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THE DIFERENCES CHOLESTEROL LEVEL OF EMPLOYEES WITH NUTRITIONAL STATUS OVERWEIGHT AND NON OVERWEIGHT

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Abstract
The level of colesterol plays a vital role in cardiovascular disease. Overweight and obesity can increase the occurrence of high levels of blood cholesterol (hypercholesterolemia) in otherwhise cholesterol levels are also high in people of normal weight. This study aims to compare cholesterol levels in employees with overweight and non-overweight nutritional status. This study used a cross-sectional design with a sample size of 62 respondents taken by total sampling technique. Data was collected using secondary data results from medical checkups of Tanker Division of employees. The data used a T test with a significance level of p<0.05. The percentage of overweight was 40 (64.5%), and the percentage non-overweight was 22 (35.5%). The study showed there are differences in total cholesterol levels overweight and non-overweight nutritional status with a value of p = 0.000 (p <0.05). The average cholesterol level for employees with overweight nutritional status is 195.80 mg/dl, which is higher than the average cholesterol level for non-overweight employees, which is 167.23 mg/dl. In conclusion there was significant difference between cholesterol levels of overweight and non-overweight.

Keywords: **:** *Cholesterol; Overweight; Hypercholesterolemia; Nutritional Status*

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INTRODUCTION

High blood cholesterol levels are a serious problem because they are one of the main risk factors for the occurrence of various non-communicable diseases. Noncommunicable diseases (NCDs), such as cardiovascular diseases, diabetes are the leading global cause of death and are responsible for 74% of deaths worldwide (World Health Organization, 2018.). Cholesterol is a naturally occurring molecule that resembles fat physically yet is chemically similar to steroids. The body uses cholesterol as a fundamental building block to create crucial compounds like cell membranes, the covering around nerve fibers, sex hormones, children's kidneys,

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vitamin D, and bile acids (Wang et al., 2017). However, if consumed in excessive amounts, it can cause an increase in cholesterol in the blood, which is called hypercholesterolemia, and can even cause death in the long term.

Obesity is a highly prevalent risk factor among every working individual around the globe. It is often accompanied by absenteeism, increased health expenditure, decreased productivity, and reduced quality of life (R Sowmya et al., 2020). Obesity is defined by the World Health Organization (WHO) as body mass index (BMI) ≥30 kg/m^2, while overweight is the BMI of ≥25 kg/m^2. The increasing individuals with obesity has a negative impact on their health, considering that obesity is a chronic disease of a polygenic or monogenic nature that can cause several dysfunctional or pathological conditions (obese). Several factors that can influence obesity include genetic, food intake, neuroendocrine mechanisms, social culture, and lifestyle (Salam et al., 2022). Obesity conditions will result in an increased risk of hypertension, diabetes mellitus, cardiovascular disease, dyslipidemia, kidney failure, and inflammatory responses (Prihantini & Kurniyanto, 2022).

Indonesia, as a developing country cannot be separated from the high prevalence of central obesity. Based on the results of research, it shows that the prevalence in Indonesia of total cholesterol levels >200 mg/dL is 39.8%. This high prevalence rate is one of the causes of increasing death rate in Indonesia (Kementerian Kesehatan Republik Indonesia, 2018). Various factors can influence cholesterol levels in the blood, one of which is caused by lipoprotein disorders (Virani & Ballantyne, 2018). Hereditary factors have the greatest role in determining a person's serum cholesterol levels, such as gene mutation abnormalities in the low-density lipoprotein (LDL) receptor that cause high LDL (Qureshi et al., 2021).

Hypercholesterolemia is an increase in cholesterol in the blood above normal >200 mg/dl. When the blood's cholesterol level is adequate and stays within the range that is typically needed, the regulation of cholesterol metabolism

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will function normally (Jakubowski, 2023). But obesity can disrupt the way fatty acids are regulated, leading to higher levels of triglycerides and cholesterol esters (Geest & Mishra, 2023). People who are overweight often have higher blood cholesterol levels compared to people who are of normal weight. Level physical activity and dietary intake are part of the lives of today's office workers. This is caused by the heavy demands of work so that there is no opportunity to exercise. A lifestyle will cause a buildup of carbohydrates and cholesterol in the body, which can then cause hypercholesterolemia, which is a risk factor for cardiovascular disease (Ibrahim et al., 2018). The accumulation of excess body fat causes obesity, an elaborate multifactorial condition, which has a negative effect on a person's health. Based on the description above, the author is interested in comparing the cholesterol levels of obese and non-obese.

METHOD

Study Design and Partisipant

This was a cross-sectional study. Total sampling method was utilized in this research with sampel size 62. Data were collected from secondary data medical check-up results Empolyess. The time of sample collection was in Oktober 2023.

Study Variables

The variables studied were total cholesterol levels as the dependent variable and Body Mass Index (BMI), gender and age as independent variables. Cholesterol level and anthropometric measurements like body weight (kilograms), height (meters), Body Mass Index (BMI) were taken by medical delegate office. All the procedures were performed based on the standards for anthropometric measurements. Total cholesterol levels measured by a cholesterol analyzer autocheck of blood. Hypercholesterolemia (HC) is defned as a blood cholesterol level of>200 mg/dL (Salman et al.,2020). Non-obese or normal weight is defined as a BMI of <25kg/m2, and overweight denotes a BMI of≥25 kg/m2 , while a BMI of≥30 kg/m2 falls within the obese category. Body mass index (BMI) is a

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measure of weight adjusted for height, calculated as weight in kilograms divided by the square of height in meters (kg/m^2).

Data Analyses

Data were analyzed using SPSS version 25.0 for Windows . The data is tested first with a normality test to see if the data normally distributed or not. The test used is the Kolmogorov Smirnov test because of the number respondents who were more than 30 respondents. If the data is above 5% or 0.05 then the data has normal distribution, whereas if the test results produce below 5% or 0.05 then the data does not have a normal distribution. Univariate analysis was performed on each variable to identify the characteristics of respondents in the form of frequency and percentage. Bivariate analysis uses t test with confidence interval was 95%, and a P value of less than 0.05 was set to establish a statistical significance.

RESULT AND DISCUSSION

Results

Table 1. Data Distribution Characteristics Age Based on Level Cholesterol

Variabel Age	Cholesterol Level < 200 mg/dl		Cholesterol Level ≥ 200 mg/dl		Total	
	n = 36	%	n = 26	%	n = 62	%
23-34 Years	21	58.3	20	76.9	41	66.1
35-46 Years	9	25	4	15.4	13	21
47-57 Years	6	16.7	2	7.7	8	12.9

Table 1. showed that more than half cholesterol levels employees < 200 mg/dl. Most employees who have cholesterol levels ≥ 200 mg/dl are in 23-34 year group.

Table 2. Data Distribution Characteristics Gender

Variabel Gender	Cholesterol Level < 200 md/dl		Cholesterol Level ≥ 200 mg/dl		Total	
	n = 36	%	n = 26	%	n = 62	%
Female	8	22.2	13	50	21	33.9
Male	28	77.8	13	50	41	66.1

Table 2. there were more respondents in male group. Employees who have cholesterol levels ≥ 200 mg/dl, both men and women in the same percentage.

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Table 3. Data Distribution Characteristic Nutritional Status

Variable	Cholesterol			
	Mean	SD	F	Sig. (2-tailed)
Overweight	195.80	33.498	.630	0.001
Nonoverweight	167.23	27.621		

Table 3. Showed the majority of respondents were overweight nutritional status. Employees who have cholesterol levels ≥ 200 mg/dl are more likely to be in the overweight group.

Table 4. Comparison of Cholesterol Levels

Variabel Nutritional Status	Cholesterol Level < 200 md/dl		Cholesterol Level ≥ 200 md/dl		Total	
	n = 36	%	n = 26	%	n = 62	%
Overweight	19	52.8	21	80.8	40	64.5
Non Overweight	17	47.2	5	19.2	22	35.5

Based on table 4 shows that the F value in the test for Equality of variances is 0.630, it can be concluded that the variances of the two overweight and non-overweight groups are homogeneous groups. The average cholesterol level for employees with overweight nutritional status is 195.80 mg/dl, which is higher than the average cholesterol level for non-overweight employees, which is 167.23 mg/dl. The study showed there are differences in total cholesterol levels overweight and non-overweight nutritional status with a value of p = 0.001 (p <0.05.

Discussion

There are several causes of hypercholesterolemia, age can affect a person's total cholesterol levels. At an older age, total cholesterol levels are relatively higher than at a young age; this is because the older a person is less LDL receptor activity (Jung et al., 2022). The prevalence of borderline and high cholesterol levels increased with age in men between the ages of 45–49. Then it stayed quite steady and eventually declined. Then it stayed quite steady and eventually declined. The prevalence in women also increased with age, with its maximum rise after the ages of menopause and a slight decline at the ages of 65–69

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(Hosseini et al., 2019)**.** Obesity affects cholesterol absorption, synthesis, lipoprotein processing, and results in the accumulation of cholesterol hepatically. Many of the changes are similar to how ageing intersects with cholesterol metabolism and it can be suggested that an obese state superimposed on ageing has the potential to exacerbate the dysregulation of cholesterol metabolism, which occurs with advancing age (Auley, 2020).

Overweight and obese people may have high total cholesterol levels. study by Prihantini found that the risk of developing comorbidities began to increase at a BMI of 24.91 Kg/m2 for total cholesterol levels. The BMI variable has a significant relationship with blood cholesterol levels. The correlation (r = 0.4) shows a moderate correlation. The higher a person's BMI, the higher their blood cholesterol levels (Dana & Maharani, 2022). The results of measuring total cholesterol levels showed that 39 samples (61.9%) were in the normal category. However, there were 24 samples (38.1%) included in the high cholesterol category. it was found that there was a difference in average total cholesterol levels based on the incidence of central obesity (Luh et al., 2019). Increased serum cholesterol is consistent with weight gain in an individual. According to the study's findings, hypercholesterolemia has significant positive associations with growing age and high BMI. It was discovered that having HC was significantly correlated with being male, married, a graduate of college, employed in the civilian sector, diabetic, a smoker, overweight, or obese (Al-Zahrani et al., 2021).

Study cohort showed at the population level, partially higher LDL-C values were linked to increased BMI or severe obesity, but at the person level, they were determined to be clinically insignificant (Sustar et al., 2023). There are two types of cholesterol exist. Low density lipoproteins (LDL) and high density lipoproteins (HDL), also known as "good" and "bad" cholesterol, respectively.The possibility of developing heart disease is thought to be better predicted on the level of HDL to LDL ratio. In obese individuals, excessive lipid buildup leads to higher levels of free fatty acids digested by endothelial lipoprotein lipases, the free

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fatty acids released as a result of excessive fat buildup also raise blood triglyceride levels (Salim.,2021). Multiple research efforts have demonstrated that the pathophysiology of several illnesses is significantly influenced by accumulation of high levels of cholesterol in various tissues and organs. The impact of high cholesterol on the etiology of various diseases, including liver diseases, diabetes, chronic kidney disease, alzheimer'sdisease, osteoporosis, osteoarthritis, pituitary-thyroid axis dysfunction, immune disorders (Song et al., 2021).

Obesity is a complicated condition that can cause a number of illnesses with high mortality and morbidity rates. At the governmental, corporate, community, family, and individual levels, it is essential to provide the public with all the knowledge and resources necessary to inspire them and use prevention techniques (Lin & Li, 2021). High cholesterol is not always influenced by obesity, it is influenced by the consumption of foods that contain a lot of cholesterol. Lifestyle behavioural factors such as dietary intake patterns and levels of physical activity may afect the relative risk of HC status (Grundy et al., 2019). This analysis has certain limitations because the researchers did not directly interview survey participants about their eating habits, such as how frequently they ate and what they ate in the previous 24 hours, their smoking history and physical activity.

CONCLUSION

The conclusion from this study that the cholesterol levels among employees who are overweight and non-overweight have significant differences. Based on these findings, most employees are overweight, so they are advised to do regular exercise, especially routine exercise such as performance sports to maintain a balanced BMI and cholesterol levels.

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