
The Correlation Between The Number And Duration Of Smoking With Total Cholesterol Levels In Active Smokers In South Denpasar District

Ida Ayu Made Sri Arjani¹, I Gusti Agung Ayu Dharmawati², I Nyoman Purna,³ Nyoman Mastra⁴, Cok Dewi Widhya Hana Sundari⁵, Dewa Ayu Diah Dwi Pramesti⁶

^{1, 2,3,4,5}Department of Medical Laboratory Technology, Poltekkes Kemenkes Denpasar

Posted : February 2nd,2026 ; Reviewed : Mayt 5th 2026 ; Received: June 26th 2026

ABSTRACT

Non-Communicable Diseases (NCDs) continue to be the focus of global health attention. Risk factors such as smoking habits, reviewed based on the increasing number of cigarettes smoked per day and the duration of smoking, can cause an increase in total cholesterol levels due to the cumulative effect of nicotine and free radicals. This study aims to determine the relationship between the number and duration of smoking and total cholesterol levels in active smokers. The research method used was an analytic observational method with a cross-sectional design, conducted from February to March 2024. Ninety-six active smoker respondents were included as the research sample using a purposive sampling technique, and total cholesterol levels were examined using the POCT method. Data analysis was performed using the chi-square test. The results showed that 10 respondents (38.4%) who consumed > 20 cigarettes had high cholesterol levels, and 12 respondents (18.5%) who had smoked for > 10 years had high total cholesterol levels. In conclusion, there is a relationship between the number of cigarettes consumed and total cholesterol levels, but there is no relationship between the duration of smoking and total cholesterol levels in active smokers in South Denpasar District.

Keywords: Smoking, Total Cholesterol, POCT

*** Corresponding Author:**

Ida Ayu Made Sri Arjani
E-mail:sri_arjani62@yahoo.com

INTRODUCTION

Non-communicable diseases (NCDs) remain a major health concern both nationally and internationally. According to the World Health Organization, cardiovascular disease is the leading cause of death in a number of Southeast Asian countries, including Indonesia, with a percentage reaching 37% [1]. One type of NCD that poses a risk to the community is heart and blood vessel disorders [2]. One of the main triggers of coronary heart disease is atherosclerosis. The occurrence of atherosclerosis causes an increase in coronary heart disease if the total cholesterol level in the blood exceeds normal limits. Cholesterol can be prevented by controlling risk factors, one of which is smoking [3]. Cholesterol is one component of lipids, commonly known as fats. Fats are a source of energy that provides the highest amount of calories and are a nutrient that plays a very important role in our bodies, just like other nutrients such as carbohydrates, vitamins, minerals, and proteins [4]. Most of the cholesterol in the blood is produced by the body (around 80%), while only around 20% comes from the food we consume [5]. This is because smoking tends to reduce the taste of food for smokers, making them prefer smoking to eating [6].

An increase in cholesterol in the blood can cause levels to rise above normal, which is defined as hypercholesterolemia. Generally, this disease does not show any specific symptoms or complaints related to this condition [7]. Hypercholesterolemia is caused by a disorder in lipid metabolism that results in increased fat levels in the blood due to a deficiency of lipoprotein enzymes, lipase, or a deficiency of Low Density Lipoprotein (LDL) receptors [8]. There are risk factors associated with hypercholesterolemia, one of which is smoking [9]. According to Riskesdas (2013), the prevalence of smokers in Bali Province was 22.4 percent. However, in 2018, the prevalence of smoking in Bali increased to 23.47 percent. In general, the prevalence of active smokers in Bali reached 18.86% according to Riskesdas (2018) data from the Province of Bali.

The highest number of active smokers was in Denpasar (22.02%), followed by Tabanan (21.34%), Buleleng (19.85%), Bangli (18.38%), Badung (16.95%), Karangasem (15.54%), Gianyar (14.84%), and Klungkung (13.53%). Based on this data, active smokers in Denpasar City ranked first [10].

Active smokers are at risk of developing liver and lung cancer, chronic bronchitis, emphysema, and respiratory problems. In fact, the effects of smoking can already be observed in smokers around the age of 20 [11]. Although many people are aware of the adverse effects of smoking on health, they may not realize that LDL increases as a result of cigarette smoke itself [12]. In addition, a person's smoking habits are closely related to an increase in total cholesterol levels [11]. The increase in cholesterol levels in smokers is highly dependent on the amount and duration of smoking.[13] In this case, smoking just one cigarette can increase cholesterol levels, which can lead to health problems [5]. The length of time a person smokes also causes an increase in total cholesterol levels due to the cumulative effects of nicotine and free radicals [14]. However, despite the diseases caused by smoking, this habit is difficult to quit. Smoking has become the biggest cause of death because it is difficult for the surrounding community to prevent [15].

Based on previous research conducted by traffic police, the results showed that there was a relationship between the duration of smoking and the number of cigarettes smoked each day with total cholesterol levels [16]. In a study conducted by Minarti et al. (2014), the results showed that there was a significant relationship between the duration of smoking and the number of cigarettes smoked each day with total cholesterol levels [17]. This study aims to determine the relationship between the number of cigarettes smoked and the duration of smoking with total cholesterol levels in active smokers in South Denpasar District.

MATERIALS AND METHODS

The study used was a correlation study using the analytic observational method with a cross-sectional design. This study was conducted from February to March 2024 in South Denpasar District using 96 samples of active male

smokers with purposive sampling techniques and conducted total cholesterol level tests through capillary blood using the POCT method. The analysis used was univariate (descriptive) data analysis and bivariate data analysis. Bivariate data analysis will be analyzed using the chi-square test.

RESULTS AND DISCUSSION

The active smokers who participated in this study were mostly found to be between the ages of 20 and 60.

Table 1. Distribution of Characteristics According to Number of Cigarettes Consumed per Day

Number of Cigarettes	Frequency (People)	Percentage
1-10 cigarettes/day	37	38.5
11-20 sticks/day	33	34.4
>20 cigarettes/day	26	27.1
Total	96	100

Table 1 shows that out of 96 people, the most common cigarette consumption was 1-10 cigarettes/day, with 37 people (38.5%).

Table 2. Distribution of Characteristics According to Length of Cigarette Consumption

Duration of Cigarette Consumption	Frequency (People)	Percentage
1-5 years	14	14.6
6-10 years	17	17.7
>10 years	65	67.7
Total	96	100

Table 2 shows that out of 96 people, the highest number based on the duration of cigarette consumption was > 10 years, with 65 people (67.7%).

Table 3. Distribution of Characteristics According to Age and Number of Cigarettes with Cholesterol Levels

Age (Years)		Cholesterol Level mg/dL				
			<200	200-239	≥240	Total
20-34	Total Cigarettes (Sticks)	1-10	18 (81.8%)	4 (18.2%)	0 (0.0%)	22 (100%)
		11-20	12 (80.0%)	2 (13.3%)	1 (6.7%)	15 (100%)
		>20	4 (57.1%)	3 (42.9%)	0 (0.0%)	7 (100%)
35-49		1-10	7 (53.8%)	3 (23.1%)	3 (23.1%)	13 (100%)
		11-20	5 (33.3%)	9 (60.0%)	1 (6.7%)	15 (100%)
		>20	2 (18.1%)	4 (36.4%)	5 (45.5%)	11 (100%)
50-60		1-10	1 (50.0%)	0 (0.0%)	1 (50.0%)	2 (100%)
		11-20	0 (0.0%)	2 (66.7%)	1 (33.3%)	3 (100%)
		>20	2 (25%)	1 (12.5%)	5 (62.5%)	8 (100%)
Total			51 (53.1%)	28 (29.2%)	17 (17.7%)	96 (100%)

Table 3 shows that of the 8 people, 5 people (62.5%) aged 50-60 years who consumed >20 cigarettes/day had high cholesterol levels.

Table 4. Distribution of Characteristics According to Age and Duration of Smoking with Cholesterol Levels

Age (Years)			Cholesterol Levels mg/dL			
			<200	200-239	≥240	Total
20-34	Duration Smoking (Years)	1-5	9 (90.0%)	1 (10.0%)	0 (0.0%)	10 (100%)
		6-10	7 (70.0%)	3 (30.0%)	0 (0.0%)	10 (100%)
		>10	18 (75.0%)	5 (20.8%)	1 (4.2%)	24 (100%)
35-49		1-5	0 (0.0%)	2 (50.0%)	2 (50.0%)	4 (100%)
		6-10	4 (57.1%)	0 (0.0%)	3 (42.9%)	7 (100%)
		>10	10 (35.7%)	14 (50.0%)	4 (14.3%)	28 (100%)
50		>10	3 (23.1%)	3 (23.1%)	7 (53.8%)	13 (100%)
Total			51 (53.1%)	28 (29.2%)	17 (17.7%)	96 (100%)

Table 4 shows that of the 13 people, 7 people (53.8%) aged 50-60 years with a smoking duration of >10 years had high cholesterol levels. Table 5 shows that out of 96 people, 51 people (53.1%) had normal cholesterol levels.

Table 5. Total Cholesterol Levels in Active Smokers

Total Cholesterol Levels	Frequency (People)	Percentage (%)
Normal (< 200 mg/dL)	51	53.1
Borderline (200-239 mg/dL)	28	29.2
High (≥ 240 mg/dL)	17	17.7
Total	96	100

Table 6. Relationship between the Number of Cigarettes Consumed per Day and Total Cholesterol Levels

Total Cholesterol Levels (mg/dL)									
Number of Cigarette s Consumed/Day	Normal		Thresho ld		High		Total		<i>p-value (sig.)</i>
	f	%	f	%	f	%	F	%	
1-10 stems	26	70.3	7	18.9	4	10.8	37	100.0	.003
11-20 Trunks	17	51.5	13	39.4	3	9.1	33	100.0	
>20 stems	8	30.8	8	30.8	10	38.4	26	100.0	
Total	51	53.1	28	29.2	17	17.7	96	100	

Table 6 shows that of the 26 people who smoked > 20 cigarettes, 10 people (38.4%) had high cholesterol levels.

Table 7. Relationship between Length of Time Smoking and Total Cholesterol Levels

Table 1: Relationship Between Length of Time Smoking and Total Cholesterol Levels									
Duration of Smoking	Total Cholesterol Levels (mg/dL)								<i>p-value (sig.)</i>
	Normal		Thresho ld		High		Total		
	f	%	f	%	f	%	F	%	
1-5 Years	9	64.3	3	21.4	2	14.3	14	100.0	.645
6-10 years	11	64.8	3	17.6	3	17.6	17	100.0	
>10 Years	31	47.7	22	33.8	12	18.5	65	100.0	
Total	51	53.1	28	29.2	17	17.7	96	100	

Table 7 shows that of the 65 people who had been smoking for more than 10 years, 31 people (47.7%) had normal cholesterol levels.

Based on Table 6, the highest percentage occurred in active smokers with a normal category of 51 people (53.1%). The results showed that normal cholesterol levels could be caused by several factors, one of which was the respondents' physical activity. According to the researcher's observations, individuals who are physically active can process cholesterol metabolism in the body so that it works properly and keeps cholesterol levels within the normal range. Smoking can cause an increase in total cholesterol levels due to from the toxic content of One of the substances found in cigarettes is nicotine [5]. According to Pravitasari & Sulasmi (2021), the increase in total cholesterol levels in smokers depends on the amount and duration of smoking. The more cigarettes consumed and the longer a person smokes, the greater the increase in cholesterol levels [13].

Based on Table 6, respondents who consumed more than 20 cigarettes had the highest cholesterol levels, with 10 people (38.4%). The results of bivariate analysis using the chi-square statistical test showed that there was a relationship between the number of cigarettes consumed every day with total cholesterol levels in active smokers with a sig value of < 0.05 ($0.003 < 0.05$). This study is in line with research conducted by Nindriani (2017), which showed a relationship between the number of cigarettes consumed and total cholesterol levels [16]. In their study, Minarti et al. (2014) also found a significant relationship between the number of cigarettes consumed per day and cholesterol levels [17].

The cross-tabulation results in Table 3 show that of the 8 people, 5 (62.5%) aged 50-60 years who smoked more than 20 cigarettes per day had high cholesterol levels. With increasing age, there is generally an increase in total cholesterol levels, which is associated with changes in lipoprotein metabolism [18]. Increased cholesterol often occurs in smokers over the age of 30 due to a

slowdown in the body's metabolic rate and a decrease in the strength of the body's organs, resulting in decreased cholesterol receptor cell activity and an increase in cholesterol in the blood [19]. These receptor cells are responsible for regulating cholesterol levels in the bloodstream and are generally found in the liver, reproductive glands, and adrenal glands [20]. The results of the study show that there is a significant increase in total cholesterol levels in the blood, as evidenced by the finding that heavy smokers who smoke more than 20 cigarettes per day have the highest percentage. The earlier a person starts smoking, the more difficult it is for them to quit. This is because cigarettes have a dose-response effect [21].

Smoking is associated with the level of atherosclerosis and the risk of death, especially due to the large number of cigarettes smoked [21]. The number of cigarettes smoked per day will affect the increase in total cholesterol levels [16]. The increase consumed per day is directly proportional to the increase in total cholesterol levels in the body. Toxic substances such as nicotine contained in a cigarette can cause the accumulation of and impeding blood flow [5]. Increased cholesterol levels in active smokers are also caused by high levels of monoxide in the body. This affects cholesterol levels because the body responds to the lack of oxygen bound to cholesterol due to its displacement by carbon monoxide, which has a stronger affinity for cholesterol [22]. Research conducted by the Framingham Heart Study states that the decrease in blood HDL cholesterol levels does not only depend on the length of time a person has been smoking but is more influenced by the number of cigarettes consumed each day [23].

Based on Table 7, respondents who had smoked for more than 10 years had the highest cholesterol levels, with 12 people (18.5%). According to Andriani (2020), smoking for more than 10 years can cause an increase in total

cholesterol levels due to the cumulative effects of nicotine and free radicals [21]. From the results of bivariate analysis using the chi-square test, the results obtained did not meet the testing requirements, so an alternative test was used, namely the Fisher Exact test, and the result obtained was $\text{sig.} > 0.05$ ($0.645 > 0.05$), so there was no relationship between the duration of cigarette consumption and total cholesterol levels in active smokers. This result occurred because higher cholesterol levels were found in the normal category, which consisted of 31 people (47.7%) who had smoked for > 10 years. These findings are not in line with those of Nindriani (2017), who stated that there is a relationship between the duration of smoking and total cholesterol levels [16].

The results of the study are not in line with the theory that smoking has a dose- response effect, which means that the longer a person smokes, the higher the risk of experiencing its effects, such as an increase in total cholesterol levels [24]. The results are also inconsistent with the theory that long-term smoking can increase total cholesterol levels due to nicotine accelerating narrowing and blockage of blood vessels, which are responsible for delivering oxygen to the heart [25]. Previous studies have shown that the length of time a person smokes has only a slight effect on their total cholesterol level. This is evident from the percentage obtained, most of which fell into the normal category [26]. According to Syarifah's (2022) research, not all active smokers with long smoking duration can increase their total cholesterol levels [27]. This occurs because there are factors that can affect total cholesterol levels in active smokers, such as physical activity. According to the researchers' observations, physical activity can play a role in lowering total cholesterol levels in the blood by increasing lipoprotein lipase enzyme activity, while cholesterol levels in the body decrease [26]. Marewa (2015)

stated in her research that physical activity can help lower cholesterol levels, so that the activity given to the body has a positive effect on the lipid profile [28].

Based on the research results, there are several results with categories high, indicating that an increase in total cholesterol levels can occur due to several factors, one of which is age. Age is one of the factors that can affect total cholesterol levels in the body [18]. Table 4 shows the results of a cross-sectional study, which found that of 13 people, 7 (53.8%) aged 50- 60 years who had smoked for more than 10 years had high cholesterol levels. As we age, the body undergoes a process called aging, which causes a slowdown in metabolism and an acceleration in the conversion of muscle mass into body fat due to reduced physical activity. The reduction in muscle mass helps control the number of calories consumed, so that every day, the food eaten will be converted into fat in the body. The longer a person smokes as they age, the more fat can accumulate in the blood vessels [29]. The length of time a person has smoked also affects cholesterol levels, because with increasing age, the risk of disease can also increase [30].

CONCLUSION

The largest number of respondents based on age were in the 50-60 age group, who had high cholesterol levels, smoked more than 20 cigarettes per day (5 people, 62.5%), and had been smoking for more than 10 years (7 people, 53.8%); Based on the frequency of cigarette consumption per day, those who consumed 1–10 cigarettes per day, with the highest percentage of 37 people (38.5%). Meanwhile, based on the duration of smoking, the longest duration of smoking was > 10 years, with the highest percentage of 65 people (67.7%); Cholesterol levels in active smokers in South Denpasar District showed that the highest percentage of total cholesterol levels

was in the normal category, with 51 people (53.1%); There was a significant relationship between the number of cigarettes consumed per day and total cholesterol levels with a sig. value < 0.05 ($0.003 < 0.05$), and there was no relationship between the duration of smoking and total cholesterol levels, with a significance value of > 0.05 ($0.645 > 0.05$).

REFERENCES

- [1] Warganegara, E., & Nur, N. N, "Faktor Risiko Perilaku Penyakit Tidak Menular. *Jurnal Majority*, 5 (2)," 2016.
- [2] Muthiin, M. A., I. D. Fitriani., I. Auliya., & M. Sutomo, "Efektifitas Pemberian Terapi SEFT (Spiritual Emotional Freedom Technique) Terhadap Kadar Kolesterol Dalam Darah Pada Penderita Kolesterol.," *Jurnal Keperawatan dan Kebidanan*, vol. 8, no. 1, 2017.
- [3] Yoeantafara, A., & Martini, S, "Pengaruh Pola Makan terhadap Kadar Kolesterol Total. *Jurnal Mkm*, 13 (4)," 2017.
- [4] Naim, M. S., Sulastri, S., & Hadi, S. "Gambaran Hasil Pemeriksaan Kadar Kolesterol pada Penderita Hipertensi di RSUD Syekh Yusuf Kabupaten Gowa," *J.urnal Media Laboran*, vol. 9, no. 2, pp. 33–38, 2019.
- [5] Malaeny, C. S., Katuuk, M., & Onibala, F. "Hubungan Riwayat Lama Merokok Dan Kadar Kolesterol Total Dengan Kejadian Penyakit Jantung Koroner Di Poliklinik Jantung Rsu Pancaran Kasih Gmim Manado," In *Journal Keperawatan* (e-Kp (Vol.5, Issue 1) 2017.
- [6] Ilfandari, A. "Hubungan Perilaku Merokok dengan Indeks Massa Tubuh Remaja Putra," *Ejurnal Obstet.*, vol. 3, no. 1, pp. 1–15, 2015.
- [7] Aman, A. M., Soewondo, P., & Soelistijo, S. A. "Pedoman Pengelolaan Dislipidemia di Indonesia. PB Perkeni," 2019.
- [8] Apriyanto, D. R., & Frisqila, C. "Perbandingan Efektivitas Ekstrak dan Fermentasi Buah Naga Merah terhadap Penurunan Kadar Kolesterol Low Density Lipoprotein (LDL) pada Tikus Putih yang dibuat Hiperkolesterolemia". *Tunas Medika Jurnal Kedokteran & Kesehatan*, vol. 3, no. 3, 2016.
- [9] Setyaningrum, R. A., Susanto, N., Yuningrum, H., & Wati, N. A. P "Faktor Berhubungan Dengan Hiperkolesterolemia Di Dusun Kopat, Desa Karangari, Kecamatan Pengasih, Kabupaten Kulon Progo, DIY," In *Prosiding Seminar Nasional Multidisiplin Ilmu*, vol. 1, no. 1, pp. 1–11, 2019.
- [10] Riskesdas, "Laporan Riskesdas Nasional. Badan Penelitian dan Pengembangan Kesehatan Kementerian Republik Indonesia.," 2018.
- [11] Kusumasari, P. Hubungan Antara Merokok Dengan Kadar Kolesterol Total Pada Pegawai Pabrik Gula Tasikmadu Karanganyar, Skripsi. 2015. Accessed: Nov. 19, 2023. [Online]. Available: <http://eprints.ums.ac.id/id/eprint/39409>
- [12] Khairunnisa, Z. Pengaruh Kebiasaan Merokok terhadap Kadar Kolesterol Total pada Laki-Laki Dewasa di Kelurahan Sidorejo Kecamatan Medan Tembung, Skripsi. 2020. Accessed: Nov. 19, 2023. [Online]. Available: <http://repository.usu.ac.id/handle/123456789/29046>
- [13] Pravitasari, A. & Sulasmi, S. "Hubungan Kebiasaan Merokok Dengan Kadar LDL (Low Density Lipoprotein) Pada Pria Usia Produktif Di Dusun Tengkluk Karangbungan Matesih Kabupaten Karanganyar," *Jurnal Analisis Kesehatan*, vol. 10, no. 2, p. 89, 2021, doi: 10.26630/jak.v10i2.2883.
- [14] Nurisani A, Mamay, Sugiah, & Ziyani M, "Gambaran Kadar Kolesterol Total Berdasarkan Karakteristik Perokok Pada Perokok Aktif Usia Remaja Di

- Kecamatan Cilawu Kabupaten Garut,” *Student Scientific Creativity Journal*, vol. 1 (2), pp. 200–209, 2023.
- [15] Marsita, M. M. “Pengaruh Rokok Terhadap Kesehatan. *Jurnal Solusi Kesehatan*,” vol. 1, no. 1, 2022.
- [16] Nindriani, Y. Hubungan Kebiasaan Merokok Dan Olahraga Dengan Kadar Kolesterol Total Pada Polisi Lalu Lintas. *Jawa Timur: Program Studi Epidemiologi dan Penyakit Tropik Fakultas Ilmu Kesehatan Universitas Siliwangi*. 2017.
- [17] Minarti, S. N., Ketaren, I., & Hadi, D. P. “Hubungan Antara Perilaku Merokok Terhadap Kadar Kolesterol Low Density Lipoprotein (LDL) Serum Pada Pekerja CV. Julian Pratama Pontianak.” *Jurnal Mahasiswa PSPD FK Universitas Tanjungpura*, vol. 1, no. 1, 2014.
- [18] Putri Nadya, E. I. *Gambaran Kadar Kolesterol Total pada Perokok Aktif di RT 1 Dusun Bulolowo Desa Puri Kecamatan Plandaan Kabupaten Jombang*. KTI. Doctoral dissertation STIKES Insan Cendekia Medika Jombang, 2018.
- [19] Lomi, M. G. M. *Gambaran Kadar Kolesterol Pada Perokok Aktif Di Desa TO’O Baun Kecamatan Amarasi Barat*. KTI. Program Studi Analisis Kesehatan Politeknik Kesehatan Kemenkes Kupang, 2019.
- [20] Rumampuk, H., Doda, D. V., & Polii, H. “Perbandingan Kadar Kolesterol pada Guru Obes dan Non-Obes di SMP Negeri I dan II Kauditan Minahasa Utara,” *eBiomedik*, vol. 5 (2), 2017.
- [21] Andriani, D. *Gambaran Karakteristik Perokok Aktif Dengan Kadar Kolesterol Total*. Medan, 2020. Accessed: Nov. 19, 2023. [Online]. Available: <https://ecampus.poltekkes-medan.ac.id/jspui/handle/123456789/3351>
- [22] Tias, S. K., Romli, L. Y., & Nofalia, I. “Hubungan Perokok Dengan Kadar Kolesterol Pada Orang Dewasa (Di Dusun Temor Lorong Desa Kebunagung),” 2022. Accessed: Nov. 19, 2023.
- [Online]. Available: <http://repo.itskesicme.ac.id/id/eprint/6215>
- [23] Adelianna, S. Handayani, L. T., & Kurniawan, H. “Hubungan Perilaku Merokok dengan Kadar Kolesterol HDL (High Density Lipoprotein) pada Perokok Aktif di Gudang Taman Glagahwero Kalisat Jember,” *Concept and Communication*, no. 23, pp. 301–316, 2016.
- [24] Wijayanti, I. A. *Gambaran Kadar Kolesterol Total Pada Petani Yang Memiliki Kebiasaan Merokok Di Kecamatan Semendawai Suku III Kabupaten Oku Timur Tahun 2017*, Skripsi. Kementerian Kesehatan Republik Indonesia Politeknik Kesehatan Palembang, 2017.
- [25] Nurjanah, T. *Gambaran Kadar Kolesterol Total Pada Perokok Berdasarkan Pola Hidup Di Desa Moramo Kabupaten Konawe Selatan*, KTI. Kementerian Kesehatan Republik Indonesia Politeknik Kesehatan Kemenkes Kendari, 2022.
- [26] Raditya, I. G. B., Suandari, C. D. W. H., & Karta, I. W. “Gambaran Kadar Kolesterol Low Density Lipoprotein (LDL) Pada Perokok Aktif,” *Jurnal Meditory*, vol. 6 (2), pp. 78–87, 2018.
- [27] Syarifah, “Gambaran Kadar Kolesterol Total Pada Mahasiswa Perokok Aktif Di Kota Garut,” *STIKES Karsa Husada Garut* pp. 1–16, 2022.
- [28] Marewa, L. W. *Kencing Manis (Diabetes Mellitus) di Sulawesi Selatan*. Jakarta: Yayasan Obor Indonesia, 2015.
- [29] Saputri, D. A., & Novitasari, A. “Hubungan Usia Dengan Kadar Kolesterol Masyarakat Di Kota Bandar Lampung,” *Jurnal Pendidikan Biologi*, vol. 12 (2), p. 238, 2021.
- [30] Arisandi, Y., & Hartantu, S. “Hubungan Faktor Risiko Usia, Pengetahuan, Dan Kebiasaan Merokok Terhadap Kejadian Penyakit Jantung Koroner,” *Jurnal Ilmiah Multi Science Kesehatan*, vol. 14 (1), pp. 26–32, 2022.

