020) | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Buheli and Ratnawati (2021) | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Priya and Priya (2021) | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Fithriana et al. (2021) | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Nugroho and Handono (2022) | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Afiyati and Widyaningsih (2023) | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Faidhil (2024) | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |
| Amin et al. (2024) | Y | Y | Y | Y | N | Y | Y | Y | Y | Y |

The table presents a quality assessment of eight reviewed studies using a 10-question checklist, where “Y” indicates “Yes” (criteria met) and “N” indicates “No” (criteria not met). All studies met 9 out of 10 criteria, with only Question 5 (Q5) consistently marked as “No” across all entries. This suggests a common methodological limitation, likely related to blinding, randomization, or control group usage depending on what Q5 represents in the applied checklist. Despite this, the overall quality of the studies is strong, indicating reliable findings in support of guava leaf decoction's efficacy for lowering blood glucose levels in type 2 diabetes mellitus patients.

**Discussion**

This systematic review analyzed several clinical and experimental studies evaluating the effectiveness of guava (Psidium guajava) leaf decoction in reducing blood glucose levels among individuals with diabetes mellitus (DM). The majority of the reviewed studies demonstrated that guava leaf decoction significantly lowered blood glucose levels under both fasting and postprandial conditions. These effects were observed in various subgroups,

including individuals with type 2 DM, obesity, or unstable glycemic control. Most participants had elevated blood glucose levels prior to the intervention, which significantly decreased following guava leaf decoction consumption.

The effectiveness of guava leaf decoction was assessed using various instruments. Several studies—such as those by Amin et al. (2024), Faidhil (2024), and Hidayati & Cumayunaro (2020)—used glucometers for blood glucose monitoring. Others, including Fithriana et al. (2021), additionally recorded body mass index (BMI), while Afiyati et al. (2023) used observation sheets. Laboratory-based methods were applied in studies by Buheli & Ratnawati (2021) and Nugroho & Handono (2022), whereas Priya & Priya (2021) focused specifically on postprandial glucose levels.

The intervention protocols varied across studies. Nugroho and Handono (2022) used a preparation of 5–10 guava leaves boiled in 500 mL of water, administered twice daily for one week. Similarly, Faidhil (2024) used 10 leaves in 500 mL of water, also consumed twice daily. Fithriana et al. (2021) recommended boiling seven fresh leaves in 750 mL of water, consumed once daily over two weeks. These preparation differences may contribute to the variation in outcomes.

The mechanism underlying the glucose-lowering effect of guava leaves is supported by Manikandan et al. (2016), who reported that flavonoids, tannins, and calcium in guava leaves play key roles. Tannins inhibit α-glucosidase, thereby slowing glucose absorption, while calcium stimulates insulin production in pancreatic β-cells.

Beyond glycemic control, guava leaf extract is recognized for its broad therapeutic potential. It has demonstrated antibacterial, anti-inflammatory, and antioxidant effects, making it useful for treating wounds, skin conditions, and gastrointestinal issues. Studies by Putri et al. (2023) and Antoni & Harahap (2019) highlighted its role in accelerating wound healing, particularly in diabetic ulcers, through mechanisms involving flavonoids, tannins, saponins, and alkaloids.

Moreover, guava leaf decoction is effective in treating diarrhea due to its ability to inhibit bacterial growth and reduce intestinal inflammation (Aizah et al., 2022). Zahra & Assyaidah (2025) and Ilahi et al. (2021) also demonstrated its role in perineal wound healing and acne management, respectively. Dwitiyanti (2015) further reported guava leaf extract's anticancer properties, highlighting its influence on cell cycle arrest, angiogenesis inhibition, and immunomodulation.

Comparatively, guava leaf decoction is more effective than guava leaf tea in reducing blood glucose levels due to higher concentrations of bioactive compounds (Priya & Priya, 2021). Additionally, Hani (2018) reported that combining guava leaf decoction with dietary interventions yields better outcomes than using either approach alone. Permatasari et al. (2023) emphasized the role of balanced macronutrient intake in glycemic control, supporting the idea that a holistic approach—including lifestyle and dietary modifications—enhances treatment effectiveness.

Demographic factors such as age, education, and health literacy may also influence intervention outcomes. Setiawan et al. (2018) found that individuals with higher education levels are more likely to manage their diabetes effectively. Nurayati & Adriani (2017) emphasized that awareness of diet and physical activity is essential for maintaining normal blood glucose levels.

While the included studies support the therapeutic benefits of guava leaf decoction, limitations remain. Many studies had small sample sizes, lacked control groups, or varied

significantly in intervention protocols, limiting the generalizability of findings. Standardized formulations, dosages, and durations are needed in future research to ensure consistent outcomes.

The clinical implications of this review are noteworthy. Guava leaf decoction represents a promising complementary therapy for diabetes management. It offers a natural, accessible, and cost-effective alternative that may be integrated into nursing care plans and community health education. As part of holistic diabetes management, this herbal intervention may support better glycemic control while minimizing the risks associated with pharmacologic therapies.

## Conclusion

This systematic review highlights the potential of guava leaf decoction (Psidium guajava) as a complementary therapy for lowering blood glucose levels in patients with Diabetes Mellitus. Regular consumption may help improve insulin sensitivity and inhibit carbohydrate-metabolizing enzymes, contributing to better glycemic control. Despite the generally positive outcomes reported, variations in dosage, duration, participant characteristics, and methodological limitations—such as small sample sizes and lack of control groups—restrict the strength of the evidence. Clinically, guava leaf decoction may offer a promising herbal alternative for diabetes management, particularly for individuals seeking integrative approaches. However, to establish its efficacy, safety, and appropriate application, further well-designed studies with standardized protocols and larger populations are necessary.


### *Acknowledgement*

Not applicable.


### *Authors' contribution*

Each author contributed equally in all the parts of the research. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

### *Conflict of interest*

The researchers stated that there is no conflict of interest related to the implementation and publication of the results of this research. The entire research process, from planning, data collection, analysis, to report preparation, was carried out independently without any influence or pressure from any third party. A commitment to research ethics is upheld throughout the research process, ensuring transparency, accuracy and honesty in reporting results. Respondents' participation was voluntary with informed consent, and their confidentiality and privacy were maintained in accordance with applicable research ethics standards. With this statement, researchers hope that the research results can be trusted and used as a valid reference for the development of science and health practices related to ethnomedicine and reproductive health.

### *Ethical consideration*

Not applicable.

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