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Research Article



## Analysis of cholesterol and triglyceride levels in obese patients

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**ABSTRACT**

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Obesity is excessive fat accumulation in the body. Continuous obesity and excessive food intake can cause metabolic system disorders in the form of hypercholesterolemia. Analysis of cholesterol and triglyceride levels in obese patients needs to be carried out to assist them in making healthier lifestyle changes. This study aims to analyze cholesterol and triglyceride levels in obese patients. The research method used is experimental with a laboratory approach. The samples to be analyzed were 20 obese people obtained by purposive sampling technique in the Tulungagung area. The research instruments used were height and weight check sheets and cholesterol and triglyceride test results sheets. Research data analysis technique by examining cholesterol and triglyceride levels using a MicroLab C-300 spectrophotometer and will be analyzed descriptively quantitatively. The results showed that 15 patients had normal cholesterol levels (75%) with criteria <200 mg/dl and 5 patients had high cholesterol levels (25%) with criteria >200 mg/dl, while there were 17 patients with normal triglyceride levels (85 %) with criteria <150 mg/dl and 3 patients had high triglyceride levels (15%) with criteria >150 mg/dl. The conclusion of this study is that people who are obese do not necessarily have high cholesterol and triglyceride levels. However, when a person weighs > 80 kg, it is recommended to start paying attention to a healthier lifestyle.

**Keywords:** Cholesterol; obesity; triglycerides

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### INTRODUCTION

Obesity is the accumulation of abnormal fat which results in health risks. Obesity is a problem in developed countries with high-income populations. The new findings show that obesity is also increasing in countries with low and middle-income populations, particularly in urban areas. Obesity increased by 5% at the age of 12 to 19 years in 1980 and reached 21% in 2012., and in that year more than a third of adolescents were overweight or obese (Badi et al., 2015).

Body Mass Index (BMI) is a method used to determine a person's nutritional status. In adolescents, this determination is based on calculating the BMI which is then matched with a growth chart according to age and sex. People can be said to be obese if they are included in the category of obesity BMI or overweight (Santika, 2015). Cholesterol released consists of 2 types, namely High-Density Lipoprotein/HDL and Low-Density Lipoprotein/LDL (Hermawati et al., 2019). Cholesterol is synthesized systemically in cell types and organ functions, from cholesterol synthesized per day, 20 to 25 percent, synthesized cholesterol is transported through the bloodstream by lipoprotein particles, Very Low-Density Lipoprotein (VLDL), LDL, Intermediate Density Lipoprotein (IDL) and HDL (Ormazabal et al., 2018).

High fasting triglycerides can increase the risk of various health problems, especially cardiovascular disease. High fasting triglycerides are often associated with other metabolic disorders, leading to the expansion of adipose tissue, steatosis, obesity, insulin resistance, and hepatic VLDL secretion (Soffanti & Graham, 2016). In addition, fasting triglycerides are strongly correlated with other adverse lipid profile changes and are more complex (Litvinov et al., 2018). The condition of an obese body is often associated with an increase in cholesterol and triglyceride levels. This is due to unhealthy lifestyles, such as consuming foods high in fat and carbohydrates and a lack of physical activity (Farizal & Marlina, 2019).

Previous research conducted by Hastuty (2018) which focused on differences in cholesterol levels in obese and non-obese people showed that there was no difference in cholesterol levels in both. The research method used is descriptive analytic, the research sample is employees of Ministry agencies, and the data analysis technique uses the T-test. Furthermore, Salim et al. (2021) showed that there is a relationship between obesity status and increased triglyceride levels in the blood. The research method used is literature study and a sample of articles related to obesity. While in this study, researchers will focus on the analysis of cholesterol and triglyceride levels in obese patients. The research method used was experimental through a laboratory approach with a sample of 20 obese patients in the Tulungagung area taken by random sampling technique. The instruments used were the results of checking cholesterol and triglyceride levels. The research data analysis technique was carried out using quantitative descriptive results from the MicroLab C-300 spectrophotometer test.

This study was conducted by identifying the problem that occurs, which is where many people who do not maintain a diet so that they are obese. Where these obesities can have an impact in the form of easy attack of a disease. One of the problems that are feared to occur due to obesity is the increase in cholesterol and triglyceride levels. Therefore, the results of the study are expected to be used to determine how dangerous obesity and find a way out to change a healthier lifestyle. The purpose of this study to analyze the level of cholesterol and triglycerides in obese patients. The hope of this study is that the results of the study can add insight into how important it is to maintain a lifestyle, especially maintaining a diet.

## RESEARCH METHODS

This study was an experimental study to determine cholesterol and triglyceride levels in obese people. This study used Cholesterol Oxidase-Peroxidase Aminoantypirin (CHOD-PAP) and Glucosa Oxidase-Peroxidase Aminoantypirin (GPO-PAP) methods. The sample used in this study was the blood of obese patients obtained from Tulungagung area. Sampling technique in this study using purposive sampling. The selection technique is because the research sample must meet the criteria that have been determined as follows. (1) Male or female with an obese condition. (2) Have an age of 30-50 years. (3) Not currently taking medication. The following are the exclusion criteria in sample selection: (1) the RW.

02 Plosokandang village who was traveling out of town during the study, (2) being sick during sampling, and (3) Not willing to respond.

The research instruments used were height and weight check sheets and cholesterol and triglyceride test results sheets. After that, respondents who met the criteria were measured height and weight. The results of height and weight measurements were used to analyze the level of obesity of the respondents. The last stage is to measure cholesterol and triglyceride levels. Cholesterol and triglyceride levels were measured using a Microlab C-300 spectrophotometer. Research data analysis technique by examining cholesterol and triglyceride levels using a MicroLab C-300 spectrophotometer and will be analyzed descriptively quantitatively.

## FINDING AND DISCUSSION

Measurement results of height and weight in obesity are shown in Table 1.

Table 1. Measurement Results of Height and Weight in Obesity

Respondent Code	Sex Types	Age	Height (m <sup>2</sup> )	Weight (kg)	BMI	BMI Scale
A01	L	38	160	102	39	Fat
A02	P	39	152	76	33	Fat
A03	L	39	158	87	38	Fat
A04	P	50	155	70	29	Fat
A05	P	49	157	78	34	Fat
A06	L	36	158	88	36	Fat
A07	P	37	155	70	29	Fat
A08	L	39	158	83	34	Fat
A09	P	42	157	92	36	Fat
A10	P	31	150	73	29	Fat
A11	L	40	152	78	34	Fat
A12	P	40	153	79	38	Fat
A13	L	45	150	78	32	Fat
A14	P	40	153	80	35	Fat
A15	L	38	152	95	41	Fat
A16	P	36	155	81	33	Fat
A17	L	47	157	85	35	Fat
A18	P	35	151	80	35	Fat
A19	L	35	155	89	37	Fat
A20	P	37	150	90	40	Fat

Based on Table 1, there were 9 male patients and 11 female patients, all of whom were included in the fat criteria. Height is a fundamental component as an indicator of nutritional status, by linking weight to height. So that the measurement of a person's height accurately is very important to determine the value of BMI, other than that height can be used as a measure of Basal Metabolism Rate/BMR (Nurcan et al., 2010). Weight is a common measure often used to assess the state of human nutrition. Body weight is also one of the criteria for measuring body Time Index (Santika & Subekti, 2020). The body mass index is the body weight in kilograms divided by the square of the height in meters. It is used because for most people it correlates quite well with the level of body fat (Wiranata & Inayah, 2020).

The relationship between height and weight in obesity is proven by the results of the correlation test which shows that there is a relationship between height and weight in obesity (R Square = 0.767). There is a significant relationship between height and obesity, was rejected. The direction is negative, meaning that the higher the height, the lower the level of obesity or BMI. There is a significant relationship between body weight and obesity, is accepted. The direction is positive, meaning that the higher the weight, the more it will increase the level of obesity or BMI. There is a significant relationship between

height and weight with obesity, accepted ( $\text{sig} < 0,05$ ). The test results above follow the analysis conducted by Sugiyono (2013), Budiwanto (2017), and Ghozali (2015). The results of the analysis of cholesterol and triglyceride levels in obesity can be seen in Table 2.

**Table 2. The Results of The Analysis of Cholesterol and Triglyceride Levels in Obesity**

No	Sample Code	Weight	Cholesterol	Triglycerides	BMI
1	A01	102	245*	69	39
2	A02	76	192	105	33
3	A03	87	146	68	38
4	A04	70	177	198**	29
5	A05	78	188	242**	34
6	A06	88	135	159**	36
7	A07	70	184	108	29
8	A08	83	149	59	34
9	A09	92	87	45	36
10	A10	73	175	70	29
11	A11	78	154	86	34
12	A12	79	157	122	38
13	A13	78	142	54	32
14	A14	80	202*	81	35
15	A15	95	230*	52	41
16	A16	81	163	40	33
17	A17	85	173	102	35
18	A18	80	201*	43	35
19	A19	89	166	123	37
20	A20	90	270*	83	40

Information:

Normal cholesterol level  $< 200$  mg/dl, and normal triglyceride levels  $< 150$  mg/dl  
(\*) high cholesterol, (\*\*) high triglycerides

Based on Table 2 above, it can be summarized that there are 15 obese patients who have normal cholesterol levels with a percentage value of 75% and 5 obese patients who have high cholesterol levels with a percentage value of 25%. Meanwhile, 17 obese patients had normal triglyceride levels with a percentage value of 85% and 3 obese patients had high triglyceride levels with a percentage of 15%. Cholesterol is a type of lipid or fat found in the blood and throughout the body. Healthy cholesterol levels are important for maintaining a healthy heart and blood vessels (P2PTM Kemenkes, 2018).

The results of the study in Table 2 show that 15 (75%) of obese people have cholesterol levels within normal limits. These results are in line with previous studies. Research conducted by Surentu et al. (2014) found obese adolescents had cholesterol levels within the normal range. The same is also evidenced in a study conducted Wahjoeni et al. (2016), to 25 adolescents have normal cholesterol levels. The results of the study in Table 2 show that 18 (85%) of obese people have triglyceride levels within normal limits. These results are in line with previous studies. Research conducted by Oway et al. (2020) found 30 samples in obesity had normal triglyceride levels. Factors that can affect high cholesterol are activity because current technological advances that allow reduced physical activity and increased access or desire for calorie and fatty foods can be a trigger for increased blood cholesterol levels. So, it is necessary to educate the public about a healthy lifestyle with an explanation of the diseases that will accompany it. Errors in the tool can also affect the results such as the cleanliness of the tool used, the skill of the attendant, air bubbles in the spectrophotometer, imperfect homogeneity, improper pipetting, time and temperature incubation less precise (Pratiwi et al., 2022). Increased triglyceride levels can be caused by the intake of fats and carbohydrates which are the basic ingredients for the formation of

triglycerides, if there is excess carbohydrate intake it will be stored under the skin in the form of fat. Obesity can occur due to an increase in triglyceride levels that trigger excessive accumulation of carbohydrates because it lasts for a long time. Increased intake of fat and also saturated fat will increase triglyceride levels (Choirudin, 2022).

In this study, the average respondent has a job with physical activity that is not heavy. Where this study is in line with research conducted by Choirudin (2022) that someone with light activity will be at risk of increased cholesterol and triglyceride levels compared to someone who has heavy activity. This is consistent with research that one of the risk factors for increased cholesterol and triglycerides is lack of physical activity. These overweight study respondents were not always followed by increased cholesterol and triglyceride levels. This proves that cholesterol and triglyceride levels are not only determined by one factor but various factors including diet, exercise, lifestyle, and genetics. Dietary adjustments, regular exercise and a good lifestyle are quite effective ways to keep cholesterol and triglyceride levels at normal limits.

## CONCLUSION

There are 15 patients had normal cholesterol levels (75%) with criteria <200 mg/dl and 5 patients had high cholesterol levels (25%) with criteria >200 mg/dl, while there were 17 patients with normal triglyceride levels (85 %) with criteria <150 mg/dl and 3 patients had high triglyceride levels (15%) with criteria >150 mg/dl. Not all obese people have high cholesterol and triglyceride levels. Furthermore, the results of this study can be used as a reference that when a person's weight is > 80 kg, it is recommended to start paying attention to a healthier lifestyle.

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