The Influence Of Diabetes Mellitus Exercise On Cholesterol Levels In Diabetes Mellitus Patients At Permata Blora Hospital

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Abstract. Background: Preliminary studies that have been conducted on 10 DM patients undergoing outpatient care at Permata Blora General Hospital through interviews found that as many as 7 (70%) patients said that the patients had never received DM exercise training. The patient also said that he always takes medication after the medicine he has received runs out. The 7 patients above experienced high cholesterol levels with cholesterol levels > 239 mg/dl. As many as 3 (30%) patients said they had undergone DM exercise therapy when they were being treated at the hospital. Of the 3 patients, 1 patient had high cholesterol levels > 239 mg/dl. The results of the preliminary study above shows that DM sufferers who have never exercised DM have an average high cholesterol level.
Method: This research method uses a quasy experimental method with an approach*One-Group Pre Test – Post Test Design*. The sample used was 33 respondents using a purposive sampling technique.
Results: The results of the study showed that respondents before being given DM exercise had the most moderate cholesterol levels, as many as 26 respondents (78.8%). The results of the study showed that after being given DM exercises, the highest normal cholesterol levels were 16 respondents (48.5%). The Wilcoxon test results obtained a ρ value of 0.000 less than 0.05 which could be interpreted as having a significant effect of diabetes mellitus exercise on cholesterol levels in diabetes mellitus patients at Permata Blora General Hospital.
Conclusion: This research can be concluded that there is a significant effect of diabetes mellitus exercise on cholesterol levels in patients with Diabetes Mellitus at RSU Permata Blora.

Key words: [DM Exercise, Cholesterol Levels, and Diabetes Mellitus..]

INTRODUCTION

Diabetes Mellitus is one of the metabolic disorders that occurs due to the failure of the pancreas to produce insulin in sufficient quantities. This disease occurs chronically so it can be categorized as a chronic disease. There are 3 types of diabetes mellitus based on the cause, namely diabetes mellitus type 1, type 2, and gestational diabetes mellitus (Ministry of Health, 2020). The cause of type 1 diabetes mellitus is an autoimmune reaction in which the body's immune system attacks the beta cells of the pancreas so that insulin cannot be produced at all. The cause of type 2 diabetes mellitus is insulin resistance where the body's cells do not have the ability to fully respond to insulin.

The prevalence and incidence of type 2 diabetes mellitus in various parts of the world have increased based on the results of epidemiological studies. The World Health Organization (2015) estimates that the increasing number of DM sufferers will become a global health threat. Hyperglycemia is associated with type 2 DM. The World Health Organization predicts that there will be an increase in the number of DM sufferers in Indonesia, from initially 8.4 million in 2000 to 21.3 million in 2030. This report shows an increase in DM sufferers ranging from 2-3 times in 2035. While the prediction from the International Diabetes Federation (IDF) is that there will be an increase in the number of people with DM from 9.1 million in 2014 to 14.1 million in 2035 (Soelistijo, 2015).

The latest data update from PERKENI (Endocrinology Association) in 2015 states that DM sufferers in Indonesia have reached 9.1 million people. Indonesia is ranked 5th in the world with the most diabetes sufferers in the world whereas previously Indonesia was in 7th position. This condition makes Indonesia worrying because it is still in the top 10 in 2011 (Fitri, 2015).

The number of new cases of PTM (Non-Communicable Diseases) in Central Java reached 603,840 cases. This figure is the result of the recapitulation of data on new cases of non-communicable diseases. Cases of hypertension have the largest proportion of all PTM cases in Central Java Province, namely 57.87%. Diabetes Mellitus occupies the second position with cases of 18.33%. This shows that the Diabetes Mellitus rate in Central Java is still relatively high (Central

Java Provincial Health Office, 2018).

Data on Diabetes Mellitus, both IDDM and non-IDDM in Blora, especially at Permata Blora Hospital in 2020, found 198 patients, including 96 males (46.4%) and 102 females (53.6%). In 2021 there will be 238 DM sufferers of which the number of men is 109 (39.1%) and 129 women (60.9%). Data were taken for the last 6 months, from April to September 2022, there was 162 patients whit diabetes who is undergoing outpatient treatment at RSU Permata Blora. Patients with DM who undergo treatment at RSU Permata Blora on average have a history of DM management so further complications often occur. In laboratory examinations, it was also found that high cholesterol levels in DM sufferers were caused by dietary problems and the sufferer's lack of physical activity. One of the pillars in the management of DM that is carried out is by carrying out sports and physical activities which in this study used DM gymnastic techniques. Physical exercise or sports can be in the form of walking, jogging, and gymnastics can provide benefits that basically increase the response of receptors in the body's tissues, with a positive impact on the transportation of fat from blood circulation into cells to be more effective.

The DM exercise is carried out for approximately 15-30 minutes. The first core of the DM exercise is that the body stands in an upright position, the right foot takes a step forward and the left foot is in place. The right hand is lifted to the right, the body is shoulder straight and the left hand is bent until it is in a position close to the chest. In execution of the 2nd core, the right leg is lifted up to a 900 angle, the left leg remains in place. The right hand is lifted straight to the shoulder, the left hand is bent up to the chest. Do the above movements alternately. This DM exercise, in addition to lowering blood glucose levels, can also suppress the occurrence of complications of blood lipid disorders or fat deposition in blood vessels such as blood cholesterol (Setiyaningsih, 2019).

Related research was carried out by Winardi (2019) with the research title "Description of Total Cholesterol Levels in Patients with Diabetes Mellitus (DM) at OKU Timur Hospital". The study found that 83 samples of Diabetes Mellitus patients showed that 64 people with DM (77.10%) had high cholesterol levels, while 19 people with DM (22.90%) had normal cholesterol levels. Increased cholesterol tends to occur in those who are female, namely as many as 45 (77.78%) compared to men as much as 29 (76.32%). The age distribution of people with diabetes mellitus shows that at-risk age (> 40 years) there are 14 (18.18%) people who have normal cholesterol levels and 63 (81.82%) with high cholesterol. The age that is not at risk is 5 (83,

Preliminary studies that have been conducted on 10 DM patients undergoing outpatient care at Permata Blora General Hospital through interviews obtained as many as 7 (70%) patients who said that the patients had never received DM exercise training. The patient also said that he always takes medication after the medicine he has received runs out. The 7 patients above experienced high cholesterol levels with cholesterol levels > 239 mg/dl. As many as 3 (30%) patients said they had undergone DM exercise therapy when they were being treated at the hospital. Of the 3 patients, 1 patient had high cholesterol levels > 239 mg/dl. The results of the preliminary study above show that DM sufferers who have never exercised DM have an average high cholesterol level.

Based on the phenomena and data that have been described by the researcher, the researcher intends to conduct a study entitled "The Effect of Diabetic Mellitus Exercise on Cholesterol Levels in Diabetic Mellitus Patients at Permata Blora Hospital".

METHODS

A. Types of research

Based on the purpose of the research conducted, namely to find out the effect of diabetes mellitus exercise on cholesterol levels in diabetes mellitus patients at Permata Blora General Hospital, then the researcher used the quasy experimental method. This method is a research method that provides the possibility for researchers to change variables and examine the

consequences (Nursalam, 2016).

Draftor this research design uses the One-Group Pre Test – Post Test Design approach. This type of research is the disclosure of causal relationships involving a group of subjects. Research subjects will be observed before and after the intervention. This study did not use a control group because the design used one group, which means one group is observed.

B. Population and Sample

The population in this study is data for the last 6 months taken from April to September 2022 with different names of respondents, there were 162 DM patients with cholesterol who were undergoing outpatient care atPermata Blora General Hospital(RMPermata Blora General Hospital, 2022).

Researchers apply procedures and sampling techniques, namely purposive sampling. This technique is a non-random sampling technique in which researchers can take samples by establishing special characteristics that are tailored to the research objectives. This is to answer research problems(Sugiyono, 2014). Due to the relatively large population, the sample calculation formula according to Arikunto (2016) using a percentage of 10-20% of the total population is as follows:

$$n : \frac{N.20}{100}$$

$$n : \frac{162.20}{100}$$

n : 33 Respondent

C. Data Analysis Techniques

The bivariate analysis carried out in this study used a statistical test, namely the Wilcoxon test to find influence with the latest SPSS computerized program (IBM version 22). The Wilcoxon test is a statistical test that can be used on normally distributed (ordinal) data. This test is used to test whether or not there is a significant effect during the pre-test and post-test in the subjects studied. (Sugiyono, 2014). If the p value is <0.05 (5%) then Ho is rejected and Ha is accepted which means there isinfluencediabetes mellitus exercise on cholesterol levels in diabetes mellitus patients at Permata Blora General Hospital.

RESULTS AND DISCUSSION

A. Research result

1. Characteristics of Respondents
   a. Age of Respondents

Table 4.1
Frequency Distribution Based on Respondents' Age
at RSU Permata Blora

Age	Frequency	%
Early Adult (26-35 Years)	3	9,1
Late Adult (36-44 years)	8	24,2
Middle Age (45-59 Years)	22	66,7
Amount	**33**	**100**

   b. Gender of Respondents

Table 4.2
Frequency Distribution Based on Gender
Respondents at RSU Permata Blora

Gender	Frequency	%
Man	14	42,4
Woman	19	57,6
Amount	**33**	**100**

c. Respondent Education

Table 4.3
Frequency Distribution Based on Respondents' Education
at RSU Permata Blora

Education	Frequency	%
Elementary School Equivalent	16	48.5
High School Equivalent	7	21,2
High School Equivalent	8	24,2
DIII/S1	2	6,1
Amount	**33**	**100**

d. Respondent's Occupation

Table 4.4
Frequency Distribution Based on Respondent's Occupation
at RSU Permata Blora

Work	Frequency	%
Doesn't work	13	39,4
Laborer	8	24,2
farmer	3	9,1
Self-employed	9	27,3
Amount	**33**	**100**

2. Univariate analysis

a. Cholesterol Levels Before Given Diabetes Mellitus Exercise

Table 4.5
Frequency Distribution Based on Cholesterol Levels Before Given Diabetes Mellitus Exercise at Permata Blora General Hospital

Cholesterol Levels Before Exercise DM	Frequency	%
Normal Cholesterol Levels	0	0
Moderate Cholesterol Levels	26	78.8
High Cholesterol Levels	7	21,2
Amount	**33**	**100**

b. Cholesterol Levels After Being Given Diabetes Mellitus Exercise

Table 4.6
Frequency Distribution Based on Cholesterol Levels After Being Given Diabetes Mellitus Exercise at Permata Blora Public Hospital

Cholesterol Levels After Gymnastics DM	Frequency	%
Normal Cholesterol Levels	16	48.5
Moderate Cholesterol Levels	14	42,4
High Cholesterol Levels	3	9,1
Amount	**33**	**100**

3. Bivariate Analysis

Table 4.7
Effect of Diabetes Mellitus Exercise on Cholesterol Levels in Diabetes Mellitus Patients at Permata Blora Public Hospital

Cholesterol Levels	Before Treatment (pre test)		After Treatment (Post Test)		P-value Wilcoxon test
	f	%	f	%	
Normal Cholesterol Levels	0	0	16	48.5	
Moderate Cholesterol Levels	26	78.8	14	42,4	0.000
High Cholesterol Levels	7	21,2	3	9,1	

B. Discussion

1. Univariate analysis

a. Cholesterol Levels Before Given Diabetes Mellitus Exercise

The results showed that cholesterol levels before being given DM exercises were mostly moderate cholesterol levels in the number of 26 respondents (78.8%) and high cholesterol levels in the number of 7 respondents (21.2%). This is because the research subjects or respondents did not carry out the cholesterol diet while the patient was at home. The diet that the respondent follows should be in accordance with the recommendations of the health worker so that the respondent's cholesterol level can decrease. This proves that many respondents still do not know about dietary cholesterol so that knowledge about preventing increased cholesterol levels must be further improved. Cholesterol levels in DM have nothing to do with gender and education. This is evidenced by each characteristic item that is almost evenly distributed in the value of good cholesterol, good cholesterol, medium or high. While the level of bad cholesterol is dominated by the age of respondents over 40 years. The results showed that the average age of the respondents was 46.51 years. This shows that the age of the respondent has a relationship with cholesterol levels. The age of the respondent himself is getting old so he rarely attends counseling so that the respondent's knowledge is also lacking.

The results above are in line with Yovina's theory (2014) one of the factors that influence blood cholesterol levels is knowledge. The level of one's knowledge is one of the factors that affect cholesterol levels. A person's knowledge influences the precautions that can be taken in controlling cholesterol levels. This requires information input by health workers so that the knowledge obtained by sufferers increases.

Related research was carried out by Ananto (2016) with the research title "Effectiveness of Fantastic Gymnastics on Total Blood Cholesterol Levels in Patients with Type 2 Diabetes Mellitus at PKU Muhammadiyah Hospital Yogyakarta Unit 1". The results of this study indicate that the prevalence of type 2 DM sufferers in women is actually higher than men, with a percentage (65%; 35%). Meanwhile, the age range 45-64 years suffers from type 2 diabetes mellitus more often when compared to the age range ≥ 65 years (76%; 24%). The results of the analysis using the Paired Sample Test obtained a significant number, namely p = 0.01 (significant).

b. Cholesterol Levels After Being Given Diabetes Mellitus Exercise

The results of the study showed that after being given DM exercises, the highest normal cholesterol levels were 16 respondents (48.5%) and the least high cholesterol levels were 3 respondents (9.1%). This shows that DM exercise can also be used to reduce cholesterol levels in addition to normalizing blood glucose levels. This is due to the high motivation of the respondents in participating in DM exercises and routinely consuming glycemic drugs so that cholesterol levels in the blood also experience improvements. DM gymnastics can be carried out independently at home in addition to routine exercise schedules at the hospital. This is intended to regulate the lifestyle of respondents in carrying out activities and sports and further accelerate the reduction of blood cholesterol levels in DM patients.

The above is in line with Soegondo's theory (2016) that the risk factors for high

cholesterol levels for people with DM are due to lifestyle factors in these patients. The Lifestyle itself is the most dominant, namely food factors and daily activities of sufferers. An uncontrolled lifestyle pattern, it often causes the cholesterol level of DM sufferers to increase. One of the pillars in the management of DM that is carried out is by carrying out sports and physical activities which in this study used DM gymnastic techniques. Physical exercise or sports can be in the form of walking, jogging, and gymnastics can provide benefits that basically increase the response of receptors in the body's tissues, with a positive impact on the transportation of fat from blood circulation into cells to be more effective.

Related research was carried out by Kapitan (2014) with the research title "Total Cholesterol in Patients with Diabetes Mellitus Who Do Diabetes Exercise". The study obtained the average value of cholesterol before doing exercise, which was 231.44 mg/dl, the average value of cholesterol after doing exercise was 226.19 mg/dl, and the average value of changes that occurred was 5.25 mg/dl. dl, with a value of p=0.000.

2. Bivariate Analysis

The Wilcoxon test that has been carried out shows that the ρ value of 0.000 is less than 0.05, so these results can be interpreted if there is a significant effect of diabetes mellitus exercise on cholesterol levels in diabetes mellitus patients at Permata Blora General Hospital. These results indicate that cholesterol levels can be lowered by diabetes mellitus exercise in DM patients.

Analysis from the author, the test results obtained above were accompanied by good motivation from the intervention group in carrying out DM exercises 3-5 times each week. The principle of DM exercise for people with Diabetes Mellitus itself is that it is carried out with a frequency of 3-5 times a week every Saturday at the Hospital and with mild and moderate intensity. Time (duration) 30-60 minutes to improve cardiorespiratory abilities (Soegondo, 2016).

The results above are also in line with Anies' theory (2016) which states that the benefits of DM exercise for people with diabetes mellitus are controlling blood sugar, lowering total cholesterol and improving the profile of fat in the blood. Triglycerides, LDL and raise HDL cholesterol levels ranging from 45-65% and improve blood pressure and the hemostatic system. These conditions can inhibit the occurrence of coronary heart disease (CHD), stroke, and peripheral vascular disease. With regular exercise, it turns out that the level of physical fitness of DM sufferers can be maintained properly.

Supporting research was carried out by Ananto (2016) with the research title "Effectiveness of Fantastic Gymnastics Against Total Blood Cholesterol Levels in Patients with Type 2 Diabetes Mellitus at PKU Muhammadiyah Hospital Yogyakarta Unit 1". Ananto's research found that the prevalence of diabetes mellitus in women was higher than in men (65%; 35%). Type 2 diabetes mellitus mostly occurs at the age of 45-64 years compared to age ≥ 65 years (76%; 24%). The results of the analysis using the Paired Sample Test showed a significant number p = 0.01 (significant).

Supporting research was also carried out by Setyawan (2017) with the research title "Effectiveness of Diabetes Mellitus Exercise to Lower Cholesterol in Diabetes Mellitus Patients". The analysis of this study used a paired t-test. The test results found that there was a difference in average cholesterol levels before and after giving the intervention to the research subjects where the p value: 0.001. In addition, the results of the Man-Whitney test analysis also showed a significant difference between the intervention group and the control group, where the p value: 0.003 (<0.05).

CONCLUSION

The results showed that 26 respondents had moderate cholesterol levels (78.8%) while 7 other respondents had high cholesterol levels (21.2%). The results of the study showed that after administering DM exercises, 16 respondents (48.5%) showed normal cholesterol levels and as many as 3 respondents (9.1%) showed high cholesterol levels. The Wilkoxon test results obtained a ρ value of 0.000 less than 0.05, so these results mean that there is a

significant effect of diabetes mellitus exercise on cholesterol levels in diabetes mellitus patients at Permata Blora General Hospital.

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