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The Effect of Stevia Consumption on Glycemic Control in Elderly Patients with Diabetes: A Literature Review

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Abstract

Diabetes mellitus (DM) represents a significant health challenge among elderly populations, characterized by chronic hyperglycemia requiring strict dietary management. Stevia rebaudiana Bertoni, a natural low-calorie sweetener, has emerged as a promising therapeutic adjunct for diabetes management. This study aimed to evaluate the effects of stevia consumption on glycemic control in elderly patients with diabetes mellitus through comprehensive literature synthesis. A literature review was conducted across multiple scientific databases (Emerald Insight, ProQuest, PubMed, ScienceDirect, EBSCO, and Google Scholar) covering publications from 2015-2025. Initial screening of 312 articles yielded 6 studies meeting inclusion criteria, focusing specifically on stevia utilization as a sugar substitute for elderly diabetic patients. Analysis revealed that stevia demonstrates superior glycemic control properties compared to conventional sweeteners, with sweetness intensity 100-300 times greater than sucrose while maintaining zero caloric content. Stevia represents an effective and safe natural sweetener alternative for elderly patients with diabetes mellitus. Its hypoglycemic properties, antioxidant effects, and absence of adverse effects position it as a valuable therapeutic tool for diabetes management. The findings support stevia's potential development as a nutraceutical supplement and its integration into dietary recommendations for elderly diabetic populations, contributing to improved quality of life and enhanced glycemic control.

Keywords Diabetes Mellitus; Elderly; Hypoglycemia; Natural Sweetener; Stevia

1. INTRODUCTION

Diabetes mellitus (DM), commonly referred to as diabetes, is a disease caused by metabolic disorders resulting from insulin resistance or insulin deficiency in the pancreas. The primary clinical manifestation of DM is elevated blood glucose levels/hyperglycemia (Dewi & Yustiantara, 2023). Efforts to prevent and manage DM include education, early detection of risk factors, and appropriate management according to established standards (Wijayanti et al., 2022). Patients with DM are required to control blood glucose levels by maintaining dietary patterns to ensure optimal glycemic control (Nurrahman et al., 2024).

Sugar derived from sugarcane is commonly used as a sweetener in beverages and foods in daily life. Excessive sugar consumption over prolonged periods can lead to weight gain and elevated blood glucose levels. Such increases in blood glucose may predispose individuals to DM risk. Therefore, sugar substitute sweeteners are needed to reduce health risks while satisfying the desire for sweet taste (Hafidz et al., 2024).

Elderly individuals are defined as persons who have reached 60 years of age and above (UU RI No 13 Tahun, 1998). With advancing age, the likelihood of experiencing physical, psychological, spiritual, economic, and social problems increases. One of the most fundamental problems in elderly populations is health issues resulting from degenerative processes, as demonstrated by disease pattern data in the elderly (Permenkes RI, 2016). Elderly individuals often face complex health challenges, particularly related to insufficient physical activity and limited coping abilities. One of the primary problems that emerges is elevated blood glucose levels (Abidin et al., 2025). Diabetes prevention and management efforts must be strengthened through comprehensive health education, dietary modifications, and promotion of healthy lifestyles (Hafidz et al., 2024). Elderly individuals with DM who are following sugar-restricted diets require synthetic sweeteners as sugar substitutes (Cahyaningtyas et al., 2025).

Stevia is an emerging plant that has gained tremendous popularity among all types of sweeteners as the most ideal sugar substitute (Gusnawati & Hutapea, 2024). Its extremely low caloric content can help diabetes patients better control their blood glucose levels (Hafidz et al., 2024). Stevia leaves possess hypoglycemic properties that can reduce blood glucose levels in DM patients (Nurrahman et al., 2024). The advantages of stevia include low caloric content, sweetness 100-300 times that of sugarcane, obesity prevention, absence of dental caries, blood pressure reduction capability, and non-carcinogenic properties (Cahyaningtyas et al., 2025). The use of

stevia-derived sweeteners is expected to increase in the future, corresponding to the growing number of obesity and DM patients, as well as increasing public interest in natural products (Wijayanti et al., 2022).

Despite the promising potential of stevia as a natural sweetener for diabetes management, comprehensive evidence regarding its specific effects on glycemic control in elderly populations remains limited and fragmented across various studies. Previous research has primarily focused on general populations or specific age groups, with insufficient synthesis of evidence specifically addressing the elderly demographic who represent a particularly vulnerable population requiring tailored diabetes management strategies. Furthermore, the lack of literature evaluation of stevia's safety profile and therapeutic efficacy in elderly patients with diabetes creates a significant knowledge gap that hinders evidence-based clinical recommendations. Therefore, this study aimed to conduct a literature review to evaluate the effects of stevia consumption on glycemic control in elderly patients with diabetes mellitus.

2. METHODS

This study employed a literature review methodology to systematically examine the available evidence regarding stevia consumption and glycemic control in elderly patients with diabetes mellitus. The selection of relevant literature was conducted using predetermined eligibility criteria to ensure methodological rigor and relevance to the research objectives. Articles and journals were selected based on three primary inclusion criteria: (a) temporal relevance, requiring publications within the timeframe of 2015 to 2025 to capture contemporary research findings and current understanding of the topic; (b) accessibility criterion, necessitating the availability of complete full-text articles to enable comprehensive analysis and data extraction; and (c) linguistic accessibility, including studies published in both English and Indonesian languages to encompass a broader range of research perspectives and findings. Following the application of these inclusion criteria during the database searches, qualifying articles were identified through the specific search terms including "glucose," "stevia," "elderly," and "diabetes mellitus." The literature search was conducted across multiple established scientific databases to ensure comprehensive coverage of available research. The selected databases included Emerald Insight, ProQuest, PubMed, ScienceDirect, EBSCO, and Google Scholar. This multi-database approach was implemented to capture diverse academic sources and minimize the risk of overlooking relevant studies across different scientific platforms and publishing venues.

The literature search strategy was executed using predetermined keywords that aligned with the established inclusion criteria. Search terms were consistently applied across all selected databases to maintain methodological uniformity and ensure reproducible results. The search methodology focused on identifying studies that specifically addressed the relationship between stevia consumption and glycemic control within the context of elderly populations and diabetes mellitus management.

The comprehensive database search yielded a substantial volume of potentially relevant literature. The initial search results demonstrated the following distribution across databases: Emerald Insight contributed 1 article, ProQuest yielded 101 articles, PubMed provided 3 articles, ScienceDirect generated 65 articles, EBSCO produced 42 articles, and Google Scholar contributed 100 articles. This comprehensive search strategy resulted in a total collection of 312 articles for potential inclusion in the review. The screening process was implemented through two-stage approach. Initially, a preliminary screening phase was conducted by a single researcher, focusing on title evaluation to exclude studies that demonstrated clear misalignment with the research objectives and study focus. Subsequently, a secondary screening phase was performed to identify and eliminate articles addressing identical or substantially similar themes, thereby preventing duplication and ensuring the uniqueness of included studies.

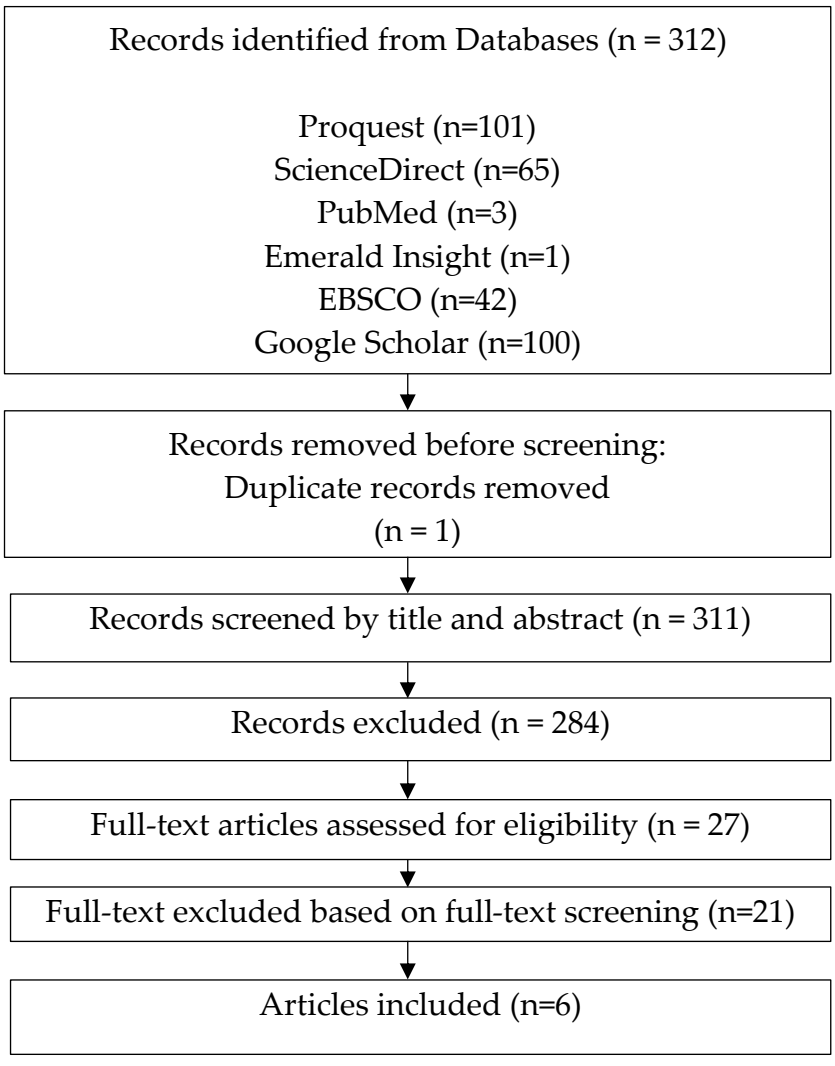

Figure 1. Literatur Review

2.1.Data Analysis and Final Study Selection

Following the comprehensive screening process, a limited number of articles were identified that specifically addressed the study theme and research objectives with appropriate depth and relevance. The rigorous screening and selection methodology ultimately resulted in the identification of 6 articles that met all inclusion criteria and demonstrated sufficient quality and relevance for detailed analysis and synthesis within the scope of this literature review.

3. FINDINGS AND DISCUSSION

Based on the comprehensive search conducted through multiple online databases, 312 articles were initially identified; however, only 6 articles were selected for further analysis due to their specific focus on the utilization of stevia as a sugar substitute for elderly patients with diabetes (Figure 1). The synthesis phase of findings from this review elucidates the utilization of stevia as a sugar substitute for elderly patients with diabetes. The articles selected for detailed analysis are presented in Table 1.

Table 1. Included Studies Characteristics

No.	Author and Year of Publication	Research Objectives	Research Methods	Findings
1.	(Christine et al., 2022)	To determine the characteristics of type 2 diabetes mellitus patients, examine blood glucose profiles following low-calorie sugar administration, and compare blood glucose elevation between sucralose and steviol glycoside	True-experimental design with pre- and post-test randomized group selection and purposive sampling	Following low-calorie sugar treatment, at 60 minutes there was an increase of 7.9, at 120 minutes levels decreased by 13.5, and at 180 minutes a reduction of 29.3 occurred. Regarding the comparison of blood glucose elevation profiles between

		products.		products, steviol glycoside elevated blood glucose levels higher (7.9) compared to other groups.
2.	(Haryani et al., 2024)	To review several articles on plants with potential for diabetes mellitus management and identify compound content in these materials, with findings expected to provide information for diabetes mellitus patients and future research development.	Literature review of articles	Herbal plants containing flavonoids offer significant potential as alternative diabetes treatments. Flavonoids, abundantly found in herbal plant leaves, demonstrate significant antidiabetic effects and represent a non-pharmacological approach.
3.	(Dewi et al., 2025).	To provide community knowledge about processing stevia leaves into alternative sweeteners.	Through local community needs analysis, education regarding stevia benefits as sugar substitute, and knowledge about appropriate daily consumption to increase community awareness about healthy dietary patterns.	Stevia, with high sugar content, represents an alternative to artificial sweeteners. Communities developed awareness of excessive sugar consumption dangers and improved skills in stevia powder production from stevia leaves.
4.	(Hafidz et al., 2024).	To increase community knowledge regarding sugar-related risks and stevia benefits in	Participatory Rural Appraisal approach	This activity was effective in educating communities about the importance of replacing sugarcane with stevia to prevent diabetes and

		blood glucose regulation		improve health.
5.	(Chupeerach et al., 2018)	To develop healthier coconut jelly formulations using stevia as natural sweetener.	Cross-over study design	Stevia use demonstrated lower sugar content, and high-fiber coconut jelly can help prevent non-communicable diseases such as diabetes mellitus.
6.	(Wijayanti et al., 2022)	Education for productive-age DM groups as elderly health post members regarding DM prevention and control efforts through dietary management, sweetener replacement in foods and beverages, and assistance in stevia cultivation and processing.	Community service	Increased community knowledge regarding DM prevention and control using stevia, with production results marketable online and providing economic benefits.

3.1.Stevia Demonstrates Low Sugar Content

The aroma, taste, appearance, and sweetness level of stevia leaves serve as fundamental parameters for determining sweetener quality. Stevia can be utilized as a sweetener without causing adverse effects, requires no chemical additives, and contains no calories. This sweetener can be incorporated into beverages, vegetables, and even soy sauce (Utami et al., 2024). The addition of stevia extract sweetening agents is expected to enhance the quality and flavor profile of resulting products, thereby increasing consumer acceptance (Herlina & Wardani, 2019). Stevia demonstrates sweetness levels 110-270 times greater than sucrose, with the advantage of being a natural sweetening agent capable of masking unpleasant medicinal tastes while remaining stable under heating temperatures up to 100℃ (Rustiani et al., 2024). ow-calorie sweeteners such as stevia sugar are safe for consumption across various age

groups, including children over 6 years, adults, and elderly individuals over 55 years (Sylvetsky & Rother, 2016). Stevia represents a natural sweetener that is safer for children, pregnant women, and elderly populations (Baits et al., 2025).

3.2.Prevention of Diabetes Mellitus

Sugarcane consumption contains higher caloric content that cannot be consumed by certain populations, particularly diabetes patients, necessitating alternative sugar sources such as stevia (Sale & Nairfana, 2024). Stevia leaf extract is utilized to enhance insulin levels and provide antihyperglycemic effects through PPARγ mechanisms while possessing antioxidant properties (Novit et al., 2021). This demonstrates stevia's capability to provide hypoglycemic action for reducing elevated blood glucose levels and insulin resistance, thereby decreasing the incidence of metabolic syndrome and diabetes (Peteliuk et al., 2021).

Prevention of high sugar consumption utilizes stevia leaves as a natural sweetener safe for DM patients due to its calorie-free composition, which does not cause blood glucose elevation upon consumption. Therefore, stevia leaf addition to beverages can serve as an alternative for type 2 DM patients (Akbar et al., 2019). Stevia can be used as a sugar substitute in home cooking and various confectionery products. Utilizing natural stevia sugar is particularly suitable for health-conscious individuals, especially those experiencing obesity and diabetes (Pramudhita, 2024).

3.3.Blood Glucose Control

Insulin hormone functions to maintain body homeostasis by controlling blood glucose levels. DM diagnosis must be established when fasting blood glucose levels ≥126 mg/dL, 2-hour post-prandial blood glucose ≥200 mg/dL accompanied by symptoms of hunger, thirst, frequent urination, and weight loss (Handayani et al., 2023). Health benefits of stevia leaves include blood glucose control, safety for diabetes patients, gastric pain relief and digestive improvement, ideal weight regulation, dental caries prevention, and oral bacterial growth inhibition (Ajami et al., 2020).

3.4.Natural Ingredients

Patients with diabetes mellitus, obesity, and individuals following sugar-restricted diets require synthetic sweeteners as sugar substitutes. However, commercially available synthetic sweeteners pose significant health hazards due to potential carcinogenic effects with long-term consumption, necessitating safer health alternatives. One alternative to synthetic sweeteners is plant-derived stevia sweeteners. Stevia sweetener advantages include non-carcinogenic properties, absence of dental caries, obesity prevention, blood pressure reduction, and low caloric content with sweetness levels 100-300 times that of sugarcane (Cahyaningtyas et al.,

2025).

Active stevia compounds demonstrating antihyperglycemic effects include steviol, rebaudioside, and stevioside. The potential for stevia-based preparation and supplement development requires further advancement as sweetener alternatives for type 2 DM patients and non-diabetic supplements from stevia-derived nutraceutical products (Dewi & Yustiantara, 2023). Stevia also contains stevioside compounds at 4-15% concentration, with stevioside demonstrating potential for treating metabolic syndrome diseases including hyperglycemia, hypertension, and dyslipidemia. Stevia possesses natural antioxidant compounds with free radical electron and superoxide scavenging capabilities, making it effective in preventing oxidation, particularly of lipid compounds (Pramukantoro, 2020).

4. CONCLUSION

The utilization of stevia as a sugar substitute for elderly patients with diabetes mellitus (DM) represents a potential solution in blood glucose management. Stevia, as a natural low-calorie sweetener, possesses hypoglycemic and antioxidant effects while avoiding adverse effects associated with synthetic sweeteners that pose carcinogenic risks. Stevia utilization can help prevent blood glucose spikes, support healthy dietary patterns, and is safe for consumption by elderly individuals, children, and pregnant women. Furthermore, stevia demonstrates potential as a foundation for nutraceutical supplements for both type 2 DM patients and non-diabetic populations. With increasing public awareness regarding healthy lifestyles and the dangers of excessive sugar consumption, stevia emerges as a safe, natural, and effective sweetener alternative that supports diabetes control and enhances quality of life for elderly populations.

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