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The Relationship Between Diet and Cholesterol Levels Among Farmers in Ulubelu District, Tanggamus Regency, Lampung Province

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ABSTRACT: Cardiovascular disease (CVD) in farming populations is a health concern that can reduce productivity in the agricultural sector. Some of the factors that determine the risk of developing CVD are diet and cholesterol levels. This study aimed to identify early CVD risk in coffee farmers in Ulubelu district, Tanggamus Regency, Lampung Province by analysing the relationship between diet and cholesterol levels. This study used a cross-sectional design with quantitative analysis and was conducted in February-March 2025 with a total sample of 92 people obtained by purposive sampling technique. Dietary data were collected using the Food Frequency Questionnaire (FFQ) and cholesterol levels were measured using the Easy Touch GCU Meter device. Data were analysed using chi-square test on IBM SPSS Statistics 20 software. The results showed that 53.3% of the farmers were <50 years old, 37% had grade 1 hypertension, the majority had a normal BMI (82.6%), were active smokers (71.7%) and had a high level of physical activity (88%). Assessment of diet and cholesterol levels revealed 49 individuals (53.3 %) with poor diet and 49 individuals (53.3 %) with high cholesterol. The Chi-square test showed that there was no relationship between diet and cholesterol levels (p-value 1.000 OR = 0.983 95% CI 0.433 - 2.234).

KEYWORDS: Cardiovascular Disease, Cholesterol, Diet, Farmers.

INTRODUCTION

The health of farmers is one of the determinants of productivity in the agricultural sector. Research on cardiovascular health in farmers has started to be conducted. The risk of cardiovascular disease (CVD) among farmers is quite high, with high cholesterol levels being one of the factors determining the risk of CVD (Cai et al., 2022). Cholesterol is a fat component needed for various biological processes in the body, including cell membranes, bile production and hormone synthesis (estrogen, progesterone, testosterone, cortisol and aldosterone). Most cholesterol is produced by the human body in the liver and the rest is a result of dietary intake (Kemenkes RI, 2022). High blood levels of total cholesterol can be caused by unhealthy lifestyles. Consumption of foods high in saturated fats, obesity and smoking can disrupt the metabolism of fats in the body, causing LDL cholesterol and total cholesterol levels to rise (National Health Service, 2024).

Diet plays a key role in determining an individual's overall health. A healthy diet that includes a balanced intake of carbohydrates, healthy proteins, good fats and fruit and vegetables can help maintain an ideal body weight, control cholesterol, blood sugar and blood pressure levels, and reduce the risk of chronic diseases such as heart disease, type 2 diabetes and certain cancers. In contrast, diets that are high in saturated fat, high in sugar, high in salt and processed foods can increase the risk of obesity, hypertension, insulin resistance and chronic inflammation, all of which contribute to the development of various non-communicable diseases (WHO, 2020). At the national level, analysis of data from the National Socio-Economic Survey (SUSENAS) shows a decline in diet quality in rural Indonesia between 2008 and 2017. Consumption of processed and high-fat foods increased, while consumption of vegetables and beans decreased, increasing the risk of CVD in rural communities, not least among farmers (Mehraban & Ickowitz, 2021).

The aim of this study is to identify early risk of CVD in farmers by analyzing the relationship between diet and cholesterol levels in this population.

METHODS

Primary data was collected from coffee farmers in Ulubelu District, Tanggamus Regency using a cross-sectional design. Quantitative approach was used as the method of analysis. The sampling technique used in this study was purposive sampling technique. The

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inclusion criteria were male farmers who were registered in the Ulubelu Community Forest group, aged between ≥25 years and <65 years, and willing to become respondents by signing the informed consent. Ninety-two coffee farmers from Ulubelu District, Tanggamus Regency participated in this study. Data were collected by completing Food Frequency Questionnaire (FFQ) and checking cholesterol level using Easy Touch GCU Meter Device between February and March 2025. The Food Frequency Questionnaire (FFQ) was used to assess intake of carbohydrate, protein, fat, fast food and fibre sources. Each type of food is calculated based on the frequency of consumption, namely never (0), twice a month (5), 1-2 times a week (10), 3-6 times a week (15), once a day (25), and more than three times a day (50). The results of calculating each respondent's score were then analysed descriptively to see the distribution of the data; if the distribution is normal, the mean value is used as the cut-off point, with a score below the mean value indicating a poor diet and a score above the mean value indicating a good diet. In this study, cholesterol levels were categorised as normal cholesterol (<200mg/dL) and high cholesterol (≥200mg/dL). Data analysis was performed using chi-square test with IBM SPSS Statistics 20 software to determine the association between diet and cholesterol levels.

RESULTS

In this study, 92 farmers who were registered in the Community Forest Group (HKm) of Ulubelu District, Tanggamus Regency, were obtained as the respondents. An overview of the characteristics of the respondents was obtained based on the results of data collection through questionnaire sheets and physical examination of all respondents as follows:

Table 1. Characteristics of Respondents

Characteristics	Frequency	Percentage(%)
Sex		
Female	0	0
Male	92	100,0
Age		
25 - 49	49	53,3
50 – 64	43	46,7
Blood Pressure		
Normal	19	20,7
Normal high	16	17,4
Grade 1 hypertension	34	37,0
Grade 2 hypertension	18	19,6
Grade 3 hypertension	5	5,4
Body Mass Index (BMI)		
13,97-25,99	76	82,6
26,00-29,99	13	14,1
30,00-35,58	3	3,3
Smoking Status		
Non-Smokers	18	19,6
Former Smokers	8	8,7
Smokers	66	71,7
Physical Activity		
High	81	88,0
Medium	11	12,0
Low	0	0,0
Never	0	0,0
Total	92	100,0

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Based on the characteristics of respondents shown in the table above, it is known that all respondents are male farmers aged between 25 and 64 years, 37% have grade 1 hypertension, the majority of respondents have a normal BMI (82.6%), are active smokers (71.7%) and have a high level of physical activity (88%). The results of the assessment of the dietary values obtained data with a normal distribution (Figure 1), with a mean value of 317.93, so that values below this value are considered as a poor diet, while values above this value are considered as a good diet.

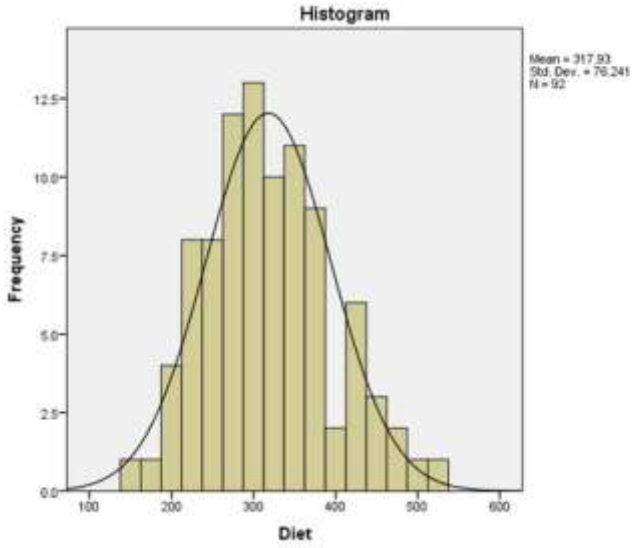

Figure 1. Data Distribution of Diet Scores

The results of the diet and cholesterol assessment showed that 49 people (53.3%) had a poor diet and 49 people (53.3%) had high cholesterol. Chi-squared test was then performed to determine the relationship between diet and cholesterol levels among the farmers in this study. The results of the analysis showed no association between diet and cholesterol levels (p-value 1.000 OR=0.983 95% CI 0.433 - 2.234) (Table 2).

Table 2. Relationship between Diet and Cholesterol Level in Coffee Farmers in Ulubelu District

	Cholesterol Level		Total (%)	*p-value*	OR	95% CI	
	Normal (%)	High (%)				*Low*	*Up*
Diet							
Good diet	20 (46,5)	23 (53,5)	43 (100)	1,000	0,983	0,433	2,234
Poor diet	23 (46,9)	26 (53,1)	49 (100)				
Total	43 (46,7)	49 (53,3)					

DISCUSSION

Most of the subjects in this study had poor diets and high cholesterol levels. The results of this study are different from research on farmers in East Java, where it was found that most farmers had a good diet, ate three times a day and often cooked themselves using local harvests such as vegetables. There was only a small proportion of farmers with poor diets, which was influenced by income and education factors (Aini et al., 2024). Poor diet can be influenced by knowledge factors about the importance of balanced nutrition and the influence of food culture (Lichtenstein et al., 2021). Many coffee farmers in this study prioritised the consumption of staple foods such as rice with little variety of protein sources, vegetables and fruits, and the consumption of fried foods was also quite high. As a result, although farmers live close to food sources, they remain at risk of deficiencies in essential nutrients and increased risk of non-communicable diseases.

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In this study, 49 people had high total cholesterol levels. This shows that high cholesterol levels are still a health problem for farmers in Ulubelu District. High cholesterol levels are closely linked to the incidence of CVD, particularly heart attack, stroke and peripheral arterial disease, through the mechanism of atherosclerotic plaque formation in the blood vessels, which in the long term causes the arterial blood vessels to become hard, stiff and narrowed. In addition, the atherosclerotic plaque can rupture into a thrombus and release into the bloodstream. Both of these processes disrupt and can even lead to a sudden blockage of blood flow to the target organ (Rhafif, 2024).

In general, diet is almost always associated with cholesterol levels. However, in this study, diet did not have a significant effect on cholesterol levels among coffee farmers in Ulubelu district, where there were farmers with good diets but still had high cholesterol levels, and vice versa. This could be due to the interaction of other factors, for example, the majority of coffee farmers have high smoking habits. Substances contained in cigarettes, especially nicotine and reactive oxygen species (ROS) can interfere with lipid metabolism in the body. Nicotine can increase the release of stress hormones such as adrenaline and cortisol. Both hormones encourage the process of lipolysis, which is the breakdown of fat in adipose tissue resulting in an increase in free fatty acids in the blood. These high levels of free fatty acids are then transported to the liver and stimulate the production of lipoproteins, especially very low-density lipoprotein (VLDL) which in turn increases blood triglyceride levels. Nicotine also inhibits the activity of the enzyme lipoprotein lipase, which is responsible for breaking down triglycerides in the blood. This leads to an increase in triglycerides, a decrease in HDL (good cholesterol) and an increase in LDL (bad cholesterol), all of which contribute to the risk of CVD (Messner & Bernhard, 2014). Failure to control for this factor may lead to the erroneous conclusion that diet is unrelated to cholesterol levels.

Similarly, the majority of these coffee farmers have high levels of physical activity, which can improve fat metabolism and control body weight, which indirectly contributes to lowering total cholesterol levels. High levels of physical activity also stimulate the function of liver enzymes that break down and remove excess cholesterol from the body (Braga et al, 2023). Therefore, if a farmer has a poor diet but does not smoke and has high activity levels, his cholesterol levels may be low.

CONCLUSION

Although diet was not associated with cholesterol levels in this study, the influence of other factors such as smoking habits and high levels of physical activity may influence the relationship. Therefore, farmers still need to maintain a balanced diet in order to maintain cardiovascular health, improve quality of life and optimal agricultural activity.

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