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RESEARCH **Open Access**

Diabetes Self-Management Education on Dietary Compliance in Indonesia: A Descriptive Literature Review

Meigi Rompas[1a*], Dwi Indah Iswanti[2b], Julvainda Eka Priya Utama[2c]

[1] Master of Nursing Study Program, Faculty of Nursing and Health, Universitas Karya Husada Semarang, Semarang, Central Java, Indonesia
[2] Faculty of Nursing and Health, Universitas Karya Husada Semarang, Semarang, Central Java, Indonesia

[a] Email address: rompasmeigi@gmail.com
[b] Email address: dwi.indah.iswanti@unkaha.ac.id
[c] Email address: julvaindaeka@gmail.com

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Abstract
Diabetes Mellitus (DM) is a condition that is becoming more common worldwide, affecting both industrialized and developing countries. The objective of this study was to do a comprehensive analysis of the available literature in order to investigate the impact of Diabetes Self-Management Education (DSME) on adherence to dietary guidelines among individuals with diabetes in Indonesia. This study employed a method of descriptive literature review. Relevant keywords were used to conduct literature searches on academic databases including PubMed, Scopus, and Google Scholar. Relevant articles were picked based on specific criteria, and data were collected from them. The initial studies found from databases were 1,730 and after applied inclusion and exclusion criteria, the final studies included to this study was nine studies (2012 – 2024). The gathered data were subsequently examined through three distinct stages: data reduction, data presentation, and generating conclusions that was done by all authors. The results indicated that Diabetes Self-Management Education (DSME) programs had a notable effect on the degree of adherence to dietary guidelines in individuals with Diabetes Mellitus (DM). Patients who engaged in the DSME program exhibited greater adherence to the prescribed diet, in contrast to those who did not partake in the program.

Keywords: Diabetes, Self-Management Education, Diet Compliance.

Corresponding Author:

Meigi Rompas
Master of Nursing Study Program, Faculty of Nursing and Health, Universitas Karya Husada Semarang, Semarang, Central Java, Indonesia
Email: rompasmeigi@gmail.com

1. INTRODUCTION

Diabetes Mellitus (DM) is a disease that is increasingly common throughout the world, both in developed and developing countries. This condition shows that DM has become a significant global health problem for society at large (Arokiasamy et al., 2021; Lovic et al., 2020; Mukhtar et al., 2020). Number of diabetes sufferers worldwide in 2021 reached 537 million people. IDF projections show that this figure will continue to increase to around 643 million in 2030, and even reach 783 million in 2045. IDF also noted that Indonesia ranks fifth among countries with the largest number of diabetes sufferers, with 19.5 million sufferers in 2021 (Magliano & Boyko, 2022).

Diabetes Mellitus is a metabolic disorder characterized by increased blood glucose levels, caused by abnormalities in insulin secretion, insulin function, or both (Kumar et al., 2020; Rachdaoui, 2020). Therefore, to keep blood sugar levels under control, people with diabetes must follow five main pillars in managing their condition, namely education, diet management, physical activity, use of drugs, and self-monitoring of blood sugar levels (Ibrahim et al., 2020; Prabawati & Natalia, 2020; Soep & Agussalim, 2020). Diet in diabetes management, also known as medical nutrition therapy, aims to help individuals with diabetes improve their diet and exercise habits in order to achieve optimal metabolic control (Evert et al., 2019; Tamura et al., 2020). The basic principle of regulating diet in people with diabetes is to choose foods that are balanced and in accordance with the calorie and nutrient needs needed (Salvia & Quatromoni, 2023).

Education is an integral part of efforts to promote a healthy lifestyle that must continue to be carried out. In the management of diabetes mellitus, education plays a key role in efforts to prevent and holistically manage this disease (Lambrinou et al., 2019; Świątoniowska et al., 2019). This includes knowledge about healthy eating patterns, proper physical activity patterns, regularity in taking oral diabetes medication (OAD) or insulin, and good foot care (Mirahmadizadeh et al., 2020). The effectiveness of efforts to prevent complications is highly dependent on the level of knowledge of individuals with diabetes about their condition (Nazir et al., 2018). This knowledge can be influenced by various factors, such as age, education level, type of work, personal experience, access to information, and social, cultural, and economic factors (Hill-Briggs et al., 2021).

This educational effort can be done, one of which is through Diabetes Self-Management Education (DSME). DSME is a process that provides knowledge to individuals with diabetes mellitus (DM) regarding self-care strategies to improve metabolic control, prevent complications, and improve their quality of life (Ernawati et al., 2021). The main goal of DSME is to assist individuals in making decisions regarding self-care, improving health behaviors, resolving problems related to their condition, and actively collaborating with the health team to improve clinical outcomes, health status, and quality of life (Kolb, 2021). However, based on the background description, researchers are interested in conducting research on diabetes self-management education on dietary compliance. There are existing studies related to DSME such as the study in China, Ethiopia, and India (Hailu et al., 2019; Srinath et al., 2017; Zheng et al., 2019). The findings from those three studies revealed that diabetes mellitus with self-management education found effective to reduce the morbidity among DM patients. These findings can contribute to a theoretical understanding of the effectiveness of educational interventions in the context of chronic disease management, such as diabetes. In addition, this study can also encourage the development of more comprehensive theories and models in describing the relationship between education, compliance, and health outcomes. The purpose of this study was to conduct a descriptive literature review of the existing literature to evaluate the effect of Diabetes Self-Management Education (DSME) on dietary compliance in people with diabetes in Indonesia.

2. RESEARCH METHOD

This study uses a descriptive literature review method. The review method is a research method that involves a series of systematic processes, to collect, identify, assess, and interpret evidence from the results of research that has been conducted. Literature searches were conducted through academic databases such as PubMed, Scopus, and Google Scholar using relevant keywords. The keywords used were "diabetes self-management education", "diet adherence", and "diabetes mellitus". The data used in this study has several inclusion criteria and exclusion criteria.

Inclusion Criteria: Language: Articles published in English or Indonesian. Publication Year: Articles published in 2012 or after 2024 and only in the Indonesia setting. Study Type: Original research studies, including observational studies, clinical trials, or meta-analyses. Studies that specifically address diabetes self-management education (DSME) and dietary compliance among individuals with diabetes mellitus. Study Population: Research involving individuals diagnosed with diabetes mellitus, either type 1 or type 2. Accessibility: Articles available in full text and accessible through databases such as PubMed, Scopus, or Google Scholar. There is no limit of the participants aged in the study. According to PICO (Population, Intervention, Comparison, and Outcome), this review study did not limit the selected studies based on type of patients, intervention, comparisons, and outcome. The main point is diabetes self-management education.

Exclusion Criteria: Language: Articles published in languages other than English or Indonesian. Publication Year: Articles published before 2012 or after 2024. Publication Type: Review articles, commentaries, editorials, or case reports that do not present primary research data. Studies focusing on aspects of diabetes unrelated to self-management education or dietary compliance, such as complications of diabetes or pharmacological therapy without including DSME. Non-Relevant Populations: Articles focusing on non-diabetic populations or other health conditions not relevant to diabetes mellitus. Accessibility: Articles available only in abstract form or those not accessible in full text. Based on the established criteria, the flow and results of the research that will be used in this study are described in the following PRISMA diagram:

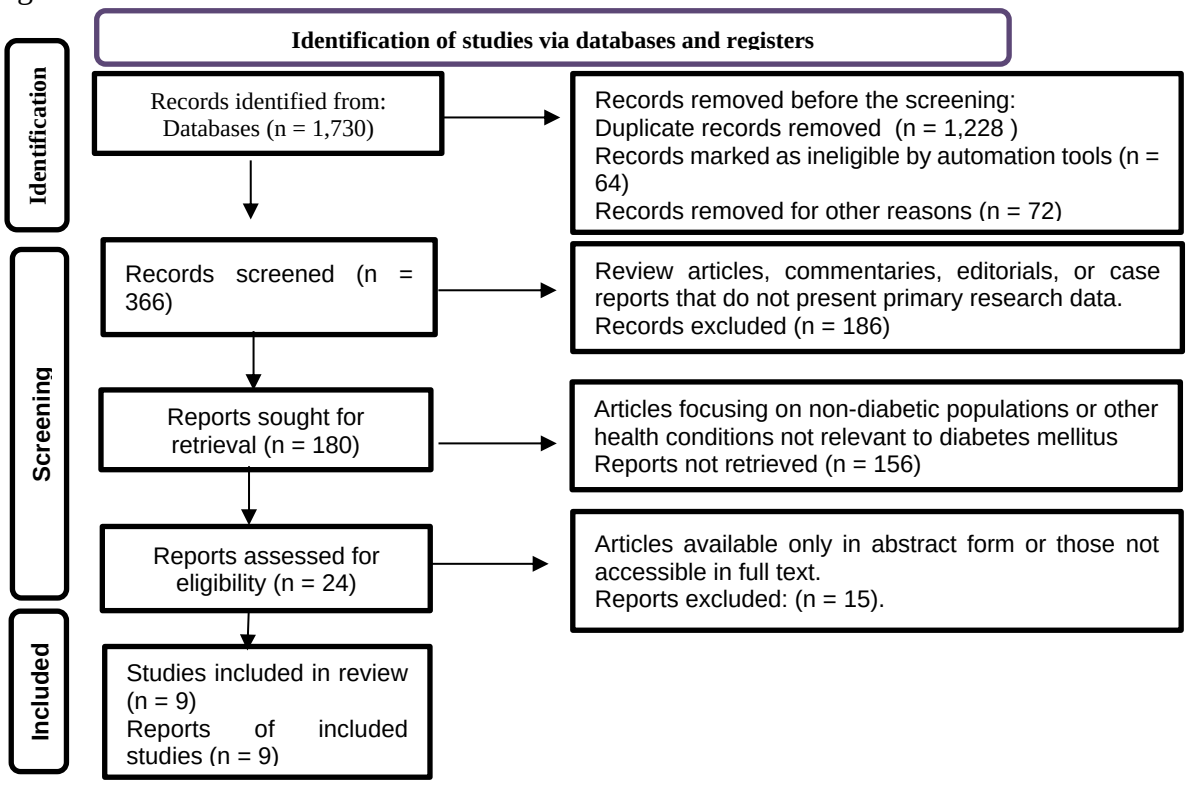

Figure 1. PRISMA Diagram

The final studies included in this study was nine studies from Indonesia. The collected data was then analyzed in three stages, namely data reduction, data presentation and drawing conclusions. All the data processes were responsible to all authors.

3. RESULTS AND DISCUSSION

The following is a critical analysis of nine research articles that were sampled in the literature review that focused on the role of Diabetes Self-Management Education (DSME) and other diabetes education on dietary compliance of DM patients, which is presented in the following table 1:

Table 1. Tabulation and descriptive literature review used

No	Authors, year, and country	Patient's information	Methods and Interventions (duration)	Results
1	(Aminah et al., 2022) Cimahi, Indonesia	Involved 16 respondents (aged 35-65 years old) with duration September to October 2021.	Pre-Experimental with One Group Pretest Posttest design. The sampling technique used was purposive sampling with 16 respondents. With booklet media.	The Self-Management Education program reduced the percentage of respondents not compliant with their diet from 81.3% to 81.3%, a statistically significant result with a p-value of 0.006, indicating a positive effect.
2	(Laili et al., 2019) Semarang, Indonesia	Involved 100 patients with DM type 2 (not mentioned age and duration of the study)	Quasi-experimental using purposive sampling and divided into two groups, namely the treatment group and the control group. With a structured questionnaire and daily food recording for seven days.	Diabetes Self-Management Education (DSME) is a patient-centered approach that enhances dietary adherence in type 2 Diabetes Mellitus patients. It involves patient empowerment and behavioral strategies, aiming to improve their understanding and skills in managing their condition. Ongoing support maintains progress and strengthens adherence behavior.
3	(Restuning, 2015) Yogyakarta, Indonesia	Involved 82 respondents who mostly aged >45 years old. The duration of study was September to October 2014.	Quasi experimental pre–posttest without control group design and conducted in Wirogunan and Brontokusuman sub-districts. There is 41 intervention groups	The study found that diabetes education significantly impacts the level of diet compliance in type 2 diabetes patients. The intervention group showed a significant difference in diet management

			and 41 control groups.	compliance before and after diabetes education, while the control group showed no significant difference. The Mann Whitney difference test also showed a significant difference in diet compliance before and after diabetes education.
4	(Harwadi et al., 2015) Padang, Indonesia	Involved 15 respondents (not mentioned age and study duration)	Quasi-experimental with One Group Pre-Post Test Design, involving 15 people as samples selected using the Purposive Sampling method.	Health education significantly improved Diabetes Mellitus patients' compliance with the right diet in terms of quantity, type, and schedule (p = 0.002). This suggests that providing diet education can enhance treatment compliance among patients with Diabetes Mellitus.
5	(Syaftriani et al., 2021) Medan, Indonesia	Involved 63 patients who were aged 56-65 years old. However, not mentioned the study duration.	Community Service was carried out on Friday, April 1, 2022, in Dusun 1B Wampu, Pantai Gemi Village, Stabat District, Langkat Regency, North Sumatra. The process of implementing this service is divided into three stages, namely preparation, implementation, and closing.	Parents with Diabetes Mellitus can enhance their self-care skills and manage their condition more effectively by regularly monitoring blood sugar levels, maintaining a healthy diet, engaging in physical activities, taking prescribed medication, and managing stress related to DM.
6	(Widayati, 2021) Kediri, Indonesia	Involved 16 respondents age 30-60 years old.	The pre-experiment involving 16 samples was selected intentionally through purposive sampling.	Peer-led education can boost adherence to diet and self-care in individuals with Diabetes Mellitus (DM) by creating a sense of connection and support among those experiencing the same condition.

7	(Damhudi et al., 2021) Singkawang, Indonesia	Involved 60 patients aged 19 to 65 years old.	A quasi-experimental study in Indonesia compared the effects of modified DSMES on 60 patients. The modified curriculum included culturally appropriate nature similarities, photos, and eating habits. Intention-to-treat analyses were conducted to determine the modified DSMES' effect on self-care, DFU severity, and QoL in a total of 60 patients.	The study found that the DSMES program was more effective than standard care in improving self-care behaviors, quality of life, and the degree of diabetic foot ulcers among Indonesians with DFU, both immediately after the intervention and three months later. This suggests that DSMES is a valuable intervention for managing diabetes and its complications.
8	(Aklima et al., 2012) Indonesia	Review article	An analytical literature review was undertaken by examining papers pertaining to evidence-based procedures. Exclusively articles written in English and Indonesian were examined. The search yielded eleven published empirical papers pertaining to the subject matter.	The review suggests that a family-based dietary self-management support program could significantly improve dietary behaviors in type 2 diabetes patients. This program, guided by Funnell and Anderson's self-management theory, would empower patients and their families through reflective listening, emotional support, active problem-solving, and structured goal-setting. Further studies are needed to integrate family support into routine diabetes care.
9	(Sugiharto et al., 2017) Pekalongan, Indonesia	Involved 41 participants (not mentioned the duration of study)	The Joanna Briggs Institute implemented a three-phase project to enhance evidence utilization and improve community health settings, involving stakeholder	Baseline audit revealed poor compliance with 12 criteria, but strategies implemented during phase 2 (diabetes educator training, curriculum development, patient logbook) led to 100% compliance, indicating improved

	engagement, baseline audits, identification of barriers, and follow-up audits.	evidence-based compliance.

Diabetes Self-Management Education (DSME) plays a critical role in enhancing dietary compliance among individuals with diabetes in Indonesia. The integration of effective educational strategies tailored to the local context is essential for improving dietary habits and managing diabetes effectively. Studies indicate that educational interventions significantly influence dietary practices and overall diabetes management (Butayeva et al., 2023; Mikhael et al., 2020).

One of the primary challenges in diabetes management is adherence to dietary recommendations. Research shows that a substantial portion of diabetic patients struggle with dietary compliance, often due to a lack of adequate nutritional education and support from healthcare providers. For instance, a study conducted in Ethiopia found that only 44.3% of participants adhered to dietary recommendations, highlighting the necessity for ongoing educational efforts to promote better dietary management among diabetes patients (Mohammed & Sharew, 2019). Similarly, the absence of proper nutritional education in clinical settings has been linked to poor dietary practices, emphasizing the need for healthcare systems to prioritize diabetes education (Cristello Sarteau et al., 2024).

Moreover, the effectiveness of DSME is enhanced when it incorporates diverse educational methods. For example, emphasize the importance of flexible strategies that align with patients' real-life situations, suggesting that educational content should not only focus on glucose monitoring and medication adherence but also on practical dietary changes, such as reducing salt intake (Weller et al., 2017). This aligns with findings from, who demonstrated that a multifaceted approach to nutritional education, including community activities and media outreach, significantly improved dietary knowledge and practices among diabetic patients (Jarvandi et al., 2023). Such comprehensive educational frameworks can empower patients to make informed dietary choices that align with their health goals.

Peer education and community support also emerge as vital components of effective DSME. propose a framework for peer education that fosters shared learning and support among individuals with diabetes, which can enhance dietary compliance (Eu et al., 2019). This approach is supported by evidence that social support from family and peers significantly influences dietary habits and adherence to diabetes management plans (Busebaia et al., 2023). The role of family dynamics in shaping dietary practices cannot be overlooked, as participants in various studies have reported that family members often influence their dietary choices, either positively or negatively (Tshiswaka et al., 2017).

Furthermore, the integration of psychosocial theories into DSME can enhance its effectiveness. Research indicates that understanding the psychological and social factors influencing dietary behaviors is crucial for developing effective educational interventions (Chiang et al., 2021). For instance, a study highlighted that individuals with a higher level of diabetes knowledge were more likely to adhere to dietary recommendations, suggesting that education must address both knowledge and the underlying beliefs and attitudes towards diabetes management (Elafros et al., 2023).

Providing proper education through DSME allows patients to gain a better understanding of their diabetes. Education about diabetes is considered crucial to prevent complications and undesirable outcomes. When patients are provided with comprehensive information about their disease and how to properly treat it, they tend to show more positive results in managing their condition. Accurate knowledge about diabetes allows patients to make better decisions based on the information they have (Ferreira et al., 2024). After the implementation of education with the Diabetes Self-Management Education (DSME)

approach, patients who participated in the DSME program tended to show higher levels of adherence to the recommended diet, compared to those who did not participate in the program (Shahabi et al., 2024). There is potential bias of the study selection because the studies selected to this review study were only from Indonesian context.

These findings suggest that DSME has an important role in helping patients with Diabetes Mellitus (DM) to better manage their diet. By increasing the level of adherence to the recommended diet, patients can achieve better blood sugar control and reduce the risk of long-term complications associated with diabetes. Thus, the results of this study confirm that the DSME approach not only improves patients' knowledge about diabetes, but also helps them to implement healthy dietary practices to effectively manage their condition. This study overcome the insight of DSME which understudied in developing countries such as Indonesia. However, additional literatures from developed countries could be better comparison. Future studies could examine the long-term effect of DSME for patients' health by using cohort study for ensuring effectiveness of the program.

4. CONCLUSION

The results of the analysis of nine studies that met the inclusion and exclusion criteria showed that Diabetes Self-Management Education (DSME) has a significant impact on the level of dietary compliance in Diabetes Mellitus (DM) patients. Patients who actively participate in the DSME program tend to show a higher level of compliance with the diet recommended by medical personnel, compared to those who do not participate in the program. These findings indicate that DSME has an important role in helping DM patients to better manage their diet, thereby improving blood sugar control and reducing the risk of long-term complications associated with diabetes.

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