International Journal of Health Science (IJHS)

E-ISSN: 2827-9603
P-ISSN: 2827-9603

Research Article

The Potential of Complementary Therapy Using Bay Leaves (Syzygium polyanthum) and Ginger (Zingiber officinale) in Lowering Blood Glucose Levels in Patients with Diabetes Mellitus: A Literature Review

Ria Rizka Mansur [1*], Musdalipa [2], Selviana Tawil [3]

[1-2] Institut Batari Toja Bone, Indonesia
[3] Sekolah Tinggi Ilmu Kesehatan Nani Hasanuddin Makassar, Indonesia
* Corresponding Author: riarizkamansur@gmail.com

Abstract: Diabetes mellitus (DM) is a global public health issue, with its prevalence steadily increasing. The 2023 Indonesian Health Survey (SKI) reported that 11.7% of the population aged ≥15 years is affected by DM. DM is marked by high blood glucose levels due to impaired insulin secretion or action, leading to chronic complications. While conventional treatments such as insulin and oral antidiabetic drugs are effective, their long-term use can cause side effects, including hypoglycemia, gastrointestinal issues, and economic burdens. As a result, herbal-based complementary therapies are gaining attention due to their safety, accessibility, and alignment with Indonesian culture. Research suggests that certain herbs can lower blood glucose by increasing insulin secretion, improving insulin sensitivity, inhibiting glucose absorption, and offering antioxidant effects. Herbs like bay leaves (Syzygium polyanthum) and ginger (Zingiber officinale) have shown hypoglycemic activity. This literature review aims to explore the potential, mechanisms, preparation, and clinical evidence of using bay leaves and ginger for glycemic control. Findings indicate that both herbs improve insulin sensitivity, inhibit α-glucosidase, and exhibit antioxidant effects. However, further research, including large-scale clinical trials and multidisciplinary studies, is needed to validate these benefits and explore synergies with conventional therapies.

Keywords: Bay Leaves; Blood Glucose; Complementary Therapy; Diabetes Mellitus; Ginger.

Received: September 15, 2025
Revised: October 21, 2025
Accepted: November 14, 2025
Published: November 17, 2025
Curr. Ver.: November 17, 2025

1. Introduction

Diabetes Mellitus (DM) is a serious global public health problem that has been continuously increasing in recent decades. The International Diabetes Federation (IDF) in Diabetes Atlas 2024 reports that more than 500 million people worldwide are living with DM, and this number is estimated to increase to 643 million by 2030 (IDF, 2025). The prevalence of this disease is increasing rapidly, especially in low- and middle-income countries. This metabolic disorder contributes to high morbidity and mortality as well as a large economic burden (WHO, 2024).

In Indonesia, the prevalence of DM has also shown a significant increase. Based on the results of the 2018 Basic Health Research (Riskesdas), the prevalence of DM increased from 6.9% in 2013 to 10.9% in 2018 and 11.7% in 2023 (SKI, 2023). This estimated figure and upward trend indicate the need for comprehensive diabetes prevention and management strategies, including consideration of safe and effective complementary therapies. The WHO Global Report on Traditional and Complementary Medicine (2019) mentions that about 80% of the population in developing countries still use traditional medicine, including herbal remedies, in maintaining their health.

Herbal-based complementary medicine is widely used by the public and attracts the attention of researchers because several plants show glucose-lowering activity in both preclinical and clinical studies. Two plants that are often studied and traditionally used in Southeast Asia are bay leaves (*Syzygium polyanthum*) and ginger (*Zingiber officinale*) (Irmawati et al., 2022; Luthfiani & Setyowati, 2023). Initial evidence from in vitro studies, experimental animals, and several clinical trials shows potential anti-hyperglycemic effects and mechanisms involving antioxidant activity, increased insulin sensitivity, inhibition of carbohydrate digestive enzymes, and modulation of glucose metabolism (Adi et al., 2023; Dewi, 2025; Nasution, 2022; Novira & Febrina, 2018; Setiawan et al., 2025; Yohana & Dewi, 2024). However, the quality of evidence, heterogeneity of studies, and methodological limitations mean that the results still need to be reviewed more systematically.

As public interest in herbal therapy as a complement to conventional treatment increases, it is important to conduct a comprehensive literature review to summarize existing evidence regarding the potential, mechanism of action, preparations, and clinical evidence for the use of bay leaves and ginger in the context of glycemic control. This review will help researchers, practitioners, and policy makers determine the feasibility of further research or evidence-based practice recommendations.

2. Literature Review

Diabetes Mellitus

Diabetes Mellitus (DM) is a serious chronic condition that occurs when the body cannot produce enough insulin or cannot use insulin effectively, leading to high blood glucose levels (hyperglycemia). Diabetes Mellitus is classified into several types, including Type 1 Diabetes Mellitus (T1DM), Type 2 Diabetes Mellitus (T2DM), Gestational Diabetes Mellitus (GDM), and other types of Diabetes Mellitus. T1DM is a type of diabetes caused by autoimmune factors and beta-cell destruction (genetic). T1DM is most common in children and young adults who require insulin to survive. T2DM accounts for the majority (more than 90%) of diabetes cases worldwide. T2DM occurs due to insulin resistance and beta-cell dysfunction. T2DM usually affects adults (often over 40 years of age), but cases are currently increasing among adolescents. GDM is diabetes mellitus experienced by pregnant women (2nd-3rd trimester) and carries a higher risk of delivery complications and the birth of babies with large birth weight (macrosomia). GDM occurs due to impaired glucose tolerance caused by pregnancy hormones (IDF, 2025; Septiani, Mardhotillah, & Tanuwijawa, 2025).

Other types of Diabetes Mellitus are related to causes other than the types mentioned previously. Other types of DM are caused by monogenic diabetes syndromes (neonatal diabetes, MODY), pancreatic endocrine diseases (cystic fibrosis, pancreatitis), and drugs or chemicals (for example, the use of glucocorticoids in HIV/AIDS therapy or after organ transplantation) (PERKENI, 2024). T1DM can be treated with insulin therapy, while T2DM can be improved by adopting a healthy lifestyle, consuming oral medication, and insulin if necessary. For GDM treatment, the therapy is almost the same as the previous types of DM, namely with the correct diet, regular exercise, and insulin therapy if necessary (Septiani, Mardhotillah, & Tanuwijawa, 2025).

Various complaints can be found in DM sufferers. A person can be suspected of suffering from DM if they experience complaints such as polyuria (frequent urination), polydipsia (excessive thirst), polyphagia (frequent hunger), and unexplained weight loss. Other common complaints include frequent tiredness and weakness, tingling, itching, blurred vision, and erectile dysfunction in men, as well as *pruritus vulvae* in women (Alfaqih, Anugerah, & Khayudin, 2022). To confirm that a person has DM, several blood glucose level tests can be performed. A person is diagnosed with DM if the test value for HbA1c ≥6,5%, Fasting Blood Glucose (GDP) ≥126 mg/dL, Random Blood Glucose (GDS) and 2-Hour Postprandial Blood Glucose(GD2PP) ≥200 mg/dL (ADA, 2022).

DM sufferers must receive appropriate management to improve quality of life, eliminate complaints, reduce the risk of acute complications, prevent or inhibit the progression of microangiopathy and macroangiopathy complications, and reduce morbidity and mortality due to DM. The steps for DM management generally start with reviewing the patient's history, conducting a physical examination, and laboratory evaluation. DM sufferers also need to receive health education about a healthy lifestyle, medical nutrition therapy (explanation of the importance of regular meal schedules, types, and amounts of food, especially for sufferers

who use blood glucose lowering drugs and insulin), and physical exercise (the time and type of physical exercise are adjusted to the ability and age of each patient or according to the doctor's instructions) (Alfaqih, Anugerah, & Khayudin, 2022). A combination of lifestyle approaches, medication, and monitoring is key in the management of all types of DM (Septiani, Mardhotillah, & Tanuwijawa, 2025).

Herbal-Based Complementary Therapy

Complementary therapy is a method of disease treatment used as a complement to conventional medical treatment or as an alternative treatment outside of conventional treatment (Anggraini, et al., 2024). The goal of complementary therapy is to improve the function of the body's systems, especially the immune system and body defenses, so that the body can self-heal when it is sick (Tasalim & Astuti, 2021). Complementary therapy is divided into several types, including nutritional therapy, herbal therapy, psycho-somatic therapy, and spiritual therapy based on prayer (Noorbaya & Mayangsari, 2024).

For DM, herbal-based complementary therapy is widely used by sufferers because of its hypoglycemic potential and other metabolic effects. Two herbs frequently used in the Southeast Asian region are bay leaves (*Syzygium polyanthum*) and ginger (*Zingiber officinale*) (Irmawati et al., 2022; Luthfiani & Setyowati, 2023).

Bay Leaves (Syzygium polyanthum)

Syzygium polyanthum (known as bay leaf in Indonesia) is widely used as a spice and herbal remedy in traditional medicine in Southeast Asia, including for digestive problems and metabolic complaints. Several ethnopharmacological studies report its traditional use to help regulate blood sugar (Hairani et al., 2023). Phytochemical analysis shows the presence of flavonoids, phenolics, saponins, tannins, and triterpenoids which are hypothesized to play a role in antioxidant and anti-hyperglycemic activity. These compounds may contribute to the inhibition of carbohydrate digestive enzymes (α-glucosidase/α-amylase), increased insulin sensitivity, and protection of pancreatic β-cells (Syabana et al., 2022).

Ginger (Zingiber officinale)

Ginger has long been used as a spice and traditional medicine (anti-inflammatory, antiemetic, digestive). The main bioactive components include gingerols, shogaols, paradols, and zingerone, which have antioxidant, anti-inflammatory, and metabolic effects. According to reports, ginger's mechanism of action includes increasing insulin sensitivity, stimulating insulin signal transduction, inhibiting carbohydrate-breaking enzymes, and anti-inflammatory/antioxidant effects that protect β-cells. Meta-analyses and systematic reviews mention that ginger can affect FBG and HbA1c in some T2DM populations (Zhu et al., 2018).

3. Proposed Method

This research uses a literature review method, which is a systematic approach to identify, evaluate, and synthesize relevant research findings regarding the potential of herbal-based complementary therapy using bay leaves (*Syzygium polyanthum*) and ginger (*Zingiber officinale*) in lowering blood glucose levels in DM patients. The main goal of this literature review is to summarize existing scientific evidence, identify research gaps, and provide a strong theoretical basis for clinical practice and further research. This literature review is narrative with a descriptive-analytical approach, where the reviewed research findings will be critically analyzed and compared to identify patterns and draw conclusions (Drayton et al., 2022).

The inclusion criteria used in the selection of articles for review include: (1) articles in Indonesian or English, (2) articles published in the last 10 years (2015-2025), (3) In vitro, animal, or human studies evaluating the effect of bay leaves/ginger on blood glucose levels in DM patients, (4) publications in the form of scientific journals that have gone through a peer-review process, and (5) articles published in Reputable International Journals or Accredited National Journals. Meanwhile, the exclusion criteria include articles that (1) only discuss T1DM or T2DM, (2) only discuss general antioxidants without glucose parameters, (3) articles without full access, and (4) non-scientific publications such as opinions, blogs, and newsletters.

Searches were conducted online using trusted scientific databases such as PubMed, ScienceDirect, Google Scholar, and ProQuest. The keywords used in the search included: "diabetes mellitus", "complementary therapy", "bay leaves", "ginger", "*Syzygium polyanthum*",

and "*Zingiber officinale*". Searches were performed using Boolean operators (AND, OR) to combine keywords effectively. Each article found was selected through the stages of title identification, abstract review, and evaluation of the relevant full text. The selected articles were then analyzed using data extraction techniques, where important information such as the researcher's name, year of publication, type of herb used, research subject, research design, preparation, potential, mechanism of action or research results, and clinical evidence were recorded in a synthesis table.

The results of this analysis were used to compile a systematic narrative regarding the potential of herbal-based complementary therapy using bay leaves (*Syzygium polyanthum*) and ginger (*Zingiber officinale*) in lowering blood glucose levels in DM patients. To ensure validity, only articles from Reputable International Journals or Accredited National Journals that had gone through a peer-review process were used. However, there are still limitations, such as differences in research design and subjects, dosage forms, and the lack of specific studies discussing further clinical evidence on the safe dose of bay leaf and ginger consumption for DM patients. The following is a flowchart using *Preffered Reporting Items for Systematic Review and Meta-analyses* (PRISMA):

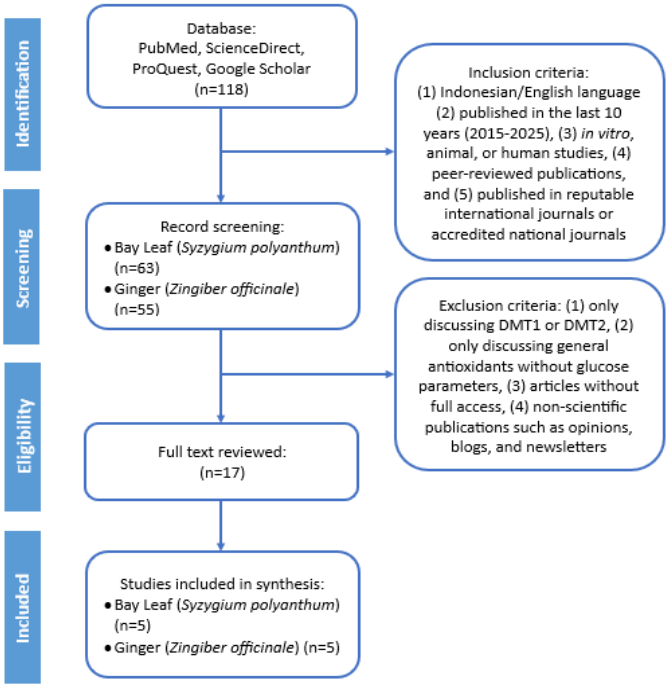

Figure 1. *Flowchart with* PRISMA.

4. Results and Discussion

Following are the results of the literature review regarding the potential of herbal-based complementary therapy using bay leaves (*Syzygium polyanthum*) and ginger (*Zingiber officinale*) in lowering blood glucose levels in DM patients:

Table 1. Literature Review of The Potential of Complementary Therapy Using Bay Leaves (*Syzygium polyanthum*) and Ginger (*Zingiber officinale*) in Lowering Blood Glucose Levels in Patients with Diabetes Mellitus

No.	Researcher Name, Publication Year	Herbal Type	Design – Research Subject	Preparation	Potential	Mechanism of Action / Research Results	Clinical Evidence
1	(Widodo et al., 2024)	Bay Leaves (*Syzygium polyanthum*)	Preclinical (experimental design) – in vitro & animal	Ethanolic extract	Shows blood-glucose lowering activity, suggested antioxidant and	Ethanolic extract testing in animal models, phytochemical screening, acute oral	No RCTs in this paper; preclinical only

No.	Researcher Name, Publication Year	Herbal Type	Design – Research Subject	Preparation	Potential	Mechanism of Action / Research Results	Clinical Evidence
					enzyme-modulating effects	toxicity/ Combined ethanolic extract of S. polyanthum showed significant reduction in blood glucose in diabetic rats	
2	(Widyawati et al., 2022)	Bay Leaves (*Syzygium polyanthum*)	Preclinical (experimental design) - bioactivity guided fractionation, diabetic animal	Methanol extract	Identified active fractions with hypoglycemic effects, squalene noted as major compound in earlier work	Fractionation of methanol extract; testing fractions in diabetic animal models/ Specific fractions reduced blood glucose in diabetic rats compared to controls	Preclinical only
3	(Nasution, 2022)	Bay Leaves (*Syzygium polyanthum*)	Preclinical (experimental design) – animal	Ethanolic extract	Ethanolic extract of bay leaves has the potential to lower blood glucose levels in male white rats induced with glucose	Ethanolic extract of bay leaves was given to 15 male white rats divided into 4 groups with different doses/ Ethanolic extract of bay leaves at a dose of 150 mg/kgBW was more effective in lowering rat blood glucose levels compared to doses of 50 mg/kgBW and 100 mg/kgBB	Preclinical only
4	(Syabana et al., 2022)	Bay Leaves (*Syzygium polyanthum*)	Preclinical (experimental design) – in vitro & isolation	The dried leaves of S. polyanthum extract (isolated compounds inhibit α-glucosidase enzyme)	Showed α-glucosidase inhibitory activity supporting a mechanism for postprandial glucose control	The dried leaves of S. polyanthum were extracted by a comprehensive extraction method using a solvent combination of n-hexane, acetone, and water in a	Preclinical only

No.	Researcher Name, Publication Year	Herbal Type	Design – Research Subject	Preparation	Potential	Mechanism of Action / Research Results	Clinical Evidence
						gradient, resulting in a total of 42 fractions. All fractions were subjected to an in vitro α-glucosidase inhibition test and chemical profile analysis using Nuclear Magnetic Resonance (NMR) and high performance liquid chromatography (HPLC)/ Isolated compounds from S. polyanthum showed α-glucosidase inhibitory activity supporting a mechanism for postprandial glucose control	
5	(Safitri et al., 2024)	Bay Leaves (*Syzygium polyanthum*)	Clinical (experimental design) – human (T2DM patients)	Bay leaves decoction	Lowers blood glucose levels in T2DM patients	The sample was divided into 2 groups, namely 15 experiment people (given bay leaf decoction) and 15 control people whose blood glucose levels were measured every day for 6 days/ There was an effect of bay leaf decoction on the reduction of blood glucose levels in T2DM patients	No RCTs in this paper; clinical only

No.	Researcher Name, Publication Year	Herbal Type	Design – Research Subject	Preparation	Potential	Mechanism of Action / Research Results	Clinical Evidence
6	(Schumacher, et al., 2024)	Ginger (*Zingiber officinale*)	Systematic review & meta-analysis – human (T2DM patients)	Oral ginger supplements (powder/ capsule/ extract)	Reductions in fasting blood glucose and HbA1c among patients with type 2 diabetes	Pooled RCTs comparing ginger supplements to control; subgroup analyses by dose/duration/ Meta-analysis of randomized controlled trials found that ginger supplementation was associated with reductions in fasting blood glucose and HbA1c among patients with type 2 diabetes	Meta-analysis of RCTs
7	(Zhu et al., 2018)	Ginger (*Zingiber officinale*)	Literature review – human (T2DM patients)	Ginger	Supports metabolic benefits of ginger including glycemic control	Review of clinical and preclinical studies on ginger and metabolic outcomes/ Evidence for beneficial effects on blood glucose and some metabolic markers, heterogeneity across studies	Several small RCTs; more high-quality trials recommended
8	(Luthfiani & Setyowati, 2023)	Ginger (*Zingiber officinale*)	Clinical (experimental design) – human (elderly DM patients)	Red ginger brew	Lowers random blood sugar levels in diabetes mellitus patients	Health education and red ginger brew given over 7 visits to the home. RBS examination before (pretest) and after (posttest) namely giving health education and red ginger brew/ Giving health education and red ginger brew	Clinical only

No.	Researcher Name, Publication Year	Herbal Type	Design – Research Subject	Preparation	Potential	Mechanism of Action / Research Results	Clinical Evidence
						can lower random blood sugar levels in diabetes mellitus patients	
9	(Astuti et al., 2022)	Ginger (*Zingiber officinale*)	Clinical (pre experimental design) – human (DM patients)	Ginger decoction	Reduction in blood glucose levels due to an increase in metabolism caused by the active phenolic substance in ginger	Ginger decoction was given to 6 respondents, the average glucose level of respondents before the intervention was 287,7 mg/dl after the intervention was 244,7 mg/dl, with an average decrease of 63 mg/dl/ Drinking ginger decoction can be an implementation to lower blood sugar levels in diabetes mellitus patients	Clinical only
10	(Setiawan et al., 2025)	Ginger (*Zingiber officinale*)	Preclinical (experimental design) – diabetic animal	Ginger rhizome extract	Shows a protective effect against histopathological damage to the Islets of Langerhans	The research was conducted on 30 male Wistar strain rats divided into 5 groups: negative control (K-), positive control (K+), ginger extract treatment 100 mg (P1), ginger extract treatment 200 mg (P2), and positive control metformin (P3). Hyperglycemia was induced with STZ-NA, then treated	Preclinical only

No.	Researcher Name, Publication Year	Herbal Type	Design – Research Subject	Preparation	Potential	Mechanism of Action / Research Results	Clinical Evidence
						for 21 days. Blood sugar levels were measured using the GOD-PAP method/ Melatonin-rich ginger rhizome extract has a protective effect against histopathological damage to the Islets of Langerhans in hyperglycemic model rats, with the 200 mg dose showing the best effectiveness with a mean Allred score of 4.8, even better than metformin as a positive control	

The synthesis results from ten studies indicate that bay leaves and ginger have significant potential as complementary therapy in the management of DM. Both herbs provide a hypoglycemic effect through various biochemical mechanisms that have been proven both preclinically (in vitro and animal) and clinically (in humans).

Anti-hyperglycemic activity of Bay Leaves (*Syzygium polyanthum*)

Most research on bay leaves is still at the preclinical trial stage. Studies by Widodo et al. (2024), Widyawati et al. (2022), and Nasution (2022) showed that ethanolic and methanolic extracts of bay leaves were able to significantly lower blood glucose levels in diabetic animal models. This effect is associated with antioxidant activity and inhibition of the α-glukosidase enzyme, which plays a role in reducing postprandial glucose absorption.

The study by Syabana et al. (2022) strengthens this mechanism with evidence that isolated compounds from bay leaves inhibit α-glukosidase activity in vitro, supporting the role of bay leaves in postprandial glucose control. This mechanism is similar to the action of antidiabetic drugs in the acarbose group, but comes from a natural source.

One clinical study by Safitri et al. (2024) showed that consuming bay leaf decoction for six days could lower blood glucose levels in T2DM patients, indicating the transition of preclinical results to clinical evidence. However, this study still has limitations because it did not use a randomized controlled trial (RCT) design, so the clinical evidence is preliminary and requires further trials with stronger experimental designs.

Anti-hyperglycemic activity of Ginger (Zingiber officinale)

Research on ginger shows a higher level of evidence compared to bay leaves, with the existence of RCT meta-analyses. The study by Schumacher et al. (2024) reported that ginger supplementation significantly lowered fasting blood glucose and HbA1c levels in T2DM patients. This effect was confirmed by Zhu et al. (2018) who found that ginger has metabolic benefits including in glucose control and insulin resistance, although there is still heterogeneity between studies.

Clinical studies in Indonesia, such as those by Luthfiani & Setyowati (2023) and Astuti et al. (2022), reinforce local evidence that ginger brew or decoction can lower random blood sugar levels in diabetes patients. This hypoglycemic effect is thought to originate from active phenolic compounds such as gingerol and shogaol which increase insulin sensitivity and improve glucose metabolism.

In addition, the study by Setiawan et al. (2025) on experimental animals showed that ginger rhizome extract provided a protective effect against histopathological damage to the Islets of Langerhans, indicating that ginger not only lowers glucose but also protects pancreatic β-cells from oxidative stress.

Comparative Analysis and Clinical Implications

Overall, bay leaves show great potential but are mostly limited to preclinical evidence, while ginger has reached the level of clinical evidence and RCT meta-analysis. This indicates that ginger is more ready to be implemented as evidence-based complementary phytotherapy, while bay leaves still require controlled clinical testing to verify their safety and effectiveness in humans.

Both herbs have complementary mechanisms of action, namely: (a) Bay Leaves: inhibits the α-glukosidase enzyme and acts as an antioxidant. (b) Ginger: increases insulin sensitivity, accelerates glucose metabolism, and protects pancreatic cells.

The combination of the two has the potential to provide a synergistic effect in lowering blood glucose levels and reducing oxidative stress, which could form the basis for the development of a combination herbal tea preparation of bay leaves and ginger as complementary therapy for T2DM.

Limitations and Recommendations

The main limitation in bay leaf research is the lack of clinical trials with an RCT design and adequate sample size. Meanwhile, in ginger research, differences in dose, dosage form, and intervention duration cause variations in results between studies.

Therefore, further research needs to be directed at: (a) Standardization of doses and preparations of bay leaf and ginger extract. (b) Controlled clinical trials for the combination of the two. (c) Long-term toxicity studies and interactions with conventional antidiabetic drugs.

5. Conclusion

Based on the synthesis of research results, bay leaves (*Syzygium polyanthum*) and ginger (*Zingiber officinale*) have significant potential as complementary therapy in the management of DM. Bay leaves are proven to have hypoglycemic activity through the mechanism of α-glukosidase enzyme inhibition and antioxidant effects, which play a role in lowering postprandial blood glucose levels and protecting pancreatic β-cells from oxidative stress.

However, most of the evidence is still limited to the preclinical stage (*in vitro* and animal), so its effectiveness in humans needs to be further validated through large-scale clinical trials with a randomized controlled design (RCT). Meanwhile, ginger shows a stronger level of scientific evidence, with various clinical trials and RCT meta-analyses consistently reporting a reduction in fasting blood glucose and HbA1c levels in T2DM patients. Active compounds such as gingerol, shogaol, and zingerone play a role in increasing insulin sensitivity, improving glucose metabolism, and providing a protective effect on pancreatic cells.

Overall, these two plants can be an alternative herbal-based complementary therapy that is safe, natural, and potentially synergistic in lowering blood glucose levels and improving the metabolic function of DM patients.

References

ADA. (2022). American Diabetes Association Professional Practice Committee, 2. Classification and diagnosis of diabetes: Standards of medical care in diabetes - 2022. *Diabetes Care, 45*(Suppl 1), S17–S38. https://doi.org/10.2337/dc22-S002

Adi, G. S., Pratiwi, E., & Permanasari, P. (2023). Efektivitas jahe merah sebagai kontrol gula darah lansia di wilayah Puskesmas Tegalrejo. *Jurnal Pengabdian Kesehatan, 6*(4), 315–322.

Alfaqih, M., Anugerah, A., & Khayudin, B. (2022). *Manajemen penatalaksanaan diabetes mellitus*. Bojonegoro: 2022.

Anggraini, N., Riskika, S., Ayu, N., Sibulo, M., Mardiana, Hamka, & Mas'ud, A. (2024). *Keperawatan Komplementer*. Yogyakarta: Rizmedia Pustaka Indonesia.

Astuti, Y., Fandizal, M., & Khairani. (2022). Pengaruh pemberian air rebusan jahe terhadap penurunan kadar gula darah pada penderita diabetes mellitus di Kelurahan Cililitan Tahun 2021. *Jurnal Medika Hutama, 3*(2), 2053–2057 (5). https://doi.org/10.57213/nurse.v5i2.119

Dewi, A. (2025). Efektivitas rebusan daun salam terhadap penurunan kadar gula darah pada pasien diabetes melitus: Literature review. *1*(2), 76–84.

Drayton, D. J., Birch, R. J., D'Souza-Ferrer, C., Ayres, M., Howell, S. J., & Ajjan, R. A. (2022). Diabetes mellitus and perioperative outcomes: A scoping review of the literature. *British Journal of Anaesthesia, 128*(5), 817–828. https://doi.org/10.1016/j.bja.2022.02.013

Hairani, M. A. S., Abdul Majid, F. A., Zakaria, N. H., Hudiyanti, D., Fadhlina, A., & Sheikh, H. I. (2023). Anti-diabetic properties of traditional herbal concoction containing *Eleutherine palmifolia* (L.) Merr., *Momordica charantia* L., and *Syzygium polyanthum* (Wight.): A bibliometric analysis. *Food Production, Processing and Nutrition, 5*(1), 1–24. https://doi.org/10.1186/s43014-023-00172-x

IDF. (2025). *IDF Diabetes Atlas 11th Edition* (11th ed.). International Diabetes Federation. https://doi.org/10.1111/1753-0407.12644

Irmawati, N. E., Indarti, D., Komsiyah, K., & Marahayu, M. (2022). Pengaruh penerapan rebusan daun salam terhadap kadar gula darah pada penderita diabetes mellitus tipe 2 di Desa Kopek Kecamatan Godong Kabupaten Grobogan. *JIIP - Jurnal Ilmiah Ilmu Pendidikan, 5*(6), 1945–1955. https://doi.org/10.54371/jiip.v5i6.657

Luthfiani, F., & Setyowati, D. (2023). Penerapan intervensi pemberian jahe merah terhadap kadar glikemik indeks pada lansia dengan diabetes mellitus. *Ners Muda, 4*(3), 257–264. https://doi.org/10.26714/nm.v4i3.10603

Nasution, P. R. (2022). Uji efektivitas ekstrak etanol daun salam (*Syzygium polyanthum*) terhadap kadar glukosa darah pada tikus putih jantan yang diinduksi glukosa. *Jurnal Sains Medisina, 1*(2), 62–69. https://doi.org/10.63004/snsmed.v1i2.147

Noorbaya, S., & Mayangsari, R. (2024). *Buku Ajar Asuhan Kebidanan Komplementer Neonatus, Bayi, Balita, dan Anak Prasekolah*. Banyumas: CV Pena Persada.

Novira, P. P., & Febrina, E. (2018). Review artikel: Tinjauan aktivitas farmakologi ekstrak daun salam (*Syzygium polyanthum* (Wight.) Walp). *Farmaka, 6*(2), 288–297.

PERKENI. (2024). *Pedoman Pengelolaan Dan Pencegahan Diabetes Melitus Tipe 2 Di Indonesia 2024*. Perkumpulan Endokrinologi Indonesia.

Safitri, S. W., Frana, I., Kk, J., Herawati, D., Studi, P., Keperawatan, I., Kader, U., Palembang, B., & Serikat, A. (2024). Pengaruh rebusan daun salam (*Syzygium polyanthum*) terhadap kadar glukosa darah pada pasien diabetes mellitus tipe II. *Babul Ilmi Jurnal Ilmiah Multi Science Kesehatan, 16*(1), 152–164. https://doi.org/10.36729/bi.v16i1.1215

Schumacher, J. C., Mueller, V., Sousa, C., Peres, K. K., Mata, I. R., Menezes, R. C., & Bosco, S. M. (2024). The effect of oral supplementation of ginger on glycemic control of patients with type 2 diabetes mellitus - A systematic review and meta-analysis. *Clinical Nutrition ESPEN, 63*, 615–622. https://doi.org/10.1016/j.clnesp.2024.07.011

Septiani, B., Mardhotillah, H., & Tanuwijawa, R. (2025). *Buku Ajar Dietetik Penyakit Tidak Menular*. Jakarta Barat: PT Nuansa Fajar Cemerlang.

Setiawan, B. B., Tursinawati, Y., Widianingrum, R., & Rahmatullah, D. E. (2025). Analisis pengaruh pemberian ekstrak rimpang jahe (*Zingiber officinale* Rosc.) terhadap gambaran histolopatologi islet pankreas pada tikus wistar model hiperglikemia: Sebuah studi preklinis. *Jurnal Sosial Dan Sains (SOSAINS), 5*(9), 7199–7211. https://doi.org/10.59188/jurnalsosains.v5i9.32500

SKI. (2023). *Laporan SKI 2023 Dalam Angka*. In BKPK Kemenkes.

Syabana, M. A., & et al. (2022). α-glucosidase inhibitors from *Syzygium polyanthum* (Wight) Walp leaves as revealed by metabolomics and in silico approaches. *Journal of Ethnopharmacology, 282*. https://doi.org/10.1016/j.jep.2021.114618

Tasalim, N., & Astuti, N. (2021). *Terapi Komplementer*. Bojonegoro: Guepedia.

WHO. (2019). *WHO Global Report on Traditional and Complementary Medicine 2019*. America: World Health Organization.

WHO. (2024, November 14). Diabetes (Fact Sheet). Retrieved from World Health Organization: https://www.who.int/news-room/fact-sheets/detail/diabetes

Widodo, A., Sulastri, E., Ihwan, I., Cahyadi, M. H., Maulana, S., & Zubair, M. S. (2024). Antidiabetic activity, phytochemical analysis, and acute oral toxicity test of combined ethanolic extract of *Syzygium polyanthum* and *Muntingia calabura* leaves. *Scientific World Journal, 2024*. https://doi.org/10.1155/2024/3607396

Widyawati, T., Yusoff, N. A., Bello, I., Asmawi, M. Z., & Ahmad, M. (2022). Bioactivity-guided fractionation and identification of antidiabetic compound of *Syzygium polyanthum* (Wight.)'s leaves extract in streptozotocin-induced diabetic rat model. *Molecules, 27*(20), 1–15. https://doi.org/10.3390/molecules27206814

Yohana, I. R., & Dewi, W. M. (2024). Manfaat jahe (*Zingiber officinale* Roscoe) untuk menurunkan kadar gula darah pada penyakit diabetes melitus tipe 2. *Watson Journal of Nursing, 2*(2), 51–65.

Zhu, J., Chen, H., Song, Z., Wang, X., & Sun, Z. (2018). Effects of ginger (*Zingiber officinale* Roscoe) on type 2 diabetes mellitus and components of the metabolic syndrome: A systematic review and meta-analysis of randomized controlled trials. *Evidence-Based Complementary and Alternative Medicine, 2018*. https://doi.org/10.1155/2018/5692962