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Diabetic Gymnastics can Reduces The Risk of Diabetic Ulcers in Patient with Type 2 Diabetic

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Abstract

Background: Diabetes mellitus occurs due to impaired insulin secretion, insulin work and both are called a group of metabolic diseases. Diabetic gymnastics is a relaxation gymnastic that focuses on the rhythmic motion of muscles, vasculars, joints and nerves. Diabetic ulcers are wounds that open up the skin layer and get to the dermis area.
Objectives: to determine the effect of diabetic gymnastics exercises on the risk of diabetic ulcers in patients with type 2 diabetes mellitus.
Methods: Design in this study using pre *experimental* using the design of One group *pre-post test design*. This study sampled as many as 20 respondents using *total sampling* techniques. The instruments used are observation sheets and *in low's 60-Second Diabetic Foot Screen Screening Tool.* Using *Shapiro-Wilk* static test.
Results: before the action that experienced the risk of diabetic foot ulcers the most moderate category is 18 respondents (90%), and after the action of the most low category is 18 respondents (90%). Statistic test result obtained p-value value 0.000 < α (0.05).
Conclusion: there is an effect of diabetic gymnastics exercises on the risk of diabetic ulcers in patients with type 2 diabetes mellitus.
Keywords: diabetes mellitus, diabetic ulcers, diabetic gymnastics.

Introduction

There is information that there is a group of diseases that cause symptoms such as hyperglycemia and insulin secretion disorders, and in general, people know the disease by the term diabetes mellitus (DM).[1] Then, explain that in DM there are several types, including the first type, the second type, another specific type, and the gestational type.[2]

It is known that DM can be experienced by individuals or a person there is an increase in glucose levels in the blood. The increase in glucose levels can occur because it is influenced by a progressive decrease in insulin secretion but is initiated by insulin resistance conditions. To reduce glucose levels in the blood, it is known that there is one of the sports activities, namely diabetic gymnastics that has been shown to provide a decrease in glucose or sugar levels in the blood.[3]

In diabetic gymnastics, there is a set of movements that focus on movements that cause reactions to muscles, joints, vascular, and nerves, such as when performing stretching movements and relaxation movements.[4] It is known that every movement in diabetic gymnastics, derived from

the movement contained in pulmonary heart endurance exercises so that almost all movements in gymnastics focus on the movements that maintain the balance of the right and left muscles.[5]

Based on the information, it is known that diabetic gymnastics should be done quite intensely, which is about 3 to 5 times each week. Preferably, in doing gymnastics activity does not need to be done every day and with a maximum duration of about 30 minutes. In addition, in diabetic gymnastics activities, there are a set of movements that are easy to do so that the gymnastics can be followed by DM sufferers with various age groups.[6]

There is a management that is usually done to provide prevention of disease complications for patients with DM, namely through the help of drug administration such as insulin and oral medicine, in addition to self-action, such as through physical exercise.[7] It is known that diabetic gymnastics activities for DM sufferers have a long-term goal, especially to prevent problems in blood vessels.

It is known that the number of DM sufferers continues to increase. This is supported by a statement from the World Organization (WHO) that provides information that in 2014 there is 422 million patient and WHO predicts that by 2035 there will likely be an increase in DM sufferers to as many as 592 million.[8] Then based on information from the Ministry of Health, it is known that the victims who died from DM and complications caused by DM reached 41,590 fatalities.[9] Based on data from RSAL Dr. mintohardjo (2019), it is known that patients suffering from DM reached 402 people, including patients with insulin-dependent DM, patients with DM who are not dependent on insulin, patients with dm that has been determined, and patients with undetermined DM, and dm sufferers who suffer from malnutrition

From the results of the study, it was known that there were differences in risk related to diabetic foot ulcers before and after active FOOT ROM in the treatment group with the control group.[10] Then from the results of the study obtained information that there is an influence derived from Diabetes Self Management *Education* (DSME) to the risk of diabetic ulcers in patients (DM) type two.[11] The purpose of the study was to find out if diabetic gymnastics can reduce the risk of diabetic ulcers in patients with type 2 diabetes mellitus.

Methods

The research design used in this study is *pre-experimental* by using one *group pre-post test design.*[12] The population of this study was patients with type 2 diabetes mellitus. This study sampled as many as 20 respondents using *total sampling* techniques.[13]

The research instrument uses an observation sheet and measuring instrument *In low's 60-Second Diabetic Foot Screen Screening Tool* with 12 indicators namely: Skin condition, Nail condition, Whether or not a deformity, Footwear feasibility, Cold foot temperature, Hotfoot temperature, Range of foot motion, Foot sensation test with monofilament, Foot sensation test with 4 questions, Pulse rate on feet, Absence of momentary redness in the feet, Absence of *erythema.*

Univariate analysis is used to describe each variable, namely, age, gender, education, the value of the risk of diabetic ulcers before action, and the value of the risk of diabetic ulcers after action. Before conducting bivariate analysis, researchers conduct normality test first, because respondents < 50 then researchers use *Shapiro Wilk* test. The researchers analyzed bivariate using *a nonparametric statistic of the Wilcoxon test,* as the data was abnormal.

This study has passed the ethics test at the Health Research Ethics Commission with a certificate, number: 1090/Sket/Ka-Dept/RE/STIKIM/VI/2020.

Results

Table 1. Distribution of Respondents' Frequency by Age, Gender, Education, Before Gymnastics And After Gymnastics In Diabetes Mellitus Type 2 Patients (N=20)

Characteristic	Frequency	%
age		
36-45 years old	2	10,0
46-55 years old	6	30,0
56-65 years old	8	40,0
56 years old	4	20,0
gender		

woman	20	100,0
education		
Sd	6	30,00
Junior	3	15,0
Sma	8	40,0
Pt.	3	15,0
Before the action		
Low risk	0	0
Moderate risk	18	90,0
High risk	2	10,0
After the action		
Low risk	18	90,0
Moderate risk	0	0
High risk	0	0

Based on table 1 who experienced the risk of diabetic leg ulcers age frequency distribution of 56-65 years old as many as 8 respondents (40%). The frequency distribution of female gender as many as 20 respondents (100%). The distribution of high school education frequency is 8 respondents (40%). Frequency distribution of Diabetic Foot Ulcer Risk Before Diabetic Gymnastics the risk of diabetic foot ulcers is the most moderate category of 18 respondents (90%). The frequency distribution of Diabetic Foot Ulcer Risk After Diabetic Gymnastics is the lowest category of 18 respondents (90%).

Table 2. Effect of Diabetic Gymnastics On Risk of Diabetic Ulcers In Type 2 Diabetes Mellitus Patients (N=20)

Diabetic Gymnastics	Negative Ranks		Positive Ranks		N.	Asymp. Sig. (2-Tailed)
	N.	Mean Rank	N.	Mean Rank		
before – after	20[a]	10,50	0[a]	0	20	0,000

Based on table 2. Wilcoxon test is found in negative ranks or the difference between diabetic gymnastics before and after the action of N value of 20 means that 20 respondents experienced a decrease in the risk of foot ulcers and mean rank value or average decrease of 10.50. While in the positive ranks value N value and mean rank value that is 0 means no increase or occurrence of foot ulcers. And the value of Asymp. Sig. (2-tailed) is 0.000. Since the test value is 0.000 < 0.05 it can be concluded that the hypothesis is accepted. This means that there is an effect of diabetic gymnastics on the risk of diabetic ulcers in patients with Type 2 diabetes mellitus.

Discussion

Respondent Characteristics by Age, Gender, Education

The results of the univariate analysis based on the distribution of age frequency with the number of 20 respondents, who experienced the risk of diabetic foot ulcers from the age of 36-45 years as 2 respondents (10%), age 46-55 years as many as 6 respondents (30%), age 56-65 years, namely 8 respondents (40%), and age more than 60 years as many as 4 respondents (20%). So from the results of the age category, who experienced the most risk of foot ulcers occurred at the age of 56-65 years, namely 8 respondents (40%).

Generally, humans experience a physiological decline that dramatically decreases rapidly at the age of 40 years. This decrease will be at risk of the decreased endocrine function of the pancreas to produce insulin.[14] Diabetes Mellitus type 2 concerning individuals aged 60 years or 45 years. The risk of suffering from glucose intolerance increases with age. increase one decade age, fasting blood glucose levels will rise about 1-2 mg/dl and 5,6-13 mg/dl in 2 hours postprandial. Age is very closely related to the increase in blood glucose so that in the older age group, the prevalence of glucose tolerance disorders will increase, as will the prevalence of Diabetes Mellitus. Age ≥ 60 years related to the occurrence of diabetic ulcers because at that age the function of the body physiologically decreases due to the aging process, there is a decrease in the secretion of insulin resistance so that the ability of the body's function to control high blood glucose is less optimal.[14]

This study is in line with the study that stated the results of the study showed that the average age of respondents in this study is 56 years old. In the treatment group, the average age of the

respondents was 57 years and in the control group, the average age of respondents was 55 years. The minimum age treatment group is 43 years and the maximum age is 65 years while in the control group the minimum age is 40 years and the maximum age is 65 years.[15]

From the results of research conducted by researchers and related research results, it can be concluded that the age of 56 years and above is very vulnerable to the risk of ulcers, this is due to decreased physiological function and lack of movement and activity carried out. They are more restrictive of activity because they are already starting to be vulnerable.

The results of the analysis of gender frequency univariate with the number of 20 respondents, who experienced the risk of diabetic foot ulcers, namely women as many as 20 respondents (100%). Based on research conducted by researchers did not obtain male respondents, this shows that the female gender is more dominant.

Some theories state that women experience more DM type 2 this is due to physical greater chances of increasing body time index. Monthly cycle syndrome (premenstrual syndrome), post-menopausal makes the distribution of fat in the body become easily accumulated due to hormonal processes so that women are more at risk of suffering from DM type 2.[16]

This study is in line with the results of the majority of female respondents, namely 52 people (59.1%). while respondents who are male are as many as 36 people (40.9%).[17]

From the results of the research conducted by researchers and related research results, it can be concluded that in the study there were no men and from the results of the research, women were more restrictive in exercising or doing activities. Thus making women more and more at risk of diabetes mellitus. It is expected that diabetic gymnastics can increase metabolism so that glucose in the blood decreases.

The results of the univariate analysis of the frequency of education with the number of 20 respondents, who experienced the risk of diabetic foot ulcers in the category of elementary education as many as 6 respondents (30%), the category of junior high school education as many as 3 respondents (15%). So from the results of the study that experienced the most risk of diabetic foot ulcers, namely high school level education as many as 8 respondents (40%).

Education can affect a person in managing the risk of diabetic ulcers. It is supported that education is an aspect of social status that is strongly related to health status. Education plays an important role in shaping one's knowledge and behavioral patterns in maintaining one's health. The results of a study conducted by Sugiarto (2013) showed that low education significantly influenced the occurrence of diabetic ulcers.[18] According to the results of the study, the level of public education in the working area of The Wawonasa Health Center Singkil District Manado consists of elementary school 18.94%, junior high school 27.85%, high school / vocational school 28.31%, and PTN / PTS 2.74%. Interviews conducted at the ten informants in the working area of The Wawonasa Health Center Singkil District Manado City obtained data on education. For education, 5 informants are high school graduates, 1 person is a vocational school graduate, and 3 people are elementary school graduates.[19]

From the results of research conducted by researchers and related research results, it can be concluded that the theory and previous research are in line. Karena with less or low education most sufferers lacks knowledge. And the results of the research showed that education is more dominated at the high school level education, this could happen with unhealthy living behaviors, we can not assume that with less education or lowest we can not live healthy, can just because of the busyness factor.

Effect of Diabetic Gymnastics on Risk of Diabetic Ulcers In Patients With Type 2 Diabetes Mellitus

Distribution of the frequency of Diabetic Foot Ulcer Risk Before Diabetic Gymnastics with a total of 20 respondents. Before the diabetic gymnastics action, the researchers checked/observed, whether there is a risk of ulcers. And the results of researchers who experienced the risk of diabetic foot ulcers in a most moderate category are 18 respondents (90%) and who experienced the risk of high categorical diabetic foot ulcers as many as 2 respondents (10%).

The results of previous research on the distribution of respondents based on the risk of diabetic foot ulcers before diabetic gymnastics from 49 respondents, who experienced normal feet that is 12 respondent (24.5%) who had a foot at risk as many as 34 respondents (69.4%) 3 respondents (6.1%). [20] From the results of research conducted by researchers and related research results, it can be concluded that the previous theory and research are said to be in line. Because previously respondents

were not always active and not much in the activity, especially diabetic gymnastics itself. This leads to moderate and high risk of diabetic foot ulcers.

The results of the univariate analysis of the frequency distribution of Diabetic Foot Ulcer Risk After Diabetic Gymnastics with a total of 20 respondents. After the diabetic gymnastics action, the researchers checked/observed again, whether the previous observation results decreased after the action. And the results of his research are. Those at risk of diabetic foot ulcers were the lowest category, with 18 respondents (90%) and who have a risk of moderate category diabetic foot ulcers as many as 2 respondents (10%). The results of previous research showed the number of respondents with a moderate risk of diabetic foot ulcers was reduced from 10 respondents (66.7%) to 1 respondent (6.7%) treatment group. In the control group, the number of respondents with moderate category foot ulcer risk was reduced from 10 respondents (66.7%) to 9 respondents (60%).[10] From the results of research conducted by researchers and related research results, it can be concluded that the theory and previous research. That by doing gymnastics can help overcome the risk of foot ulcers in patients with diabetes mellitus. As well as by doing activities will increase the hormone-insulin-like growth *factor,* this will work in someone who performs activities regularly.

The results of bivariate analysis, namely Wilcoxon test, are found in negative ranks or differences between diabetic gymnastics before and after the N-rated action which is 20 meaning that 20 respondents experienced a decrease in the risk of foot ulcers and mean rank value or average decrease of 10.50. While in the positive ranks value N value and mean rank value that is 0 means no increase or occurrence of foot ulcers. And the value of Asymp. Sig. (2-tailed) is 0.000. Since the test value is 0.000 < 0.05 it can be concluded that the hypothesis is accepted. This means that there is an effect of diabetic gymnastics on the risk of diabetic ulcers in patients with Type 2 diabetes mellitus.

Physical exercise or exercise has the goal of increasing insulin sensitivity, preventing obesity, improving blood flow, stimulating the formation of new glycogen, and preventing further complications. [21] Healthy gymnastics diabetes mellitus is a type of low *impact* aerobic gymnastics that emphasizes rhythmic movements of muscles, joints, vascular and nerves and in the form of stretching and relaxation.[4] From the contents of the explanation contained in the study, it is known that there are ways that patients with DM can reduce sugar levels in the blood, such as by doing physical exercises. The exercise, proven to influence the decrease in sugar or glucose levels in the blood of DM sufferers but must be adjusted to the condition of the body and the age of the sufferer. Thus the explanation of several types of physical exercises that can be done by dm sufferers, including leisure activities, doing gymnastics activities, cycling activities, and doing swimming sports.[21]

This research is in line with the previous. The results of this study showed that the *P-value* test *Paired* in the intervention group of 0.000 and 0.015 in the control group, while the P-value *Independent T-test* 0.001 ($p < \alpha$; $\alpha = 0.05$). This study concludes that there is an influence of DSME on the risk of diabetic ulcers in outpatients with DM Type 2 in rsd dr. Soebandi Jember.[11] Previous research results of Wilcoxon Signed Rank Test obtained p-value 0.000 <0.05 concluded that there is an effect of diabetic leg exercises on body balance in elderly adults with diabetes mellitus at Diabetic Club Gatoel Hospital Mojokerto. Concluded that there is an effect of diabetic leg exercises on body balance in elderly adults with diabetes mellitus at Diabetic Club Gatoel Hospital Mojokerto.[22] Previous research results of Wilcoxon signed-rank test statistics obtained results day-1 (α count) = 0.000 and correlation Z = 3,202, day-2 (α count) = 0.000 and correlation Z = 3,352, day-3 (α count) = 0.000 and correlation Z = 4,128 means there is a strong influence of diabetic foot gymnastics on the decrease in blood sugar levels in patients with type 2 diabetes mellitus. This means that there is a strong influence of diabetic foot gymnastics on the decrease in blood sugar levels in patients with type 2 diabetes mellitus. [23]

From the results of research conducted by researchers and related research results, it can be concluded that the theory and previous research are very direct, with the conduct of diabetic gymnastics can prevent the risk of diabetic ulcers, this happens because by doing actively or diligently in exercising can increase glucose input in cells. This gymnastics can also make respondents excited in doing gymnastics so that respondents are enthusiastic in doing gymnastics.

Conclusion

The results of the study, which saw the influence of diabetic gymnastics on the risk of diabetic ulcers conducted on 20 respondents. From the results of the study that before the action of foot ulcer risk is in

the category of moderate more, and after the action of diabetic gymnastics diabetic ulcer is in the category of mild more. So it can be concluded that diabetic gymnastics can reduce the risk of foot ulcers in patients with type 2 diabetes mellitus. It is expected that after this research, health workers or other medical calm can apply diabetic gymnastics regularly.

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