

FAKTOR-FAKTOR YANG BERHUBUNGAN DENGAN PREVALENSI DIABETIK NEUROPATI PERIFERAL (DPN) PADA PASIEN DM TIPE II DI INDONESIA

Associated Factors of The Prevalence of Peripheral Neuropathy Diabetic (DPN) Among DM Type II Patients in Indonesia

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Abstrak

Pendahuluan: Di Indonesia, prevalensi diabetes di Indonesia meningkat secara signifikan selama 5 tahun terakhir. DPN adalah komplikasi yang paling umum di antara pasien dengan DM tipe II sementara, hanya studi terbatas yang membahas topik terkait tentang intervensi untuk mengurangi rasa sakit. **Tujuan:** Tujuan penelitian ini adalah untuk mengukur efektivitas senam tangan dan kaki terhadap nyeri pada penderita DM Tipe II. **Metode:** Quasy Experiment dengan desain pre-post test melibatkan kelompok kontrol dan intervensi. Penelitian ini berlokasi di bangsal rawat inap dua rumah sakit di Indonesia yang terletak di daerah pinggiran kota. Dua kuesioner yang digunakan dalam penelitian ini adalah Instrumen Skrining Neuropati Michigan (MNSI) dan Skor Analog Visual (VAS). Visual Analog Score (VAS). Sebanyak 38 responden yang terbagi dalam jumlah yang sama pada kelompok intervensi dan kontrol dengan masing-masing 19 responden. **Hasil:** Rata-rata skala nyeri pada minggu ke-1 sampai minggu ke-8 pengukuran mengalami penurunan secara bertahap dari awal hingga akhir pada kelompok intervensi. Berdasarkan hasil Friedman Test terdapat pengaruh penerapan hand and foot exercise terhadap proses penurunan nyeri pasien neuropati perifer diabetik pada kelompok intervensi. **Simpulan:** Intervensi ini dapat diimplementasikan pada pasien DM Tipe II sebagai salah satu manajemen nyeri dalam setting klinis.

Abstract

Introduction. In Indonesia, the prevalence of diabetes in Indonesia increased significantly over the last 5 years. DPN was the most common complication among patient with type II DM whilst, only limited studies discussed related topic about intervention to reduce pain. **Aim.** This study objective was to measure the effectiveness of hands and feet exercise toward pain among patient with Type II DM. **Method.** A quasi-experiment of pre-post test design with a control and intervention group was applied in this study. This study located in inpatient ward of two hospitals in Indonesia located in suburban areas. Two questionnaires used in this study are Michigan Neuropathy Screening Instrument (MNSI) and Visual Analog Score (VAS). The Visual Analog Score (VAS). **Results.** A total of 38 respondents divided into the same number in intervention and control groups with each of them is 19 respondents. The average pain scale in the 1st to 8th week of measurement has decreased gradually from the beginning to the end among the intervention group. Based on the results of the Friedman Test there was an effect of applying hand and foot exercise in the process of reducing patient pain diabetic peripheral neuropathy among intervention group **Conclusion.** This intervention can be implemented among patients with Type II DM as one of pain management in clinical settings.

INTRODUCTION

Diabetes Mellitus (DM) is a type of non-communicable disease (PTM) which is currently a public health problem, every year the number of patients always increases in countries all over the world. DM is a heterogeneous group of disorders characterized by increased blood glucose levels or hyperglycemia. Hyperglycemia occurs because the body's ability to react to insulin decreases or the pancreas stops producing insulin (Brunner & Suddarth, 2015).

Hyperglycemia among patients with type II DM can occur due to several factors including genetics, lifestyle, and diet that lead to obesity (Katuuk, M. E., Sitorus, R., & Sukmarini, L. (2020). Patients with Diabetes Mellitus (DM) are at risk of experiencing acute and chronic complications. The most complication is diabetic neuropathy (Tarwoto, W., Taufiq, I., & Mulyati, L. (2016).

Patients with Type II DM requires medical supervision, providing education and self-care which is carried out on an ongoing basis as a prevention of complications (CDC,2020). People with Diabetic Neuropathy (DPN) will not realize injury because the wounds that occur in peripheral areas and can causing infection and tissue death (Morrison, S., Colberg, S. R., Parson, H. K., & Vinik, A. I. (2014). Nurses need to carry out prevention or treatment of extremities that experience DPN. The results from previous research mentioned that the risk factors for diabetic peripheral neuropathy in type II DM patients include old age, male sex, duration of suffering from DM, poor glycemic control, retinopathy, nephropathy, and risk factors for cardiovascular disease such as: obesity, overweight, hypertension, and dyslipidemia (Putri, R. N., & Waluyo, A. (2020).

Diabetic peripheral neuropathy / Diabetic Peripheral Neuropathy (DPN) is a major cause of morbidity and mortality in patients with diabetes mellitus which can predispose to ulcers and gangrene so that diabetic patients who experience complications of peripheral neuropathy have a low quality of life due to signs and symptoms experienced such as neuropathic pain, impaired mobility and impaired balance (Sartika, M., & Setiyowati, S. N. (2022). However, limited study describe associated factors of DPN therefore, researcher interested to explore the associated factors of the prevalence of DPN among patients with Type II DM.

METHOD

A descriptive statistic with cross-sectional study design was implemented in this study. A total of 89 respondents agreed to be participated in this research on June-December 2022 at the rural area in Indonesia. Inclusion criteria are patients with Type II DM living in targeted area and able to communicate both writing and reading. Exclusion criteria are respondents who have neurological disorders and illiterate. The instrument of *Michigan Neuropathy Screening Instrument* (MNSI) consist of 15 questions filled with yes and no answer was given to respondents. This questionnaire measure the symptoms of numbness or insensitivity to pain or temperature, for instance a feeling of tingling, burning, or prickling, sharp pain or cramps, loss of balance and coordination, loss of muscle tone in the extremities, swollen feet, and overly sensitive to pressure. In this study, data analyzed used SPSS Version 23 with univariate, bivariate (Chi Square) and multivariate with Logistic Regression.

RESULTS

Table 1. Demographic characteristics Patients with Type II DM in Rural Area in Indonesia (n=89)

Variables	Mean $\pm$ SD	f(%) / Min-Max
Age (years)	62.01 $\pm$ 10.3	39-83
39-50		14 (15.7)
51-69		46 (51.7)
>70		29 (32.6)
Gender		
Female		65 (73)
Male		24 (27)
Occupation		
Military service		55 (61.8)
Private employee		7 (7.9)
Retired Employee		13 (14.6)
Others		14 (15.7)
Education		
Elementary		55 (61.8)
Junior High		7 (7.9)
School		13 (14.6)
Senior High		14 (15.7)
School		
Higher Education		
Duration of Type II DM (years)		30 (33.7)
< 10		59 (66.3)
> 10		
Weight (kg)	64.49 $\pm$ 6.29	49-79
Height (cm)	163.02 $\pm$ 7.34	145-172

Body Mass Index (BMI)	24.41±3.25	
Normal (18.5-25)		54 (60.7)
Overweight (25.1-27)		18 (20.2)
Obesity (> 27)		17 (19.1)
Glucose Control		
Controlled		30 (33.7)
Uncontrolled		59 (66.3)
Health History of Cardiovascular (Hypertension, Obesity, Dyslipidemia)		
Yes		30 (33.7)
No		59 (66.3)
The incidence of Diabetic Peripheral Neuropathy (DPN)		
Yes (Score < 7)		30 (33.7)
No (Score > 7)		59 (66.3)

Table 1 it can be concluded that half of the respondents are aged 51-69 years old with an average of 62.01 (SD±10.3). The majority of the respondent is female (n: 65, 73%), work in military service (n: 55, 61.8%), and obtained the latest education in elementary school (n: 55, 61.8%). Based on clinical data, a lot of Type II DM patients are gained the disease for more than 10 years (n:59, 66.3%) and have normal Body Mass Index (BMI) (n: 54; 60.7%). A total of 59 patients (66.3%) had uncontrolled blood glucose, a health history of cardiovascular diseases) and not suffer from Diabetic Peripheral Neuropathy (DPN).

Table 2. The Association of Variables with Incidence of Diabetic Peripheral Neuropathy (DPN) (n=89)

Variables	Diabetic Peripheral Neuropathy		Chi Square (X ²)	P-value
	No	Yes		
Gender				
Female	17	13	20.26	0.000*
Male	7	52		
Duration of Type II DM (years)				
< 10	30	0	89	0.000*
>10	0	59		
Glucose Control				
Controlled	30	0	89	0.000*
Uncontrolled	0	59		
Health History				
	30	0	89	0.000*

Yes	0	59
No		

*Correlation is significant at the 0.01 level (2-tailed)

From the bivariate analysis Chi-Square in Table 2, it can be seen that gender, duration of Type II DM, glucose control, and health history had statistically significant correlation with the higher incidence of DPN compared to females (Table 2). The duration of Type II DM, glucose control, and health history had the same number of DPN incidences. A total of 59 patients with a period of Type II DM of more than 10 years, having uncontrolled blood glucose and with no health, history will get 89 times higher incidence of DPN incidence of Diabetic Peripheral Neuropathy (DPN) (p< 0.005). A total of 52 male patients diagnosed with Type II DM will get a 20.26 times.

Table 3. The Relationship of demographic characteristic with Incidence of Diabetic Peripheral Neuropathy (DPN) (n=89)

Variables	Incidence of Diabetic Peripheral Neuropathy (DPN)	
	r ^a	p-value
Age	0.25	0.01*
Occupation	-0.11	0.28
Education	-0.34	0.00*
IMT	0.05	0.34
Weight (kilogram)	-0.08	0.43
Height (cm)	0.45	0.00*

^a Pearson Correlation

*Correlation is significant at the 0.01 level (2-tailed)

There is a positive relationship between age (r: 0.25) height (0,45) with the incidence of DPN (p> 0.000) and it is a statistically significant result (Table 3).

Higher age indicates a higher incidence of DPN and the same with height, higher height will indicate a higher incidence of DPN. However, there is negative correlation (r: -0.34; p< 0.000) between education and DPN, therefore lower education means higher incidence of DPN and higher education means lower incidence of DPN

Table 4. Factors associated toward The Incidence of Diabetic Peripheral Neuropathy (DPN)

Variabel	β	SE	Wald	95% CI	p-value
Age	0.09	0.03	10.03	1.03-1.17	0.00*
Gender	3.02	0.7	18.56	5.18-80.72	0.00*
Education	-0.07	0.22	0.11	0.59-1.44	0.74
IMT	0.18	0.62	0.08	0.35-4.09	0.76

^a Logistic Regression

*Correlation is significant at the 0.01 level (2-tailed)

R² : 0.03 : 3%

In multivariate analysis of Logistic Regression, the researcher found that age (β : 0.09; 95% CI: 1.03-1.17) and gender (β : 3.02, 95% CI: 5.18-80.72) statistically significantly contribute to the incidence of DPN. Age and gender will impact 3% (R²: 0.03) of the total of DPN among patients with Type II DM.

DISCUSSION

The result of the study is similar to Tanhardjo, Pinzon, & Sari (2016) which states that the incidence of diabetic neuropathy is most experienced by men than women. However, in terms of self-care, women tend to pay more attention to appearance and self-care, maintaining health such as foot care, where good and routine foot care can reduce the risk of DPN (Gogia and Rao, 2017). Duration of DM will increase the higher risk of complications (HerreraRangel, et.al, 2014). This finding is consistent with a previous study (Mildawati, M., Diani, N., & Wahid, A. (2019). The risk of DM Type II complication will develop after 5 years of diagnosis and increases by 25%. Low glycemic control and dyslipidemia will increase the occurrence of diabetic neuropathy (Jaiswal et al., 2017). The results of the study are in line with research by Stanifer, et al (2016) which states that there is a relationship between hypertension and the incidence of complications of type II DM. Prevention of this worsening can be done by implementing diabetes management such as diet and physical activity according to the patient's ability.

Age and gender are the dominant or influential variables in the incidence of DPN in Type II DM. Ages 51 and above have a greater chance of DPN occurring than those aged 50 and under, and male sex is dominant for DPN compared to women. Similar research by Suyanto & Susanto, (2016) found that age is a risk factor that is not related to the incidence of DM neuropathy, complications of diabetes

mellitus with neuropathy can be experienced by diabetics of all ages. Based on the variables age and gender are the dominant variables physiologically it means that with increasing age there is a decrease in the function of the body's organs in managing glucose and a decrease in physical ability, whereas when viewed from a gender perspective the relationship between hormonal changes and the behavior of men and women is different in Addressing health care is also something that supports the results of this study

CONCLUSION

To reduce the incidence of DPN nurses, minimize the risk of several factors significantly influencing this disease. Patients with Type II DM with the possibility of DPN need clear and scheduled follow-up and treatment therefore will decrease the cases. Standardized treatment for instance hand and foot massage is an example.

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