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Relationship between BMI (Body Mass Index) and Cholesterol in the Community Around UPN "Veteran" Jawa Timur

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ABSTRACT

Cholesterol is a risk factor for non-communicable diseases. High cholesterol levels that exceed normal limits or hypercholesterolemia can be a risk factor that causes various non-communicable diseases such as an increased risk of hypertension, obesity, stroke and coronary heart disease. The factor associated with high cholesterol is Body Mass Index (BMI). High body mass index (BMI) is caused by high calorie consumption patterns, lack of physical activity, and consuming foods that contain high amounts of calories, salt and fat, including cholesterol. Weight gain is also associated with increased serum cholesterol levels. The aim of this research is to determine the relationship between BMI and cholesterol levels in the community around UPN "Veteran" Jawa Timur. The method used is descriptive-analytic with a cross-sectional research design. The research sample used was the community around UPN "Veteran" Jawa Timur who visited UPN Serving activities. The sample consisted of 69 people with sampling using simple random sampling techniques. Data analysis used bivariate analysis (chi square test). The results showed that of the 69 respondents, the largest percentage of BMI was normal at 52.4%, overweight at 31.9% and obesity 1 at 8.7%. Meanwhile, the results of cholesterol levels were obtained from 29 people in the high cholesterol level category and 40 people in the low cholesterol level category. The Chi-Square test between body mass index (BMI) and cholesterol levels in the community around UPN "Veteran" Jawa Timur obtained a statistical result of 0.675 ($p > 0.05$). The conclusion of the research is that there is no relationship between body mass index (BMI) and cholesterol levels in the community around UPN "Veteran" Jawa Timur .

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1. INTRODUCTION

The problem currently faced by society in the health sector is double burden disease, which is a situation where non-communicable diseases (NCDs) have increased in incidence, but infectious diseases have not yet been eradicated (Kalsum et al., 2019). Non-communicable diseases (NCDs) are known as chronic diseases, which are not transmitted and transmitted to other people (Salam, 2016). NCDs are "lifestyle" diseases because most of these diseases are diseases that can be prevented by controlling risk factors such as tobacco use (smoking), alcohol abuse, poor diet (high consumption of sugar, salt, saturated fat and trans fatty acids), and lack of physical activity (Sari & Artsanthia, 2019).

Cholesterol levels are one of the risk factors for non-communicable diseases (NCD) (Sinulingga, 2020). High cholesterol levels that exceed normal limits or hypercholesterolemia can be a risk factor that causes various non-communicable diseases such as an increased risk of hypertension, obesity, stroke and coronary heart disease (Patala et al., 2023). The prevalence rate of hypercholesterolemia is currently still relatively high. The prevalence of hypercholesterolemia in Indonesia reaches 9.3% in the 25-34 year age group and with increasing age, the prevalence of hypercholesterolemia increases to 15% in the 55-64 year age group (Lainsamputty & Gerungan, 2022). Several factors related to high cholesterol are Body Mass Index (BMI) (Sumarsih & Hastono, 2020).

BMI (Body Mass Index) is a way of measuring body weight adjusted for height which is calculated by dividing body weight by height (Rasyid, 2021). High body mass index (BMI) is caused by high calorie consumption patterns and lack of physical activity, which leads to a sedentary lifestyle and a tendency to like fast food which has an unbalanced nutritional content, namely containing calories, salt and fat including cholesterol. in high quantities and contains little fiber (Pakpahan et al., 2021). Samosir (2018) believes that weight gain is also associated with an increase in serum cholesterol levels. Each 1 kg/m2 increase in body mass index (BMI) is associated with an increase in plasma total cholesterol of 7.7 mg/dl and a decrease in HDL of 0.8 mg/dl. According to Putri et al. (2021) stated that obesity can cause an increase in endogenous cholesterol synthesis by 20 mg per day for every kilogram of excess body weight, as well as increasing VLDL synthesis and triglyceride production. Therefore, an analysis of the relationship between BMI and cholesterol levels will be carried out.

In previous research conducted by Wahyuni & Diansabila (2020) which involved students of medical study programs by measuring BMI and cholesterol levels, the results showed that there was no significant relationship between BMI and cholesterol levels of medical students, while research conducted by Musdalifa et al. (2017) stated that there is a relationship between BMI and cholesterol levels of staff and teachers at SMA 1 Kendari. There is conflicting research regarding BMI and cholesterol levels, so the author conducted research on the relationship between BMI and cholesterol levels in the community around UPN "Veteran" Jawa Timur. The results of this research can later also be used as reference material for managing lifestyle in order to reduce risk factors and the incidence of non-communicable diseases (NCDs).

2. METHOD

Research design

This research was conducted during UPN Serving activities at the Giriloka Building, UPN "Veteran" Jawa Timur, Surabaya on 17-18 October 2023. This type of research is observational analytical research, with a Cross Sectional Study research design, namely research to study the relationship between independent variables with the dependent variable measured once and at the same time (Widia, 2017). In this study, we will analyze the relationship between variables, namely BMI and cholesterol levels. The target population in this research is visitors to UPN Berabdi. The sample in this study was UPN service visitors who met the inclusion and exclusion criteria. Inclusion criteria consist of: respondents willing to be sampled, physically and mentally healthy, able to take part in the research series. And the exclusion criteria are not willing to be a respondent, the respondent is sick. The sampling technique in this research is Simple Random Sampling, namely taking sample members from the population randomly without paying attention to strata (Harahap et al., 2018). The research sample was 69 people consisting of male and female respondents.

Method of collecting data

This research data was taken from a sample of visitors to UPN Berabdi, both male and female, by direct examination in the form of anthropometric data using a Karada Scan scale which consists of measuring body weight, height, BMI (Body Mass Index). Referring to FAO/WHO provisions, the BMI threshold is determined by dividing the BMI categories into four, namely (Susilowati et al., 2013):

Classification	BMI (Kg/m2)
Ideal (normal)	18.5 – 24.9
Overweight	25 – 29.9
Class I Obesity	30 – 34.9
Class II Obesity	35 – 39.9

Collecting cholesterol levels is by taking capillary blood samples using a blood lancet with a Digital GCU (Glucose, Cholesterol, and Uric Acid) measuring instrument. Cholesterol classification according to Ekayanti (2019): low cholesterol levels if < 200 mg/dl, while high cholesterol levels if > 200 mg/dl.

Data analysis method

Data were analyzed using SPSS 23.0 software. The method used to analyze data in this research is divided into two. First, carry out univariate analysis of characteristic data such as mean, deviation and frequency distribution of UPN Berabdi visitor characteristic data, anthropometric data and cholesterol profile. Then, secondly, a bivariate analysis was carried out using the Chi-Square test which aims to identify the relationship between BMI and total cholesterol.

3. RESULTS AND DISCUSSION

Respondent Characteristics

This research was conducted on 17 - 18 October 2023 at the UPN Berabdi activity at the Giriloka Building, UPN "Veteran" Jawa Timur, involving UPN Berabdi visitors as a sample (69 people), based on the characteristics presented in table 1 below.

Table 1. Characteristics of UPN Serve Respondents

Characteristics	Number (n)	Percentage (%)
Age		
15 – 25 Years	53	76.8
26 – 35 Years	9	13.2
36 – 45 Years	3	4.3
46 – 55 Years	1	1.4
56 – 65 Years	3	4.3
Gender		
Man	13	18.8
Woman	56	81.2
Cholesterol		
High (>200 mg/dl)	29	42.03
Low (<200 mg/dl)	40	57.97
BMI		
Ideal	41	59.4
Overweight	22	31.9
Obesity 1	6	8.7
Obesity 2	0	0

Based on the data in Table 1, it shows that the majority of UPN Berabdi visitors used as samples were female, totaling 56 people (81.2%) while only 13 male respondents (18.8%). Furthermore, based on age data, the majority of UPN service visitors who visited were in the age range 15-25 years with a total of 53 people (76.8%), the age range 26-35 years amounted to 9 people (13.2%), the age range 36- 45 years amounted to 3 people (4.3%), the age range 46-55 years amounted to 1 person (1.4%) and the age range 56-65 years amounted to 3 people (4.3%). *Body Mass Index* (BMI) characteristics show that 41 people have a normal BMI (59.4 %), 22 people have a *overweight* (31.9 %), 6 people had obese BMI class 1 (8.7 %), and there were no correspondents with obese BMI class II . Meanwhile, for total cholesterol, there were 29 people (42.03 %) who had high cholesterol levels and 40 people (57.97 %) had low cholesterol levels ,

Table 2. Anthropometric Data of UPN Serve Respondents

Variable	Man			Woman		
	Min	Max	Average	Min	Max	Average
Body Weight (kg)	33.3	91.2	69 ± 16.8	36.4	81.8	56.2 ± 9.7
Height (cm)	150	180	166 ± 9	148	168	157.1 ± 5.1
BMI (kg/m ^{2})	14.8	33.1	25.4 ± 5.3	14.9	31.9	22.9 ± 4.1

The results of the research are presented descriptively (Table 2), illustrating that the average body weight of male respondents is 69 kg and that of female respondents is 56.2 kg, as well as height shows the average height of male respondents. -men are 1.66 cm and women are 157.1 cm. Based on BMI data , it is known that male respondents have a higher BMI (25.4 kg/m2) than female respondents (22.9 kg/m2) .

Table 3. Profile of Cholesterol Levels of UPN Serve Respondents

Variable	Man			Woman		
	Min	Max	Average	Min	Max	Average
Cholesterol	130	257	167.5 ± 37.1	106	855	208 ± 97.2

Profile of respondents' cholesterol levels based on gender, Table 3 provides information that the cholesterol profile on average is higher in female respondents (208 mg/dl) than male respondents (167.5 mg/dl).

Table 4. Relationship between BMI and Cholesterol Levels of UPN Serve Respondents

BMI	Cholesterol		*P* -value
	Tall	Low	
Ideal	23	16	0.675
Overweight	14	9	
Obesity 1	2	4	
Obesity 1	0	0	

Based on the results of table 4 informed that the *P* - value of the relationship between the respondent's BMI and the respondent's cholesterol level was 0.675 , meaning *the P* - value > α. So there is no relationship between the respondent's BMI based on *the P* - value and the respondent's cholesterol level.

Discussion

Based on the results in table 4 , there is no relationship between the respondent's BMI based on the P - value and cholesterol levels . People who are obese do not always have high cholesterol levels, and vice versa. High cholesterol levels are not always caused by central obesity, but are more influenced by the intake of foods rich in cholesterol, such as meat, offal and eggs. Consuming these foods can increase cholesterol concentrations in the blood because these foods contain relatively high cholesterol levels (Simbar et al., 2015).

Another factor that plays a role in determining high or low cholesterol is physical activity. Physical activity is generally thought to reduce LDL levels in the blood, but HDL levels will increase . In addition, unstable or stressful emotional situations, as well as caffeine consumption, are associated with increased free fatty acids in the blood. The impacts include increases in triglycerides and cholesterol transported by VLDL, which in turn can lead to increases in circulating cholesterol (Botham et al., 2006).

Consuming foods with a high saturated fat content can also contribute to increasing blood cholesterol levels, with an increase of around 15%-25%. This mechanism is related to the accumulation of fat in the liver, which then causes an increase in acetyl-CoA elements in the liver for cholesterol synthesis (Guyton & Hall, 2006).

Hereditary factors have the greatest role in determining a person's serum cholesterol levels, such as the presence of gene mutations in the LDL receptor causing the formation of high LDL. Usually characterized by cholesterol production > 400 mg/dL and HDL cholesterol levels < 35 mg/dL. However, food intake and environmental factors such as physical activity, smoking, also influence cholesterol levels 16 (Botham et al., 2006) .

4. CONCLUSION

The conclusion in this study is that there is no significant relationship between Body Mass Index (BMI) and cholesterol levels in visitors to UPN Berabdi 2023 .

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