



RELATIONSHIP BETWEEN OBESITY AND PHYSICAL ACTIVITIES WITH BLOOD SUGAR LEVELS IN PATIENT WITH TYPE 2 DIABETES MELLITUS IN THE WORKING AREA OF DRIYOREJO HEALTH CENTER GRESIK DISTRICT

Resya Firda Tisnasari¹⁾, Umdatul Soleha²⁾

^{1,2)}Departement of Nursing, Nursing and Midwifery Faculty, University of Nahdlatul Ulama Surabaya.

Email: resya.ns15@student.unusa.ac.id¹⁾, umdatul@unusa.ac.id²⁾

Abstract: Diabetes mellitus is a health problem that is increasing rapidly throughout the world. Human civilization that continues to evolve along with changing times has a direct impact on human patterns or lifestyles. This study aims to determine the relationship between obesity and physical activity with blood sugar levels in patients with type 2 diabetes mellitus in the Working Area of Driyorejo Health Center, Gresik Regency. The type of research used is an analytic survey with approach cross-sectional. The population in this study were all patients with type 2 diabetes mellitus in the Work Area of Driyorejo Public Health Center in Gresik District with 95 respondents. Samples of diabetes mellitus patients as much as 39 respondents were taken by simple random sampling. Data analysis used is an analysis of spearman rank correlation. The results showed that the majority (66.7%) of respondents experienced obesity I and most (64.1%) respondents did light activities. Obesity has a relationship with blood sugar levels and has a significance value of 0.002. Physical activity has a relationship with blood sugar levels and has a significance value of 0.033. The conclusion of this study is that there is a relationship between obesity and physical activities with blood sugar levels in diabetes mellitus patient type 2 in the Driyorejo Health Center working area Gresik district. Suggestions that can be given, Type 2 diabetes mellitus sufferers can control body weight by maintaining a diet, increasing physical activity, and taking anti-diabetes drugs regularly to prevent an increase in blood sugar levels.

Keywords: Obesity, Physical Activity, Blood Sugar Levels

1. Introduction

Diabetes mellitus is a health problem that is increasing rapidly throughout the world. Human civilization that continues to evolve along with changing times has a direct impact on human patterns or lifestyles. Therefore humans tend to choose to live a practical, fast, and instant lifestyle. The lifestyle is also widely adopted by modern humans in consuming food. They choose to consume ready-to-eat food or drinks obtained through fast food restaurants, or through instant food. Though food and beverages of this type are generally detrimental to health. Obesity is one result of an unhealthy lifestyle, people themselves do not consider obesity as a disease but it is a natural thing (Sanif, 2008)^[1].

Some risk factors associated with diabetes mellitus include obesity, blood pressure, cholesterol levels, physical activity, and smoking. Obesity is a condition where a person's body has too high fat content. Too high fat levels in the body can cause various health problems. One of the risks faced by obese people is diabetes mellitus. Obesity is a risk factor for the occurrence of type 2 diabetes mellitus (Isnaini & Ratnasari, 2018)^[2]. In patients with diabetes mellitus, the pancreas produces insulin in sufficient quantities to maintain blood glucose levels at normal levels, but insulin does not can work optimally help body cells absorb glucose because it is disturbed by complications of obesity, one of which is high blood fat levels, especially cholesterol and triglycerides (Olvista, 2011)^[3].

Besides obesity, a risk factor for diabetes mellitus is physical activity. Physical activity is any bodily movement produced by skeletal muscle that requires energy. Lack of physical activity is an independent risk factor for chronic diseases and overall is estimated to cause death globally (WHO, 2013)^[4]. Physical activity affects blood glucose levels when. Enough physical activity can increase membrane permeability to increase blood flow. Thus, more capillary membranes are opened so that insulin receptors become active will affect blood glucose levels. If physical activity is lacking it can cause fatty acid buildup, decreased use of glucose levels and muscle glycogen. Calories buried in the body are the main factors causing pancreatic dysfunction (Setyawan & Sono, 2015)^[5]. Diabetes Mellitus (DM) will make the sufferer's life not as comfortable as before, especially for those who neglect to regulate their diet and control blood sugar. Not to mention the possibility of complications that will add to the long list of changes in lifestyle and schedule of hospital visits. All of that will certainly have an impact on the condition of the physical, mental, and economic strength of the sufferer and the family alone (Kurniadi, 2015)^[6].

2. Research Methodology

2.1. Research methods

The type of research used in this study is analytical research because of the relationship between obesity and physical activity with blood sugar levels. This research was conducted using a cross-sectional approach. The population of this study were 95 people with type 2 diabetes mellitus in the working area of Gresik district driyorejo health center. The sample size is 39 respondents. Data collection techniques used primary data through observation sheet weight and height, IPAQ questionnaire sheet, and observation sheet of blood sugar levels when. Data analysis using Spearman Rank Correlation test.

3. Result and Discussion

3.1 Obesity

The results of the obesity study conducted in patients with type 2 diabetes mellitus in the Working Area of Driyorejo Public Health Center in Gresik District, which are found in table 5.7 show that of the 39 respondents found, most of them belonged to the obesity I category of 66.7%, overweight 20.5%, and obesity II at 12.8%. This can be caused by people with diabetes mellitus type in the Work Area of Driyorejo Public Health Center, Gresik District, who lack physical activity. Lack of physical activity causes unused energy to be synthesized into body fat, while fat available in the body is not used for energy, consequently fat accumulation continues to occur and results in excess overweight or weight. Patients who have been overweight or overweight if they still do not carry out physical activity will gain weight gain into obesity level I. If the food that enters the body is not balanced by the energy released, consequently fat accumulation continues (Devi, 2012)^[7].

3.2 Physical activity

The results of research on physical activity carried out in patients with type 2 diabetes mellitus in the Working Area of Driyorejo Health Center in Gresik District, which are found in table 5.8, showed that of the 39 respondents, most had easy activity of 64.1%, average activity of 28.2%, and heavy activity by 7.7%. This is influenced by gender and occupational factors. The difference in physical activity carried out between men and women is related to the maximum strength of the muscles related to body surface area, body composition, muscle strength, amount of hemoglobin, hormones, lung capacity, and so on. Until puberty, usually physical activity performed on boys is almost the same as women, but after puberty the physical activity performed on men and women is usually increasingly different, especially those associated with the cardiorespiratory system. Women have more fat tissue, different testosterone and estrogen hormones, and lower hemoglobin levels (Karim, 2012)^[8].

Most respondents do not work or work as housewives. Physical activity is divided into mild, moderate, and severe activities. Physical activity carried out by housewives is categorized as mild, because daily physical activities carried out are cooking, cleaning the house, and washing clothes (Novitasary, 2013)^[9].

3.3 Blood Sugar Level

The results of research on blood sugar levels that have been carried out in patients with type 2 diabetes mellitus in the Working Area of Driyorejo Health Center in Gresik District, which are shown in Table 5.9 show that of the 39 respondents, most of them had bad sugar levels of 46.2%, moderate sugar levels of 28, 2%, and good sugar content of 25.6%. Factors that can increase blood sugar levels are age, sex, food intake, drug use, lack of activity, stress and emotional factors, knowledge, and obesity.

The results showed that of the 39 respondents, almost half (48.7%) were 51-60 years old, 38.5% were 61-70 years old, 10.3% were 41-50 years old, 2.6% were 31-40 years old. Age is very closely related to the increase in blood sugar levels. As age increases, the prevalence of diabetes mellitus and impaired glucose tolerance are higher. Change begins at the cellular level, continues at the tissue level and finally at the level of the organ that can affect the function of homeostasis. Body components that can undergo changes are beta cells of the pancreas that produce the hormone insulin, target tissue cells that produce glucose, the nervous system, and other hormones that affect glucose levels.

3.4 Relationship obesity and blood sugar levels

The results of statistical tests using the Rank-Spearman test using SPSS obtained a probability value $(P) = 0.002 < \alpha = 0.05$ so that H_0 was rejected means that there is a relationship between obesity and blood sugar levels in patients with type 2 diabetes mellitus in the working area of Gresik District Driyorejo Health Center . In the correlation coefficient $(r) = 0.492$, it shows a positive correlation with sufficient correlation strength.

According to the results of cross tabulation of 10 people who have good blood sugar levels with a percentage of 25.6%, as many as 10 respondents who have moderate blood sugar with a percentage of 28.2%, as many as 3 respondents are overweight, 6 respondents are obese I, and 2 respondents were obese obese II. Of the 18 overweight people, 15 obese I respondents, and 3 obese II respondents.

Changes in the diet of someone who currently prefers fast food is thought to be one of the reasons a person is obese. People who are overweight, leptin levels in the body will increase. Leptin is a hormone associated with the obesity gene. Leptin plays a role in the hypothalamus to regulate body fat levels, the ability to burn fat into energy, and feeling full. Plasma leptin levels increase with increasing body weight. Leptin works in the peripheral and central nervous system. The role of leptin in the occurrence of resistance is that leptin inhibits phosphorylation of insulin receptor substrate-1 (IRS) which can consequently inhibit glucose uptake. So that there is an increase in blood sugar levels (Adnan, 2013)^[10].

3.5 Relationship physical activity and blood sugar levels

The results of statistical tests using the Rank-Spearman test using SPSS obtained a probability value $(P) = 0.033 < \alpha = 0.05$ so that H_0 was rejected means that there is a relationship between physical activity and blood sugar levels in type 2 diabetes mellitus patients in the Driyorejo District Health Center work area Gresik. In the correlation coefficient $(r) = -0,343$, it shows a negative correlation with sufficient correlation strength.

Increased blood sugar levels occur open only because eating patterns that do not adhere to abstinence, do not take anti-diabetes drugs, but also due to lack of physical activity. Some things that affect the lack of physical activity include the presence of various facilities that provide various facilities that cause physical activity to decline. Another factor is the existence of technological advances in various fields of life that encourage all things done by humans to be so practical that they do not need to require heavy physical activity.

The absorption of glucose by the body's tissues at rest requires insulin, while the active muscles are not accompanied by an increase in insulin levels even though the need for glucose increases. This is because when a person is physically active, there is an increase in the sensitivity of the insulin receptor in the active muscle. The main problem that occurs in type 2 diabetes mellitus is the occurrence of insulin resistance which causes glucose cannot enter the cell. When someone does physical activity, muscle contractions will occur which will eventually facilitate glucose into the cell.

This means that when a person is physically active, it will reduce insulin resistance and ultimately reduce blood sugar levels (Ilyas, 2011)^[11].

4. Conclusion

1. Most people with type 2 diabetes mellitus in the working area of Driyorejo Health Center in Gresik District are included in the category of obesity I (66.7%).
2. Most people with type 2 diabetes mellitus in the working area of Driyorejo Health Center in Gresik District have a easy activity (64.1%).
3. Most people with type 2 diabetes mellitus in the working area of Driyorejo Public Health Center in Gresik District have a majority of bad blood sugar levels (46.2%).
4. There is a significant relationship between obesity and physical activity with blood sugar levels in patients with type 2 diabetes mellitus in the work area of Driyorejo Health Center in Gresik District. The higher the level of obesity, the blood sugar levels will increase. The lighter physical activity, the blood sugar levels will increase.

5. Thank You Note

Acknowledgments I told Nahdlatul Ulama Surabaya University who helped in the research process and to the respondents who participated in the study so that the research can proceed smoothly.

6. References

- [1] Sanif, Edial. 2008. *Kolesterol Biang Penyakit Jantung*.
- [2] Isnaini, Nur & Ratnasari. 2018. *Faktor Risiko yang Mempengaruhi Kejadian Diabetes Mellitus Tipe Dua*. Jurnal Keperawatan dan Kebidanan Aisyiyah Vol 14, No. 1, Juni 2018, pp.59-68. Vol 14, No. 1, Juni 2018, pp.59-6
- [3] Olvista. 2011. *Sedentary lifestyle*.
- [4] WHO. 2015. *World Health Statistics 2015 – World Health Organization*.
- [5] Setyawan, Septa. 2015. *Hubungan Aktivitas Fisik Dengan Kadar Glukosa Darah Sewaktu Pada Paisein Diabetes Melitus*. Jurnal Keperawatan, Volume XI, No. 1, April 2015, ISSN 1907 - 0357.
- [6] Kurniadi, Helmanu & Nurrahmi, Ulfa. 2015. *Gejala Penyakit Jantung Koroner, Kolesterol Tinggi, Diabetes Melitus, Hipertensi*. Yogyakarta: Istana Media.
- [7] Devi, Nirmala. 2012. *Gizi Anak Sekolah*. Jakarta: Kompas.
- [8] Karim, Faizati. 2012. *Panduan Kesehatan Olahraga Bagi Petugas Kesehatan*. Jakarta: Tim Departemen Kesehatan.
- [9] Novitasary, dkk. 2013. *Hubungan Antara Aktivitas Fisik Dengan Obesitas Pada Wanita Usia Subur Peserta Jamkesmas di Puskesmas Wawonasa Kecamatan Singkil Manado*. Jurnal e-Biomedik (eBM), Volume 1, Nomor 2, Juli 2013.
- [10] Adnan, Miftahul. 2013. *Hubungan Indeks Massa Tubuh (IMT) Dengan Kadar Gula Darah Penderita Diabetes Mellitus (DM) Tipe 2 Rawat Jalan Di RS Tugurejo Semarang*. Jurnal Gizi Universitas Muhammadiyah Semarang April 2013, Volume 2, Nomor 1.
- [11] Ilyas, E. I., 2011. *Olahraga bagi Diabetesi dalam: Soegondo, S., Soewondo, P., Subekti, I., Editor. Penatalaksanaan Diabetes Melitus Terpadu Bagi Dokter Maupun Edukator Diabetes*. Jakarta: Fakultas Kedokteran Universitas Indonesia.