The Effect of Leisure Stroll (A Physical Activity) on Blood Glucose Levels in Type 2 Diabetes Mellitus Patients

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Abstract. Diabetes mellitus (DM) is a group of metabolic diseases characterized by hyperglycemia due to abnormalities in insulin secretion, insulin action or both. Leisure stroll includes a physical activity by taking a leisurely stroll with a distance of two kilometers for 30 min. Checking blood glucose levels was conducted before and after to find out the acute effect of the physical activity. The study aimed to determine the effect of leisure stroll (a physical activity) on blood glucose levels in type 2 diabetes mellitus. This study used quasi experiment with one group pre-test and post-test design approach. The sampling technique was purposive sampling with 19 respondents. The findings of paired t-test on the comparison before and after leisure stroll (physical activity) on blood glucose levels was found a significant change with $p = 0{,}000 (p < 0.05)$. It could be concluded that there was an effect of leisure stroll (a physical activity) on blood glucose levels in type 2 diabetes mellitus patients. The study is expected to be able to provide information to respondents in taking precautions as well as knowing the effect of leisure stroll on blood glucose levels.

Keywords: Leisure Stroll · Blood Glucose Level · Diabetes Mellitus

1 Introduction

World Health Organization declared that the prevalence of DM worldwide was estimated at 9%. The proportion of deaths due to DM from non-communicable diseases was 4%. It occurred in low and middle income countries with 80% proportion. In 2030, it is predicted that DM is the seventh leading cause of death in the world (WHO, 2017).

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Indonesia has faced a DM threat situation similar to the world. The International Diabetes Federation (IDF) in 2017 reported that the DM epidemic in Indonesia showed an increasing tendency. Indonesia was ranked sixth in the world after China, India, the United States, Brazil and Mexico with the number of DM patients aged 20–79 years around 10.3 million people (IDF, 2017).

Basic Health Research data showed a significant increase in the prevalence of DM from 6.9% in 2013 to 8.5% in 2018. It was estimated number of patients in Indonesia reached more than 16 million people risking of developing other diseases, such as: heart attack, stroke, blindness and kidney failure even causing paralysis and death (Basic Health Research, 2018). Diabetes Mellitus (DM) patients in North Sumatra have increased every year. Based on data of North Sumatra Health Office stated that from 2017 to 2018, the number of patients with type 1 diabetes mellitus (DM) was 18,358 and type 2 was 54,843 (Suyatno, 2018). Based on data of Padangsidimpuan City Health Office, the number of DM patients in 2018 was 929 people (Padangsidimpuan City Health Office, 2018).

Physical activity is defined as any bodily movement produced by skeletal muscles which requiring energy expenditure. Structured physical activity is able to lower the risk of coronary heart disease, type 2 diabetes mellitus and improve blood pressure as well as can increase insulin sensitivity. The consensus management and prevention of type 2 diabetes mellitus of Indonesian Endocrinology Association (IEA) in 2015 declared that physical activity was carried out every 3 to 5 times per week for 30 to 45 min, a total of 150 min ‘per week in order to get maximum results. The break between activities was no more than two consecutive days. Physical activity did not need to be strenuous. The suggested activities were cardio-respiratory exercises such as strolling, cycling, jogging and swimming (IEA, 2015).

According to research by Dian Syafitri (2019) with the title “The Effect of Physical Activity (Leisure Stroll) on Blood Glucose Levels Reduction on Obese Men” showed that moderate intensity physical activity (leisure stroll) had a statistically significant effect on decreasing blood glucose levels on obese men at the Faculty of Medicine, University of Lampung. The average decrease in blood glucose levels was 20.33% or 19.6 mg/Dl.

The findings of a preliminary study conducted by researchers on 19 until 21 November 2019 at Padangmatinggi Health Center showed that the incidence of type 2 diabetes mellitus from September to December in 2019 was 64 people. Then, the findings of interviews showed that four out of six people of type 2 diabetes mellitus patients rarely strolling since they were busy due to working, taking care of children, being lazy and tending to watch television. This study aimed to determine the effect of leisure stroll (a physical activity) on blood glucose levels in type 2 diabetes mellitus patients at Padangmatinggi Health Center Working Area of Padangsidimpuan City.

2 Research Methods

The research design used was a quasi experiment with a one group pre-test and post-test design approach. This research was conducted in July-August 2020 at Padangmatinggi Health Center Working Area, Padangsidimpuan City. The population was 22 respondents and the sampling technique was purposive sampling with 19 respondents.

Statistical analysis used the Shapiro-Wilk test to analyze small amounts of sample available (≤50). If the results of the data normality test with Shapiro Wilk were not normally distributed then this study would use a non-parametric statistical analysis test. Bivariate analysis was performed by using the dependent T-test to test the difference between two observations.

3 Findings

Based on the Table 1 showed that the majority of respondents was in the 46–55 age intervals with 11 respondents (57.9%). The minority was in the 56–65 age intervals with 2 respondents (10.5%).

Based on the Table 2, it could be seen that the majority of respondents was female with 10 respondents (52.6%) and male respondents with 9 respondents (47.4%).

Based on the Table 3 showed that the average blood glucose levels before taking leisure stroll was 164.11 mg/dL with a standard deviation of 16,124 with the minimum value of 134 mg/dL and the maximum value of 189 mg/dL. Meanwhile, the average blood

Table 1. The Distribution of Respondents by Age

Age	N	Percentage (%)
36–45	6	31.6
46–55	11	57.9
56–65	2	10.5
Total	**19**	**100.0**

Data Source: Primary data processed 2020

Table 2. The Distribution of Respondents by Gender

Gender	N	Percentage (%)
Male	9	47.4
Female	10	52.6
Jumlah	**19**	**100.0**

Data Source: Primary data processed 2020

Table 3. Frequency Distribution of Blood Glucose Levels Before-After Intervention

Variabel	N	Mean	SD	Min	Max
Pre Test - Blood Glucose Level	19	164.11	16,124	134	189
Post Test - Blood Glucose Level		144.00	12,202	125	167

Data Source: Primary data processed 2020

Table 4. Normality Test Result of Blood Glucose Level Before-After Intervention on Respondents

Variables	N	P Value
Pre Test Blood Glucose Level	19	0,691
Post Test Blood Glucose Level	19	0,434

* normal distribution ($p > 0.05$)

Table 5. Statistical Test Results Before and After Intervention

Variables	N	Mean	Margin mean	SD	Min	Max	P value
Blood Glucose Level Pre	19	164.11	20.11	16.124	134	189	0.000
Blood Glucose Level Post	19	144.00		12.202	125	110	

glucose levels after taking leisure stroll was 144.00 mg/dL with a standard deviation of 12,202, a minimum value of 125 mg/dL and a maximum value of 110 mg/dL (Table 4).

The findings of data analysis on respondents with the Shapiro Wilk test on the average blood glucose level before the intervention obtained a p value = 0,691 ($p > 0.05$), and after the intervention a p value = 0,434 ($p > 0.05$). It was normally distributed. Thus, the bivariate statistical test in this study was a paired t-test.

The finding of the Table 5 analysis showed that the average blood glucose level before taking leisure stroll was 164.11 mg/dL, a standard deviation of 16,124 with a minimum value of 134 mg/dL and a maximum value of 189 mg/dL. Meanwhile, the average blood glucose level after taking leisure stroll was 144.00 mg/dL, a standard deviation of 12.202 with a minimum value of 125 mg/dL and a maximum value of 110 mg/dL.

Then, the significance test was carried out by using the paired t-test on the comparison before and after leisure stroll (physical activity) on blood glucose levels was found a significant change with $p = 0{,}000$($p < 0{,}05$). It showed that there was a significant effect of leisure stroll (physical activity) on blood glucose levels in type 2 diabetes mellitus patients at Padangmatinggi Health Center Working Area Padangsidimpuan City.

4 Discussion

4.1 Age

The study showed that the majority of respondents were in the 46–55 age intervals with 11 respondents (57.9%). According to Astuti (2017) blood glucose levels was also influenced by age. Since getting older, more people suffer from diabetes mellitus. In accordance with the theory Arisman (2011) said that by increasing age starting from 45 years, beta cells decreased caused people were more susceptible to diabetes mellitus.

4.2 Gender

The results of the study showed that there were female with 10 respondents (52.6%). This research was in line with the study of Fahrunnisa (2019) showed that there were more female with 21 respondents than male with 9 respondents. It concluded that the percentage of female was more than men in taking leisure stroll. Moreover, female tended to have lighter activities than male as well as a lifestyle and imbalance diet put women at higher risk of developing diabetes mellitus (Tandra, 2007).

The findings were also in accordance with the theory based on research conducted by Jelantik and Haryati (2014) said that women were more susceptible to diabetes mellitus than men because women had LDL (Low Density Lipoprotein) or bad cholesterol with a higher triglyceride level. In addition, there appeared to be differences in carrying out all activities and daily lifestyles strongly affecting the incidence of disease as a risk factor of diabetes mellitus (59.0%).

4.3 The Effect of Leisure Stroll on Blood Glucose Levels in Type 2 Diabetes Mellitus Patients

Based on the findings of paired t-test on the comparison before and after leisure stroll (physical activity) on blood glucose levels on the respondents was found a significant change with $p = 0{,}000$ ($p < 0{,}05$). This was due to leisure stroll caused glucose was used in the body by the hormone insulin since increased sensitivity of insulin receptors in muscles to produce energy during doing physical activity. It would lead to blood glucose decreasing (Barnes, 2012).

The findings were in accordance with Subroto (2006) stated that diabetics could be strolling to decrease glucose levels. In type 2 diabetes mellitus, strolling was closely related to controlling diabetic blood glucose levels. Regular exercise such as strolling could reduce insulin resistance so it could be better used by the body cells and lowered the dose. Another study conducted by Fauzi and Anggorowati (2013) involving 36 DM patients in the Ngudi Laras Purbalingga also showed that leisure stroll had a significant effect on lowering blood glucose levels with a p value of <0,0001.

5 Conclusions and Suggestions

Based on the conclusion of the findings in the table analysis, it can be concluded that the average blood glucose levels before taking leisure stroll was 164.11 mg/dL, a standard deviation of 16,124 with a minimum value of 134 mg/dL and a maximum value of 189 mg/dL. Meanwhile, the average blood glucose level after taking leisure stroll was 144.00 mg/dL, a standard deviation of 12,202 with a minimum value of 125 mg/dL and a maximum value of 110 mg/dL.

Then, the significance test was carried out by using the paired t-test on the comparison before and after leisure stroll (physical activity) on blood glucose levels on the respondents. It was found a significant change with $p = 0{,}000$($p < 0{,}05$). It showed that there was a significant effect of leisure stroll (a physical activity) on blood glucose levels in type 2 diabetes mellitus patients at Padang Matinggi Public Health Center Working Area, Padangsidimpuan city.

The study is expected to provide information to respondents in taking precautions as well as knowing the effect of leisure stroll on blood glucose levels. For future researchers, it is hoped that this research can be used as a source of information who will conduct further research.

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