COMPARISON OF TOTAL CHOLESTEROL LEVELS IN ACTIVE AND PASSIVE SMOKERS IN THE ALOEI SABOE REGIONAL GENERAL HOSPITAL AREA, GORONTALO CITY

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ABSTRAK

Smoking and high cholesterol are risk factors for cardiovascular disease and events such as heart attacks and strokes. However, smoking habits in the community have not been eliminated. The purpose of this study was to compare total cholesterol levels in active smokers and passive smokers at Aloei Saboe Regional General Hospital in Gorontalo City.This research method uses a quantitative observational analytical approach. Type of observational analytical research. Research results: Results of research comparing total cholesterol levels in active smokers and passive smokers at Aloei Saboe Regional General Hospital from 30 samples.The results of this study indicate a significant difference in total cholesterol levels between active and passive smokers at Aloei Saboe Regional General Hospital. The data analysis shows a significance value < alpha (0.05) or (sig < 0.05), so Ha is accepted and H0 is rejected. The suggestion for future researchers is to conduct further research with a larger sample and to include additional research variables that affect the results, such as the physical activity and diet patterns of the research respondents.

Keywords: Total Cholesterol, Active Smokers, Passive Smokers

INTRODUCTION

More than 9 million deaths are caused by non-communicable diseases (NCDs), making them the leading cause of death globally. About 90% of these deaths occur in low- and middle-income countries. The most common NCDs causing mortality include diabetes mellitus, cancer, chronic respiratory diseases, and cardiovascular diseases [1]

Cardiovascular diseases such as stroke, hypertension, heart failure, and coronary heart disease are caused by impaired function of the heart and blood vessels. Plaque buildup in the arteries can lead to coronary heart disease (CHD), which restricts blood flow to the heart and causes chest pain [2]

According to WHO (2021), coronary heart disease remains the leading cause of death worldwide. In 2019, heart attacks and strokes accounted for 85% of 17.9 million deaths caused by cardiovascular disease, representing about 32% of global deaths.

Smoking and high cholesterol levels are the two major risk factors for cardiovascular disease. Despite their dangers, smoking habits remain prevalent across all age groups due to their addictive nature and temporary relaxing effects[3]

This habit negatively affects health by increasing bad cholesterol (LDL) and lowering good cholesterol (HDL). Even a single cigarette can trigger an increase in cholesterol and lead to various disorders such as coronary heart disease, thrombosis, cancer, and bronchitis. Nicotine and other toxic substances in cigarette smoke raise blood pressure and worsen the lipid

Submit: Agust 25th, 2025 Accepted: Sept 14th, 2025 Published: Sept 24th, 2025
Journal of Health, Technology and Science (JHTS) — E-ISSN: 2746-167X

profile by increasing triglycerides, total cholesterol, and VLDL while decreasing HDL. Long-term nicotine exposure further exacerbates this condition [4]

Smoking habits are widespread globally. About 57% of smokers come from the Asia–Australia region, followed by Eastern Europe (14%), America (12%), Western Europe (9%), and the Middle East and Africa (8%). The Tobacco Atlas reports that over 10 million cigarettes are smoked every minute worldwide. In Indonesia, around 53.2 million adults (≥15 years old) use tobacco daily [5]The number continues to rise, especially among adolescents, posing a major challenge to public health improvement. WHO even warned that by 2020, tobacco use could cause 10 million deaths per year, 70% of which would occur in developing countries [6]

In Gorontalo, the prevalence of smoking in 2018 reached 62.9% among men aged >15 years, and smoking behavior was also observed among adolescents aged 13–15 years, indicating a smoking emergency. For those aged ≥10 years, the prevalence was 31.1%. Riskesdas 2019 data showed that Gorontalo Province ranks among the regions with the highest smoking prevalence in Indonesia. In 2018, the percentage of smokers reached 18%, a figure that continued to rise, making Gorontalo one of the provinces with the largest number of smokers.

According to the Gorontalo Provincial Health Office (2022), the highest proportion of smokers was recorded in Gorontalo Regency (48.46%), followed by Bone Bolango (32.67%), North Gorontalo (9.41%), Boalemo (4.71%), Gorontalo City (2.56%), and Pohuwato (2.15%).

High cholesterol levels are often found in individuals who are overweight, smoke, are physically inactive, or have diabetes mellitus. Certain hormones also affect cholesterol levels—for instance, testosterone and anabolic steroids may reduce good cholesterol (HDL), while estrogen increases it [7]

According to[8] high cholesterol levels are often feared due to their association with heart disease risk. Persistent hypercholesterolemia can trigger several health problems such as hypertension, coronary heart disease, and arterial blockage.

RESEARCH METHOD

This study employed a quantitative approach focusing on processing and comparing numerical data on total cholesterol levels between active and passive smokers. The research used an analytical observational design to assess differences between active and passive tobacco users at Aloei Saboe Regional Hospital, Gorontalo City.

The study was conducted at the Regional General Hospital (RSUD) Aloei Saboe, Gorontalo City, from September to October 2024. The population consisted of all active and passive tobacco users within the hospital area, including staff, patients, and patients' families. The sample consisted of 30 participants—15 active smokers and 15 passive smokers—selected based on inclusion and exclusion criteria using purposive sampling, a technique based on specific considerations or criteria.

RESEARCH RESULTS

This study was conducted over a period of 20 days, from September 27 to October 13, 2024, in the Laboratory of Aloei Saboe Regional Hospital, Gorontalo. The study titled *"Comparison of Total Cholesterol Levels Between Active and Passive Smokers"* yielded the following findings:

1. Univariate Analysis

Table 4.1 presents the total cholesterol levels among active smokers, shown both in tabular and graphical forms (Figure 4.1).

Table 4.1. Total Cholesterol Levels of Active Smokers

Sample Code	Total Cholesterol Level	description
A1	225 mg/dl	High (200-240 mg/dl)
A2	110 mg/dl	
A3	120 mg/dl	
A4	131 mg/dl	
A5	133 mg/dl	
A6	139 mg/dl	
A7	168 mg/dl	Normal
A8	172 mg/dl	(<200 mg/dl)
A9	178 mg/dl	
A10	170 mg/dl	
A11	160 mg/dl	
A12	183 mg/dl	
A13	135 mg/dl	
A14	159 mg/dl	
A15	188 mg/dl	
Everage	143,0 mg/dl	Normal

Based on Table 4.1, 14 respondents had normal cholesterol levels (<200 mg/dL), while one respondent had high cholesterol levels (200–240 mg/dL), precisely 225 mg/dL. Active tobacco users had an average total cholesterol level of 143.0 mg/dL, which was within the normal range (<200 mg/dL).

The table shows the results of total cholesterol levels in passive smokers. Figure 4.3 shows the comparison of total cholesterol levels in passive smokers.

Table 4.2. Total Cholesterol Levels of Passive Smokers

Sample Code	Total Cholesterol Level	description
A1	230 mg/dl	High (200-240 mg/dl)
A2	126 mg/dl	
A3	170 mg/dl	
A4	174 mg/dl	
A5	156 mg/dl	
A6	143 mg/dl	
A7	140 mg/dl	Normal
A8	159 mg/dl	
A9	111 mg/dl	
A10	129 mg/dl	(<200 mg/dl)
A11	134 mg/dl	
A12	140 mg/dl	
A13	130 mg/dl	
A14	155 mg/dl	
A15	120 mg/dl	
Everage	132,0mg/dl	Normal

Table 4.2 shows that 14 respondents had normal cholesterol levels (<200 mg/dL) and one respondent had high cholesterol levels (200–240 mg/dL), precisely 230 mg/dL. Passive smokers had an average total cholesterol level of 132.0 mg/dL, which was within the normal range (<200 mg/dL).

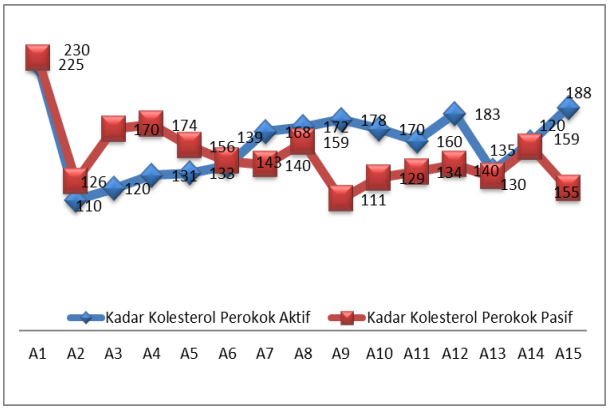
Table 4.3. Smoking Behavior Based on Consumption and Duration

Smoking Category	Cigarettes per Day	Risk Leve
Light Smoker	Consuming 1–10 cigarettes per day, with an interval of 60 minutes after waking up	≤10 years Not at risk
Moderate Smoker	Consuming 11–20 cigarettes per day, with an interval of 6–30 minutes after waking up	≤ 10 years Not at risk
Heavy Smoker	Consuming 21–30 cigarettes per day, with an interval of 6–30 minutes after waking up	≥10 yearsAt risk

Table 4.3 shows total cholesterol levels and smoking behavior based on smoking duration, as determined by the analysis of research findings. The duration group of >10 years (at risk) and <10 years (not at risk) was used to assess the dangers associated with long-term cigarette use. Only one respondent had a high cholesterol level, which was 225 mg/dL, while the other 14 respondents had normal levels below 200 mg/dL. According to the interview results, the respondent with high cholesterol levels had been smoking since adolescence and was still in school. The graph below shows the

comparison of total cholesterol levels in active and passive tobacco users displayed in the form of a chart and graph.

Figure 5.1. The results of the examination comparing total cholesterol levels in active tobacco users and passive smokers are displayed in the form of tables and graphs.



The graph below shows the comparison of total cholesterol levels in active and passive tobacco users displayed in the form of a chart and graph.

Based on the graph above, it is known that the highest cholesterol level in active tobacco users was in respondent sample code A1 at 225 mg/dL, and the lowest cholesterol level was in respondent sample code A2 at 110 mg/dL. Meanwhile, in passive smokers, the highest cholesterol level was in respondent sample code A1 at 230 mg/dL, and the lowest cholesterol level was in respondent sample code A9 at 111 mg/dL. The average examination of total cholesterol levels in active tobacco users was obtained at 143.0 mg/dL, higher than the average examination of total cholesterol levels in passive smokers, which was 132.0 mg/dL.

2. Bivariate Analysis

This analysis compared total cholesterol levels of active and passive smokers using the Independent Sample T-Test in SPSS. Since data distribution was not normal, a nonparametric Mann–Whitney test was applied.

Table 4.4. Shapiro–Wilk Normality Test for Total Cholesterol Levels

Based on Table 4.4, the results of the Shapiro-Wilk normality test on uric acid level examinations using POCT devices of brand A and brand B showed that the data distribution was not normal ($p < 0.05$).

The Shapiro-Wilk test on total cholesterol levels in active and passive tobacco users also produced a significance value of 0.04, which means the data were not normally distributed. According to the criteria, a p-value < 0.05 indicates that the normality assumption is not met. Because the data are not normal, the analysis continued using the non-parametric Mann-Whitney test.

Table 4.5 Mann-Whitney Test Results

Normality Test	**Statistic**	***Df***	***Sig.***
Total Cholesterol Levels in Active and Passive Smokers	0,930	30	0,04
Mann-Whitney Test	***Asymp Sig.(2-tailed)***		
Total Cholesterol Levels	0,024		

Based on Table 4.5, the significance value of the Mann-Whitney test is 0.024. Since the value is < 0.05, H_0 is rejected and H_1 is accepted, meaning that there is a significant difference in total cholesterol levels between active and passive tobacco users at Aloei Saboe Hospital, Gorontalo City.

Table 4.5 shows the comparison results of 30 respondents, where the average total cholesterol level of active tobacco users was 143.0 mg/dL, higher than passive smokers who had an average of 132.0 mg/dL. Although there

is a difference, both values are still within the normal category (<200 mg/dL). With a Sig. (2-tailed) value of 0.024, which is less than 0.05, it can be concluded that the difference in total cholesterol levels between the two groups is statistically significant.

Pharmacists, as healthcare professionals, have a crucial role in educating the public about the safety of herbal medicines. However, studies show that many pharmacists face challenges in carrying out this role. These challenges include lack of time for consultations, limited knowledge about herbal medicines, and patient distrust of pharmacists. Therefore, an in-depth analysis is needed to evaluate the role of pharmacists in increasing public understanding of the risks of herbal and prescription drug interactions [12].

SOP are in the form of standard operational procedures that exist within an organization's scope that are used to ensure that all actions, as well as all use of facilities, processes

carried out can run effectively, efficiently, consistently, systematically and safely[13].

DISCUSSION

his research used an analytical method with an observational analysis framework. This design allows the researcher to clarify a situation or condition by examining and analyzing correlations between variables. The purpose was to identify significant variations in total cholesterol levels among active and passive tobacco users at the Regional General Hospital Aloei Saboe, Gorontalo City.

Samples were selected using the purposive sampling method based on specific criteria. The research was conducted for 20 days, from October 27 to November 13, 2024.

The results of the comparison of total cholesterol levels between active and passive tobacco users showed that the highest total cholesterol level among active users was found in sample A1, 225 mg/dL, while the lowest was found in sample A2, 110 mg/dL. In passive smokers, the highest total cholesterol level was found in respondent code A1, 230 mg/dL, while the lowest was in respondent code A9, 111 mg/dL. The average total cholesterol level of active tobacco users was 143.0 mg/dL, exceeding the average level of passive smokers, which was 132.0 mg/dL.

The researcher assessed that active tobacco users tend to have higher total cholesterol levels than passive smokers due to direct exposure to harmful substances in cigarettes, including nicotine. Nicotine can interfere with fat metabolism, increase LDL levels, decrease HDL, and affect liver function, which plays an important role in regulating cholesterol levels. Long-term smoking also has the potential to increase total cholesterol levels and affect the results of various body parameters.

These findings are consistent with the research by [9]which reported that active tobacco users have higher cholesterol levels than passive smokers due to disrupted fat metabolism. The research of [10]also showed a correlation between smoking habits and increased blood cholesterol levels in active tobacco users compared to passive smokers.

Based on Table 4.3, the group of smokers with a duration of ≥10 years and ≤10 years showed that only one respondent had high cholesterol levels (225 mg/dL), while 14 other respondents were within normal limits (<200 mg/dL). This finding is in line with the research of Dita Adriani (2020), which showed a correlation between smoking duration of more than 10 years and increased cholesterol levels, where 94.45% of participants experienced high cholesterol levels.

The smoking duration data of active tobacco users also support this result. The first

reference showed an increase in cholesterol levels in respondents who smoked 5–15 cigarettes/day (63.33%), and the second reference showed the same in respondents who smoked 11–20 cigarettes/day (77.27%). These findings indicate a tendency for increased total cholesterol in line with the number and duration of smoking.

Based on Table 4.4, the Shapiro-Wilk normality test showed that total cholesterol levels in active and passive tobacco users were not normally distributed (sig. 0.04). Because the p-value < 0.05, the data were declared not to meet the assumption of normality.

Based on Table 4.5, the significance value of the Mann-Whitney test (2-tailed) was 0.024. Because this value < 0.05, H_0 was rejected and H_1 was accepted, which means there was a significant difference in total cholesterol levels between active and passive tobacco users at Aloei Saboe Hospital, Gorontalo City.

This result is consistent with the research of [11]who reported that active tobacco users tend to have higher cholesterol levels than passive smokers. Increased cholesterol can accumulate on the walls of blood vessels, obstruct blood flow to the heart, and potentially cause damage to heart muscles.

RESEARCH LIMITATIONS

In this study, there were several research limitations, including some respondents who were unwilling to be research samples because they were afraid of needles. In this study, the respondents were divided into 15 active tobacco users and 15 passive smokers.

CLOSING

According to the results of the study that has been conducted, it can be concluded that:

1. The average total cholesterol level in active tobacco users was 143.0 mg/dL.
2. The average total cholesterol level in passive smokers was 132.0 mg/dL.
3. There was a significant difference between total cholesterol levels of active tobacco users and passive smokers at Aloei Saboe Hospital, Gorontalo City. The significance value <0.05 indicates that H_1 was accepted and H_0 was rejected.

When performing laboratory examinations, it is recommended that:

1. Active smokers should pay more attention to their health by reducing the number of cigarettes smoked daily, maintaining a healthy diet, exercising regularly, and routinely checking lipid profiles in the laboratory.
2. Passive smokers should avoid exposure to cigarette smoke as much as possible, ask smokers at home to smoke outside, and wear masks when frequently meeting active tobacco users outside the environment.
3. Future researchers are advised to conduct further studies with larger sample sizes and include study variables that may affect the findings, such as respondents' eating habits and levels of physical activity.

BILIOGRAPHY

[1] Ningsih D 2022., “Description Cholesterol Levels in Active Smoking Communities in Sukajaya Subdistrict Palembang City in 2022,” 2022.

[2] Afriyanti R. . J. S, 2015 “The Relationship between Smoking Behavior and the Incidenci of Coronary Disease," J.e-Clinic, vol,9,no 1,2015

[3] Praningsih S, 2023 “The Relationship between Body Mass Index and Cholesterol Levels With Blood Pressure in Prolanis Perak Jombang Healt Center,” *J. Ilm. Nursing*, vol. 9, no. 2, 2023.

[4] Pratiwi N.S, RahmanT.;, A., 2022 “The effect of smoking habits on cholesterol

levels and the risk of coronary heart disease," J. Health. Environment. and Sports, vol. 7, no. 1, pp. 33–41, 2022

[5] Ministry of Health of the Republic of Indonesia, 2014 Book of Anthology - Facts about Tobacco and its Problems in Indonesia, Edition V. Central Jakarta: Tobacco Control and Support Center-IAKMI, 2014.

[6] World Health Organization (WHO), "Ministry of Health, P2PTM," 2018, Non-Communicable Diseases in Indonesia. [Online]. Available: https://p2ptm.kemkes.go.id

[7] Maria E. 2019, "The relationship between hormone levels and lipid profiles in individuals at risk of cardiovascular disease," J. Kesehat. Masy. Indones., vol. 14, no. 2, pp. 85–92, 2019.

[8] Abdurrachman MR, 2020 "Analysis of Health Behavior Regarding Covid-19 on Interest in Quitting Smoking Among Active Smokers in Palembang City," Faculty of Medicine, Sriwijaya University, Medical Education Study Program, Palembang.

[9] Kusumasari P., 2020 "The Relationship Between Smoking and Total Cholesterol Levels in Tasik Madu Sugar Factory Employees," Muhammadiyah University of Surakarta, 2020.

[10] Adeliana SL . H.; Kurniawan T., H., 2016 "The Relationship between Smoking Behavior and HDL (High Density Lipoprotein) Cholesterol Levels in Active Smokers," 2016.

[11] Muhammad Fathur CSN, 2021 "Lipid Profile in Passive Smokers," Poltekkes Kemenkes Bandung, 2021.

[12] Thaib S. P. and. Maulana T. S, (2025)"Analysis of the role of pharmacists in education on herbal medicines used in conjunction with prescription medicines, *J. Heal. Technol. Sci.,* vol. 6, no. 1, pp. 40-51, 2025, [Online]. Available:

[13] Adnan Malaha (2020). Analysis of Work Accident Prevention Efforts for Laboratory Staff in the Laboratory of the Bina Mandiri Gorontalo Health Sciences College. Journal of Health, Technology and Science (JHTS), 1(1), 1-6.