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The Relationship Between Patient Characteristics Diabetes Self-Care Management with Diabetic Peripheral Neuropathy in Type 2 DM Patients in Regional General Hospital in Indonesia

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ABSTRACT

One of the microvascular complications is loss of sensation in the leg area (peripheral neuropathy) which causes foot ulcers and the risk of amputation. The purpose of this study was to determine the relationship between patient characteristics and Diabetes Self-Care Management (DSCM) with Diabetic Peripheral Neuropathy (DPN) in type 2 diabetes mellitus patients in a regional public hospital in one of the provinces in Indonesia. This study used a correlative design with a cross-sectional approach to 154 patients with type 2 diabetes mellitus who were selected using a proportionate stratified random sampling technique. The data were obtained using a *Summary of* Diabetes Self-Care Activities and the Michigan Diabetic Neuropathy Score and analyzed using the Chi-square test and logistic regression. The results showed that age and duration of diabetes were the sub-variables of patient characteristics that were most associated with neuropathy in diabetic patients. Patients are expected to be able to do diabetes management regularly so that no more diabetes patients are injured due to a lack of self-management. Hospitals are expected to routinely carry out training and counseling for diabetic patients to prevent serious complications caused by peripheral neuropathy.

Keywords*:* Characteristics patient, Diabetes self-care management, Diabetic peripheral neuropathy.

INTRODUCTION

Diabetes Mellitus (DM) is a metabolic disease with characteristic hyperglycemia that occurs due to abnormalities in insulin secretion and insulin action. The World Health Organization (WHO) reports that the increase in the number of people with DM is one of the global health threats[1]. The International Diabetes Federation (IDF) divides diabetes into 3 types, namely type 1 diabetes, type 2 diabetes, and gestational diabetes. The most common DM experienced by patients is type 2 DM with a percentage of 90% of all DM cases[2] a disease no longer associated with affluence, is on the rise across the globe as reported in this 8th edition of the are significant: millions of people are being destroyed IDF Diabet by the current diabetes pandemic which substantiates es Atlas 2017. The indicators IDF's mission and rigorous

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efforts to provide solutions to this worldwide health crisis. Already for some time, diabetes and other noncommunicable diseases (NCDs**.** The number of people with DM in Indonesia in 2015 was 10 million people and in 2017 it increased to 10.3 million people, and it is predicted that this number will continue to increase to 16.7 million people in 2045[2]a disease no longer associated with affluence, is on the rise across the globe as reported in this 8th edition of the are significant: millions of people are being destroyed IDF Diabet by the current diabetes pandemic which substantiates es Atlas 2017. The indicators IDF's mission and rigorous efforts to provide solutions to this worldwide health crisis. Already for some time, diabetes and other noncommunicable diseases (NCDs. This high incidence rate makes Indonesia the sixth country with the highest number of DM sufferers after China, India, the USA, Brazil, and Mexico with an age range of DM sufferers between the ages of 20-79 years[2]a disease no longer associated with affluence, is on the rise across the globe as reported in this 8th edition of the are significant: millions of people are being destroyed IDF Diabet by the current diabetes pandemic which substantiates es Atlas 2017. The indicators IDF's mission and rigorous efforts to provide solutions to this worldwide health crisis. Already for some time, diabetes and other noncommunicable diseases (NCDs.

The most common diabetic neuropathy in DM patients is peripheral neuropathy. This damage affects the peripheral nerves, which are usually located in the lower limbs, namely the feet and lower legs[21]. The occurrence of diabetic neuropathy in DM patients is a symptom caused by dysfunctional peripheral nerves[3].

According to the International Diabetes Federation (IDF), the prevalence of DPN in DM patients ranges from 16-66%[3]. Research on the prevalence of risk factors for peripheral neuropathy conducted in India with a sample of 273 people, showed that more than 40% of DM patients had DPN based on the diabetic neuropathy symptoms (DNS) score[4].

The prevalence of DPN in African countries is 46% with the highest prevalence in West Africa and the lowest being in Central Africa[5]. Other studies also show that higher rates of neuropathy can be found in Southeast Asian countries, namely Malaysia (54.3%), the Philippines (58.0%), and Indonesia (58.0%)[6].

DSCM can control the patient's blood sugar levels to remain stable or normal. Good self-management in DM patients can reduce other complications due to DM. Good self-care can reduce morbidity and mortality caused by DM[7]. By carrying out the DSCM program independently and routinely by patients at home, it is possible to avoid complications, especially peripheral neuropathy which is the most complained of[8].

Existing literature review shows that research on the relationship between patient characteristics and diabetes self-care management has not been done much and indicates that it still needs to be done in Indonesia. This study aims to identify the relationship between patient characteristics and diabetes self-care management on diabetic peripheral neuropathy in type 2 diabetes mellitus patients in regional public hospitals in Indonesia.

METHOD

This quantitative research uses a correlative design with a cross-sectional approach. This research was conducted in one of the Regional General Hospitals in one of the westernmost provinces in Indonesia. The total number of respondents who were involved was 154 patients with type 2 diabetes mellitus who visited the outpatient polyclinic which was selected using a proportionate stratified random sampling technique.

Data were collected using three instruments, namely a demographic questionnaire, self-care management and diabetic peripheral neuropathy adapted from the Summary of Diabetes Self Care Activities-Revised (SDSCA) and Michigan Neuropathy Screening Instrument (MNSI) and a questionnaire (Michigan Diabetic Neuropathy Score

(MDNS) questionnaire. Before being used, the instrument was tested for content validity and then construct validity. The instrument used had a good level of reliability. Self-care management questions had a Cronbach alpha score of 0.96, and a neuropathy examination with a Cronbach alpha score of 0.70.

Questionnaires were distributed and answered directly by the respondent when the respondent was receiving treatment and then a physical examination was carried out by the researcher. The data that has been collected is then checked for completeness, processed, and analyzed using univariate, bivariate, and multivariate analysis.

Respondent involvement is voluntary. All respondents involved were explained about the research including the pros and cons of their involvement and asked to give written consent for their involvement in the research. A research ethics permit was obtained from the Ethics Committee of the Faculty of Nursing, Syiah Kuala University, Banda Aceh with Registration Number: 112004150722.

RESEARCH RESULT

Univariate analysis

Univariate Analysis Characteristics of research respondents can be seen in Table 1.

Table 1 shows that the average age of type 2 diabetes mellitus patients is > 65 years (55.8%), male (67.5%), long-suffering from DM (59.1%), has a history of disease comorbidities (79.9%), abnormal HBA1c values (80.5%).

Diabetes self-care management (DSCM)

Diabetes self-care management of research respondents can be seen in Table 2 below.

Table 2 shows that the diabetes self-care management surveyed on average had high self-care (87.0%), and as many as (13.0%) of diabetic patients had moderate results.

Diabetic Peripheral neuropathy (DPN)

Diabetes peripheral neuropathy of research respondents can be seen in Table 3..

Table 3 shows that the average Diabetic Peripheral neuropathy surveyed had moderate neuropathy (64.3%), and as many as (35.7%) of diabetic patients had low results.

The relationship between characteristics of patients and Diabetes Self-Care Management with Diabetic Peripheral Neuropathy

The relationship between characteristics of patients and diabetes self-care management with diabetic peripheral neuropathy can be seen in Table 4.

Table 1: Demographic Characteristics of Respondents

No.	*Patient Characteristics*	*f*	*%*
1.	Age		
	Young Adults	11	7,1
	Middle Adult	57	37,0
	Older Adults	86	55,8
2.	Gender		
	Male	104	67,5
	Female	50	32,5
3.	Long Suffering DM	13	8,4
	<1 year	50	32,5
	1 - 5 years	91	59,1
	>5 years		
4.	History of co-morbidities		
	Yes	123	79,9
	No	31	20,1
5.	HBA1c		
	Normal	30	19,5
	Abnormal	124	80,5

Tabel 2: Diabetes self-care management (DSCM)

No	*DSCM*	*f*	*%*
1.	Moderate	20	13,0
2.	Highw	134	87,0
Results		154	100,0

Tabel 3: Diabetic Peripheral Neuropathy (DPN)

No	*DPN*	*f*	*%*
1	Low	55	35,7
2	Moderate	99	64,3
Results		154	100,0

Table 4: Relationship between characteristics of patients and Diabetes Self-Care Management with Diabetic Peripheral Neuropathy

Variables	*DPN*				*Result*		*p-value*
	Low		*Moderate*				
f		*%*	*f*	*%*	*f*	*%*	
Age							
Young Adults	10	90,9	1	9,1	11	100,0	0,001
Middle Adult	40	70,2	17	29,8	57	100,0	
Older Adults	5	5,8	81	94,2	86	100,0	
Long Suffering DM							
<1 year	13	100,0	0	0	13	100,0	0,001
1-5 years	34	68,0	16	32,0	50	100,0	
>5 years	8	8,8	83	91,2	91	100,0	
History of co-morbidities							
Yes	28	22,8	95	77,2	123	100,0	0,001
No	27	87,1	4	12,9	31	100,0	
HBA1c							
Normal	26	86,7	4	13,3	30	100,0	0,001
Abnormal	29	23,4	95	64,3	124	100,0	

Table 4 shows that there is a significant relationship between age (p=0.001), duration of diabetes mellitus (p=0.001), history of comorbidities (p=0.001), and HBA1c (p=0.001) with diabetic peripheral neuropathy in type 2 diabetes mellitus patients in the hospital.

Multivariate analysis

Based on multivariate analysis with a logistic regression test, it was found that age was the most dominant sub-variable associated with DPN in type 2 DM patients with Odds Ratio (OR: 7,198)

DISCUSSION

Age is one index to describe the development of each individual[9]. The higher the age, the greater the possibility of neuropathy. Age 45 years is at risk for neuropathy. At the age of 45 years, body functions physiologically decline, this is due to a decrease in insulin secretion or resistance so that the ability of the body's functions to control high blood glucose is less than optimal[10]. Research by Hutapea[11] states that almost all ages who experience neuropathy the most are 45-65 years[12]. Other researchers also stated that the age range that experienced diabetic neuropathy was the most in the age range of 51 - 59 years by 52,7% [12].

Judging from the age that DPN usually occurs, namely in people with old age [13]. The results showed that from 154 elderly patients, 86 elderly patients had moderate DPN levels. The results of the analysis in this study indicate that there is a relationship between age and DPN in Type 2 DM patients at the Internal Medicine Polyclinic of Meuraxa Hospital, Banda Aceh City.

The results of this study are in line with research conducted by Amour[14]which frequently leads to amputation and/or disability and death. Data is scanty on the burden of diabetic peripheral neuropathy in Tanzania. The aim of this study was to assess the burden of peripheral neuropathy, its severity, and the associated factors. Methods. The study was a cross-sectional hospital-based study and was carried out from October 2017 to March 2018 among adolescent and adult patients attending Kilimanjaro Christian Medical Center (KCMC, which stated that the severity of neuropathy was associated with increasing age with a *p-value* <0.001. Most DM

patients with peripheral neuropathy are in the age group >60 years, namely 84.8%[14].

If it is reviewed in the field, the most experienced DPN is the elderly. Based on inspection[13] Based on the examination it is known that age over 60 years is associated with diabetic neuropathy. serious neuropathy only appears in the older age group. Similarly, the study of Popescu[15] stated that age is fundamentally closely related and turns into an autonomic component in the seriousness of neuropathy in DM patients. Age >60 years has the most serious risk for peripheral neuropathy. Increasing age affects the movement of peripheral neuropathy in patients with type 2 diabetes.

The duration of the disease can increase the risk of complications. The longer a person has DM, the greater the risk that will occur. A study stated that as many as 35-40% of DM patients had neuropathy with a duration of DM for more than 3 years and 70% in DM patients with a duration of 5 years[16]posing a major medical and economical threat. Identifying the extent of this problem and its risk factors will enable health providers to set up better prevention programs. Saudi National Diabetes Registry (SNDR.

Judging from the length of suffering from DM, DPN usually occurs in people with DM duration > 5 years [10]posing a major medical and economical threat. Identifying the extent of this problem and its risk factors will enable health providers to set up better prevention programs. Saudi National Diabetes Registry (SNDR. The results showed that of 154 patients who had suffered from DM > 5 years, 91 people (59.1 %) patients with DM > 5 years had moderate DPN levels. The results of the analysis in this study indicate that there is a relationship between the duration of suffering from DM and DPN in Type 2 DM patients at the Internal Medicine Polyclinic of Meuraxa Hospital, Banda Aceh City.

This result is relevant to a previous study by Trisnawati[17] which states that 64.6% of patients with long-term diabetic neuropathy have had diabetes for 5 years. The duration of experiencing DM is 5 years has the risk of developing diabetic neuropathy is 3.95 times higher than DM patients with DM duration <5 years. a study was also conducted by Tamer [18]to evaluate the role of history, neurological examination and the electrodiagnostic methods in the diagnosis of DSP, and to determine the association between electromyography-supported neuropathy (ESN in Turkey which examined the prevalence and risk factors for neuropathy in 191 DM patients and found a significant relationship between the duration of diabetes mellitus and diabetic neuropathy (OR = 1.010, 95% CI (1.004-1.015).

Based on the results of this study, the authors argue that the duration of suffering from DM > 5 years is one of the risk factors for neuropathy. The data from the study show that there is a relationship between an increase in the length of diabetes mellitus and the incidence of this neuropathy because chronic hyperglycemia makes a person have a high risk of complications, the longer a person suffers from DM with high blood glucose levels can weaken and damage the blood vessel walls resulting in damage and ultimately the patient did not realize that he had suffered trauma to the foot that caused the injury.

This is following the opinion of Ariani[19] adding that the prevalence of neuropathy increases along with increasing age and duration of the disease, so the researchers conclude that the longer a person is diagnosed with DM, the more at risk of complications so that if DM is not controlled properly, then the possibility of developing diabetes will increase. Complications such as diabetic foot ulcers can occur.

Based on the results of research that has been done, it is known that 99 patients (64.3%) had neuropathy in the moderate category and 55 patients (35.7%) had neuropathy in the mild category. Good self-care can reduce morbidity and mortality caused by DM[7]. By carrying out the DSCM program independently and

routinely by patients at home, it is possible to avoid complications, especially peripheral neuropathy which is the most complained of[8].

Based on the results of the study from the results of statistical tests, the most related factors obtained a p-value <0.05, namely age (p = 0.002) and duration of suffering from DM (p = 0.005) which means that there is a significant relationship between patient characteristics and diabetes self-care management. with diabetic peripheral neuropathy with values (OR = 7.198) and (OR = 5.298). The results of the analysis were then calculated using k=logistic regression with SPSS software, the results showed that age affected the incidence of neuropathy in DM patients as much as 7.198 times or 7 times.

CONCLUSION

Increasing age affects the incidence of neuropathy due to reduced sensitivity of the nerves in the legs resulting in a decrease in body function so that the control of high blood glucose is less than optimal and it will damage the nerves, especially in the peripheral nerves. Recognizing this problem, good self-management in diabetic patients is the most important thing in prevention efforts to minimize the risk of serious complications caused by neuropathy. Good family and health support to motivate patients to avoid the risk of complications can be in the form of readiness of officers to provide education and the availability of a special room for adequate consultation of diabetic patients as well as providing special training in early detection of neuropathy events can prevent the incidence from increasing.

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Ethical Clearance: The Ethical Clearance was obtained from the Research Ethics Committee of the Faculty of Nursing, Universitas Syiah Kuala, with research code 112004150722.

Limitations of the Research: This study only identified some characteristics of respondents such as age, gender, duration of suffering from DM, history of comorbidities, and the patient's HbA1c level. Other characteristics such as education, occupation, body mass index, and education were not analyzed.

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Conflict Of Interest: Nill

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