The Relationship of Fiber Supplements and Cholesterol Levels in Hypercholesterolemia Patients at The Pati II Health Center in 2025

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Abstract.

The phenomenon of hypercholesterolemia has become problematic both in the world and in Indonesia because high cholesterol levels (hypercholesterolemia) are the main risk factor for non-communicable diseases (NCDs) and have implications for an increase in mortality due to hypercholesterolemia, which is 73%. Hypercholesterolemia is closely related to risk factors such as age, gender, diet, smoking, lack of physical activity, BMI, and other related clinical conditions such as triglycerides, obesity, diabetes mellitus, and hypertension. The purpose of the study was to determine the relationship between fiber supplements and cholesterol levels in hypercholesterolemia patients at the Pati II Health Center in 2025. This research method is a correlation analytical research with a cross sectional approach. A sample was taken from a part of the research population with a sample of 56 respondents with a sampling formula using the slovin formula and the sampling criteria used was purposive sampling. The measuring tools used are observation sheets and GCU Easy Touch tools. The data analysis used univariate and bivariate analysis with a spearman rank correlation test with a significant value of a=0.05. The results showed that as many as 29 (51.8%) respondents consumed fiber supplements. High cholesterol levels were 22 (39.3%) of respondents. The results of the study concluded that there was a relationship between fiber supplements and cholesterol levels in patients at the Pati II Health Center in 2025 with a p value of 0.001.

Keywords: *Fiber Supplements; Cholesterol Levels; Hypercholesterolemia Patients and Health Center.*

I. INTRODUCTION

The phenomenon of hypercholesterolemia is problematic both in the world and in Indonesia because high cholesterol levels (hypercholesterolemia) are the main risk factor for non-communicable diseases (NCDs) and have implications for an increase in mortality due to hypercholesterolemia, which is 73% (Sofiatun, et al., 2022). Cholesterol levels can be seen from cholesterol levels in the body <200 mg/dl, so that the situation can have a bad impact, can inhibit the blood vessels of the heart and brain which are harmful to the body (Palimbong, S., Mangalik, G and Basompei, A.V.S, 2020). According to the *World Health Organization* (WHO), the prevalence of hypercholesterolemia in the world in 2023 accounts for 4.4 million deaths annually, or 7.8% of all deaths in the world, and 24% of deaths related to *Cardiovascular Disease* are caused by high LDL cholesterol (WHO, 2023). According to the Ministry of Health of the Republic of Indonesia, in 2022 the number of hypercholesterolemia sufferers in Indonesia is quite high, reaching 28%. Meanwhile, according to the BPS of Central Java Province in 2023, the incidence of hypercholesterolemia in Central Java is 1,608 people, where Pati Regency is in first place with the highest cases of hypercholesterolemia with a total of 123 people. Based on a preliminary study on January 19-20, 2025 at the Pati II Health Center, data was obtained that there were 65 patients with hypercholesterolemia. The patient underwent routine treatment at the Pati II Health Center and received health counseling related to the management of care for patients with hypercholesterolemia.Cholesterol is the main component of cell membranes.

Cholesterol is mainly produced in the body, up to 80 percent is produced in the body and only 20 percent comes from food (Viktor, et al., 2023). Hypercholesterolemia is one of the lipid metabolism disorders characterized by an increase in cholesterol levels in the blood exceeding the threshold value of 200mg/dl. Hypercholesterolemia is closely related to risk factors, namely age, gender, diet, smoking, lack of physical activity, BMI, and other related clinical conditions such as triglycerides, obesity, diabetes mellitus, and hypertension (Susyani, et al., 2023). The impact of excessive cholesterol on the health sector is that it

can increase the risk of cardiovascular disease, stroke, chronic kidney failure, liver disease, hypertension, inflammation of blood vessels and cause 2.6 million deaths and 29.7 million others will experience *Disability Adjusted Life Year (DALYs)* every year (Brigita, et al., 2021). The impact of hypercholesterolemia on the economic sector is that it causes high medical costs (Rp. 10-50 million/month), loss of labor productivity, increased hospital treatment costs and the impact of the health and insurance industry. The impact of hypercholesterolemia on the social sector includes psychological disorders such as stress, anxiety, depression, lifestyle and habit changes, influence on family relationships, dependence on others, and stigmatization. The impact of hypercholesterolemia on the education sector includes a lack of awareness about cholesterol disease, a lack of knowledge about prevention, an influence on the quality of life of students, and an impact on academic achievement (IAARD, 2022).

The impact of complications due to hypercholesterolemia requires treatment, one of which is using non-pharmacological therapy. The use of natural ingredients as traditional medicine in Indonesia has been carried out since centuries ago. One of the factors that causes many people to prefer to use traditional medicine is that the use of modern medicine has relatively greater side effects than traditional medicine. One of the traditional medicine ingredients that has the potential to be hypolipidemia is natural fiber (Zalmi, et al., 2019). Fiber consumption in people in Indonesia is fairly low in consuming fruits/vegetables, based on SKI data, (2023) the proportion of less eating fruits/vegetables per day in a week in the population aged > 5 years in Indonesia is 96.7% with the highest reason, namely 61.8% of fruits are not at home and 28.6% cannot afford to buy. Fiber has an important role in lowering blood cholesterol levels. The importance of increasing the consumption of high-fiber foods in people with hypercholesterolemia is because consumption in sufficient amounts can help control cholesterol levels in patients. Fiber, especially water-soluble fiber that goes with food, will absorb a lot of fluid in the stomach and form food into a more viscous form. More viscous foods will slow down the digestive process so that the absorption process of nutrients such as cholesterol will occur slowly. In the next mechanism of fiber that cannot be digested by digestive enzymes will cause dietary fiber to enter the colon intact. The fiber that is still intact in the colon is then fermented by bacteria in the colon to form *SCFA (Short-Chain Fatty Acid)*.

The formation of SCFA induces the secretion of the hormones *GLP-1 (Glucagon Like Peptide-1), GIP (Gastric Inhibitory Polypeptide), and PYY (Peptide YY)* which will increase insulin sensitivity has a long-term effect, namely decreasing lipolysis activity in adipose tissue so that fat levels including cholesterol in the blood decrease (Arisandra, 2021). According to the *Food & Drug Association*, the recommended daily fiber consumption is 28 g/day (FDA, 2020).Fiber can be consumed practically and effectively in the form of fiber supplements. One of the countries, namely the United States, is making efforts to prevent a lack of fiber consumption by consuming fiber supplements. Fiber needs can be met with supplements, but these must have clinical evidence of beneficial physiological effects and qualify as functional fiber (Lambeau and McRorie, 2017). Fiber supplements have health benefits for the small intestine, namely the physical effects of the fiber. The benefits are lowering cholesterol, can improve glycemic control, can cause satiety/weight loss (Ludfi, 2021). Some fiber supplements that have been studied to lower cholesterol levels include supplements from vegetables, fruits, nuts or seeds, cereals, psyllium fiber supplementation and green tea. Research by Nuril, et al., (2024) discussing "Vegetable and Fruit Consumption Habits and Their Impact on Hdl Cholesterol Levels of Bengkulu Health Employees" showed that there was a meaningful relationship between vegetable and fruit consumption habits and HDL cholesterol levels in employees of the Bengkulu Provincial Health Office.

Research by Rizki, et al., (2022) discusses "The Effect of Aloe Vera Pudding on the Reduction of Total Cholesterol Levels of Patients with Hypercholesterolemia Outpatient at the Genuk Health Center in Semarang City" showed the results of There was a difference in changes in total cholesterol levels between the treatment and control groups (p=0.026) and there was a decrease in total cholesterol levels (p=0.009) by -44.70 ± 56.51 in the treatment group given aloe vera pudding. The research of Basu, et al., (2019) discussed *"Dietary fiber intake and glycemic control: coronary artery calcification in type 1 diabetes (CACTI) study"* showed that there was a strong relationship (R= -0.12) between fiber intake (16 g for men and 15 g for women) and total cholesterol levels as evidenced by a significance value of P = 0.0005 (P < 0.05). Based on

the research of Fazdria, (2021) with the title "The Effectiveness of Green Tea and Green Bean Juice in Reducing Total Cholesterol Levels in Progestin Injectable Contraceptive Users" showed that there was a difference in average cholesterol levels between pretest and posttest in the mung bean juice group from 252 mg/dl down to 179.83 mg/dl and the combination of green tea and mung bean juice down from 259.17 mg/dl down to 212.33 mg/dl. However, there was no significant mean difference in pretest and posttest cholesterol levels in the control group and the green tea treatment group. Green tea and mung bean juice consumed separately were able to reduce cholesterol levels in mothers who accepted birth control DMPA.

Further research by Brigita, et al., (2021) with the title "Antioxidant Effects of Green Tea on Blood Cholesterol Levels" showed the results of 12 literature reviewed using experimental research methods with human and animal research subjects who were given green tea (extract, EGCG and PPE) all showed results of a significant reduction in blood cholesterol levels after being given green tea. In conclusion, the antioxidants in green tea can lower cholesterol levels in the blood. Research by Viktor, et al., (2023) shows the results of cholesterol levels in the elderly after drinking green tea for seven days in Batangtura Sirumambe Village, East Angkor District, South Tapanuli Regency, which can be seen based on the results of the research that cholesterol levels before green tea consumption are at levels of 247, mg/dl and after with levels of 214, mg/dl. From the results, it can be seen that there is a linear influence between green tea consumption and cholesterol reduction, where if green tea is drunk regularly, namely 2 times a day, there will be a decrease in cholesterol levels. Research by Rully, et al., (2023) showed significant differences in changes in cholesterol levels and blood pressure values before and after intervention (p=0.000). Herbal therapy using green tea can reduce cholesterol levels and high blood pressure. Subsequent research by Nisa et al. (2022) reported a decrease in patients' cholesterol levels after consuming mung bean fiber. The average cholesterol levels of the control group before and after an increase of 5.7% were 240.1 mg/dl and 253.9 mg/dl. The average cholesterol levels of the intervention group before and after an 11% decrease were 220 mg/dl and 195.7 mg/dl. The results of the paired t-test showed a significant difference between total cholesterol levels before and after in the treatment group and the control group (p=0.000).

In addition, Budiatmaja and Noer (2024) reported that patients after consuming red dragon fruit fiber, the total cholesterol level before the treatment group intervention was 226.00 mg/dl and after the intervention was 212.47 mg/dl. There was a significant difference in total cholesterol levels in the treatment group (p=0.043). Setiawati et al. (2024) in their research reported that soursop is effective in reducing cholesterol levels in the elderly. From the results of the study, it was revealed that the reduction in cholesterol levels in the intervention group was more significant than in the control group (-18.03±19.590; -2.60±2.527). Furthermore, Sukesih et al. (2024) reported that bitter melon vegetables have a statistically significant effect on the reduction of cholesterol, uric acid, and blood pressure levels in patients. The novelty of this study is that the researcher is interested in identifying the types of fiber supplements consumed by hypercholesterolemia patients and their relationship with a decrease in cholesterol levels in hypercholesterolemia patients. Based on the results of a preliminary study at the Pati II Health Center in 2025, 10 patients were found to have consumed fiber supplements derived from vegetables, fruits, nuts and green tea to lower cholesterol levels. The role of nurses in providing nursing care to hypercholesterolemia patients according to this study is to conduct studies on patients with high cholesterol levels, collect data on the patient's medical history and treatment, identify the fiber supplements used, periodically monitor the patient's cholesterol levels, collect data on the side effects of fiber supplements, educate patients about the importance of fiber in managing cholesterol, and provide nursing care with the intervention of providing fiber supplements in the form of vegetables, fruits, cereals, nuts or seeds, and green tea.

II. METHODS

The type of research used in this study is correlation analysis research, which is research that aims to determine the relationship between two or more variables and the data collection process which is only carried out once for each research variable (Syamsul, 2023). The approach used in this study is *cross sectional* , which is research in which independent variables and bound variables are measured simultaneously and carried out momentarily or once (Syamsul, 2023). The purpose of this study is to

determine the relationship between fiber supplements and cholesterol levels in hypercholesterolemia patients at the Pati II Health Center in 2025. The population in this study is 65 hypercholesterolemia patients at the Pati II Health Center. The sample in this study is part of the population of 56 respondents. This study used two questionnaires. The data analysis methods used are univariate analysis and bivariate analysis.

III. RESULT AND DISCUSSION

Respondent Characteristics

The characteristics of the respondents consist of various aspects that reflect the background of the respondents. These aspects include age, which describes the age range of respondents; gender, to see the distribution of respondents based on gender differences; the last level of education, which indicates the level of knowledge and ability to understand health information; work, which is related to daily activities. The results of the frequency distribution of respondent characteristics will be discussed in the sub chapter below:

1. Age

The age of the respondents in this study can be seen in the following table:

Table 1. Description of the Age of Respondents at the Pati II Health Center (n=56)

Categories	Min-max	Red	Std. D
Age	17-53	30,8	9,957

Source : Primary data 2025

The table above explains that the age of the respondents in the study was the lowest which was 17 years and the highest was 53 years. The average age of respondents was 30 years old with a standard deviation of 9.957

2. Gender, education and occupation

The frequency distribution of respondent characteristics can be seen in the following table:

Table 2. Distribution of Frequency of Gender, Education, and Occupation of Respondents at Puskesmas Pati II (n=56)

Yes	Categories	Number of Reponents	Percentage (%)
	Gender		
1	Male	37	66,1
2	Women	19	33,9
	Total	**56**	**100**
	Education		
1	Junior High School/Equivalent	18	32,1
2	High School/equivalent	30	53,6
3	DIII/S1/Equivalent	8	14,3
	Total	**56**	**100**
	Jobs		
1	Not working	11	19.6
2	Employees	19	33.9
3	Self-employed	17	30.4
4	Labor	9	16.1
	Total	**56**	**100**

Source : Primary data 2025

The table above shows that the most respondents were men as many as 37 people (66.1%) compared to women as many as 19 (33.9%). Respondents with high school education were the most in this study, at 30 (53.6%) and the fewest were university education at 8 (14.3%). Then the most respondents' jobs were as employees by 19 (33.9%) respondents and as laborers by only 9 (16.1%).

Univariate Analysis Results

1. Fiber supplement consumption

In this section, the researcher showed the results of a questionnaire on the use of fiber supplements of various types such as green tea, vegetables, nuts and fruits. The results of the questionnaire are shown in the table below:

Table 3. Distribution of Frequency of Respondent Fiber Supplement Use at Pati II Health Center (n=56)

Yes	Fiber supplement consumption	Number of Reponents	Percentage (%)
1	Consumption	29	51,8
2	No consumption	27	48,2
	Total	**56**	**100**

Source : Primary Data, 2025

The table above shows that as many as 29 (51.8%) respondents consume fiber supplements. Meanwhile, as many as 27 (48.2%) respondents did not consume fiber supplements.

2. Cholesterol levels

In the second variable data processing, the researcher showed the results of the measurement of cholesterol levels as shown in the table below:

Table 4. Distribution of Frequency of Respondents' Cholesterol Levels at Puskesmas Pati II (n=56)

Yes	Cholesterol levels	Number of Reponents	Percentage (%)
1	Normal	16	28,6
2	Normal upper limit	18	32,1
3	Height	22	39,3
	Total	**56**	**100**

Source : Primary Data, 2025

The table above explains that respondents who have high cholesterol levels are 22 (39.3%) respondents, the upper limit of normal is 18 (32.1%) respondents while those with normal cholesterol levels are 16 (28.6%).

Bivariate Analysis Results

Bivariate analysis aims to find relationships between two variables. In this study, bivariate analysis was used to analyze the relationship between fiber supplement consumption and cholesterol levels. To conduct bivariate analysis, the researcher used *the spearman rank* test on SPSS. The cross-tabulation between the two variables can be seen in the table below:

Table 5. Cross-tabulation between fiber supplement consumption and respondents' cholesterol levels at the Pati II Health Center (n=56)

	Normal		Normal upper limit		Height		Total		*p value*	*Rho Value*
Fiber supplement consumption	f	%	f	%	f	%	f	%		
Consumption	12	21,4	12	21,4	5	8,9	29	51,8	0.001	0,449
No consumption	4	7,2	6	10,7	17	30,4	27	48,2		
Total	16	28,6	18	32,1	22	39,3	56	100		

Table 5 explains that of the 56 respondents studied, 29 (51.8%) respondents were known to take supplements and Most 12 (21.4%) had normal and still nominal upper limits. As for the 27 (48.2%) respondents who did not consume fiber supplements, most 17 (30.4%) had high cholesterol levels. The variable of supplement consumption and cholesterol levels had a significant relationship $p = 0.001 < 0.05$ and rho value = 0.449, meaning that the level of relationship between the two variables in the moderate category was significant.

Discussion

Respondent Characteristics

The age of the respondents in the study was the lowest which was 17 years and the highest was 53 years. The average age of the respondents was 30 years old with a standard deviation of 9.957. According to Rahayu et al., (2023), age can affect a person's cholesterol levels. At an older age, cholesterol levels are relatively higher than total cholesterol levels at a young age.The most respondents in this study were 37 men (66.1%) compared to 19 women (33.9%). According to Mary & Praningsih, (2021), differences in behavior and way of life in both sexes are thought to be influencing factors. Men tend to have a diet high in fat and cholesterol, such as often eating fatty meats, fried foods, and fast food, compared to women who generally pay more attention to food intake. In addition, smoking habits and more frequent alcohol consumption by men can also contribute to increased cholesterol levels in the blood.Respondents with high school education were the most in this study, at 30 (53.6%) and the fewest were university education at 8 (14.3%). According

to Rahmawati et al., (2022), the educational factor is one of the things that affects a person's ability to absorb information or knowledge so that it is easier to receive information and even ready to apply the knowledge he has gained. Respondents with higher education will be more compliant with treatment, including in reducing cholesterol levels by consuming fiber supplements.The most respondents' jobs were as employees at 19 (33.9%) respondents and as laborers at only 9 (16.1%). Work can be related to cholesterol levels because the type of work affects physical activity patterns, stress levels, and individual diet. Employees generally have low physical activity because they work more in a sitting position for long periods of time and tend to eat fast food or high fat due to time constraints. This condition can increase the risk of increased cholesterol levels in the blood (Lainsamputty & Gerungan, 2022)

Univariate Analysis

Univariate analysis is the analysis of each research variable. In this section, the researcher shows the results of the research and its discussion.

1. Fiber supplement consumption

In this study, it was found that as many as 29 (51.8%) respondents consumed fiber supplements. Meanwhile, as many as 27 (48.2%) respondents did not consume fiber supplements. The respondents consumed the most green tea fiber supplements as many as 12 respondents. Fiber supplements are additives derived from natural and synthetic ingredients that function to help meet the body's daily fiber needs (Fadilla & Isnaeni, 2021). Fiber supplements generally contain components such as psyllium husk, inulin, pectin, or other soluble fibers that play a role in facilitating digestion and helping to bind bad cholesterol (LDL) in the digestive tract to be expelled from the body. Thus, regular consumption of fiber supplements can help lower total cholesterol levels and increase good cholesterol (HDL). In addition, fiber supplements are also beneficial in maintaining an ideal weight, stabilizing blood sugar levels, and improving the overall health of the digestive system.Fiber in the body is hypocholesterolemic, having a resistance effect to the risk of developing cardiovascular disease through a decrease in cholesterol. Some of the mechanisms of cholesterol lowering by fiber are inhibiting cholesterol absorption, decreasing the availability of cholesterol so that its transfer to the bloodstream is reduced, preventing cholesterol synthesis, lowering food energy so as to reduce cholesterol synthesis and increase bile excretion (Lestari et al., 2022)

2. Cholesterol levels

This study found that that respondents who had high cholesterol levels were 22 (39.3%), respondents with normal upper limit amounted to 18 (32.1%) respondents while those with normal cholesterol levels were 16 (28.6%). In accordance with the results of the research from Khodijah et al., (2023), Of the 173 participants who were examined for blood cadre, most of the participants had high cholesterol levels, which was 53%.High cholesterol levels in the blood have an important role in the atherosclerosis process which will subsequently lead to cardiovascular disorders. Basically, bad cholesterol in the body can be lowered and prevented before it turns into bad cholesterol in the body that can cause disease. The impact of increased cholesterol in the body that can trigger complications such as hypertension, diabetes mellitus, heart disease and stroke (Kusumaningsih & Djamalludin, 2021)

Bivariate Analysis

The results of the study concluded that there was a significant relationship between fiber supplements and cholesterol levels in patients at the Pati II Health Center in 2025 with *a p value* of 0.001. The rho value = 0.449 means that the relationship level of the two variables in the medium category and the relationship value of the two variables is positive, meaning that respondents who consume fiber supplements have the potential for normal cholesterol levels. Cross-distribution proved that 29 (51.8%) of the respondents were known to take supplements and Most 12 (21.4%) had normal cholesterol levels and were still at the nominal upper limit. In line with previous research conducted by Hikhmah & Mulfianda, (2022) After being given green tea supplementation interventions, most of the respondents' cholesterol levels were in the nominal limit category as many as 7 respondents (46.6%), in the high limit category as many as 4 respondents (26.7%) and in the high category as many as 4 respondents (26.7%). Green tea supplements contain beneficial polyphenols as anti-inflammatory, anti-cancer and able to affect body fat accumulation and cholesterol levels, so that it can lower cholesterol levels in the body (Tamon et al., 2021).Supported by

research from Baroroh et al., (2024), showed that the results showed that there was a meaningful relationship between vegetable consumption habits and HDL cholesterol levels in Health Office employees. Research (Anggraeni et al., 2022) showed results There was a difference in changes in total cholesterol levels between the treatment and control groups (p=0.026) and there was a decrease in total cholesterol levels (p=0.009) by -44.70 ± 56.51 in the treatment group given aloe vera pudding.

Subsequent research by Nisa et al. (2022) reported a decrease in patients' cholesterol levels after consuming mung bean fiber. The average cholesterol levels of the control group before and after an increase of 5.7% were 240.1 mg/dl and 253.9 mg/dl. The average cholesterol levels of the intervention group before and after an 11% decrease were 220 mg/dl and 195.7 mg/dl. The results of the paired t-test showed a significant difference between total cholesterol levels before and after in the treatment group and the control group (p=0.000).Although most of the respondents who consumed fiber had normal cholesterol levels, there were still 5 (8.9%) respondents who still had high cholesterol levels. This could be because respondents did not routinely consume fiber supplements or occurred because most of the samples still consumed foods that were high in cholesterol such as egg yolks during the study period and changed the way food ingredients were processed more often steamed, boiled or sautéed. So cholesterol levels are still in the high category.From several supporting studies, it can be found that fiber supplements, both green tea, vegetables and fruits, can lower patients' cholesterol levels. Fiber supplements, whether derived from green tea, vegetables, or fruits, are effective in helping to lower cholesterol levels in hypercholesterolemia patients (Sari et al., 2024).

The bioactive content such as polyphenols, flavonoids, and soluble fiber in various types of supplements plays a role in increasing fat metabolism, inhibiting the absorption of cholesterol in the intestines, and accelerating the excretion of bile acids. In addition, fiber supplements also help increase good cholesterol (HDL) levels which function to bring cholesterol from body tissues back to the liver to be broken down.Fiber supplements have an important role in lowering blood cholesterol levels. Fiber can form gelatin and pass through digestion, bind bile acids and bind cholesterol, further excreted through feces. By pulling cholesterol out of the digestion, the level of cholesterol entering the blood decreases15. This increase in fiber intake occurred because the sample had begun to increase the intake of foods high in fiber such as vegetables and fruits in terms of the amount and variety of types of high-fiber food ingredients (Siti et al., 2021)

IV. CONCLUSION

The results showed that as many as 29 (51.8%) respondents consumed fiber supplements. The respondents consumed the most green tea fiber supplements as many as 12 respondents. The results showed that respondents who had high cholesterol levels were 22 (39.3%) respondents while those with normal cholesterol levels were 16 (28.6%). The results of the study concluded that there was a relationship between fiber supplements and cholesterol levels in patients at the Pati II Health Center in 2025 with *a p value* of 0.001. Of the 56 respondents studied, 29 (51.8%) respondents were known to take supplements as well and Most 12 (21.4%) had normal cholesterol levels

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