Original Article

A correlation study of quality of sleep with total cholesterol level in the elderly at Budi Agung Elderly Social Welfare Unit, Kupang city, Indonesia

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ABSTRACT

The increase in the number of elderly (seniors) is followed by also an increase in the prevalence of various cardiovascular diseases. Cardiovascular disease has become the number one cause of death globally, one of which is coronary heart disease (CHD). CHD is caused by the atherosclerosis process, which is a disease of the arteries due to cholesterol and metabolic waste products build-up. Hypercholesterolemia can be caused by the aging process, obesity, genetics, smoking, low physical activity, stress, hypertension, eating high-fat foods, and poor sleep quality. The deterioration of sleep quality experienced by two out of five elderly people is one type of change that occurs due to aging. The aim of this study is to analyze the correlation between sleep quality and the total cholesterol levels of the elderly at Budi Agung Elderly Social Welfare Unit in Kupang City, Indonesia. The study was conducted in August-September 2020. The sample was selected by purposive sampling technique which came to 56 research subjects. The design of this study was analytic observational using a cross-sectional study method. Data collection used the Pittsburgh Sleep Quality Index questionnaire for sleep quality and digital cholesterol sticks to measure cholesterol levels. Data were tested by Chi-square with a significance value of $P < 0.05$. The result of this study was that 17 elderly have adequate sleep quality (30.4%) and poor sleep quality were 39 elderly (69.6%). The mean total cholesterol level in the elderly at Budi Agung's Elderly Social Welfare Unit was 230.23 ± 45.44, while those with poor sleep quality were 112.97 ± 32.42 ($P = 0.09$). There is no significant correlation between sleep quality and total cholesterol levels of the elderly at Budi Agung Elderly Social Welfare Unit, Kupang, Indonesia.

Keywords: Elderly, Cardiovascular disease, Sleep quality, Total cholesterol

INTRODUCTION

The explosion in the growth of the world's elderly (seniors) population is the result of the government's success in reducing high birth rates. Government efforts in many countries through the family planning program have succeeded in reducing the population growth rates; the birth rate is low, the mortality rate is decreasing, and the life expectancy rate is increasing. This is also followed by the rapid growth rate of elderly population.[1,2]

According to the World Health Organization (WHO) and Government Regulation of the Republic of Indonesia No. 43 of 2004, elderly person is someone who has reached the age of ≥60 years.[3] The increase in the number of elderly people is followed by an increase in the prevalence of various cardiovascular diseases. This disease has become the number one cause of death, globally. According to the WHO data in 2012, of all deaths from non-communicable diseases, 31% were caused by cardiovascular disease or around 17.5 million people.[4]

According to the WHO, coronary heart disease (CHD) is at most kills among all the cardiovascular diseases, which is as many as 7.4 million people and will continue to increase. It is predicted that in 2030, the death rate due to CHD will reach 23.3 million people globally if prevention efforts are not made immediately.[5] The mortality rate due to CHD has

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increased in developing countries, including Indonesia. In 2010, CHD was ranked the sixth highest cause of death in Indonesia.[4] It is estimated that around 100,000–499,999 people have died from CHD according to the WHO data in 2002. Based on the data from Basic Health Research in 2013, it shows an increase in the prevalence of disease. CHD increases with age, which is highest in the 65–74 years age group and slightly decreases at age ≥75 years. The prevalence is higher in women 0.5% compared to men 0.4%.[6,7] CHD is caused by the atherosclerosis process, which is a disease of the arteries due to cholesterol build-up and metabolic waste products. If this continues, it will cause the blood vessels to thicken and narrow, which results in reduced blood and oxygen supply to the heart. Cholesterol build-up in blood vessels occurs due to an increase in cholesterol levels in the blood above normal values, namely, ≥200 mg/dl or called hypercholesterolemia.

Hypercholesterolemia can be caused by the aging process, obesity, genetics, smoking, low physical activity, stress, hypertension, eating high-fat foods, and poor sleep quality.[8] The poor sleep quality is bound to be experienced by the elderly, where two out of five elderly people report having sleep disturbances. The types of sleep disorders most often experienced by the elderly include difficulty starting to sleep, difficulty maintaining sleep, and waking up too early.[9] In the elderly, there are various changes caused by the aging process which results in the loss of the tissue's ability to repair and maintain normal body functions.[10] Adequate sleep quality is defined as sleep that has fewer disturbances. The quality of sleep affects human health both for the day and the long term.[10] The consequences of poor sleep quality are changes in the physiological functions of the body, especially endocrine and metabolic. Indeed, sleep disturbances are often associated with hypercholesterolemia, hypertension, obesity, and death.[6,8] Therefore, based on the description above, the authors are interested in examining the relationship between sleep quality and the total cholesterol levels in the elderly.

MATERIALS AND METHODS

The design of this study was observational analytic using cross-sectional analytic study method to analyze the correlation between sleep quality and the total cholesterol levels in the elderly. The measured sleep quality will be divided based on two criteria, namely, poor and adequate. The criteria for the total cholesterol levels used were the fasting blood sugar tests. Each subject is only taken one measurement at the time during this study.

The subjects in this study were all the elderly who lived at Budi Agung's Elderly Social Welfare Unit with purposive sampling technique that met the inclusion criteria. Subsequently, the subjects had to sign the informed consent form. Subjects are required to fast for 8–10 h before drawing blood samples for the total cholesterol test. The blood was taken in the morning using peripheral blood. Furthermore, the subjects filled out the Pittsburgh Sleep Quality Index questionnaire. Data were the collected and processed using predetermined data analysis techniques.

Ethical clearance was obtained from the Ethical Commission of the Faculty of Medicine, UNDANA, Kupang.

RESULTS

This study was conducted from August to September 2020 at Budi Agung Elderly Social Welfare Unit, Kupang, with 56 research subjects.

As shown in Table 1, it can be seen that the mean age of the research subjects was 74.55 ± 8.19 and the percentage of female subjects was greater, namely, 60.7% compared to men which is 39.3%. The study subjects who had adequate sleep quality were 17 elderly (30.4%) and 39 elderly (69.6%) had poor sleep quality.

Furthermore, the data in Table 2 displayed that there is no significant correlation between sleep quality and total

Table 1: Characteristics of the research subjects

Variable	F	%	Mean±SD	Median (min–max)
Age			74.55±8.19	73 (60–96)
Gender				
Male	22	39.3		
Female	34	60.7		
Total cholesterol			236.82±45.61	234.00 (160–313)
Sleep quality				
Adequate	17	30.4		
Poor	39	69.6		

Table 2: The relationship between sleep quality and total cholesterol

Variable	Sleep quality		P
	Adequate	Poor	
Age	74.41±8.71	74.62±8.06	0.933§
Gender			
Male	9 (52.9%)	13 (33.3%)	0.167¥
Female	8 (47.1%)	26 (66.7%)	
Total cholesterol	251.94±43,60	230.23±45.44	0.090‡

§,¥,‡: (*P* = 0.09)

cholesterol levels in the elderly ($P = 0.09$). In addition, it also indicated that there is no significant correlation between age, sex, and sleep quality.

DISCUSSION

The results of this study indicated that there was no significant correlation between sleep quality and total cholesterol levels in the elderly ($P = 0.09$), where the elderly who had good sleep quality had higher cholesterol levels (251.94 ± 43.60) than the elderly who have poor sleep quality (230.23 ± 45.44). This result is the same as the study conducted by Bernedeta *et al*. (2017). In research subjects aged 30–50 years, the results showed that there was no significant relationship between sleep quality and total cholesterol levels.[11] In addition, another study also indicated that there is no significant correlation between sleep quality with the incidence of metabolic syndrome including total cholesterol levels, high-density lipoproteins levels, low-density lipoprotein levels, central obesity, and blood pressure.[12]

Sleep quality is the satisfaction of sleeping so that a person does not show feelings of fatigue, irritability and anxiety, lethargy and apathy, blackness around the eyes, swollen eyelids and eyes, headaches, and frequent yawning. The fulfillment of sleep needs for each person is different, some can be met properly and vice versa; depending on the factors such as chronic pain, environment, fatigue, emotional stress, diet, smoking, and medication.[13] Lack of sleep causes changes in the hormonal system related to endocrine and cardiovascular metabolism. This can trigger hunger and the desire to eat high-calorie foods which affect levels of nutrients in the body such as glucose and cholesterol.[14] This is supported by the results of a study by Jennings *et al*. (2017) in Pennsylvania with research subjects aged 30–54 years that indicated that poor sleep quality also had higher cholesterol levels. This might due to an alteration of the hormonal system that triggers hunger and the desire to eat foods high in calories, which can result in obesity and changes in lipid homeostasis.[14]

The absence of significant results in this study is thought to be influenced by factors that influence sleep quality on cholesterol that are not assessed such as diet and emotional stress. Consumption of high-fat food and emotional stress tend to make people eat unhealthy food frequently, which affects the level of total cholesterol.

CONCLUSION

There is no significant correlation between sleep quality and total cholesterol level in the elderly at Budi Agung Elderly Social Welfare Unit.

CONFLICTS OF INTEREST

There are no conflicts of interest found during this study.

ETHICS

This study has received ethical approval from the Health Research Ethics Commission of the Faculty of Medicine, University of Nusa Cendana.

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