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Medicine

Knowledge and Diabetes Self-Management Practices Among Type-2 Diabetes Mellitus Patients in Tomohon

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Abstract	Original Research Article

Type 2 Diabetes Mellitus (T2DM) is a chronic disease that requires careful management and adequate knowledge from the patients. This study seeks to explore the relationship between knowledge levels and self-management in patients with type 2 diabetes mellitus. It utilized a descriptive analytical approach within a cross-sectional study framework, where data were collected using the Diabetes Knowledge Questionnaire-24 (DKQ-24) questionnaire which was used to assess the variable of knowledge level about DM. For the variable of self-management of diabetes mellitus, was measured with Diabetes Self-Management Questionnaire-Revised (DSMQ-R) questionnaire. Samples were sixty T2DM patients in the city of Tomohon. The study findings indicated a significant relationship between the level of knowledge and diabetes self-management among patients with type 2 diabetes mellitus in Tomohon, with a p-value of 0.029 (p<0.05). Most patients have a fair to poor understanding of Diabetes Mellitus self-management. These findings highlight the importance of ongoing education and more focused interventions to improve knowledge and control of diabetes in T2DM patients. In conclusion, this study indicates the need for greater efforts from the healthcare sector to enhance understanding and management of diabetes in T2DM patients through a holistic approach, including more intensive education, psychosocial support, and accessible and affordable healthcare services.
Keywords: Type 2 Diabetes Mellitus, knowledge, self-management, practices.

INTRODUCTION

Diabetes mellitus (DM) continues to pose a substantial health challenge, impacting populations worldwide. The World Health Organization (WHO) reported that DM was responsible for 1.5 million deaths in 2019, with 48% of these deaths occurring in individuals under 70 years old. Additionally, approximately 460,000 deaths from kidney disease is attributable to DM, while cardiovascular deaths reach around 20% due to elevated blood glucose levels (WHO, 2022).

The results of the Basic Health Research (Riskesdas) at the national level in Indonesia indicate that the percentage of people diagnosed with diabetes mellitus is 2%. This shows an increase compared to the prevalence of diabetes mellitus in the population aged 15 years and above in the previous Riskesdas, which was 1.5%. The prevalence of diabetes mellitus patients whose blood sugar levels were checked increased from 6.6% in 2013 to a higher 8.5% in 2018. There are five provinces with high prevalence of diabetes mellitus; the highest cases in Indonesia are located in the provinces of DKI Jakarta, DI Yogyakarta, East Kalimantan, North Sulawesi, and East Java has the fifth highest incidence. North Sulawesi is the fourth province with a prevalence of diabetes mellitus at 2.3% (Riskesdas, 2018).

Reports from North Sulawesi Province indicate that the prevalence of diagnosed diabetes mellitus is notable across all age groups. Particularly high rates are observed among individuals aged 55-64 years, with a prevalence of 8.53%, and those aged 65-74 years, with a prevalence of 9.67% (Riskesdas, 2018). The prevalence of diabetes mellitus cases in the city of Tomohon in 2019 was 4.25%, which decreased to 3.89% in 2020, while in 2021 and 2022, the prevalence rate of diabetes mellitus remained at 3.90%. Based on an epidemiological study of metabolic diseases in Tomohon City in 2018 using data from the Tomohon City Health Office over the past 9 years and also data from two hospitals in Tomohon and

one of the health centers in Tomohon, a direct survey of the prevalence of non-communicable diseases was conducted on 25% of the population of Tomohon City (Permatasari, 2018).

The increasing prevalence of diabetes mellitus can lead to an increase in cases of illness and death due to complications caused by the disease itself. Elevated blood sugar levels in DM can lead to immediate metabolic issues like diabetic ketoacidosis (DKA), and over time, can also contribute to neuropathic complications. Diabetes mellitus is also associated with an increased incidence of macrovascular diseases such as Coronary Heart Disease (CHD) and stroke (Smeltzer & Bare, 2013). Other possible complications that may occur include kidney failure, heart disease, nephropathy, retinopathy, and gangrene. All of these can also affect the psychological well-being of patients. The impact of DM on life and health should be considered, as small things can quickly develop and cause debilitating disabilities and affect both body function and the individual's quality of life. This can result in negative impacts on the quality and longevity of life (Puspasari and Farera, 2021).

To prevent complications from DM, therapeutic and regular control through appropriate, firm, and permanent lifestyle changes for DM patients are necessary. The government also plays a role in the prevention of diabetes mellitus by establishing Posbindu (Integrated Service Post). Posbindu aims to monitor and early detect non-communicable disease risk factors in the community. This program has been initiated since 2011 and has developed into 11,027 Posbindus throughout Indonesia by 2015 (Trisnadewi, *et al.,* 2018). In general, DM control efforts to prevent complications involve maintaining blood sugar levels within normal limits. However, keeping blood sugar levels stable is often a challenge for most patients, especially due to lack of discipline in DM management and various other factors.

According to the Indonesian Society of Endocrinology (Perkeni, 2021), the management of diabetes mellitus is based on four pillars: education, balanced diet, physical activity, and adherence to medication. Type 2 diabetes is usually caused by lifestyle and behavior, especially poor dietary patterns and lack of physical activity. A diet high in sugar and insufficient physical activity can lead to type 2 diabetes. Knowledge about DM, medication intake, dietary patterns, complications, and emergency signs is crucial for patients and their families. Understanding diabetes mellitus and its management is essential for effective self-management of T2DM (Mikhael *et al.,* 2018).

Knowledge is the result of human perception of an object through the five human senses: sight, hearing, smell, taste, and touch (Notoatmodjo, 2012). Patients' knowledge about DM is crucial because it can help them manage DM throughout their lives. The more patients understand their disease, the more capable they are of changing behavior and taking necessary actions to control DM. When a patient has knowledge about the risks of DM complications, they can choose the best alternatives in their treatment and tend to pay attention to important aspects such as proper diet, regular exercise, blood sugar monitoring, and maintaining an environment free from the risk of injury. By having comprehensive understanding of diabetes and its management, individuals can take an active role in managing their condition. This includes being aware of the symptoms of diabetes, understanding how to monitor blood glucose levels, and knowing when and how to adjust medication dosages (Desi *et al.,* 2023; Ferreira *et al.,* 2014).

MATERIALS AND METHODS

The research was conducted in the city of Tomohon. The study utilized a descriptive analytical approach with a cross-sectional design to investigate the relationshiop between knowledge levels and self-management among individuals with type 2 diabetes mellitus in Tomohon, employing bivariate analysis. The sample in this study consisted of 60 respondents who were type 2 diabetes mellitus patients aged 45-64 years. The variables in this study were the level of knowledge and self-management of diabetes mellitus. Diabetes Knowledge Questionnaire-24 (DKQ-24) was used to collect data for knowledge level, and Diabetes Self Management Questionnaire-Revised (DSMQ-R) was used to collect data for self management of the patients. The data were then analysed with SPSS software version 25. The data analysis employed both univariate and bivariate analyses, with chi-square test for the bivariate analysis.

RESULTS AND DISCUSSION

The respondents in this study amounted to 60 individuals who were type 2 diabetes mellitus patients in the city of Tomohon. Data collection was conducted using the DKQ-24 questionnaire to measure the level of knowledge of the patients and the DSMQ-R to assess the self-management of diabetes mellitus.

This study indicates that the majority of respondents are aged between 55 and 64 years, with most individuals in this age group, comprising 41 respondents (68%). A slightly younger age range, 45 to 54 years, is also adequately represented, with 19 respondents (32%). The research findings show that the majority of type 2 diabetes mellitus patients are in the 55-64 age group with an average age of 57 years. These findings are consistent with existing theories and knowledge regarding the prevalence and common characteristics of diabetes mellitus in this age group (Indrahadi *et al.,* 2021).

Gender comparison indicates that more female are part of this study, comprising 37 respondents (61%), compared to the number of male, which reached 23 respondents (39%). Fitri & Yekti (2012) and Paseki (2021) in their journals state that female are more prone

to diabetes than men because female are at higher risk of weight gain and obesity. Female have a higher risk of weight gain and obesity, especially after the age of 45. Female are also more vulnerable to type 2 diabetes mellitus than male. One of the contributing factors is obesity due to a lack of physical activity in female. This leads to excess insulin production and insulin resistance, which ultimately can lead to type 2 diabetes mellitus. These findings support existing theories.

Univariate Analysis

Table 1: Distribution of Respondents

Age (years)	n	%
Age		
45-54 tahun	19	31,7
55-64 tahun	41	68,3
Gender		
Male	23	38,3
Female	37	61,7
Occupation		
Farmer	13	21,7
Civil servant	7	11,7
Housewife	23	38,3
Entrepreneur	8	13,3
Retired	9	15,0
Education		
Primary School	6	10,0
Junior High School	17	28,3
Senior High School	24	40,0
University	13	21,7
Knowledge		
Good	10	16,7
Enough	31	51,7
Poor	19	31,6
Self-management		
Good	27	45,0
Poor	33	55,0
Total	**60**	**100**

In terms of occupation, the majority of respondents are housewives, comprising 23 respondents (38%), indicating that most respondents may have significant family responsibilities. This is followed by the profession of farmers, which reached 13 respondents (21%), showing variability in the respondents' occupational backgrounds. The type of occupation influences the risk of developing type 2 diabetes mellitus; occupations with low physical activity can lead to inadequate energy expenditure, resulting in weight gain. In this condition, blood glucose levels become too high and pose a significant risk of developing type 2 diabetes mellitus. The treatment of type 2 diabetes mellitus can be done in several ways, such as maintaining a healthy diet with exercise, regularly controlling blood sugar levels, and avoiding excessive stress (Arania *et al.*, 2021).

The educational level of the respondents also a focus in this study. It was found that the majority of respondents had completed upper secondary education or its equivalent, with 24 respondents (40%) having a high school diploma or equivalent background, while 17 respondents (28%) had completed junior high school or its equivalent. This indicates that most respondents have a sufficient level of education to understand and respond to questions or information related to diabetes mellitus and health in general. Notoatmodjo (2012) suggests that knowledge is an individual's attitude related to an object at various levels; it can be said that the higher the level of education an individual has, the better their knowledge. A study conducted by Damayanti & Sofyan (2022) indicates a relationship between education and diabetes mellitus. The research findings show that higher education is associated with better knowledge of diabetes mellitus. Disparities in educational opportunities can lead to varying levels of knowledge among diabetic patients. Those with lower education levels often rely on information from fellow patients or the internet, highlighting the importance of accessible and comprehensive educational programs. Conversely, those with higher levels of education are more inclined to understand the seriousness of diabetes complications and the importance of self-care practices, highlighting how education can impact the understanding and management of the disease (Mikhael *et al.*, 2018).

There were only sixteen percent of the respondent with good knowledge of diabetes mellitus. The rest of the respondent were categorized as enough knowledge level (51,7%) and poor knowledge level (31,6%). This includes knowledge of the causes, symptoms, and potential complications of diabetes, as well as the various treatment options available. By having a clear understanding of these factors, individuals diagnosed with type 2 diabetes can make informed choices regarding their health and take proactive measures to effectively manage their condition. Nevertheless, research indicates that levels of knowledge about diabetes among type 2 diabetes patients are frequently insufficient. (Almousa *et al.,* 2023).

More than half of the respondents (55%) have poor self-managements. Self-management in type 2 diabetes mellitus patients is crucial for effectively managing this chronic condition. Individuals diagnosed with type 2 diabetes should regularly check their blood sugar levels, follow their prescribed medication schedules, and sustain a balanced diet, engage in regular physical activity, and attend regular medical check-ups. Research indicates that successful self-management practices can result in enhanced glycemic control, lowered risk of complications, and improved quality of life for individuals with diabetes. For instance, a study by Chrvala *et al.,* (2016) emphasized the importance of self-management education and support in empowering patients to make informed decisions about their health. Additionally, a review by Powers *et al.,* (2017) highlighted the positive impact of self-management interventions on glycemic control and other health outcomes in type 2 diabetes patients. In general, self-care is pivotal in the comprehensive management of type 2 diabetes, enhancing health outcomes and overall well-being for patients.

Bivariate Analysis

Table 2: The Relationship Between Knowledge and Self-Management of Diabetes Mellitus

Knowledge	Self Management				Total		p-value
	Good		Poor				
	n	%	n	%	n	%	
Good	7	11,7	3	5,0	10	16,7	0,029
Enough	14	23,7	17	28,0	31	51,7	
Poor	6	10,0	13	23,6	19	31,6	
Total	27	45,0	33	55,0	60	100,0	

Based on the statistical analysis using the Chi-Square test, the p-value was 0.029 (p < 0.05), indicating that there is a relationship between the level of knowledge and self-management behavior of diabetes mellitus patients in Tomohon. It can be concluded that individuals' level of knowledge is associated with their behavior and awareness in maintaining health (Notoatmodjo, 2018). One of the most critical aspects of self-management of type 2 diabetes mellitus is having a comprehensive understanding of the disease and its management (Li, *et al.,* 2022). Another study revealed a significant positive correlation coefficient of 0.326 between knowledge and self-management among patients with type 2 diabetes mellitus, with a p-value of 0.013. This suggests a meaningful association between knowledge and self-care among type 2 diabetes mellitus patients in the Palaran Health Center area of Samarinda City (Saqila & Muflihatin, 2021).

Past research conducted by Ningrum & Siliapantur (2019) and Hidayah (2022) demonstrated an association between knowledge levels and self-care practices among individuals with diabetes mellitus. The statistical results from the study by Ningrum & Siliapantur (2019) showed strong significance with a p-value of 0.000 and a correlation coefficient of 0.799, while the study by Hidayah (2022) also showed a significant relationship with a p-value of 0.000. Overall, these research findings indicate that good knowledge plays a crucial role in effective self-management related to diabetes mellitus. Kusnanto's study (2019) confirms that the level of knowledge influences the control of diabetes mellitus.

Adequate knowledge enables patients to take appropriate actions in managing diabetes mellitus, including in terms of diet, medication use, and healthy lifestyle. Gharaibeh & Tawalbeh (2018) also emphasize the importance of knowledge level in controlling diabetes mellitus. The higher someone's knowledge about diabetes mellitus, the better the control of the condition. Good knowledge provides a deep understanding of the disease, risk factors, and effective management strategies. Enhancing the knowledge levels of individuals with type 2 diabetes mellitus is essential for enhancing their self-management of the condition and quality of life.

CONCLUSION

In conclusion, a significant relationshiop was found between knowledge and self-management among individuals with type 2 diabetes mellitus in Tomohon. It indicates the need for greater efforts from the healthcare sector to enhance understanding and management of diabetes in T2DM patients through a holistic approach, including more intensive education, psychosocial support, and accessible and affordable healthcare services.

As a recommendation, the researchers suggest that the government continues to collaborate with the local community to promote programs aimed at health education regarding T2DM and encouraging individuals to enhance their control over type 2 diabetes mellitus.

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