The Impact of Using Brisk Walking Exerrcise in Lower Blood Sugar of Patients with Type 2 Diabetes Mellitus

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Article Info	ABSTRACT
	The stability of blood sugar levels in people with diabetes mellitus is still difficult to control because of the patient's lack of awareness to do physical activity. This study aimed to determine the impact of brisk walking exercise on reducing blood sugar levels in patients with type II diabetes mellitus. This study used a quasi-experimental design with a non-equivalent control group design approach. The population in this study were patients with type 2 DM in the working area of the Luragung Health Center, Kuningan Regency. The sample taken in this study was 28 respondents using the purposive sampling technique. The statistical test used was the Wilcoxon test. The results showed that the respondents' blood sugar levels before brisk walking were 200-250 ml/dl. After brisk walking, there was a decrease in blood sugar levels, which were tested using the Wilcoxon statistical test resulting in a p-value of $0.01<0.05$, meaning Ha was accepted. The conclusion of this study is the impact of brisk walking exercise on reducing blood sugar levels in patients with type 2 diabetes mellitus in the working area of the Luragung Health Center. It is hoped that people with type 2 diabetes mellitus get used to doing physical activities or sports to help control blood sugar levels. **Keywords:** Brisk walking exercise, diabetes mellitus, blood sugar

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1. INTRODUCTION

Diabetes Mellitus is a severe chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot use the insulin it produces effectively (Chaudhury et al., 2017; Jones et al., 2009; Narjis et al., 2021; Nuniek Tri Wahyuni et al., 2022). Insulin is a hormone that regulates blood sugar (Crecil Dias et al., 2020; Irwin, 2020); hyperglycemia or increased blood sugar levels are common effects of uncontrolled diabetes (Panchbhai, 2012; Wang & Hutchinson, 2006). Diabetes is divided into several types (Eizirik et al., 2020), namely, type I diabetes mellitus, due to damage to pancreatic cells, so there is little or no insulin production (Fujikawa et al., 2005). Type II diabetes mellitus is an increase in blood sugar levels due to a decrease in low insulin secretion by the pancreas gland, and gestational type diabetes (Palomer et al., 2008), which is characterized by the rise in blood sugar levels due to normal pregnancy occurs in the 24th week (Di Cianni et al., 2003) and returns to normal after delivery (Kemenkes, 2020).

The World Health Organization (WHO) states that 422 million people suffered from diabetes mellitus in 2014 (Lovic et al., 2020). There was also an increase in the death rate in 2016 due to diabetes

mellitus by 5% from 2000. In 2019 it was estimated that 1.5 million deaths were directly caused by diabetes mellitus (Wou et al., 2019; Yousif et al., 2021)

The International Diabetes Federation (IDF) organization estimates that at least 463 million people aged 20-79 years have diabetes in 2019, equivalent to 9.3% of the total population of the same age. This figure is predicted to increase to 578 million people in 2030 and 700 million in 2045. Based on gender, IDF estimates that women fill 9%, and men fill 9.65%; the prevalence was obtained in 2019 (International Diabetes Federation, 2019).

Uncontrolled diabetes mellitus can cause acute and chronic complications (Arya, 2014; Rahaman et al., 2017). Therefore, managing diabetes mellitus is very important, usually done by implementing five pillars. It consists of education, nutrition therapy/food planning, pharmacological therapy, monitoring blood sugar levels, and physical exercise/physical activity (Brown et al., 2002; Welschen et al., 2005). The first step that can be done is to modify the lifestyle through physical exercise (Subiyanto, 2019).

Unbalanced physical exercise is one of the factors that cause diabetes mellitus (Lumb, 2014; Thomas, 2004). Irregular physical exercise can reduce the quality of blood vessels and damage the metabolic aspects (Simarmata et al., 2021). Physical exercise adjusts to the body's ability, combined with food intake (Stohs & Badmaev, 2016). Physical exercise is carried out with a minimum duration of 30 minutes/day or 150 minutes/week with moderate intensity (Carlson et al., 2010; Tucker et al., 2011). Physical exercise in people with DM can be done by doing activities such as jogging, swimming, leisurely cycling and also brisk walking (Altschuler et al., 2009; Ranasinghe et al., 2015).

One of the physical exercises that can lower blood sugar levels is the Brisk Walking Exercise (Chan et al., 2018; Klachko et al., 1972). Brisk walking or brisk walking is a walking activity different from normal walking because there is an increase in the speed or frequency of steps and various movement techniques (Indarto et al., 2018) The Brisk Walking Exercise is a fast walking activity that is carried out for about 15-30 minutes (Merom et al., 2007), but if you cannot reach that time, you can do it gradually. In brisk walking, there are basic techniques and several stages that must be learned, such as the first stage is to step one foot forward, the second stage is to pull the back leg forward, the third stage is relaxation, and then the pushing stage (Efendi & Efendi, 2018).

2. METHOD

This type of research is a quantitative study using a quasi-experimental design method with a non-equivalent control group design approach (Hidayat & Perdana, 2021). In this design, the experimental group was given intervention treatment for one week, three times for 20 minutes, while the control group was not given intervention.

The population in this study was patients with type II diabetes mellitus in the working area of the Luragung Health Center, with as many as 110 people. In taking samples for research, according to Arikunto 2013, if the sample is less than 100 people, it is better to take all. If the subject is prominent or more than 100 people, 10-15% or 20-25% of the population can be taken. The sampling technique was using a purposive sampling technique. The sample was 28 people from 25% of the population (Arikunto, 2013).

Data analysis is divided into two, namely univariate and bivariate. For bivariate, it was done by the Wilcoxon test. The significance value is $p<\alpha$ (0.05); these results show an impact of brisk walking exercise on reducing blood sugar levels in patients with type II diabetes. If the significant value is $p>\alpha$ (0.05), it shows no impact.

3. RESULTS AND DISCUSSION

3.1 Results

a. *Univariate Analysis*

Respondent characteristic table

Table 1. Characteristics of respondents with type II diabetes mellitus in the working area of the Luragung Health Center

Characteristics of respondents	Intervention		Control	
	n	%	n	%
Gender				
Male	4	28.6	5	35.7
Female	10	71.4	9	64.3
Total	14	100.0	14	100.0
Age				

35-45 years	5	35.7	3	21.4
46-60 years	9	64.3	10	71.4
>60 years	0	0	1	7.2
Total	14	100.0	14	100.0
Education				
Did not finish elementary school	1	7.1	0	0
Graduated from elementary school	9	64.3	9	64.3
Junior High School	2	14.3	4	28.6
High School	2	14.3	1	7.1
Total	14	100.0	14	100.0
Work				
Housewife	9	64.3	8	57.1
Farmer	3	21.4	3	21.4
Enterpreuner	2	14.3	2	14.3
Others	0	0	1	7.1
Total	14	100.0	14	100.0
Long time suffering from DM				
1-3 years	10	71.4	7	50.0
4-5 years	4	28.6	7	50.0
Total	14	100.0	14	100.0
Regularity of taking medication				
Yes	10	71.4	12	85.7
No	4	28.6	2	14.3
Total	14	100.0	14	100.0
Doing the DM Diet				
Yes	8	57.1	11	78.6
No	6	42.9	3	21.4
Total	14	100.0	14	100.0
Sports Regularity				
Yes	4	28.6	0	0
No	10	71.4	14	100.0
Total	14	100.0	14	100.0

Characteristics of respondents based on Table 1, it is known that most of them are female as many as 10 people (71.4%) in the intervention group and 9 people (64.3%) in the control group. Based on the age of most of the respondents aged 46-60 years as many as 9 people (64.3%) in the intervention group and 10 people (71.4%) in the control group. Based on education, most of the respondents with the last education graduated from elementary school as many as 9 people (64.3%) in the intervention group and 9 people (64.3%) in the control group.

Based on occupation, most of the respondents worked as housewives as many as 9 people (64.3%) in the intervention group and 8 people (57.1%) in the control group. Based on the duration of suffering from DM, most of the respondents suffered from DM for 1-3 years as many as 10 people (71.4%) in the intervention group and 7 people (50.0%) in the control group. Based on the regularity of taking medication, most of the respondents regularly took medication as many as 10 people (71.4%) in the intervention group and 12 people (85.7%) in the control group.

Based on the DM diet, most of the respondents did the DM diet as many as 8 people (57.1%) in the intervention group and 11 people (78.6%) in the control group. Based on the regularity of exercise, most of the respondents were not regular in doing sports or physical exercise as many as 10 people (71.4%) while in the control group all respondents were not regular in doing physical exercise as many as 14 people (100%).

Distribution of the frequency of decreasing blood sugar levels in patients with type 2 diabetes mellitus

Table 2 Distribution of the frequency of decreasing blood sugar levels after brisk walking exercise in patients with type 2 diabetes mellitus in the working area of the Luragung Health Center

	Intervention		Control	
	N	%	n	%
Permanent	2	14,3	1	7,1
Go on	1	7,1	6	42,9

Down	11	78,6	7	50,0
Total	14	100	14	100

Based on table 4.2 there was a decrease in blood sugar levels after brisk walking exercise in the intervention group as many as 14 respondents (78.6%) and in the control group as many as 7 respondents (50%)

b. Bivariate Analysis

Table 3. The effect of brisk walking exercise on reducing blood sugar levels in patients with type 2 diabetes in the working area of the Luragung Health Center

Brisk Walking Exercise Variabel	Decrease		P-Value
	N	%	
Intervention			
Permanent	2	14.3	
Go on	1	7.1	0.01
Down	11	78.6	
Control			
Permanent	1	7.1	
Go on	6	42.9	0.03
Down	7	50.0	

Based on the results of the Wilcoxon statistical test in the intervention group, a p-value of 0.01 was obtained where the value was <0.05, so Ha in this study was accepted, which means that there is an effect of brisk walking exercise on reducing blood sugar levels in patients with type 2 diabetes mellitus in the working area of the Luragung Health Center.

Based on the Wilcoxon statistical test in the control group, a p-value of 0.03 was obtained where the value was <0.05, which means that the control group also had a significant value in reducing blood sugar levels in patients with type 2 diabetes mellitus.

3.1 Discussion

Based on the results of the study, most of the respondents were female with a total of 10 people (71.4%) in the intervention group and 9 people (64.3%) in the control group. This is in line with Prasetyani's research, 2017 which shows that the majority of people with diabetes mellitus are women, this is due to differences in body composition and hormonal differences. This can be seen from the difference in fat levels for men and women where fat levels in men range from 15-20% while in women it ranges from 20-25% of body weight (Pibriyanti & Hidayati, 2018).

In addition, a decrease in the hormone estrogen, especially during menopause can cause diabetes mellitus (Slopien et al., 2018). Estrogen and progesterone hormones have the ability to increase insulin response in the blood (Cheng et al., 2021), at the time of menopause the estrogen hormone becomes low as a result the insulin response will decrease (Marlatt et al., 2022).

Based on the results of the study, it is known that most of the respondents were aged 46-60 years with a total of 9 people (64.3%) in the intervention group and 10 people (71.4%) in the control group. This is in line with Komariah's research, 2020 which shows that the majority of respondents with type 2 diabetes mellitus are aged 46-36. 65 years this happens because that age is a phase of entering old age. These conditions greatly affect the decline in the body's physiological functions, including the function of insulin which has an important role in regulating blood sugar levels. In addition, when people enter that age, people tend to be less involved in sports (Komariah & Rahayu, 2020)

Based on the results of the study, it is known that most of the respondents with the last education graduated from elementary school with a total of 9 people (64.3%) in the intervention group and 9 people (64.3%) in the control group. This is in line with Pahlawati's research, 2019 which shows that most respondents have low education (elementary school). This is one of the factors that cause diabetes mellitus. People who have low education tend to have low knowledge so that it has an impact on the lack of knowledge about healthy lifestyles that should be applied in everyday life (Pahlawati & Nugroho, 2019).

Based on the results of the study, it was found that most of the respondents had jobs as housewives with a total of 9 people (64.3%) in the intervention group and 8 people (57.1%) in the control group. This is in line with Desita's research, 2019 which shows that most respondents work as housewives. The work is quite difficult and has a high level of stress because housewives are always at home. In carrying out their activities, housewives often feel stressed because there are too many demands

for work that have to take care of children, take care of the house and prepare for the needs of their husbands and children (Desita, 2019).

When stress occurs the body will try to release the hormone cortisol. This can increase heart rate and respiration, simultaneously glucose and protein stores from the liver will go to the bloodstream to be processed into energy. Finally, sugar levels in the blood will increase (Ikhwan et al., 2018).

Based on the results of the study, it was known that the majority of DM patients had suffered from DM for 1-3 years as many as 10 people (71.4%) in the intervention group and 7 people (50.0%) in the control group. The respondent is classified as a new patient, therefore blood sugar levels are easier to decrease because serious damage/complications have not occurred. In contrast to patients who have had DM for longer. This is supported by Mildawati's research, 2019 which explains that the longer the respondent suffers from diabetes mellitus, the higher the risk of complications and blood sugar keeps piling up so it's hard to get back down (Mildawati et al., 2019).

The results of the intervention group study the effect of brisk walking exercise on reducing blood sugar levels in people with diabetes mellitus in table 4.4 shows a significant value after being tested using the Wilcoxon statistical test, the probability value is $0.01 < 0.05$, then Ha is accepted. Researchers argue that there is an effect of brisk walking exercise on reducing blood sugar levels in patients with type 2 diabetes mellitus related to the energy use system during activity, so that glucose in the blood is used for energy formation instead of energy that has been used. In addition, physical activity or exercise can help control body weight which can trigger diabetes mellitus so that insulin sensitivity will increase. This is in line with previous research conducted by Hidayah, 2020 which showed a p-value of 0.000 using the man whitney statistical test which means that there is an effect of walking exercise on changes in blood sugar levels (Hidayah et al., 2020). This is also supported by research by Hastuti, 2017 which shows a p-value of $0.000 < 0.05$, which means that there is an effect of diabetes exercise on blood sugar levels in people with type 2 diabetes mellitus (Hastuti et al., 2017).

Based on the results of the study in the control group in Table 3, it also shows a significant result of $0.03 < 0.05$, but this value is greater than the intervention group so that it has a lower significance value. This can be caused by several factors including the use of drugs and the regularity of doing a DM diet. In both the control group and the intervention group, all respondents took diabetes mellitus drugs, this could trigger a decrease in blood sugar levels in the control group so that they got a significant p-value even though they did not receive brisk walking exercise. In the control group, most of the respondents were on a DM diet, where the DM diet was one of the pillars of DM management in helping control blood sugar levels so that the statistical test values in the control group also showed significant results.

Regularity in doing physical exercise or sports has a big influence in controlling blood sugar levels (Valerio et al., 2007). Regular physical exercise is an important part of managing diabetes mellitus in daily life which is proven to be able to maintain body weight, maintain normal blood pressure, help improve insulin function in the body and improve psychological health (American Diabetes Association, 2003). Regular physical exercise, as well as regularity in dieting DM and taking medication will show optimal results in controlling blood sugar lizards because these three are pillars in the management of diabetes mellitus.

4. CONCLUSION

From the results of the study, patients with type 2 diabetes mellitus who were used as respondents had blood sugar levels ranging from 200-250 mg/dl. Most respondents had blood sugar levels of 240 mg/dl as many as 13 respondents. It is known that after doing brisk walking exercise for 20 minutes in the intervention group as many as 11 respondents (78.6%) there was a significant decrease in blood sugar levels while in the control group as many as 7 respondents (50.0%). The decrease in blood sugar levels was in the range of 190-220 mg/dl as many as 8 respondents. Wilcoxon statistical test results show the number $0.01 < 0.05$, Ha is accepted, which means that there is an impact of brisk walking exercise on reducing blood sugar levels in people with type 2 diabetes mellitus.

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