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DOI: [10.31965/infokes.Vol22.Iss2.1531](https://doi.org/10.31965/infokes.Vol22.Iss2.1531)Journal homepage: <https://jurnal.poltekkeskupang.ac.id/index.php/infokes>**RESEARCH****Open Access****The Effectiveness of Diabetic Self-Management Education (DSME) on Dietary Habit, Obesity, and Physical Activity Among Patients with DM Type II****Liana Lidia Agow^{1a*}, Fery Agusman Motuho Mendrofa^{2b}, Sonhaji^{2c}**¹ Master of Nursing Program, Faculty of Nursing and Health Science, Universitas Karya Husada Semarang, Semarang, Central Java, Indonesia² Department of Community Health Nursing, Universitas Karya Husada Semarang, Semarang, Central Java, Indonesia^a Email address: lidialiana22@gmail.com^b Email address: ferysinga@gmail.com^c Email address: soni_aji84@yahoo.com

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Abstract

Diabetes mellitus and metabolic disorders are the priority programs in Indonesia. There is one program to reduce the fatality impact of diabetes which is diabetic self-management education (DSME). This study aimed to examine the effectiveness of Diabetes Self-Management Education (DSME) on dietary habits, physical activity, and obesity. This study is a quasi-experimental approach with one group pre-test post-test design. The sample in this study was 75 people with DM type II. The intervention for all samples was done for 4 sessions. Each session lasted 60 to 120 minutes/day with a maximum of 10 patients. The findings revealed that dietary habits were good from 56.0% to 69.3%, physical activity was good from 54.7% to 76.0%, and obesity decreased from 69.3% to 57.35, respectively for pre and post-test. The paired t-test result revealed that DSME correlates with dietary habits, physical activity, and obesity (obesity, physical activity, and dietary habit with p-values 0.024; 0.007; and 0.02, respectively). In conclusion, DSME has significantly influenced dietary habits, physical activity, and obesity. Education is crucial in promoting physical activity among individuals with diabetes. By enhancing self-efficacy, providing education on self-care behaviors, and emphasizing the importance of regular physical activity, these programs contribute to improving metabolic control, quality of life, and overall health outcomes in diabetic patients.

Keywords: DSME (Diabetic Self-Management Education), Dietary Habit, Physical Activity, Obesity.

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1. INTRODUCTION

The increasing prevalence of NCDs in developing countries has encouraged the emergence of agreement on a global strategy for preventing and controlling non-communicable diseases (NCDs). NCDs have become a strategic issue in the 2030 SDGs (Sustainable Development Goals) agenda so it must be a development priority in every country. In the management of non-communicable diseases, the SDGs indicator states that the rate of premature deaths due to non-communicable diseases will decrease by one-third by 2030 with one of the first global targets, namely reducing premature deaths due to NCDs by 25% by 2025 (Ministry of Health Republic of Indonesia, 2019). The global prevalence of diabetes in 2019 is estimated at 9.3% (463 million people), increasing to 10.2% (578 million) in 2030 and 10.9% (700 million) in 2045. The prevalence in urban areas is higher (10.8%) compared to rural (7.2%) and in high-income countries (10.4%) compared to low-income countries (4.0%). The world prevalence of diabetes in adults (aged 20-79 years) was 6.4% (285 million) in 2010 and will increase to 7.7% (439 million) in 2030. Vulnerable in 2010 and 2030 there will be an increase of 69 % in developing countries and a 20% increase in developed countries. Indonesia has the highest prevalence of Diabetes Mellitus (DM) sufferers in the world along with China, India, the United States, Brazil, Russia, and Mexico with an estimated number of people with DM of 10 million people (IDF, 2019).

The report from Indonesian Basic Health Research stated that the prevalence of DM is 1.5% of the total population of Indonesia (Ministry of Health Indonesia, 2018). The highest prevalence of diabetes mellitus (DM) in Indonesia is in Yogyakarta (2.6%), DKI Jakarta (2.5%), North Sulawesi (2.4%), and East Kalimantan (2.3%). The prevalence of DM increases with increasing age, but from age ≥ 65 years it tends to decrease. Based on the North Sulawesi Basic Health Survey Report, there were 25,661 DM sufferers of all ages. The highest prevalence of DM sufferers in North Sulawesi based on a doctor's diagnosis is in Manado, namely 3.45%. There are several programs established by the government to reduce the prevalence of DM.

Diabetes self-management education (DSME) programs are essential in empowering individuals with diabetes to effectively manage their condition. These programs aim to enhance patients' knowledge, skills, and self-care behaviors, leading to improved glycemic control and better health outcomes (Fitria et al., 2023; Powers et al., 2015). By utilizing culturally sensitive approaches and tailored interventions, these programs facilitate self-care practices and provide individuals with the necessary tools to make informed decisions regarding their diabetes management (Fitria et al., 2023; Powers et al., 2015). Furthermore, diabetes self-management education programs have evolved to become more patient-centered, and theoretically based, and emphasize the provision of ongoing support to maintain the self-management gains achieved by patients (Funnell et al., 2007). These programs address various factors such as health beliefs, cultural needs, knowledge levels, emotional concerns, and family support to enable individuals to effectively meet the challenges of self-management (Funnell et al., 2007; Powers et al., 2015). Collaborative efforts involving healthcare professionals, community health workers, and peer educators are crucial for the successful delivery of diabetes self-management education programs (Lawless et al., 2016; Tamayo & Reyes, 2022). These programs not only aim to enhance glycemic control but also work towards preventing diabetes-related complications, such as diabetic foot injuries, through education and empowerment (Fitria et al., 2023).

There are barriers of implementation DSME and the impact on dietary habits, physical activity, and obesity status is under study (Funnell et al., 2007). This study aimed to examine the effectiveness of Diabetic Self-Management Education on dietary habits, physical activity, and obesity.

2. RESEARCH METHOD

This study is a quasi-experimental approach with one group pre-test and post-test design with intervention in between. The population in this study was 75 people with Diabetes Mellitus (DM) type II who live in the area of West Modayag Primary Health Care, East Bolaang Mongondow, North Sulawesi Province. The data collection was done from December 2023 to January 2024.

The sample derived for this study was 75 people with DM type II that derived from the total sampling. The inclusion criteria of sample selection consist of those who were willing to participate in the study, residents in West Modayag Primary Health Care, actively controlled to primary health care, could be able to communicate verbally, and could be able to read and write. The exclusion criteria consist of refusal during the data collection, having physical, mental, and cognitive disabilities, and patients with neuropathy and cardiomyopathy complications.

The intervention for all samples was done for 4 sessions. Each session had a duration of 60 to 120 minutes/day with a maximum of 10 patients. So, for 75 samples, each session took six days. The interval time between each session was one week. The independent variable of this study is Diabetes Self-Management Education (DSME). There are four sessions of DSME, the first session is about education about DM, the second session is the explanation of nutrition diet for DM patients, the third session is about physical exercise, and the last session is about pharmacology treatment. To measure this variable, SAP (Satuan Acara Pengajaran or *Teaching Program Unit*) was used which followed the guidelines from Funnell theory (2011) (Funnell et al., 2007). The dependent variables of this study are dietary habits, physical activity, and obesity. Dietary habit was measured by a questionnaire adopted from (Dewiyanti, 2022) consists of 15 questions using Likert scales. Good dietary habit is categorized for those has score more than 37 and not good dietary habits are categorized for those has scored 37 or less. The formula to calculate the cut-off is adding maximum and minimum scores and dividing into 2. Physical activity in this study was measured by the Global Physical Activity Questionnaire (GPAQ) developed by (World Health Organization, 2012). Good physical activity was categorized if respondents had MET < 600 and not bad was categorized for MET 600 or higher. Obesity was categorized by measuring the height and weight which resulted from the body mass index. Obese were categorized as those who had a BMI of 25 kg/m² or higher and not obese were categorized as those who had a BMI less than 25 kg/m² (PERKENI, 2015).

The normality test was done with a significant level of 5% using the Shapiro-Wilk statistical test. Additionally, due to the normal result, a paired t-test statistical test was done. Regarding the instrument used in this study, we did not check the validity and reliability test because the instruments used are standardized instruments which already been used by previous researchers (Dewiyanti, 2022; Funnell et al., 2007; Ministry of Health Indonesia, 2024; PERKENI, 2015; World Health Organization, 2012). This study used a 95% Confidence Interval to define the significant level. This study was accepted the ethical approval from the ethical committee at Karya Husada University with number 061/KEP/UNKAHA/SIE/V/2024.

3. RESULTS AND DISCUSSION

Table 1. The General Characteristics of the Respondents (n = 75)

Variable		Frequency	Percentage (%)
Sex	Male	33	44.0
	Female	42	56.0
Age	30 - 50 years old	37	49.3
	51 - 65 years old	38	50.7
Education	Elementary	1	1.3
	Junior high school	2	2.7

	Senior high school	40	53.3
	Vocation	14	18.7
	Bachelor	18	24.0
Occupation	Private sector	21	28.0
	Self-employee	16	21.3
	Civil servant	21	28.0
	Others	8	10.7
	Unemployed	9	12.0

Table 1 shows the univariate results as the general characteristics of the respondents. According to respondent's sex, more than half of them were female (56.0%), aged 51 – 65 years old (50.7%), and graduated from senior high school (53.3%). The occupation among 75 respondents revealed the highest percentage showed by those working in the private sector and as civil servants (28.0% for each).

Table 2. The Distribution Frequency for Pre and Post-test (n = 75)

Variable		Pre-test f (%)	Post-test f (%)
Dietary habit	Not good	33 (44.0)	23 (30.7)
	Good	42 (56.0)	52 (69.3)
Physical activity	Not good	34 (45.3%)	18 (24.0)
	Good	41 (54.7)	57 (76.0)
Obesity	Not obese	23 (30.7)	32 (42.7)
	Obese	52 (69.3)	43 (57.3)

Table 2 shows that 44% of respondents had not good dietary habits before giving the intervention and 56% had good dietary habits. After the intervention, those who did not have good dietary habits reduced to 30.7%, and those who had good dietary habits increased to 69.3%. According to physical activity, it shows that 45.3% of respondents did not have good physical activity before giving the intervention and 54.7% had good physical activity. After the intervention, those who did not have good physical activity reduced to 24.0%, and those who had good physical activity increased to 76.0%. In terms of the body mass index, 30.7% of respondents were not obese before giving the intervention and 69.3% were obese. After the intervention, those who were not obese increased to 42.7%, and those who were obese reduced to 57.3%.

Table 3. The Effect of DSME on variables of interest (n = 75)

Variable		Mean	Std deviation	Std error mean	p-value
Dietary habit	Before	1.56	0.500	0.058	0.024
	After	1.69	0.464	0.054	
Physical activity	Before	1.55	0.501	0.058	0.007
	After	1.76	0.430	0.054	
Obesity	Before	1.69	0.464	0.054	0.002
	After	1.57	0.498	0.057	

Table 3 explains the paired t-test results of the effectiveness of DSME on variables of interest. Based on dietary habits, the mean score increased from 1.56 to 1.69 and the significance was shown by a p-value of 0.024. According to physical activity, the mean score increased from 1.55 to 1.79 and the significance was shown by a p-value of 0.007. For the obesity status, the mean score decreased from 1.69 to 1.57 and the significance was shown by

a p-value of 0.002. In general, DSME is effective in improving dietary habits, improving physical activity, and reducing the number of obese.

DSME effect on dietary habit

The findings from this study revealed the influence of DSME on dietary habits (p-value < 0.05) and the improvement of dietary habits was a lot. The mechanism of effectiveness of DSME on dietary habits by enhancing understanding of the disease, leading to improved self-care practices and better glycemic (Iriana, 2022; Rusdiana et al., 2020; Utama et al., 2021). Additionally, DSME positively influences self-efficacy and self-care behaviors among individuals with type 2 diabetes including their foods (Fitriah et al., 2020; Wahyuni & Wahyuningsih, 2017). By implementing DSME routinely, dietary habits were improving too.

There are previous studies that examined the impact of diabetic self-management education (DSME) on dietary habits. The previous study explored the perspectives of individuals recently diagnosed with type 2 diabetes and health professionals on self-management of dietary intake and physical activity, emphasizing the importance of understanding patient views to tailor educational interventions effectively (Booth et al., 2012). Another study conducted a systematic review focusing on cultural influences on dietary self-management of type 2 diabetes in East Asian Americans, found the significance of cultural perspectives in shaping dietary habits and the necessity for culturally sensitive education interventions (Li-Geng et al., 2020). Additionally, Willig et al., (2014) conducted a qualitative study on intuitive eating practices among African-American women with type 2 diabetes, suggesting that programs focusing on enhancing self-efficacy and dietary habits could improve glycemic control (Hayek et al., 2013; Willig et al., 2014). Furthermore, one study focused on implementing an education program for type 2 diabetes patients, demonstrating significant enhancements in dietary plans, physical exercise, and adherence to self-care after six months of intervention (Hayek et al., 2013). In line with this study, another study emphasized the effectiveness of culturally competent dietary self-management interventions in improving health outcomes for southern African Americans, particularly those at risk due to high-fat diets (Anderson-Loftin et al., 2005; Zhang et al., 2019). Additionally, supporting the findings of this study, another study developed and evaluated an internet-based diabetes nutrition education resource, underscoring the importance of empowering individuals to make positive dietary choices for diabetes management (Zhang et al., 2019). Furthermore, S.-K. Lee et al., (2019) focused on diabetes education through pattern management, mentioned the role of appropriate dietary habits in enhancing self-care and self-efficacy in patients with type 2 diabetes (Lee et al., 2019; Sami et al., 2020). Similarly, to this study, research conducted a cross-sectional study on the dietary attitudes of adults with type 2 diabetes in Saudi Arabia, stressing the necessity for tailored dietary self-management strategies for improved diabetes care (Sami et al., 2020).

Effect on physical activity

The result of this study found the positive influence of DSME on physical activity (p-value <0.05). The impact of DSME is empowering individuals to take charge of their health and make informed decisions regarding their diabetes management (Fitriah et al., 2020; Wahyuni & Wahyuningsih, 2017). Additionally, DSME provides person-centered interventions to support patients, ensuring that individuals receive comprehensive care and education tailored to their specific needs (Mamed & Gastaldi, 2022; Powers et al., 2015; Sherr & Lipman, 2015). Individuals with DM type II could be able to manage their health behavior, including physical activity.

The impact of diabetic self-management education on physical activity has been extensively studied. Similar to the findings of this study, Nakawatase et al., (2007) highlighted the importance of regular physical activity for type 2 diabetic patients to improve metabolic

disorders and prevent complications such as cardiovascular disease. Additionally, Sadeghian et al., (2016) and Hamidi et al., (2022) demonstrated the positive effects of self-management educational programs on physical activity levels and quality of life in diabetic patients. Aljuhani et al., (2022) further emphasized the role of self-management behaviors, including physical activity/exercise, in enhancing self-care among individuals with diabetes. Moreover, Amer et al., (2018) found that patients with high self-efficacy in managing physical exercise activities were more adherent to exercise regimens, indicating the influence of self-efficacy on self-care activities, including physical activity. Additionally, Uly et al., (2022) explored the relationship between self-care behavior and diabetes self-management education, underlining the importance of physical activity/sports as part of self-management in patients with type 2 diabetes. Moreover, (Juarez et al., 2021) highlighted the mediating role of self-efficacy in the association between diabetes education and support and self-care management, including physical activity.

Effect on Obesity

The statistical test result from this study found a significant correlation between DSME and obesity. The process might be due to the improvement in dietary habits and physical activity. Additionally, DSME provides support and education on which necessary skills and behaviors to manage their condition effectively (Powers et al., 2015). Through the self-management system, DSME emphasizes the role of individuals themselves to control and manage their diabetes. As a result of long-term DSME implementation, the improvement in body mass index (BMI) could be measured.

The impact of diabetic self-management education on obesity as found in this study, has similar findings with several previous studies. The study by Norris et al., (2002) emphasized the significance of diabetes self-management education in clinical practice, highlighting its role in empowering individuals to effectively manage their condition. Additionally, (Boles et al., 2017) stressed the substantial contribution of obesity to the development of pre-diabetes and diabetes, underlining the importance of addressing weight management in diabetes care. Furthermore, (Fan et al., 2019) conducted a randomized controlled trial in China, illustrating that a diabetes education program significantly enhanced self-management levels, reduced psychological distress, and improved glycemic control in patients with type 2 diabetes. Supporting this study, (Miller et al., 2016) examined diabetes education, specialty care, and self-care advice among obese African American women with type 2 diabetes, shedding light on the care and education patterns in high-risk populations. Collectively, these studies suggest that diabetes self-management education plays a crucial role in addressing obesity and its implications in individuals with diabetes.

In general, the implementation of Diabetic Self-Management Education is effectively improving dietary habits, physical activity, and obesity status. The findings of this study could be generalized to other settings and times. The role of family and health care are important to control the consistency of individuals.

4. CONCLUSION

DSME has a significant effect on dietary habits, physical activity, and obesity. The DSME could affect those three components through the self-centered by providing support and knowledge to the patient. It focused on self-care activities including improved glycemic stability, quality of life, self-efficacy, and reduction of complications and depressive symptoms. Future studies can include the qualitative approach of family contribution to support DSME implementation and consistency. This study is limited to a sample in the small scope of primary health care, so the result cannot be generalized to other times and places.

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