B-ICON Proceeding

Proceeding Paper

THE EFFECT OF COMBINATION OF LEG EXERCISE AND FOOT THERAPY USING TENNIS BALL ON THE FOOT SENSITIVITY OF PATIENTS WITH DIABETES MELLITUS IN THE WORKING AREA OF PUSKESMAS SAWAH LEBAR BENGKULU CITY IN 2023

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Abstract

Diabetes Mellitus (DM) is a chronic metabolic disease characterized by hyperglycemia. The high prevalence of diabetes causes a risk of peripheral neuropathy, 90% of DM sufferers have neuropathy and 50% have peripheral neuropathy. With more than 10 million people living with diabetes, Indonesia has a prevalence rate of 6.2%. The prevalence of DM in the Bengkulu City area is 2,369 people and based on data obtained at the Sawah Lebar Community Health Center in Bengkulu City in 2021 there are 296 people. The purpose was to determine whether there was an effect of a combination of leg exercises and foot therapy using a tennis ball on the sensitivity of the feet of people with diabetes mellitus. This type of research uses a quasi-experimental design technique using a pre-post-test design with a control group. With a research sample of 40 respondents who were divided into intervention group and control. Analysis using the Wilcoxon test $\alpha < 0.05$ to see if there is a difference in the average sensitivity of the feet before and after the intervention is given. Then the Mann Whitney U Test was carried out with $\alpha < 0.05$ to assess whether there was a difference in the average sensitivity of the feet after. The results showed that the average sensitivity of the feet after the combined intervention of leg exercises and foot therapy using a tennis ball was 9.05 with a p value of 0.000 <0.05, which means that there was an effect of increasing foot sensitivity after being given the intervention.

Keywords: Diabetes, Leg Exercise, Foot Therapy Balls, Sensitivity

Presented at The 3rd Bengkulu International Conference on Health (B-ICON), Bengkulu-Indonesia, September 12-14th, 2023

Published: December 2nd, 2023

ISSN : 2986-027X

INTRODUCTION

According to the World Health Organization (WHO), diabetes mellitus (DM) is a chronic metabolic disease characterized by hyperglycemia with abnormal protein, lipid and carbohydrate metabolism. The International Diabetes Federation (IDF) has identified data containing 10 countries with the world's highest prevalence of diabetes. From the results of the data, it was found that the highest prevalence was occupied by China, India and the United States, while Indonesia was ranked 7th out of 10 countries which had DM sufferers reaching 10.7 million. Indonesia is the only Southeast Asian country that is included in the list of countries with the world's highest diabetes rate. Riskesdas results (2018) the number of diabetics with a doctor's diagnosis is 1.26% or 12,322 people. The prevalence of diabetes in several provinces in Indonesia, such as DKI Jakarta is 3.44%, East Kalimantan and DI Yogyakarta is 3.1% while the prevalence in Bengkulu city is 1.77% or 2,369 people. Data from the Bengkulu Health Service (2021) shows that diabetes mellitus cases in the Bengkulu city area are quite high, namely 806 cases, with a case prevalence of 487 cases in women and 319 cases in man.

In general patients with diabetes mellitus are at great risk for complications caused by diabetes in the form of acute and chronic complications. Acute complications of diabetes such as non-ketotic hyperosmolar coma, ketoacidosis and hyperglycemia while chronic complications include macrovascular and microvascular complications. Macrovascular complications such as stroke and microvascular complications include leg complications, nephropathy, neuropathy, complications and diabetic nephropathy (Setiawan, 2019).

Peripheral neuropathy is a type of neuropathy that occurs frequently in diabetic patients with an incidence rate of 50% of the global incidence, which is characterized by the initial common symptoms that sufferers often feel, namely pain with a sensation such as pain or burning, cold feet and a feeling of being stabbed and symptoms Other clinical features that often occur are lack of sensitivity to temperature sensation, pain protection and touch vibration. The occurrence of peripheral neuropathy raises the risk of injury, especially in the leg area which causes gangrene in the feet so that there is a risk of amputation of tissue that is experiencing necrosis (Setiawan, 2019) so that it can cause ineffective peripheral perfusion nursing problems

Exercise therapy on the feet can reduce sensory peripheral neuropathy by increasing microvascular function and fat oxidation by reducing oxidative stress and increasing neutrophic factors. Netroufin aids in the survival and differentiation of existing neurons to promote the growth of new synapses and neurons. In addition, during exercise there is a decrease in oxygen in the tissues which causes arteriolar dilation in the muscles, where the muscles consume

oxygen quickly during exercise and the amount of oxygen decreases in the tissues so that the walls of the arterioles cannot contract and lack of oxygen which causes the release of vasodilators. Release of vasodilators causes local arteriolar vasodilation so that all capillaries open and blood flow increases (Sukartini, 2020).

According to Setiawan (2019) states that the stimulation given during reflexology activities relaxes and improves blood circulation, because giving massage stimulation related to the pancreas at nerve points causes the pancreas to become more active so that it can increase insulin productivity which can reduce blood glucose levels. Foot exercises using a tennis ball done 3 times a week can improve the condition of the feet because there is movement and stimulation at the points of the feet so that the temperature of the tips of the fingers and toes which were originally cold become warmer, which were originally stiff become more flexible, reduce atrophy and numbness due to an increase in blood circulation in the peripheral area so that circulation becomes smooth (Setiawan, 2019).

MATERIALS AND METHODS

This type of research was carried out using quantitative research, a quasi-experimental design using a pre-post-test with the intervention and control groups. This study involved an intervention group and a control group. The intervention group will be given treatment in the form of leg exercises and foot therapy using a tennis ball, while the control group will be given ROM exercises as a comparison. Monofilament test scores were measured before and after the intervention was given. The work area of the Sawah Lebar Public Health Center in Bengkulu City is because this Puskesmas is a Puskesmas which has a high prevalence of diabetes mellitus patients throughout Bengkulu City. The instrument for measuring the sensitivity score of the foot uses the monofilament scoring test and the tools for measuring sensitivity are the monofilament test and a tennis ball.

RESULTS AND DISCUSSION

This type of research was carried out using quantitative research, a quasi-experimental design using a pre-post-test with the intervention and control groups. This study involved an intervention group and a control group. The intervention group will be given treatment in the form of leg exercises and foot therapy using a tennis ball, while the control group will be given ROM exercises as a comparison. Monofilament test scores were measured before and after the intervention was given.

The work area of the Sawah Lebar Public Health Center in Bengkulu City is because this Puskesmas is a Puskesmas which has a high prevalence of diabetes mellitus patients throughout Bengkulu City. The time of the research will be carried out from 14 March 2022 to 14 May 2023. The instrument for measuring the sensitivity score of the foot uses the monofilament scoring test and the tools for measuring sensitivity are the monofilament test and a tennis ball.

Table 1: Respondent Age Frequency Distribution In the Sawah Lebar Community Health Center in Bengkulu City in 2023

	Karakteristik	Intervention	Control
Age	Mean	55.00	51.05
	Median	59	54.50
	Min-Maks	35-70	35-60

Table 2: Frequency Distribution of Respondents' Body Mass Index (BMI). In the Sawah Lebar Community Health Center in Bengkulu City in 2023

	Karakteristik	Intervention	Control
BMI	Mean	24.20	22.45
	Median	24.50	22.50
	Min-Maks	16-30	15-27

Table 3: Frequency Distribution of Respondents' Blood Glucose Levels In the Sawah Lebar Community Health Center in Bengkulu City in 2023

	Karakteristik	Intervention	Control
Current Blood Sugar	Mean	214.40	204.75
	Median	202	205.50
	Min-Maks	171-275	163-280

Table 4: Distribution of Respondents' Sports Frequency In the Sawah Lebar Community Health Center in Bengkulu City in 2023

	Karakteristik	Intervention	Control
Sport	1. No Sport	14 (70%)	15 (75%)
	2. Sport	6 (30%)	5 (25%)

Table 5: Frequency Distribution of Old Suffering and Respondents In the Sawah Lebar Community Health Center in Bengkulu City in 2023

	Karakteristik	Intervention	Control
Long Suffering from DM	< 1 tahun	0 (0%)	0 (0%)
	1-2 tahun	4 (20%)	3(15%)
	>2 tahun	16 (80%)	17 (85%)

Based on table, the average age of respondents in the intervention group was 55 years with an age range of 35-70 years. While the mean age in the control group was 51.05 with an age range of 35-60 years. The body mass index (BMI) of the study respondents in the intervention group averaged 24.20 in the range of 16 to 30. In the control group, it had an average of 22.45 with a minimum of 15 and a maximum of 27, which means that the average BMI in DM patients who have decreased leg sensitivity is 24.20.

Blood glucose levels in these respondents had an average of 214.4 mg/dl and werevulnerable to 171-275 mg/dl in the intervention group while those in the control group obtained an average of 204.75 mg/dl and were vulnerable to 163-280 mg/dl. The duration of diabetes for each respondent in this study was different, but most of them had diabetes for >2 years. in the intervention group with a percentage of 80% and in the control group with a percentage of 85%.The results of the analysis in the intervention group were mostly 70% did not exercise and in the control group 75% did not exercise.The duration of diabetes for each respondent in this study was different, but most of themhad diabetes for >2 years. in the intervention group with a percentage of 80% and in the control groupwith a percentage of 85%.

Table 6 : Distribution of Mean Foot Sensitivity in Patients with Diabetes Mellitusin the Working Area of the Sawah Lebar Health Center in 2023

Variable	Intervention	Control
Foot Sensitivity Pre-Post		
Mean	7.90	7.80
Median	8	8.00
SD	0.641	0.616
SE	0.143	0.138
Min-Max	7-9	7-9
Foot Sensitivity Post Test		
Mean	9.05	8.05
Median	9.00	8.00
SD	0.349	0.605
SE	0.88	0.135
Min-Max	8-10	7-9

The results of this study showed that the average value of respondents' foot sensitivity before the intervention was 7.90 and after the intervention increased to 9.05, which indicates that there was an average increase in foot sensitivity of 1.15. This is in line with Trisnawati's research (2020) on DM sufferers with decreased foot sensitivity which informs that the foot sensitivity of DM sufferers will decrease by 20% to more per year depending on each individual. Another

study from Rahman (2021) states that the part of the foot that is prone to loss of foot sensitivity is the middle part of the foot, of which 20 respondents lost foot sensitivity.

Meanwhile, in the control group, the average value of the sensitivity of the respondent's feet beforethe intervention was 7.80 and after the intervention increased to 8.05 which showed that there was an average increase in the sensitivity of the feet of 0.25. In a study conducted by Putriyani (2020) it was found that before doing range training of motion (ROM) is active, some research respondents have a moderate level of leg sensitivity. Whereas after doing the range of motion (ROM) showed an increase.This is in line with research conducted by Intan (2018) that from the results of the study it was found that range of motion (ROM) has an effect on reducing the risk of diabetic ulcers caused by decreased sensitivity of the feet, this occurs due to an increase in blood circulation of the lower extremities.

Table 7 : Effect of a combination of leg exercises and foot therapy using tennis balls on foot sensitivity in sufferers Diabetes Mellitus in the Health Center Work Area Bengkulu City in 2023

Variable	Mean	Min-Max	SD	SE	p Value
Sensitivitas Kaki					
Intervention	9.05	7-9	0.394	0.088	0.000
Control	8.05	8-10	0.605	0.135	

Based on table 7, it is known that the results of the Mann-Withney U Test statistic show a p value of 0.000 (p value <0.05), which means that there is an effect of a combination of leg exercises and foottherapy using a tennis ball on foot sensitivity in people with diabetes mellitus in the working area of the Sawah Lebar City Health Center Bengkulu City in 2023

CONCLUSION

In this study, it was found that there was an effect of a combination of leg exercises and foot therapy using a tennis ball on the sensitivity of the feet of people with diabetes mellitus in the working area of the Sawah Lebar Health Center, Bengkulu City. The results of the analysis found that in the intervention group the p value was 0.000 <0.05, which means that there was an influence and there were differences in the value of foot sensitivity between the intervention group and the control group. In the intervention group, there was an increase in foot sensitivity before and after being given treatment. foot sensitivity is 1.15 of the average respondent's foot sensitivity is 7.90 to 9.05.

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