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Relationship between hypercholesterolemia and sleep quality among older adults

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ABSTRACT

Background: Hypercholesterolemia refers to the buildup of fat in the blood, leading to the accumulation of fatty deposits on the walls of blood vessels, known as atherosclerosis. High cholesterol levels can adversely affect health, including the sleep quality of the older adults, leading to physical and psychological health issues.
Objective: This study aims to examine the relationship between hypercholesterolemia and sleep quality among older adults.
Methods: A cross-sectional design was utilized in this study, with a sample size of 60 respondents selected through purposive sampling. Data collection involved the use of a cholesterol level observation sheet and the Pittsburgh Sleep Quality Index (PSQI) questionnaire. Data analysis was conducted using the Spearman Rank correlation.
Results: The results revealed a significant relationship between hypercholesterolemia and sleep quality in the older adults ($p < 0.0001$; $r = 0.802$). This indicates a positive correlation between hypercholesterolemia and sleep quality among the older adults.
Conclusions: The study concludes that as hypercholesterolemia levels become more normalized, sleep quality improves. Conversely, higher levels of hypercholesterolemia are associated with poorer sleep quality in the older adults.

Keywords: older adults; hypercholesterolemia; sleep quality

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INTRODUCTION

Older adults individuals experience a gradual loss of tissue's ability to repair itself and maintain its normal structure and function, which makes them more susceptible to infections and impairments in repairing damage (Montecino-Rodriguez et al., 2013). Several health problems arise due to lifestyle changes, dietary factors, environmental influences, lack of physical activity, stress, and aging. One such condition associated with diet and age is hypercholesterolemia, characterized by high cholesterol levels and the accumulation of fat in the bloodstream. Elevated cholesterol levels can have detrimental effects on health, increasing the risk of heart disease (Palatini et al., 2023). In the older adults, high cholesterol levels can also lead to sleep difficulties, negatively impacting physical and psychological health, as well as increasing health risks and

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- *Hypercholesterolemia and sleep quality are significantly related among older adults.*
- *Normalization of hypercholesterolemia levels leads to improved sleep quality in older adults.*
- *Higher levels of hypercholesterolemia are associated with poorer sleep quality in older adults.*

impairing immune system function.

According to the World Health Organization (WHO) in 2018, the global prevalence of hypercholesterolemia in adults was 37% for men and 40% for women. In Indonesia, data from the 2018 Basic Health Research (RISKESDAS) showed that the prevalence of high cholesterol was 52.3%, with the majority of cases occurring in individuals above 60 years of age (Riskesdas, 2018). The province of East Java, ranking 23rd out of 34 provinces in Indonesia, had a prevalence of high cholesterol in 2,967 out of 8,225 individuals tested.

Cholesterol, a type of lipid, is a modifiable risk factor for hypertension. Higher total cholesterol levels increase the likelihood of developing hypertension (Kotani et al., 2010; Zaki et al., 2020). Elevated cholesterol levels pose a serious health concern as they contribute to various non-communicable diseases (Arifin et al., 2022). Excessive cholesterol in the blood can lead to dangerous consequences for heart and blood vessel health. The accumulation of fat deposits on blood vessel walls can result in atherosclerosis, causing blockages and potentially leading to conditions such as fatigue, sleepiness, leg pain, neck pain, myocardial infarction (heart attack), and even death (Bista et al., 2021).

Factors such as age, obesity, consumption of fatty foods, unhealthy lifestyles, smoking, drinking alcohol, and lack of exercise contribute to elevated cholesterol levels. Additionally, heredity can also play a role in increased blood cholesterol levels (Sharifi-Rad et al., 2020). Hypercholesterolemia leads to the buildup of cholesterol plaque in the blood, which narrows blood vessels and impedes smooth blood flow (Hansson & Libby, 2006; MB & Ganz, 1997). Sleep pattern changes significantly impact the quality and quantity of sleep and rest in the older adults. Sleep quality complaints may stem from natural aging processes or a combination of factors related to old age (Miner & Kryger, 2017). Good-quality sleep is essential for the older adults to improve health and restore their bodies. Sleep quality in the older adults encompasses not only a state of complete calm but also attention to the sleep cycle process. Factors such as disease, stress, medications, nutrition, environment, motivation, and activities can influence sleep quality decline in the older adults (Shochat, 2012; Suzuki et al., 2017).

Pharmacological treatments for hypercholesterolemia include the administration of normolipidemic drugs such as statins, fibrates, resins, selective cholesterol absorption inhibitors, and nicotinic acid. Lifestyle modifications, such as maintaining a healthy diet, engaging in regular physical activity, avoiding fatty foods, adopting a healthy lifestyle, ensuring adequate rest, and managing sleep quality, are also crucial in preventing high cholesterol levels. Given the aforementioned background, the researchers are motivated to investigate the relationship between hypercholesterolemia and sleep quality in the older adults.

METHODS

Design

The research design used in this study is a cross-sectional research design, which involves measuring or observing the independent and dependent variables at a single point in time (Nursalam, 2017).

Sample and Setting

The sample in this study consists of the older adults population suffering from hypercholesterolemia within the Klatak Health Center Work Area, with a total of 60 respondents. Inclusion criteria are based on the general characteristics of the research subjects from a target population that is accessible and will be studied (Nursalam, 2017). The inclusion criteria include older adults individuals suffering from hypercholesterolemia who are willing to participate as respondents. Exclusion criteria involve removing subjects or samples that do not meet the inclusion criteria or are not suitable for the research (Nursalam, 2017). Examples of exclusion criteria include uncooperative older

Table 1. Characteristics of respondents (n=60).

Category	n	%
Age		
45-55 years old	15	25.0
56-65 years old	34	56.7
>65 years old	11	18.3
Gender		
Male	23	38.3
Female	37	61.7
Cholesterol		
Normal	3	5.0
High limit	24	40.0
High	33	55.0
Sleep quality		
Good	4	6.7
Light	9	15.0
Medium	13	21.7
Bad	34	56.7

Table 2. Relation between hypercholesterolemia and sleep quality of elderly (n=60).

Hypercholesterol	Sleep Quality					p	r
	Good	Light	Medium	Bad	Total		
	n (%)	n (%)	n (%)	n (%)	n (%)		
Normal	3 (5.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (5.0)	<0.0001	0. 802
High limit	1 (1.7)	9 (15.0)	10 (16.7)	4 (6.7)	24 (40.0)		
High	0 (0.0)	0 (0.0)	3 (5.0)	30 (50.0)	33(55.0)		
Total	4 (6.7)	9 (15.0)	13 (21.7)	34 (56.7)	60 (100)		

adults individuals or those not present during the examination.

Variable

The independent variable is the factor that influences the occurrence of the dependent variable (Nursalam, 2017). In this study, the independent variable is hypercholesterolemia, while the dependent variable is sleep quality.

Instruments

The measurement of cholesterol levels uses the Glucose Cholesterol Urid (GCU) method, and an observation sheet is employed. Total cholesterol levels are categorized as normal, borderline high, or high. The Pittsburgh Sleep Quality Index (PSQI) is a questionnaire used to assess sleep quality, consisting of seven components: subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleeping pills, and daytime dysfunction. Sleep quality is classified as good (scores 1-5), mild (scores 6-7), moderate (scores 8-14), or poor (scores 15-21). The scores of the seven components are summed to obtain a global score ranging from 0 to 21. A global score <5 indicates good sleep quality, while a score >5 indicates poor sleep quality (Liu et al., 2021).

Data Analysis

The data were analyzed using Spearman Signed Rank Test with the significance of $p<0.05$.

Ethical Consideration,

This study has obtained ethical approval from the Klatak Banyuwangi Public Health Center with approval number 069/01/KEPK-STIKESBWI/II/2022.

RESULTS

Table 1 indicates that over half of the total respondents fall within the age range of 56-65 years, with the majority being female. The study reveals that more than 50% of the participants have high cholesterol levels and experience poor sleep quality.

The findings from the aforementioned study revealed that out of the 60 respondents, nearly half of them (34 respondents, 56.7%) had hypercholesterolemia and poor sleep quality. The analysis of the Spearman rank test yielded a P-value of <0.0001, indicating ($p < 0.05$) that the alternative hypothesis is accepted and the null hypothesis (H0) is rejected. This implies that there is a significant relationship between hypercholesterolemia and sleep quality among older adults. Furthermore, the strong correlation coefficient of 0.802 indicates a robust and highly significant association (Table 2).

DISCUSSION

Our study revealed that cholesterol levels have a significant correlation with sleep quality. The findings of this study are consistent with research conducted by Barikani et al., (2019); Xing et al. (2020). Hypercholesterolemia refers to an increase in cholesterol concentration in the blood exceeding the normal limit. Older adults experience various changes in organ function, including decreased elasticity in blood vessels due to the deposition of atherosclerotic materials, including cholesterol (Dai et al., 2015).

Out of the 60 respondents, 30 (50.0%) predominantly experienced high cholesterol levels along with poor sleep quality. A study by Maryati (2017) reported that the majority (52.9%) of respondents had high cholesterol levels based on a statistical test using the Spearman rank test technique with a significance level of 0.05. Additionally, Gangwisch et al. (2010) stated that short sleep quality in older adults can be a significant risk factor for higher cholesterol levels compared to younger age groups, as observed in the cross-tabulation table where 34 respondents (56.7%) had hypercholesterolemia along with poor sleep quality.

Among the respondents, 30 (50.0%) had high cholesterol levels accompanied by poor sleep quality. This can be attributed to signs commonly experienced by older adults with hypercholesterolemia, such as difficulty falling asleep for 30 minutes while lying down, waking up during the night, extended sleep duration, and frequent use of sleep medication. In the category of high cholesterol with moderate sleep quality, 3 (5.0%) respondents were observed, indicating difficulties in initiating sleep. In the high cholesterol category with poor sleep quality, 4 (6.7%) respondents experienced breathing difficulties during sleep, frequent waking to use the bathroom, and pain or headaches during the day. Moreover, 10 (16.7%) respondents in the high cholesterol category had moderate sleep quality, experiencing symptoms such as snoring and frequent chills at night. Additionally, 9 (15.0%) respondents in the high cholesterol category had light sleep quality, including discomfort and restlessness during sleep, and daytime drowsiness. Only 1 (1.7%) respondent in the high cholesterol category demonstrated good sleep quality, occasionally experiencing nightmares.

Poor sleep quality is associated with various negative outcomes. Physiologically, insufficient sleep duration can negatively impact the immune system and lead to metabolic changes, including increased insulin resistance (Grandner et al., 2016). The results of the study align with findings by Barikani et al., (2019); Chen et al. (2022); Pu Lin et al., (2017), who reported a significant relationship between sleep quality and lipid (cholesterol) levels in older adults. The study's outcomes are consistent with existing theories, as the research considered other factors that can affect cholesterol levels, including physical activity, age, and specific diseases. Age is a significant risk factor for elevated blood cholesterol levels, as total cholesterol levels tend to be higher in older individuals compared to younger age groups. Older individuals are more prone to high cholesterol due to reduced physical activity compared to their teenage and childhood years (Ou et al., 2017).

For older adults with hypercholesterolemia, preventive measures such as maintaining a sleep duration or sleep quality of 7-8 hours are recommended. Proper disease management, including regular health check-ups, monitoring cholesterol levels, adopting a healthy diet, and adhering to prescribed medication, can help minimize complications associated with hypercholesterolemia.

Conclusions

Hypercholesterolemia is predominantly categorized as high among older adults in

the working area of the Klatak Health Center. Additionally, almost half of the older adults in the same area exhibit poor sleep quality. The statistical analysis confirms a very strong relationship, indicating a significant correlation between hypercholesterolemia and sleep quality among older adults in the working area of the Klatak Health Center. The findings of this study provide valuable information for healthcare workers, especially nurses, to implement cholesterol management strategies among older adults.

Declaration of Interest

No conflict of interest

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Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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