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7 **THE CORRELATION LIFESTYLE WITH THE INCIDENCE OF DIABETES MELLITUS TYPE 2**

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ABSTRACT

Background: The change in social structure from agricultural to industrial societies has contributed significantly to lifestyle changes that have led to an increase in non-communicable diseases, including diabetes (DM). Lifestyle changes are diet and exercise. Unhealthy diet and lack of exercise are among the triggers for the development of DM type 2. **Objective:** To analyze the correlation between lifestyle (diet and physical activity) and the incidence of DM type 2. **Methods:** The design of this study is analytical observational with a retrospective study. The population of this study was all patients sufferers diagnosed with diabetes mellitus type 2 at the Waru Sidoarjo Health Center. Sampling was carried out by purposive sampling, 60 samples in this study, research instruments using questionnaire sheets and glucometer. The statistical test in this research is Chi-Square. **Results:** Based on research that has been carried out, it was found that there was a relationship between diet ($p=0.000 < \alpha=0.05$) and physical activity ($p=0.001 < \alpha=0.05$) and the incidence of DM type 2. **Conclusion:** lifestyle relationship with the incidence of DM type 2. Nurses and nutritionists to pay more attention to diet and conduct diabetic gymnastics. For DM people to control their diet and physical activity regularly.

Keywords : *life style, diet, physical activity, DM Type 2*

INTRODUCTION

Changes in social structure from agricultural patterns to industrial societies have contributed significantly to lifestyle changes and may lead to an increase in non-communicable diseases, one of which is diabetes mellitus.^{1,2} Some of those lifestyles are diet and physical activity. Lifestyle is known to have a significant influence on the occurrence of type 2 diabetes mellitus by reducing the incidence of diabetes through good dietary habits and physical activity.³ A healthy diet lies in planning 3J (number, type and schedule of meals).⁴ People's diet today has shifted to a modern diet that tends to be instantaneous. Many experts cite this as a triggering factor and are associated with the onset of various diseases. One of the diseases in question is diabetes mellitus.⁵

On the other hands the industrial revolution changed the type and amount of work of a person. Before the industrial revolution, most of the people did heavy physical work. Gradually the machine reduces the physical work that must be done. So fewer and fewer people do physical work and more and more work behind a desk.^{6,7}

According to the International Diabetes Federation (IDF), in 2021, 537 million adults (ages 20-79) worldwide, or 1 in 10, had diabetes.⁸ Indonesia ranks second highest in the Southeast Asia region.

According to the report on the results of Riskesdas (2018), the Ministry of Health of the Republic of Indonesia in 2018, the prevalence of people with Diabetes Mellitus in Indonesia increased from 1.5% in 2013 to 2.0% in 2018 while the prevalence in East Java was 2.6%.⁹ The Sidoarjo 2.5% of people with diabetes mellitus.¹⁰

People are now very busy with work behind the desk which causes no opportunity for recreation or exercises. The number of transportation facilities such as motorbikes makes not a few people reluctant to walk to cover a distance of only about 100 m. This allows a person to suffer from non-communicable diseases, one of which is diabetes mellitus.¹¹

METHODS

This study is an analytical observational study, which is a retrospective study. This study was conducted in January-March 2021. The population in this study was all patients diagnosed with type 2 diabetes mellitus who visited the Waru Sidoarjo health center with a total of 60 respondents taken by purposive sampling.

The independent variable is the lifestyle consisting of diet and physical activity, while the dependent variable is the incidence of type 2 diabetes mellitus.



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The instrument used is a questionnaire sheet, for diet variables are instruments compiled by the researchers themselves, while physical activity variables use the GPAQ (Global Physical Activity Questionnaire) questionnaire. Blood sugar levels are checked using a glucometer.

Then test the data using the chi-square test and perform statistical tests using the SPSS version 23.0 program for Windows at significance level = 0.05. If the statistical test results in $p < 0.05$ indicating a relationship between the independent and dependent variables, the hypothesis is rejected.

RESULTS

Demographic data respondent

Table 1. Demographic data respondents with DM type 2 (n=60)

Demographic data	n	%
Gender		
Man	29	48.3
Woman	31	51.7
Ages (Years)		
< 45	6	10
45-60	40	66.7
> 60	14	23.3
Level of education		
Not educated	12	20
Elementary	12	20
Middle	22	36.7
Academy	14	23.7
Employee		
Employee	44	73.3
Unemployee	16	26.7
Smoking habit		
Yes	31	51.7
No	29	48.3
Time illness (years)		
< 5	16	26.7
> 5	24	73.3

Table. 1 shows that most of the respondents man gender (51.7%), aged 45-60 were 42 people (66.7%). Majority of education levels, up to 22 respondents in middle school (36.7%) and employe status 44 people (73.3%). Respondent with smoking habit 31 people (51.7%) and with time illness more than 5 years is 24 people (73.3%).

Table 2. The correlation lifestyle with the incidence of DM type 2

Variable	Incidence of DM type 2		P value
	n	%	
Dietary habit	Healthy	21 35	0.000
	No healthy	39 65	
Physical activity	High	26 43.3	0.001
	Low	34 56.7	

Table 2 shows that most respondents were found to have an unhealthy diet with 39 respondents. Most respondents also had low physical activity with 34 respondents. The results of the chi square test obtained a p value of 0.000 ($p < 0.05$), so it can be concluded that H_a is accepted, meaning that there is a relationship between dietary habit and the incidence of DM type 2.

The results of the chi square test obtained a p value of 0.001 ($p < 0.05$), so it can be concluded that H_a is accepted, meaning that there is a relationship between physical activity and the incidence of DM type 2.

DISCUSSION

Diabetes is more prevalent at the age of over 40 years, because the ability of the pancreas to produce insulin will decrease at an increasingly high age. Diabetes mellitus is more likely to occur in women, because metabolism in women is slower than in men, so women have a greater chance of developing diabetes. However, other studies state differently that the incidence of diabetes mellitus increases every year with a higher increase in men than women.¹²

The level of education does not directly affect the onset of diabetes mellitus. However, it is suspected to affect the diet through the selection of the type of food consumed daily. The level of education will affect a person's level of food consumption in choosing foodstuffs to meet their needs.^{13,14} that the relationship between work and the incidence of diabetes that the absence of work makes the body less mobile and can be a trigger for obesity. This will lead to the occurrence of insulin resistance.

This situation makes body tissues less sensitive to insulin. Therefore, sugar in the blood has difficulty leaving the blood and entering cells.¹⁵

A healthy diet is defined as eating according to the 3J plan of number, variety and regularity of meals.



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An unhealthy diet leads to an imbalance between carbohydrates and other requirements of the body. As a result, sugar levels in the body increase beyond the ability of the pancreas to work, leading to diabetes mellitus.¹⁶

Diabetics have two major insulin-related problems: insulin resistance and impaired insulin secretion. Insulin normally binds to special receptors on the cell surface. Binding of insulin to such receptors leads to a series of reactions in glucose metabolism within the cell. The response of insulin secretion to an increase in blood glucose concentration provides a feedback mechanism that is essential for the regulation of blood glucose concentration. That is, the increase in blood glucose increases insulin secretion, and insulin further causes the transfer of glucose into the cells, since it reduces the blood glucose concentration back to normal values.^{17,18,19}

In addition to an unhealthy diet, insufficient physical activity is also a predisposing factor to the occurrence of diabetes mellitus. Normal muscles that are in a state of rest that can result from a lack of physical activity are hardly permeable to glucose except when muscle fibers are stimulated by insulin. The increased risk of diabetes mellitus in low physical activity occurs due to a decrease in muscle contractions leading to reduced permeability of cell membranes to glucose. As a result, there is a disruption of glucose transfer into cells and a reduced response to insulin which leads to a resistant state and can give rise to diabetes mellitus.^{20,21}

Physical activity is defined as a daily activity divided into 3 parts. The first part, that is, work-related physical activity; inquire about physical activity on working days (strenuous activity). The second part, which is physical activity outside of work (moderate activity). The third part, which is physical activity related to travel; ask about the type of transportation used to get to and from work, markets, mosques/churches, and others.^{22,23} Such physical activity can be measured using the GPAQ (Global Physical Activity Questionnaire) questionnaire.²⁴

Physical activity can reduce the risk of diabetes through the effects of weight loss and insulin sensitivity. A person with low levels of body fat has a low risk of developing diabetes as well. Additionally, physical activity has been shown to

help diabetics reduce their consumption of insulin and non-insulin treatments.^{17,18}

In addition, the lack of physical activity makes the secretory system of the body run slowly. As a result, there is a buildup of fat in the body which gradually becomes excess weight and leads to the onset of diabetes mellitus.²⁵ Low physical activity has a three times greater risk of diabetes compared to high physical activity. Other studies state that people who have heavy daily physical activity have a lower risk of suffering from diabetes mellitus compared to people whose daily physical activity is low.²⁶

A person with a hereditary history of diabetes and running 3 Life's simple 7 has a low risk of developing diabetes. Life's simple 7 is an AHA (American Heart Association) program to reduce the risk of cardiovascular disease. One can at least running two of the seven Life's simple 7 programs to be at low risk of developing diabetes, and two of them are healthy diets and high physical activity.²⁷ Similar studies also explain that low physical activity and eating instant food as a form of unhealthy diet are risk factors for someone with a family history of diabetes. One of the low physical activities that increases the risk of diabetes is associated with the number of hours spent watching TV during the week.^{28,29}

CONCLUSION

Most respondents with type 2 diabetes mellitus have a history of unhealthy diet and light physical activity. These two things are part of the risk factors for diabetes, especially in respondents with a family history of diabetes. Nurses and nutritionists to pay more attention to diet and conduct diabetic gymnastics and for people with DM to control their diet and physical activity regularly.

ETHICAL APPROVAL

This research has passed the ethical clearance at Universitas Nahdlatul Ulama Surabaya with no 0281/EC/KEPK/UNUSA/2020.

CONFLICTS OF INTEREST

There are no conflicts of interest. This article has not yet been published.

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AUTHOR CONTRIBUTIONS

EMW were responsible for the completeness and accuracy of the manuscript data and drafts, and also wrote the main draft of the screenplay. RFN were responsible for study design and contributed to data analysis and interpretation.

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