http://heanoti.com/index.php/hn

RESEARCH ARTICLE

URL of this article: http://heanoti.com/index.php/hn/article/view/hn1328

The Effect of Diabetes Mellitus Gymnastic on The Risk of Diabetic Ulcer

Wiwi Rumaolat[1(CA)], Miranda Waas[2], Jurais Simal[3]

[1(CA)]Institute of Health Science "Maluku Husada", Indonesia; wiwi.rumaolat@gmail.com (Corresponding Author)

[2]Institute of Health Science "Maluku Husada", Indonesia

[3]Institute of Health Science "Maluku Husada", Indonesia

ABSTRACT

Increased socioeconomic status, public health services, changes in lifestyle, increasing life expectancy, Indonesia experienced a shift in the pattern of diseases from infectious diseases to non-communicable diseases, Diabetes Mellitus is a collection of symptoms that arise in a person caused by an increase in sugar levels (glucose) blood due to insulin deficiency both absolute and relative. Complications Diabetes mellitus are twofold, acute complications (short term) and chronic (long term) complications. Acute complications consist of diabetic ketoacidosis (KAD), non-ketotic hyperosmolar (HNK), and hypoglycemia. Gymnastics Diabetes mellitus is generally beneficial for the management of diabetes mellitus, namely: controlling blood sugar, especially in type 2 diabetes mellitus, inhibiting and improving risk factors for cardiovascular disease, losing weight, improving musculoskeleal symptoms. The purpose of this study was to analyze the effect of diabetes mellitus gymnastics on the risk of diabetic ulcer in patients with Type 2 diabetes mellitus in Telaga Piru Hamlet, West Seram Regency. The type of research used is experimental Quasy research using the Two-Group Post Test Control Design approach. The sample used is 26 respondents. Data collection is carried out with an observation sheet with direct interviews. The data that has been collected is then processed and analyzed using the Microsoft Excel program computer and the statistical program (SPSS) version 24 with Mann Whytney test and significance = 0.05. From the results of bivariate analysis, there is an effect of diabetes mellitus gymnastics on the risk of diabetic ulcers (p = 0.002)

Keywords: Diabetes Mellitus Gymnastics, Diabetic Ulcers

INTRODUCTION

The national health system states that all efforts in health development in Indonesia are directed to achieving a higher level of health that allows people to live more productively both socially and economically. Increased socioeconomic status, public health services, changes in lifestyle, increasing life expectancy, Indonesia has experienced a shift in the pattern of diseases from infectious diseases to non-communicable diseases, this is known as the epidemiological transition. The tendency to increase the prevalence of non-communicable diseases is Diabetes Mellitus(1).

International Diabetes Federation (IDF) (2014) stated that 382 million people have diabetes and by 2035 it will increase to 592 million people. The number of people with type 2 diabetes mellitus is increasing in each country and 80% of diabetics live in low- and middle-income countries. The largest groups of people with diabetes mellitus are in the age range between 40 to 59 years. Existing data show that 175 million people with diabetes mellitus were undiagnosed and caused 4.9 million deaths in 2014.(2)

According to the International Diabetes Federation (2014), there are 9 million cases of Diabetes mellitus in Indonesia. Study of population of type 2 diabetes mellitus in Indonesia ranks second largest with 9,116 million people and is expected to be around 14,1 million in 2035. Results of Basic Health Research in 2013 showed that diabetes mellitus was ranked fourth not infectious causes of death at all ages in Indonesia after asthma, chronic obstructive pulmonary disease (COPD) and cancer which is 2.1%.(2)

Based on the results of interviews with one of the employees at the auxiliary health center, it was said that people with diabetes mellitus in Telaga Piru Hamlet had 29 people and there were 3 people who had diabetic ulcers.

According to Perkeni (2011), diabetes mellitus that is not well controlled can cause various complications. Complications of diabetes mellitus are two folds acute complications (short term) and chronic complications (long term). Acute complications consist of diabetic ketoacidosis (KAD), non-ketotic hyperosmolar (HNK), and

hypoglycemia. In chronic complications it can lead to macrongiopathy which affects large blood vessels and microcipiates which often occur, one of which is diabetic ulcer. Diabetic ulcers are open sores on the skin layer into the dermis. This complication can occur due to hyperglycemia and neuropathy which results in various changes to the skin and muscles, resulting in an imbalance in the distribution of pressure on the soles of the feet and furthermore will facilitate ulceration.(3)

Diabetes mellitus compared with non-Diabetes mellitus has a tendency to be twice as easy to experience cerebral thrombosis. Chronic complications of diabetes mellitus in Indonesia for diabetic ulcer as much as 15% of people with diabetes mellitus are at risk 29 times of diabetic ulcer. Diabetic ulcer is an open wound on the surface of the skin due to the presence of macroangiopathy resulting in vascular insufficiency and neuropathy. Diabetic ulcer is easy to become an infection because the entry of germs or bacteria and the presence of high blood sugar is a strategic place for germ growth.(1)

The most common picture of risk factors for diabetic ulcers that can affect patients with diabetes mellitus is a history of hypertension (TD ≥ 130/80 mmHg) (68.33%), history of smoking (no smoking) (53.33%), physical exercise (less than 3 times a week for 30 minutes (95%), obesity (BMI: female ≥ 23 kg / m2, male ≥ 25 kg / m2) (90%), non-compliance with dietary changes (80%), bad blood sugar level (GDS ≥ 200 mg / dL) (71.67%), bad foot care (98.33%) and improper foot wear (98.33%)(4).

According to Perkeni (2011), good management of diabetes mellitus requires 4 main pillars, namely education, meal planning, physical exercise, and pharmacological interventions. One suggestion in the management of diabetes mellitus is by using physical exercise. One exercise that can be done by diabetics is diabetes mellitus gymnastics. Diabetes mellitus exercise is a gymnastic for people with diabetes mellitus whose emphasis is on rhythmic movements of muscles, joints, vascular and nerves in the form of stretching and relaxation.(3)

Gymnastics diabetes mellitus is generally beneficial for the management of diabetes mellitus, namely: controlling blood sugar, especially in type 2 diabetes mellitus, inhibiting and improving risk factors for cardiovascular disease, losing weight, improving musculoskeleal symptoms. In sports type 2 diabetes mellitus is related to controlling the blood sugar of the patient, of course it must be preceded by a diet first. In the group of obese Diabetes Mellitus patients with insulin resistance can increase insulin sensitivity, therefore what if the intensity of exercise is aggravated eating causes hypoglycemia(5).

METHODS

The research design used was quasy experimental. This research had been carried out in the village of Telaga Piru Hamlet, Piru Village, West Seram Regency on 1-14 August 2017. The population in this study were all patients of type 2 diabetes mellitus in Telaga Piru Hamlet (26 people). This study applied total sampling technique. Data were collected through observation and interview, then analyzed using Mann Whitney-U test.

RESULTS

Table 1. Distribution of Age

No.	Age	Frequency	Percentage
1	15-45 year-old	7	27
2	46-65 year-old	19	73
	Total	26	100

Table 1 shows that the most age was 46-65 (73%).

Table 2. Distribution of Gender

No.	Gender	Frequency	Percentage
1	Male	19	73
2	Female	7	27
	Total	26	100

Table 2 shows shows that the most gender were women (73%).

Table 3. Distribution of Education

No.	Education	Frequency	Percentage
1	No school	2	8
2	Elementary School	13	50
3	Junior High School	5	19
4	Senior High School	4	15
5	University	2	8
	Total	26	100

Table 3 shows that the most education level were elementary school graduate (50%).

Table 4. Distribution of Job

No.	Job	Frequency	Percentage
1	Trader	1	4
2	Civil Servant	2	8
3	Farmer	20	77
4	Fisherman	3	11
	Total	26	100

Table 4 shows that the most of jobs were farmers (77%).

Table 5. Distribution of smoking status

No.	Smoking status	Frequency	Percentage
1	No smoking	19	73
2	Smoking	7	27
	Total	26	100

Table 5 shows that the most of respondents were no smoking (73%).

Table 6. Distribution of length of experiencing diabetes mellitus

No.	Length of DM experience	Frequency	Percentage
1	< 5 year	21	81
2	> 5 year	5	19
	Total	26	100

Table 6 shows that the most of respondents experienced diabetes mellitus for <5 year (81%).

Table 7. Distribution of drug consumption

No.	Drugs Consumption	Frequency	Percentage
1	Not taking drugs	20	77
2	Taking drugs	6	23
	Total	26	100

Table 7 shows that the most of respondents no taking drugs (77%).

Table 8. The ruslt of Mann Whitney-U Test

Ranks				
	Post-test group	n	Mean Rank	Sum of Ranks
Result of ulcer screening	Intervention	13	8.88	115.50
	Control	13	18.12	235.50
	Total	26		

The results of the post-test value of the intervention group was 8.88 and the post test of the control group was 18.12, so that there was a significant difference between the intervention group and the control group.

Table 9. Effect of diabetes mellitus gymnastics on the risk of diabetic ulcers in type 2 diabetes mellitus patients in Telaga Piru Hamlet, West Seram regency 2017

Test Statistics[a]	
	Result of ulcer screening
Mann-Whitney U	24,500
Wilcoxon W	115,500
Z	-3,105
Asymp. Sig. (2-tailed)	,002
Exact Sig. [2*(1-tailed Sig.)]	,001[b]
a. Grouping Variable: group	
b. Not corrected for ties.	

The results of the Sig. (2-tailed) was 0.002, so can be concluded that there were effects of diabetes mellitus gymnastics on the risk of diabetic ulcers.

DISCUSSION

Based on table 4.1 the results of the study show that the average age of respondents in this study is aged 46-65 years. The results of the study by IDF (2014) also show the same thing, namely the age of a person who has the most diabetes mellitus is in the age range of 40-59 years.[2] Increasing age, glucose intolerance also increases so that for older age groups a higher blood glucose limit is needed than non-elderly adults[6].

In this study, total type 2 diabetes mellitus patients are women, namely 19 people (73%). Female gender is at risk for diabetic ulcer. This is due to hormonal changes in women entering menopause. The results of research conducted by Purwanti (2013) showed that there were 64.7% of respondents who were female who had diabetes mellitus compared to male sex.[7]

RISKESDAS (2013) states that diabetes mellitus is more experienced by women than by men. These factors include women who have higher levels of cholesterol, HDL, LDL, and triglycerides in women than men. The amount of fat in adult males is around 15-20% of total body weight while in females is 20-25%. The next factor is that high levels of HDL cholesterol, LDL, and triglycerides in women can cause a decrease in insulin sensitivity.[8]

In table 4.3 the results of this study can be seen that 2 respondents (8%) are not in school and 13 respondents (50%) have a history of elementary school. Education can affect a person in managing the risk of diabetic ulcers. This is supported by Friedman, Bowden & Jones (2003) in Ferawati (2014) that education is an aspect of social status that is closely related to health status.[9] Education plays an important role in shaping a person's knowledge and behavior patterns in maintaining one's health. The results of research conducted by Sugiarto (2013) showed that low education significantly affected the occurrence of diabetic ulcers.[10]

From the results of existing research it has been found that the most respondents with diabetes mellitus work as farmers, namely 17 people (66%). Work is an important determinant of health. This is supported by Marmot (2010) in Ferawati (2014) explaining that the type of work a person has and the conditions of work play a role in influencing one's health. Ferawati (2014) revealed that the more established one's work is, they will have the ability to improve their health, especially in preventing diabetic ulcers in various ways such as checking the condition of the feet regularly to health workers or buying special footwear that is adjusted to the shape of the foot.[9]

In table 4.5, it can be seen that from 26 respondents those who smoke are 7 respondents (27%). According to Sugiarto (2013) Smoking habits are very dangerous for the body and can aggravate pain in the body.[10] Smoking habits due to nicotine contained in cigarettes can cause endothelial damage and platelet attachment and aggregation occurs. This situation then causes leakage so that lipoprotein lipase will slow blood fat clearance and facilitate the onset of atherosclerosis. Atherosclerosis results in vascular insufficiency so that blood flow to the dorsalis pedis, poplitea, and tibial arteries will also decrease.[9]

The results of long-standing diabetes mellitus can be known on average in this study that is <5 years. There are 21 respondents (80%) who experience long diabetes. According to Ferawati (2014), the occurrence of diabetic ulcers can be influenced by a lack of information and a lack of awareness of the prevention of complications so that they are less concerned and pay attention to their health.[9]

Based on the data in table 4.7, it can be seen that the majority of respondents do not consume drugs as many as 20 respondents (77%). Most of the respondents did not have full awareness to seek treatment so that it could cause diabetic ulcer risk. According to PERKENI (2011), based on the way it works, OHO is divided into 5 groups, namely insulin secretagogue, sulfonilu-rea and glinid, sensitivity to insulin, for example metformin, gluconeogenesis inhibitors (metformin), glucose absorption inhibitors: alpha glucosidase inhibitors and DPP-IV inhibitors.[3]

Based on the analysis, the results obtained a significant influence between Diabates mellitus gymnastics on the risk of diabetic ulcer, this is strengthened by the results of statistical tests where the coefficient of value is Sig. (2-tailed) of 0.002 which is less than $\alpha = 0.05$ meaning that H0 is rejected, so there is an effect of Diabetes mellitus gymnastics on the risk of diabetic ulcer.

Table 4.8 explains that the results of the post-test score in the intervention group after giving diabetes mellitus for 6 x 2 weeks is 8.88 and the post-test control group is 18.12 so there is a significant difference between the intervention group and the control group with 9.24. In the control group not given diabetes mellitus gymnastics and after doing screening ulcer in getting the results of respondents with mild callus are 13 respondents, and one respondent who are at risk for diabetic ulcer while in the intervention group after giving diabetes mellitus gymnastics are 6 respondents who experiences callus ring there are no respondents at risk for diabetic ulcers. All respondents have experienced a temporary tingling in the legs, the condition of the toenails is not maintained, rough and a momentary redness of the feet.

The decrease in the risk of diabetic ulcer shows the positive impact of diabetes mellitus gymnastics on the risk of diabetic ulcers. According to Anggriyana in Hondro (2011), physical exercise has a major role for patients

with type 2 diabetes mellitus. In type 2 diabetes, insulin production is not interrupted, but the receptor response on cells to insulin is still insufficient, insulin cannot help transfer glucose into cells. When exercising, the state of membrane permeability to glucose increases in the muscles that contract so that insulin resistance decreases, in other words insulin sensitivity increases.(11)

CONCLUSION

Based on the results, can be conclude that there are effects of diabetes mellitus gymnastics on the risk of diabetic ulcers.

REFERENCES

1. Wardatul. Old Relationships Affected by Dibates with Knowledge of Prevention of Diabetic Ulcers at Ciputat Health Center. Thesis. Jakarta: Falkultas Kedokteran and Ilmu Kesehatan, Universitas Islam Negeri Syarif Hidayatullah; 2013.
2. International Diabetes Federation. 2014. Diabetes Atlas [Internet]. International Diabetes Federation. 2014 [cited 2014 Dec 12]. Available from: http://www.idf.org/diabetesatlas
3. PERKENI. Consensus on the Management and Prevention of Type 2 Diabetes Mellitus in Indonesia (Konsensus Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 di Indonesia). Jakarta: PERKENI; 2011.
4. Lestari MA. The Description of Distribution of Risk Factors in Diabetic Ulcer Patients at Kitamura Clinic PKU. Yogyakarta: University of Muhammadiyah Yogyakarta; 2013.
5. Warsito. An Overview of Knowledge about Diabetes Mellitus Gymnastics in Type 2 Diabetes Mellitus (DM) Patients at Karangpandan Health Center and Karanganyar Health Center. Thesis. Surakarta: Sekolah Tinggi Ilmu Kesehatan Kusuma Husada; 2016.
6. Hasdianah. Get to know Diabetes Mellitus in Adults and Children with Herbal Solutions. Yogyakarta: Nuha Medika; 2012.
7. Purwanti OS. Analysis of Foot Ulcer Risk Factors in Diabetes Mellitus Patients in Dr. Moewardi. Thesis. Jakarta: Universitas Indonesia; 2013.
8. Kemenkes RI. Riset Kesehatan Dasar 2013 (Basic Health Research, 2013). Jakarta: Badan Penelitian dan Pengembangan Kesehatan, Kementerian Kesehatan Republik Indonesia; 2013.
9. Ferawati I. Factors Affecting the Occurrence of Diabetic Ulcers in Type 2 Diabetes Mellitus Patients in Prof. Dr. Margono Soekarjo Purwokerto. Thesis. 2014.
10. Sugiarto I. Risk Factors Related to the Occurrence of Diabetic Ulcers in Type 2 Diabetes Mellitus Patients in Rsud. Dr. Margono Soekarjo Purwokerto. Essay. Purwokerto: Universitas Jenderal Soedirman; 2013.
11. Hondro E, Sinaga J. Effect of Diabetes Mellitus Gymnastics on Blood Glucose Levels in Patients with Type 2 Diabetes Mellitus in the Working Area of Medan Darusalam Health Center 2011. Medan; 2011.