

Effect Of Education In Preventing Diabetic Foot Ulcers To Compliance And Quality Of Life The Diabetic Patients.

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ABSTRACT

Objective of the research was to find out the influence of education in preventing foot ulcers on compliance in DM Type 2 patients. Material and Methods: the research used quasi-experimental method with pretest-posttest control group design. It was done at USU Hospital from July to August, 2019. The samples were 43 DM Type 2 patients in control and intervention group respectively, taken by using convenience sampling technique. The data were analyzed by using Wilcoxon statistic test. Result: the result showed that there was the influence of education in preventing diabetic foot ulcers ($p < 0.05$) on the level of patients' compliance. Conclusion: Education in preventing diabetic foot ulcers was done to increase compliance in DM patients to prevent more complication and to increase the quality of life the diabetic patients.

Keywords: Education, Compliance, Diabetic Foot Ulcers

Acknowledgments: The author thanks to Prof.DR.Runtung Sitepu as a Rector of Universitas Sumatera Utara, Setiawan, BSN.,MNS.,PhD as a Dean of Nursing Faculty Universitas Sumatera Utara who has given permission to do research.

Conflict of Interest: The authors have nothing to disclose.

INTRODUCTION

Diabetes mellitus (DM) is a collection of several disorders that occur due to an increase in blood glucose levels or hyperglycemia. Diabetes mellitus is also a collection of several symptoms that exist in a person which is caused by an increase in blood sugar levels due to an absolute or relative lack of insulin (Perkeni, 2015).

According to the results of the Basic Health Research (RISKESDAS) by the Ministry of Health, it shows that the prevalence of diabetes mellitus in Indonesia is 6.9%. Meanwhile, based on provinces in Indonesia, the highest prevalence of diabetes mellitus was found in Yogyakarta (2.6%). Then followed by DKI Jakarta (2.5%), North Sulawesi (2.4%) and East Kalimantan. Meanwhile, in North Sumatra, the prevalence of diabetes mellitus sufferers is 1.8% or around 160 thousand people.

Diabetic foot sores are often associated with decreased quality of life and are a direct cause of death in diabetics. Patients with diabetic foot injuries have a greater risk of experiencing myocardial infarction, stroke, premature death than those without a history of diabetic foot injuries (Brownrigg, 2012). Most cases of foot wounds are the result of the final manifestation of abnormalities in the form of peripheral neuropathy, people with diabetes mellitus have a risk of experiencing diabetic foot or foot wounds due to decreased sensitivity to the feet due to complications of diabetes mellitus in the form of peripheral neuropathy and angiopathy (Hinchcliffe et al. 2012). One of the vascular evaluation examinations used in people with diabetes mellitus who experience PAD is by measuring the value of the ankle brachial index (ABI) (Potier, 2011).

The key to diabetic foot wound management is prevention. Diabetic patients have a 25% risk of developing diabetic foot injuries (Singh, 2005). If there has been a diabetic foot wound, then the patient is at risk of amputation of the leg. Amputation of the foot is something to avoid in diabetic foot wound patients. In diabetic patients, 84% of amputations that are not caused by trauma are preceded by the occurrence of diabetic foot wounds (Brem, 2006), this condition has a 25 times greater risk of amputation than patients without mellitus drops (IDF, 2016).

For the prevention of diabetic foot wounds the key is education. Although this is specific to patients and families, medical personnel and professionals must first be educated so that they understand the nature of patient education. After mastering the educational items, they are then given the opportunity to provide effective education for patients and families.

MATERIALS & METHODS

This type of research used in this research is a quasi experiment. Quasi experimental design.

Sample

The sampling technique used was consecutive sampling. Inclusion criteria: 1). Patients diagnosed with diabetes mellitus, 2). Never received education about the prevention of diabetic foot wounds, 3). Duration of diabetes mellitus ≥ 5 years, 4). Do not experience cognitive impairment, 5). Able to communicate well verbally, 6). Able to read and write, while the exclusion criteria in this study were: 1). The patient had decreased consciousness during the study, patient 2). Have a diabetic foot wound, 3). Respiratory complications and 4). Heart.

The calculation of the number of samples uses the Power Analysis table with power $(1-\beta) = 0.80$, effect size $(\gamma) = 0.60$ and $\alpha = 0.05$. Obtained the number of samples in this study were 39 people. In an effort to anticipate the possibility of the selected subject or sample dropping out, it is necessary to increase the number of samples by 10% so that the sample size remains fulfilled so that the total sample is obtained 43 respondents. This is done so that researchers

get a large number of samples and can analyze existing samples and are representative of the study population.

Instrument

This study used several instruments, namely: a demographic characteristic questionnaire, a monitoring sheet for daily foot wound prevention activities, a monitoring sheet for the results of the ABI (ankle brachial index) measurement that was carried out to measure the mean value of blood vessel pressure in the patient's leg. The tools used are the Vascular Doppler brand Bistos HI-dop Model BT-200, 8 MHz ultrasound frequency, 1.5 V x 2 battery type (AA Type) and 60 gr Ultrasound Transmission Gel brand Bistos as well as 8.0 MHz Vascular Probe and vascular doppler which calibrated annually by BISTOS Co., Ltd Jakarta under license BISTOS Co., Ltd Seoul Korea. Furthermore, the tools needed are alcohol swabs, handsrub, tension meter and a comfortable atmosphere.

Intervention

The interventions carried out were the prevention of diabetic foot wounds, such as: 1). Diabetic foot gymnastics, 2). Maintain good diabetes management, such as: Controlling blood sugar levels, increasing physical activity and not smoking 3). Check feet every day, 4). Wash the feet 5). Using footwear suitable for diabetics, 6). Moisturizing feet with lotion, 7). Nail care, 8). Perform the first treatment when an injury occurs, 9). Avoid all activities that cause foot injuries.

Data collection

This research was conducted at the General Hospital of North Sumatra, Indonesia. This research process was carried out for 8 weeks. It took 2 weeks to identify the sample and 2 weeks to socialize the research by explaining the objectives of the implementation procedure and the benefits of the research. The time of this research was conducted at 09:00 WIB - 14:00 WIB at the Internal Medicine Department. Then after making a contract with the patient to make a visit to the patient's home for 3 weeks. Home visits were carried out to continue the intervention by teaching education on the prevention of diabetic foot wounds which has not yet been carried out in Internal Medicine Policies.

The stages in this research are as follows:

- 1) Pre-test
 - a. Fill in the respondent characteristic format
 - b. Measure blood pressure, measure glucose levels and measure ABI (ankle brachial index)
- 2) Intervention
 - a. Conduct education on the prevention of diabetic foot wounds
 - b. Education is carried out 30 minutes per session and one day is carried out as much as two sessions
- 3) Post-test
 - a. Observation of the monitoring sheet was carried out
 - c. Measure measures ABI (ankle brachial index)
 - d. Measurements were carried out every week after the respondents were educated on the prevention of diabetic foot wounds.

Data Analysis

Data analysis was tested using statistical methods. Bivariate analysis using t-independent. Bivariate analysis to determine the effect of diabetes foot wound prevention education on compliance with Type 2 diabetes. The significant v -value was $p < 0.05$.

Ethical Considerations

This research has been approved by the Ethics Commission of the Faculty of Nursing, University of North Sumatra and the researcher also asked the respondent's consent with the consent to provide information.

RESULT

Respondence's Characteristic

See in Table 1

Based on table 4.1 data on patient characteristics, it is known that at the time of the study the majority were female as many as 24 people (55.80%) for the intervention group and 28 people (65.11%) for the control group, the majority of respondents aged <60 years were 27 people (62.80%) for the intervention group and 28 people (34.99%) for the control group, the majority of the control and intervention groups had the same level of education, namely Diploma with a total of 15 people (34.90%), the majority of respondents had a history of DM < 10 years 27 people (37.20%) for the control group 25 people (58.10%), the majority of respondents had comorbid hypertension 25 people (53.50%) for the intervention group and 21 people in the control group (48.80%). For drug use, the majority of respondents used oral drugs for the intervention group with a total of 34 people (79%) and the intervention group 29 people (67%).

Bivariate Analysis Results

The Effect of Diabetes Foot Injury Prevention Education on Adherence in Type 2 DM Patients Before and After the Intervention in the Control Group and the **Intervention Group**

To assess compliance, measurements are taken indirectly (observation sheet) and directly by measuring the Ankle Brachial Index (ABI) before and after education.

Indirect compliance.

See in table 2

To measure adherence indirectly, monitoring was carried out using an activity observation sheet for diabetic foot wound prevention activities.

Diabetic foot wound prevention education had an effect on patient adherence seen from $p = 0.00$. with the highest odds ratio for the control group of 9,853 and the lowest score of 2,201. Whereas for the intervention group the lowest odds ratio was 0.48 and the highest was 0.175.

Direct compliance

Blood Circulation (ABI) Before Doing Diabetes Foot Wound Prevention Education (Pre Intervention) And After Diabetes Foot Wound Prevention Education (Post Intervention)

See in table 3

The results of the ABI (Ankle Brachial Index) analysis in diabetes mellitus patients before and after being given diabetes foot wound prevention education showed that in the intervention group before the intervention the mean ABI was 0.82 with a standard deviation (SD) of 0.02, where the lowest ABI was 0.77 and the highest was 0.85. . After the

intervention, the mean ABI value was 0.95, with a standard deviation (SD) of 0.08, where the lowest ABI was 0.77 and the highest was 1.11. Whereas in the control group that was not intervened, the mean value was 0.82, the standard deviation (SD) was 0.02, where the lowest ABI was 0.77 and the highest was 0.85, and after that the mean value was 0.91, standard deviation (SD) 0.06, where the lowest ABI was 0.81 and the highest was 1.00.

DISCUSSION

The results showed that respondents who suffered from diabetes mellitus varied where in the intervention group the majority of respondents aged <60 years were 27 people (62.80%) and 28 people (34.99%) for the control group. The older the person, the lower the organ function of the human body. The physiological function of the organs of the body decreases. Age can increase and decrease susceptibility to a disease (Potter, Perry, Stockert & Hall, 2016). The changes that occur in the body include molecular and circular changes in organ systems as well as the body's ability to function adequately against disease. In old age there is a decline in the immune system associated with aging. As a person ages, their body's defenses against foreign organisms decrease. This makes their bodies more susceptible to suffering from various diseases.

An epidemiological study showed results similar to this study. The results of this study are in line with the research conducted by Suman, et al., (2014) that 58% of patients with type II diabetes mellitus who have an age of > 60 years and 42% of patients with type II diabetes mellitus aged <60 years. So it can be concluded that those aged > 60 years are more at risk of developing type II diabetes mellitus.

Gender

In this study, it was found that there was a significant difference in the proportion between the sexes in patients with type II diabetes mellitus. The majority of respondents were female as many as 24 people (55.80%) for the intervention group and 28 people (65.11%). This is because the proportion of respondents in the study was more women than men. More female respondents visited the Internal Medicine Department than male respondents. In theory, male gender is influenced by the hormone testosterone which stimulates lipolysis in adipose tissue. Testosterone levels can lead to obesity in the stomach and insulin resistance and is a risk factor for type 2 diabetes, so insulin is more sensitive to changes in testosterone. (Arnetz, Ekber, and Alvarso, 2014). Meanwhile, Smeltzer and Bare (2010) cases of diabetes mellitus are more common in men than women, but changes in blood glucose levels are also influenced by other factors such as diet and weight control and exercise.

Education

Based on the level of education of the respondents, the majority of respondents had high school education with 33 people (76.70%) for the intervention group and 27 people (62.80%) for the control group. Fattahi, Barati, Bashirian and Moghadam (2014) in their research stated that the level of education is related to attitude and self-confidence which is an important strategy for increasing physical activity. It can be concluded that the level of education can be one of the factors to increase motivation in doing physical activity as a way of managing non-pharmacological diabetes mellitus.

Long Suffering

Length of suffering from diabetes mellitus, the majority of respondents had a history of diabetes mellitus <10 years 27 people (37.20%) for the control group 25 people (58.10%), the majority of respondents had hypertension comorbidities 25 people (53.50%) for the intervention group and the control group 21 people (48.80%). This shows that most of the respondents have not suffered from diabetes mellitus for too long, so that the management of the disease quickly and accurately can prevent the risk of further complications from occurring. Black and Hawks (2014) state that the length of time a patient has suffered from diabetic foot wounds is one of the factors that can affect and exacerbate the disruption of peripheral blood circulation. The length of time suffering from diabetes will affect the blood viscosity which continues to increase due to high levels of glucose which causes thickening of the capillary membrane, where erythrocytes, platelets and leukocytes attach to the lumen of blood vessels which have the potential to become leg wounds, or interfere with circulation.

Drug Use

For drug use, the majority of respondents used oral drugs for the intervention group with a total of 34 people (79%) and the intervention group 29 people (67%). According to Plotnikoff (2006), DM management can be done through diet, exercise (exercise), medication, and continuous counseling and guiding DM sufferers so that DM patients become independent. The balance between diet, exercise, medicine and education is very important. Because a diet that suits your needs, adherence to taking medication, and accompanied by regular exercise will help take glucose in the blood by the muscles that are active during exercise. Lamkang, Aruna, and Gowri (2017), explain to manage diabetes mellitus with peripheral arterial circulation disorders. One of them is with proven effective pharmacological management focusing on anti-platelet, anti-coagulation, antibiotics in addition to revascularization procedures such as angioplasty, blood vessel bypass branching.

According to Ndraha (2014) some blood sugar drugs have several therapeutic effects, including lowering blood glucose levels by inhibiting liver glucose production and reducing insulin resistance, especially in the liver and muscles. Blood sugar drugs also decrease glucose absorption in the intestine and increase insulin sensitivity through the effect of increasing glucose uptake in the periphery. The effect of blood sugar drugs on the fluidity of the plasma membrane, plasticity of receptors and transporters, suppression of the mitochondrial respiratory chain, increased insulin stimulated receptor phosphorylation and tyrosine kinase activity, stimulated translocation of GLUT4 transporter, and metabolic enzymatic effects. Apart from controlling glycemic blood sugar drugs can also function to improve endothelial dysfunction, hemostasis, oxidative stress, insulin resistance, lipid profile and fat redistribution.

Compliance with Type II DM Patients before Education on Diabetes Foot Wound Prevention is Conducted

To measure the compliance of respondents by measuring the ABI value before the intervention was carried out, it showed that in the intervention group before the intervention, the mean ABI was 0.82 with a standard deviation (SD) of 0.02, where the lowest ABI was 0.77 and the highest was 0.85. Whereas in the control group the mean value was 0.82, standard deviation (SD) 0.02, where the lowest ABI was 0.77 and the highest was 0.85.

Suandika Monami's research (2015) found that the average ABI value after a short educational education on the prevention of diabetic foot wounds was 0.83 (SD 0.07).

Compliance with Type II DM Patients After Education on Diabetes Foot Injury Prevention is Conducted

Based on the results of research on diabetes foot wound prevention education on patient compliance levels seen from the monitoring sheet with a value of $p = 0.00$. with the highest odds ratio for the control group of 9,853 and the lowest score of 2,201. Whereas for the intervention group the lowest odds ratio was 0.48 and the highest was 0.175. Vyas (2015) states that patient adherence in carrying out treatment and foot care shows a significant value with a good level of compliance with 242 respondents (96.41%), moderate 7 respondents (2.78%) and poor 2 respondents (0.79%)) (SD ± 0.639) with an value of $p = 0.001$.

After the intervention, the mean ABI value was 0.95, with a standard deviation (SD) of 0.08, where the lowest ABI was 0.77 and the highest was 1.11. In the control group, the mean value was 0.91, standard deviation (SD) 0.06, where the lowest ABI was 0.81 and the highest was 1.00. Fatmasari's research (2019) shows that the average ABI value after the intervention of Diabetes Self-Management Education (DSME) in combination with diabetic foot exercises is 1.89 with the highest value and the lowest value is 0.89 standard deviation (SD) 0.07.

Health education is the process of providing information that can improve cognitive, affective and psychomotor aspects in a better direction. Health education is a process that takes place continuously so that the target of education is to change behavior and improve the quality of life of patients.

Compliance with Type II DM Patients Before and After Education on the Prevention of Diabetes Foot Wounds.

The results of the Wilcoxon signed ranks test analysis. The results of the ABI (Ankle Brachial Index) analysis in diabetes mellitus patients before and after being given diabetes foot wound prevention education showed that in the intervention group before the intervention the mean ABI was 0.82 with a standard deviation (SD) of 0.02, where the lowest ABI was 0.77 and the highest was 0.85. . After the intervention, the mean ABI value was 0.95, with a standard deviation (SD) of 0.08, where the lowest ABI was 0.77 and the highest was 1.11. Whereas in the control group that was not intervened, the mean value was 0.82, the standard deviation (SD) was 0.02, where the lowest ABI was 0.77 and the highest was 0.85, and after that the mean value was 0.91, standard deviation (SD) 0.06, where the lowest ABI was 0.81 and the highest was 1.00. Research conducted by Marumo (2016) stated that the ABI value experienced after training with a correlation coefficient value of 0.232 with $p < 0.05$.

Dietary unpleasant factors, lack of understanding of diet, benefits of physical exercise, advanced age, physical limitations, wrong understanding of the benefits of drugs, and failure to adhere to taking medication for economic reasons cause non-adherence to diabetes in the management of DM. Health education for people with diabetes mellitus is important in monitoring the blood sugar of people with diabetes and preventing chronic complications, both microangiopathy and macroangiopathy. Chronic complications usually occur within 5 to 10 years after diagnosis.

Low adherence to prevention of foot wounds in people with diabetes mellitus is due to the lack of knowledge and low information they get about the rules and how to do good diabetic

foot wound prevention. Communication of health workers through education on prevention of diabetic foot wounds in the form of lectures can increase diabetes patient compliance. The more often someone receives counseling, the better their behavior will be. Diabetic clients need to get information about the understanding of DM, especially the prevention of diabetic foot wounds. Adherence to the prevention of diabetic foot injury is important in the management of DM patients to be able to increase blood sugar levels in order to improve quality of life.

CONCLUSION

This study concludes that there is a significant effect of diabetes foot wound prevention education on patient adherence, either directly by assessing the ABI (ankle brachial index) or indirectly by using daily observation sheets with patients. So that research can be applied by nurses to prevent diabetic foot wounds and patients can avoid diabetic foot injuries so that it can improve the patient's quality of life.

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RESEARCH HIGHLIGHTS

The education of prevention foot ulcers can be used as an intervention for nurses, especially in endocrine disciplines and community nursing, so as to improve the quality of life of the patients and prevent of diabetic foot ulcers.

TABLE
Table 1. Respondence's Characteristic (n=53)

No	Group	Intervention		Control	
		n	%	n	%
1	Gender				
	Male	19	44,20	15	34,90
	female	24	55,80	28	65,10
2	Age				
	<60 Years Old	16	37,20	15	65,10
	>60 Years Old	27	62,80	18	34,90
3	Graduated				
	Junior High School	4	9,3	9	20,9
	Senior High School	12	27,9	13	30,2
	Diploma	15	34,9	15	34,9
	Bachelor	12	27,9	6	14,0
4	Lenght of Suffer Diabetes Mellitus				
	<10 Years	27	37,20	25	58,10
	>10 Years	16	62,80	18	41,90
5	Comorbid				
	Hypertention	23	53,50	21	48,80
	Cronic Kidney Disease	4	9,30	7	16,30
	Hearth Disease	3	7,00	3	7,00
	Other	13	30,20	12	27,90
6	Drug used				
	Oral	34	79	29	67
	Injection	9	21	14	33

Table 2. The results of the statistical test of the respondent's observation sheet

No	Variable	<i>P value</i>	Exp B (OR)	95% CI for Exp (B)	
				Lower	Upper
	Observation sheet				
	Control Group		4.656	2.201	9.853
	Intervention Group	0,00	0.92	0.175	0.48

Table 3. Blood Circulation (ABI) Before Education was given to Prevent Diabetic Foot Wounds (Pre-Intervention) and After Education on Prevention of Diabetic Foot Wounds (Post Intervention) was given at the Internal Medicine Clinic, University of North Sumatra Hospital.

ABI	Intervention Group (N=43)				Control Group (N=43)			
	Mean	SD	Min	Max	Mean	SD	Min	Max
Pretest	0.82	0.02	0.77	0.85	0.82	0.02	0.77	0.85
Posttest	0.95	0.08	0.77	1.11	0.91	0.06	0.81	1.00
<i>p-value</i>	0.000				0.100			