



Relationship between Self-Care Behavior and Diabetes Self-Management Education in Patients with Diabetes Mellitus Type 2

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Abstract

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BACKGROUND: Diabetes mellitus (DM) type 2 is a disease caused by disruption of insulin secretion and insulin resistance. One aspect that plays an important role in the management of this disease is diabetes self-management education (DSME). Good self-care behavior will make diabetes management controlled and prevent complications and make the quality of life better.

AIM: The purpose of this study is to determine the effect of self-care behavior and the magnitude of the influence of knowledge, patient motivation, family support, and self-efficacy on DSME for type 2 DM patients.

METHODS: The method used in this study was a quantitative approach using cross-sectional methods. The sample used was 115 patients with type 2 DM in Palopo Regency. The analytical method used is the structural equation model using Amos 2.0 and SPSS 20 (IBM Corp).

RESULTS: The findings of the study showed that self-care behavior in patients with DM of type 2 was influenced by knowledge factors by 89%, motivation factors by 82.8%, family support by 84.9%, and self-efficacy factors by 78.4%. Meanwhile, diabetes management of type 2 DM patients was influenced by treatment factors by 75.5%, blood sugar control factors by 88.1%, dietary factors by 60.9%, physical activity factors by 87.3%, and foot care factors 53.8%. The structural model of this study explains the variable care cell behavior with self-care management of 47.5%.

CONCLUSION: Therefore, the management of DM must be more active in providing education to sufferers so that their knowledge or family members can increase and understand how to carry out diabetic management properly.

Introduction

Diabetes mellitus (DM) is one of the most common non-contagious chronic diseases [1]. DM is a metabolic disease with the disruption of the insulin hormone which functions to maintain the body's homeostasis by decreasing blood sugar levels [2], [3]. This disease can cause imperfect death as well as serious complications and disabilities [4]. In addition, this disease can increase blood sugar levels or hyperglycemia, because the body lacks the hormone insulin [3]. One of the most common types of DM disease in the world is DM type 2 (85–95%), which is a disease caused by disruption of insulin secretion and insulin resistance [5].

DM of type 2 is a chronic disease and global health problem, affecting approximately 422 million people worldwide [6]. The global diabetes prevalence 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 [7]. Global diabetes prevalence is around 5% for the 35–39 year age group, 10% for the 45–49 year age group, 15% for the 55–59 year age group, and close to 20% for the 65–69 year age group.

Southeast Asian countries, such as Indonesia, Malaysia, Thailand, and Vietnam have moved up the rankings in the past two decades. Due to large population, China (88.5 million people with diabetes type 2), India (65.9 million), and the US (28.9 million) maintained the top position as the country with the largest total number of individuals with this condition [8].

Based on the results of Basic Health Research (Riskesdas) in 2018, the prevalence of diabetes mellitus in Indonesia in 2013 was 6.9%, including TGT of 29.9% and GDP of 36.6%. In 2018, there was an increase of 10.9%, including TGT of 30.8% and GDP of 26.3%. The existence of diabetes mellitus based on age groups, namely, age 15–24 years (21.2%), age 25–34 years (27.2%), age 35–44 years (31.9%), and 45–54 years (32.4%). The province of South Sulawesi is one of the provinces in Indonesia which has a prevalence of diabetes mellitus, reaching 1.2% in 2013 and an increase in 2018, reaching 1.8% [9]. The increasing number of DM sufferers is evidence that DM is a serious public health problem and needs to be a priority health problem in Indonesia.

The causes of DM type 2 are unhealthy lifestyle, imbalance of dietary regulation, and lack of physical activity; this is influenced by self-care

behavior [10]. Factors that influence self-care behavior are factors from the patient himself, namely, knowledge, attitudes, motivation, family support, economy, and self-efficacy [11]. Other studies have stated that behavior greatly influences the self-care of DM patients [12], [13]. Good self-care behavior has an important role in diabetes management, especially in preventing diabetes complications [3].

The application of self-management is one of the aspects that play an important role in the management of type 2 diabetes, including dietary regulation, physical activity/sports, monitoring blood sugar, compliance with medication consumption, and self/foot care [14]. The process of health education for individuals or families in managing DM type 2 provided by nurses so as to effectively improve clinical outcomes and quality of life for patients with the diabetes self-management education (DSME) method [15]. Another study states that DSME plays an important role in preventing the progression of neurovascular complications in DM patients' type 2, thereby helping to reduce the risk of diabetic foot injury [16]. Therefore, the researcher wanted to know the self-care behavior with DSME in diabetes mellitus patients' type 2 in Palopo District.

Methods

This type of research is observational correlation with a cross-sectional approach, conducted from May to July 2022 in Palopo Regency. The variable used in this study was DSME as the dependent variable and the independent variable was self-care behavior. The sampling technique was determined using consecutive sampling technique. The number of samples were targeted in the research subjects, there were 115 who met the research criteria. The criteria for respondents who were used as subjects in this study were patients with type 2 diabetes mellitus who underwent treatment and outpatients both in hospitals and in community health centers, able to communicate well, aged 35–60 years, had blood glucose levels when they ranged from 71–380 mg/dL, and willing to be respondents. All participants agreed to the study protocol and provided written consent. This research has been approved by the Ethics Committee of Mega Buana University and takes into account the principles in the research process.

This study focuses on knowing the correlation between self-care behavior and DSME for DM patients type 2 using a research instrument in the form of a questionnaire. This research questionnaire is divided into four parts, namely, the first part is demographic data, the second part is the diabetic management questionnaire to measure self-management using the diabetes self-management questionnaire [17], and the third part of the questionnaire about the self-care behavior of DM patients'

type 2. The analysis test used is a linear regression test to determine the relationship between the variable self-care behavior and the DSME variable for DM patients type 2 with a value and significance <0.05 which is considered significant and looked at the structural model of research using the Structural Equation Model with Amos 2.0 and SPSS 20 (IBM Corp).

Results and Discussion

Table 1 shows that the majority of women experience diabetes type 2 and more dominantly do not have complications such as hypertension and stroke. The average age of DM patients type 2 is the pre-elderly age with an average length of suffering from diabetes type 2 4 years 6 months. Meanwhile, blood sugar value when they were still in the abnormal category with the average value was 253.8 mg/dL and 62.6% of the patients were women with an average age of 50.5 years.

Table 1: Characteristics of respondents

Characteristics	Mean ± SD
Gender, n (%)	
Male	43 (37.4)
Female	72 (62.6)
Disease complications, n (%)	
No complications	63 (54.8)
There are complications	52 (45.2)
Ages, years (± up to)	50.5 ± 8.39
Long suffering from DM, years (± up to)	4.6 ± 3.40
Blood sugar while, mg/dL (± up to)	253.8 ± 43.86

DM: Diabetes mellitus, SD: Standard deviation.

The data in Table 2 show that all indicators or in this case the factors that build the variable self-care behavior and DMSE can be accepted or declared valid and reliable, because the test results show that all p values on each indicator are below the value of 0.05 (≤ 0.05) and the CR value on each indicator that builds self-care behavior and DMSE is above 0.07 (≥ 0.07). Another provision which also states that the indicators forming the variable self-care behavior and DMSE are declared valid and reliable is that all the loading factor values (standardized loading) are above 0.03 (> 0.03) so that all indicators are accepted and declared capable of measuring the variable self-care behavior and DMSE so that they will be included in the next full model test.

Table 2: Results of data test analysis (validity and reliability) variables of self-care behavior and diabetes self-management education

Variable	Standardized loading	CR	p*	Description
Self-care behavior → Knowledge	0.042	12.723	0.0001	Valid and reliable
Self-care behavior → Motivation	0.080	11.689	0.0001	Valid and reliable
Self-care behavior → Family support	0.079	12.644	0.0001	Valid and reliable
Self-care behavior → Self-efficacy	0.039	13.613	0.0001	Valid and reliable
DMSE → Treatment	0.398	4.555	0.0001	Valid and reliable
DMSE → Blood sugar control	0.438	5.142	0.0001	Valid and reliable
DMSE → Diet	0.275	4.004	0.0001	Valid and reliable
DMSE → Physical activity	0.400	5.153	0.0001	Valid and reliable
DMSE → Foot care	0.094	5.153	0.0001	Valid and reliable

DMSE: Diabetes self-management education.

Self-care behavior variables are formed by four factors, namely, knowledge, motivation, family

Table 3: Test results of regression weight

Variable	Estimate	p*	Description
Self-care behavior ← Knowledge	0.890	0.0001	Significant
Self-care behavior ← Motivation	0.828	0.0001	Significant
Self-care behavior ← Family support	0.849	0.0001	Significant
Self-care behavior ← Self-efficacy	0.784	0.0001	Significant
DMSE ← Treatment	0.755	0.0001	Significant
DMSE ← Blood sugar control	0.881	0.0001	Significant
DMSE ← Diet	0.609	0.0001	Significant
DMSE ← Physical activity	0.873	0.0001	Significant
DMSE ← Foot care	0.538	0.0001	Significant

DMSE: Diabetes self-management education.

support, and self-efficacy. From the four factors of the self-care behavior variable, information was obtained that all factors had a significant relationship with the formation of the patient's self-care behavior variable, and it was known that the knowledge factor was the most related factor or played a role in the formation of the patient's self-care behavior variable with $p=0.0001$ and the estimated value of the effect is 0.890 so that real and strong knowledge plays a role in forming selfcare behavior variables (Tabel 3).

The DMSE variable is formed by five factors, namely, medication, blood sugar control, diet, physical activity, and foot care. From the five factors of the DMSE variable, information is obtained that all factors have a significant relationship with the formation of the patient's DMSE variable, and it is known that the blood sugar controlling factor is the most related factor or plays a role in the formation of the patient's DMSE variable with p value (0.0001) and the estimated effect value is 0.981 so that controlling blood sugar significantly and strongly plays a role in forming the DMSE variable.

In Table 4, it can be seen that self-care behavior has a significant effect on DMSE of type 2 DM patients. To see the percentage of the effect is $R^2 = 0.475$, meaning that self-care behavior has an effect on DMSE by 47.5%, while the remaining 52, 5% is the influence of other variables not studied. The overall model validation value can be seen from the goodness of fit value obtained by 0.569 (tends to be moderate), so this value indicates a good fit between the model and the theory used, namely, the theory of Orem (Figure 1).

Table 4: Test results of research hypotheses

Relationship between variables	Estimate	SE	R2	t	p*
Self-care behavior → DMSE	0.569	0.196	0.475	2.900	0.0001

DMSE: Diabetes self-management education, SE: Standard error.

In this study, researchers have succeeded in developing components of self-care behavior for DM patients type 2, namely, knowledge, motivation, family support, and self-efficacy for DMSE. A DM patient has good self-care behavior if he has good knowledge about diabetes and its management, has a positive attitude, gets positive support from family and people around him, has a strong motivation to recover, and has good self-efficacy. The results of this study have proven what components form self-care behavior and how strong the relationship is with DMSE. The implementation of self-care behavior toward DMSE can play an important role in the management of diabetes type 2, including

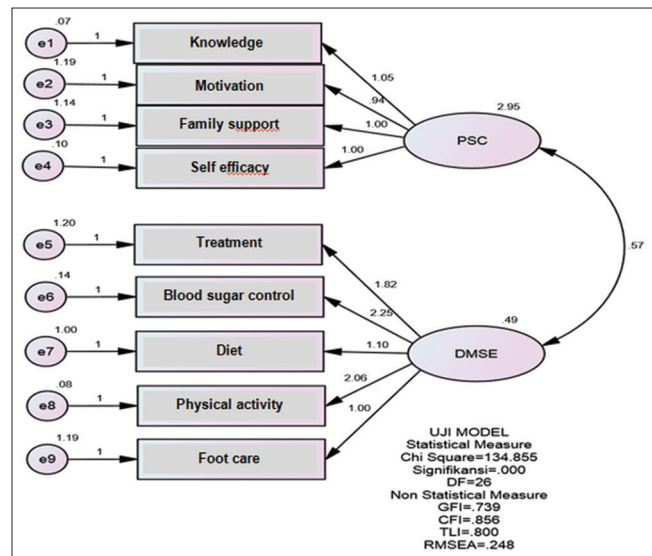


Figure 1: Path coefficient test

dietary regulation, physical activity/sports, monitoring blood sugar, compliance with medication consumption, and self/foot care [14].

Previous research stated that social support with patient self-care behavior showed a significant relationship so that DSME would be more effective for DM patients type 2 [12], [18]. Other studies have shown that DMSE affects knowledge and self-care behavior [19].

Conclusion

This study proves that DSME is influenced by the self-care behavior of DM patients type 2. The structural model produced in this study is able to explain more than half of the self-care behavior variables compared to other variables not studied. The knowledge factor is the most related factor or plays a role in the formation of self-care behavior variables for DM patients' type 2. This means that the greater the knowledge, motivation and self-efficacy of the patient, the better the self-care behavior and self-care management for type 2 DM patients. Therefore, the management of DM must be more active in providing education to sufferers so that their knowledge or family members can increase and understand how to do diabetes management properly.

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References

- Mosleh RS, Jarrar YB, Zyoud SH, Morisky DE. Factors related to diabetes self-care management behaviors among patients with Type II diabetes in Palestine. *J Appl Pharm Sci*. 2017;7(12):102-9. <https://doi.org/10.7324/JAPS.2017.71214>
- Salma N, Fadli F, Fattah AH. Dietary adherence relationship with fasting blood sugar levels in patients with diabetes mellitus Type 2. *J. Media Keperawatan*. 2020;11(1):102-7. <https://doi.org/10.32382/jmk.v11i1.1512>
- American Diabetes Association. Classification and diagnosis of diabetes. *Diabetes Care*. 2017;40(Suppl 1):S11-24. <https://doi.org/10.2337/dc17-S005>
PMid:27979889
- Shrivastava A, Phadnis S, Rao NK, Gore M. A study on knowledge and self-care practices about diabetes mellitus among patients with Type 2 diabetes mellitus attending selected tertiary healthcare facilities in coastal Karnataka. *Clin Epidemiol Glob Health*. 2020;8(3):689-92. <https://doi.org/10.1016/j.cegh.2020.01.003>
- Joyce B, Jane H. *Keperawatan Medikal Bedah: Manajemen Klinis Untuk Hasil Yang Diharapkan*. 8th ed. Singapore: Elsevier Pvt Ltd.; 2014.
- dos Santos Moura N, Lopes BB, Teixeira JJ, Oria MO, Vieira NF, Guedes MV, et al. Literacy in health and self-care in people with Type 2 diabetes mellitus. *Rev Bras Enferm*. 2019;72(3):700-6. <https://doi.org/10.1590/0034-7167-2018-0291>
PMid:31269135
- Saeedi P, Petersohna I, Salpeaa P, Malandaa B, Karuranga S, Unwinet N, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes ATLAS, 9th edition. *Diabetes Res Clin Pract*. 2019;157:107843. <https://doi.org/10.1016/j.diabres.2019.107843>
PMid:31518657
- Khan MA, Hashim MJ, King JK, Govender RD, Mustafa H, Al Kaabi J. Epidemiology of Type 2 diabetes-global burden of disease and forecasted trends. *J Epidemiol Glob Health*. 2020;10(1):107-11. <https://doi.org/10.2991/jegh.k.191028.001>
PMid:32175717
- Kementerian Kesehatan RI. Hasil Utama Riset Kesehatan Dasar Tahun 2018. Jakarta: Badan Penelitian dan Pengembangan Kesehatan; 2018.
- Widyoga RC, Saichudin S, Andiana O. Hubungan tingkat pengetahuan tentang penyakit diabetes melitus pada penderita terhadap pengaturan pola makan dan physical activity. *J Sport Sci Health*. 2020;2(2):152-61.
- Shrivastava SR, Shrivastava PS, Ramasamy J. Role of self-care in management of diabetes mellitus. *J Diabetes Metab Disord*. 2013;12(1):14. <https://doi.org/10.1186/2251-6581-12-14>
PMid:23497559
- Karimi F, Abedini S, Mohseni S. Self-care behavior of Type 2 diabetes mellitus patients in Bandar Abbas in 2015. *Electr Phys*. 2017;9(11):5863-7. <https://doi.org/10.19082/5863>
PMid:29403631
- Bintoro T, Putra MM, Made N, Yunica D. Illness Perception, Motivation, and Self-Care Behavior in Diabetic Patients," in the 5th International Conference on Public Health; 2019. p. 236.
- Hidayah M. The relationship between self-management behaviour and blood glucose level in diabetes mellitus Type 2 patient in pucang sewu health center, surabaya. *Amerta Nutr*. 2019;3(3):176-82.
- McGowan P. The efficacy of diabetes patient education and self-management education in Type 2 diabetes. *Can J Diabetes*. 2011;35(1):46-53. [https://doi.org/10.1016/S1499-2671\(11\)51008-1](https://doi.org/10.1016/S1499-2671(11)51008-1)
- Indradewi DP, Prihandhani AS, Ngurah AK. Hubungan manajemen diabetes dengan kejadian luka kaki pada pasien diabetes melitus Tipe 2. *J Community Publ Nurs*. 2019;8(1):73-8.
- Schmitt A, Gahr A, Hermanns N, Kulzer B, Huber J, Haak T. The Diabetes Self-Management Questionnaire (DSMQ): Development and evaluation of an instrument to assess diabetes self-care activities associated with glycaemic control. *J Health Qual Life Outcomes*. 2013;11(138):138. <https://doi.org/10.1186/1477-7525-11-138>
PMid:23937988
- Mohebi S, Parham M, Sharifirad G, Gharlipour Z, Mohammadbeigi A, Rajati F. Relationship between perceived social support and self-care behavior in Type 2 diabetics: A cross-sectional study. *J Educ Health Promot*. 2018;7:48. https://doi.org/10.4103/jehp.jehp_73_17
PMid:29693029
- Hailu FB, Moen A, Hjortdahl P. Diabetes Self-Management Education (DSME)-effect on knowledge, self-care behavior, and self-efficacy among Type 2 diabetes patients in Ethiopia: A controlled clinical trial. *Diabetes Metab Syndr Obes*. 2019;12:2489-99. <https://doi.org/10.2147/DMSO.S223123>
PMid:31819574