Fiber Intake and Sleep Quality in Elderly with Hypertension

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Abstract. Elderly people are at risk of experiencing various health problems because they experience changes both physically, socially and mentally. The disease that often occurs in the elderly is hypertension. Hypertension in the elderly is caused by food intake, such as fiber intake, sodium and other factors that are often overlooked are sleep quality. The purpose of this study was to determine the relationship between fiber intake, sleep quality and blood pressure in the elderly. This type of research is descriptive analytical with a cross-sectional approach. Blood pressure variables using a tensiometer, fiber intake, cholesterol, sodium using a 24-hour recall, sleep quality using the PSQI questionnaire, a sample of 57 elderly people using total sampling. The results showed that 94.7% of the elderly had hypertension, 82.5% of the elderly had low fiber intake and 68.4% of the elderly had poor sleep quality. Low fiber intake and poor sleep quality contribute to hypertension. Choosing fiber-rich foods that are easily accessible and easy for the elderly to chew and regulating the elderly's sleep hours are strategies to reduce the incidence of hypertension in the elderly.

Key words: Elderly, Fiber, Hypertension, Sleep Quality

INTRODUCTION

Elderly can be translated as someone who is 60 years of age and over. Elderly people are at risk of experiencing various health problems because the elderly experience changes both physically, socially and mentally (Putri, D.E. 2021). Currently, the number of elderly people is increasing, according to WHO data in 2050 it is predicted that the number of elderly people will increase by 600 million to 2 billion elderly people (Rossiana & Erwanti, 2018). In 2022, the number of elderly people in Central Java was 13.07% and in 2023 it increased to 13.50%. One of the cities with a high prevalence of hypertension is the city of Semarang which was ranked third in 2018 in Central Java. Hypertension in the city of Semarang from 2016-2018 has always increased every year. Cases of primary hypertension in 2016 were 44% and increased in 2017 to 62%, and in 2018 it increased to 97% experiencing hypertension (Dinas Kesehatan Jawa Tengah, 2022).

Increasing age causes several changes in body structure that affect the function of body organs including changes in the digestive organs so that changes in nutritional status can occur in the elderly (Hamsah, 2020). Increasing age in the elderly causes changes in the teeth of the elderly, this causes the elderly to be less able to enjoy food so that many elderly people experience decreased appetite (Asmaniar, 2018).

Other factors that cause decreased appetite include the reduced ability of the elderly to prepare their own food. The elderly tend to consume what their families have provided. The elderly tend to consume soft foods and small portions. Several studies have shown that the elderly lack fiber consumption. The results of a previous study in 2022 showed that only 24.58% of the elderly met the Daily AKG. The fiber requirement for the elderly is 25-30 grams per day. Fiber intake is needed for the elderly to help lower their blood pressure. Fiber plays a role in the absorption of cholesterol and fat in the blood so that it can lower blood pressure (Langingi, 2021).

High blood pressure (Hypertension) is one of the diseases that is often experienced by the elderly. Hypertension can cause cardiovascular disease and various other body system disorders. Hypertension is the silent killer because it can occur without symptoms so that some hypertensive patients are not aware of having hypertension (WHO, 2023). Hypertension in the elderly is caused by several factors including physiological factors, intake and lifestyle. Lifestyle factors that can increase the risk of hypertension are low sleep quality. Poor sleep quality can affect the hormone aldesterone so that it will affect blood pressure balance (Assiddiqy, 2020).

Physiologically, the elderly experience sleep disturbances due to biological and neurophysiological changes that occur along with the aging process. A decrease in the Suprachiasmatic Nucleus (SCN) in the hypothalamus, which is the center of the circadian biological clock, causes the elderly to experience an early sleep phase syndrome, daytime sleepiness, and waking up early without feeling enough sleep. Of course, this will affect the quality of sleep in the elderly. In addition to the decrease in SCN, there is also a significant decrease in melatonin production by the pineal gland which causes the elderly to experience sleep onset insomnia or difficulty in starting sleep during rest and sleep hours (Mander et al., 2017). In addition, there are psychological and social disorders that can also occur in the elderly such as anxiety, feeling lonely, depression which triggers insomnia. Based on the above phenomena, it is necessary to know whether there is a relationship between fiber intake, sleep quality, and hypertension in the elderly so that the basis of the results of this study will be a benchmark for determining solutions to the gaps in the problems of the three variables in the elderly.

METHODS

The type of research used is quantitative descriptive analytic with a cross-sectional research design. This research was conducted in June 2023 at Panti Wredha Elim Semarang. The population in the study were all elderly people registered at Panti Werdha Elim Semarang with a total of 57 people. The inclusion criteria for the study include; All elderly people aged 60 and over and registered at Panti Werdha Elim Semarang, willing to be respondents, participate in research activities from start to finish, and can communicate well.

The independent variables in this study are fiber intake and sleep quality while the dependent variable is blood pressure in the elderly. The data taken are respondent identity, blood pressure measurements, fiber intake using 2x24-hour re-call interviews and sleep quality using the Pittsburgh Sleep Quality Index (PSQI) questionnaire.

The sleep quality variable uses the PSQI questionnaire which contains 7 components of questions: subjective sleep quality that is comfortable, sleep duration, sleep latency (difficulty starting sleep), sleep efficiency (length of sleep and assessing hours of sleep), disturbances when sleeping, use of sleeping pills and disruption of activities during the day. This instrument produces 7 scores that correspond to the domains mentioned. Each domain has a value between 0 (no problem) to 3 (severe problem). The total score is added up from components 1-7. This research is in accordance with and has obtained permission through the Ethical Clearance of the Muhammadiyah University of Semarang no. 088/KE/06/2023.

RESULTS AND DISCUSSION

A. Description of fiber intake and sleep quality in elderly with hypertension

Elderly people experience changes in muscle mass and social changes that cause decreased immunity so that many elderly people are susceptible to diseases including hypertension (high blood pressure) (Novita Sari, 2018). Respondent characteristics can be seen in table 1.

Table 1. Respondent characteristics (n=57)

	n	%
Age		
60-65 years	13	22.8
66-70 years	23	40.4
71-75 years	11	19.3
76-80 years	10	17.5
Gender		
Male	20	35,1
Female	37	64,9
Disease		
Hypertension	54	94,7
No Hypertension	3	5,3

Based on Table 1. shows the majority of elderly aged 66-70 years, elderly who are over 70 years old are 36.8%, this shows that elderly people currently have a high life expectancy. As many as 64.9% of elderly hypertensive are female, this shows that the life expectancy of women is higher than that of men. Elderly women are at greater risk of experiencing hypertension because during menopause (over the age of 45 years), estrogen levels will decrease even though estrogen levels contribute to maintaining normal blood pressure (Reckelhoff & Granger, 2015).

As many as 94.7% of elderly people experience hypertension, this is influenced by age factors that cause changes in blood vessels, resulting in increased arterial stiffness, which increases blood pressure in the elderly (Lakatta, 2003). Hypertension in the elderly is mostly isolated systolic hypertension (SHS) which is usually more common in women than in men (Kadulli, 2012). The results of other studies show that 82.5% of elderly people with hypertension have low fiber intake and 68.4% have poor sleep quality. Fiber is an important nutrient needed by the elderly. Low fiber intake in the elderly can reduce the excretion of bile acids in the stool and increase the reabsorption of cholesterol from the bile. This cholesterol will spread in the blood vessels and inhibit blood circulation, causing increased blood pressure and causing hypertension (Yuriah, 2019). Sufficient fiber consumption can lower blood pressure in the elderly because dietary fiber will prevent the reabsorption of bile acids, cholesterol, and lower cholesterol in the blood (Fitri, 2023). Low fiber intake in the elderly is caused because the elderly rarely consume vegetables and fruits.

Table 2. Fiber intake and sleep quality (n=57)

	f	%
Fiber intake		
Sufficient (≥20 grams/day)	10	17,5
Insufficient (<20 grams/day)	47	82,5
Sleep quality		
Good (≤5)	18	31,6
Poor (>5)	39	68,4

Based on Table 2. Shows that the majority of elderly people have low fiber intake with a total of 47 people (82.5%), while for sleep quality the majority of elderly people have poor sleep quality, namely 39 people (68.4%). Another factor that causes the elderly to rarely consume vegetables and fruits is because the elderly experience decreased appetite due to decreased olfactory function and difficulty chewing hard fruit. The elderly experience physiological changes in decreased digestive function and changes in the intestinal microbiota, thereby reducing the ability to digest and absorb fiber in food (Russell, 2015). Low fiber intake is also caused by the elderly experiencing limited mobility so that they only consume food prepared by the family. Some foods that contain fiber that are recommended for the elderly include bananas, oranges, broccoli, carrots, chayote, brown rice, green beans, red beans. The elderly are advised to consume at least 25-30 grams of fiber per day.

Meanwhile, for sleep quality based on the results, it shows that most elderly people experience poor sleep quality. Physiologically, the elderly experience sleep disturbances due to biological and neurophysiological changes that occur along with the aging process. A decrease in the Suprachiasmatic Nucleus (SCN) in the hypothalamus, which is the center of the circadian biological clock, causes the elderly to experience an early sleep phase syndrome, daytime sleepiness, and waking up early without feeling enough sleep. Of course, this will affect the quality of sleep in the elderly. In addition to the decrease in SCN, there is also a significant decrease in melatonin production by the pineal gland which causes the elderly to experience sleep onset insomnia or difficulty in starting sleep during rest and sleep hours (Mander *et al.*, 2017).

B. The relationship between fiber intake and sleep quality with blood pressure in elderly people with hypertension

Based on statistical tests using Pearson Correlation, it can be concluded that there is no relationship between fiber intake and systolic blood pressure with a p value = 0.792 and diastolic with a p value = 0.217 in the elderly.

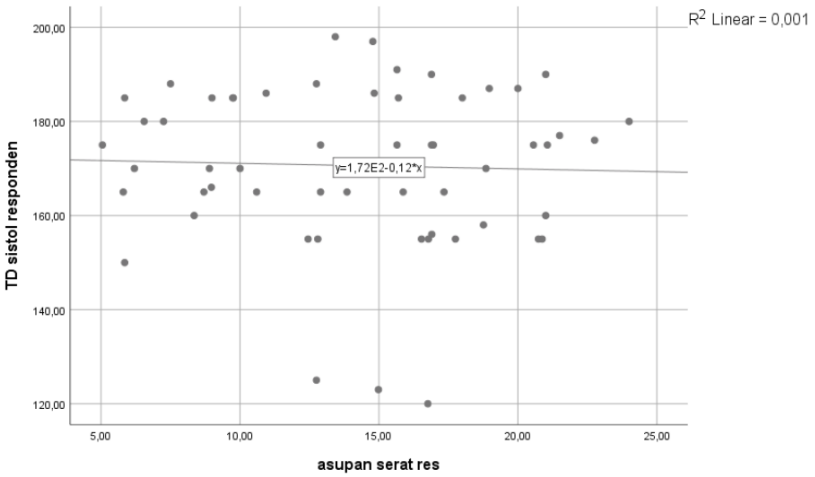

Figure 1. Diagram Relationship between Fiber Intake and Systolic Blood Pressure in the Elderly

The scatter plot diagram can explain that the slope of the linear line moves from top to bottom which shows a negative direction between the two variables. This means that if fiber intake increases, systolic blood pressure decreases.

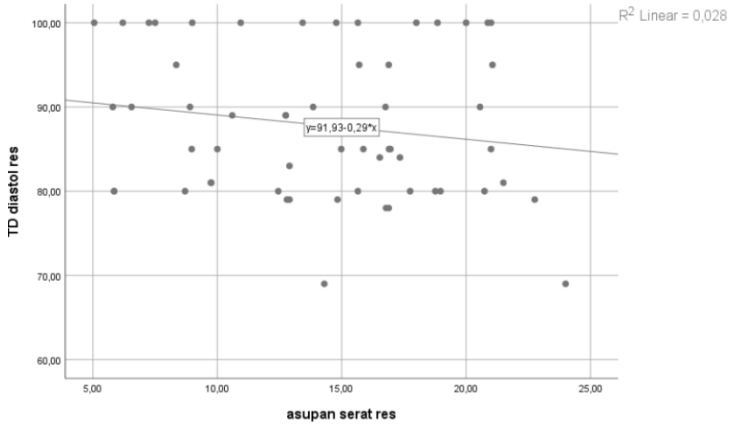

Figure 2. Diagram Relationship between Fiber Intake and Diastolic Blood Pressure

While the scatter diagram for diastolic blood pressure explains that the slope of the linear line moves from top to bottom which shows a negative direction between the two variables. This means that if fiber intake increases, diastolic blood pressure decreases.

This study is in line with research conducted by Nova *et al*. (2023) which showed no relationship between fiber intake and the incidence of hypertension. This can happen because fiber intake is not the only factor that triggers hypertension. Fiber is not directly related to lowering high blood pressure, but fiber is directly related to cholesterol. Where the fiber will bind bile acids which are the end products of cholesterol which will later be excreted with feces.

In this study, there was no relationship between fiber intake and blood pressure at Panti Werdha Elim Semarang because most respondents had insufficient fiber intake, both those with hypertension and those without hypertension. Another possibility is due to other nutrient intake factors such as sodium and cholesterol intake, most of which are included in the sufficient category. Although this study states that there is no relationship, respondents should still pay attention to their daily fiber intake by eating more fruits and vegetables.

Based on the results of statistical tests using Pearson Correlation, it was concluded that there is no relationship between sleep quality and systolic blood pressure with a p value of 0.204 and diastolic blood pressure with a p value of 0.597 in the elderly.

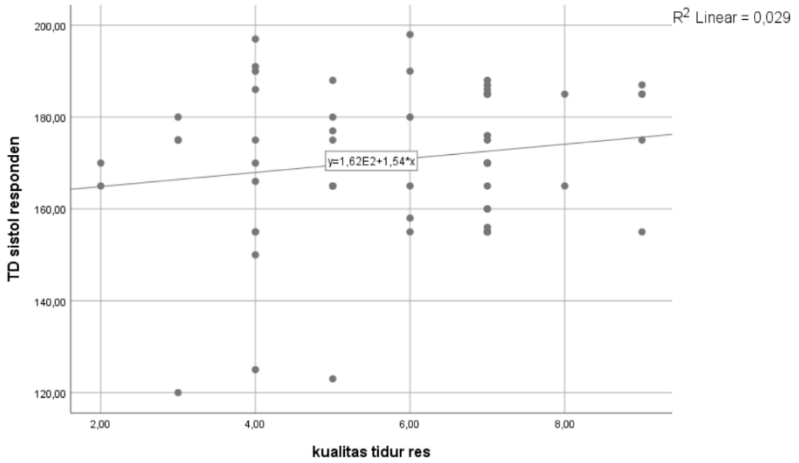

Figure 3. Diagram Relationship between Sleep Quality and Systolic Blood Pressure

Based on the scatter plot diagram, it can be seen that the slope of the linear line moves from top to bottom, indicating a positive direction between the two variables. This means that if sleep quality increases, systolic blood pressure will decrease.

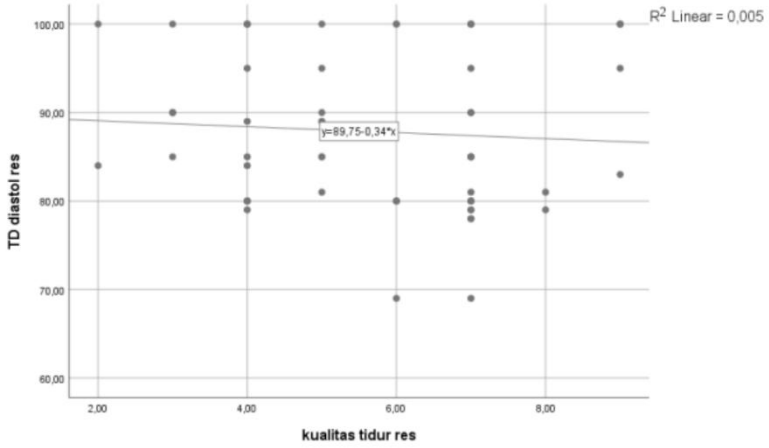

Figure 4. Diagram Relationship between Sleep Quality and Diastolic Blood Pressure

Based on the scatter plot diagram, it can be seen that the slope of the linear line moves from top to bottom, indicating a negative direction between the two variables. This means that if sleep quality increases, diastolic blood pressure will decrease.

The results of this study are in line with research conducted by Manalu et al, (2018) that there is no significant relationship between sleep quality and blood pressure with a value (p = 0.172). The results of this study differ from the results of research by Erfanti et al., (2024) which explains that there is a relationship between sleep quality and the incidence of hypertension in adults and the elderly with a value (p = 0.00). There are other factors that can affect the blood pressure of respondents such as gender, heredity, lifestyle, anxiety, stress, smoking habits and age. According to the researcher's assumption, factors that have a correlation with sleep quality in respondents are psychological factors and activities carried out every day. Physiologically, the elderly will experience a reduction in the duration of sleep hours due to a decrease in SCN and the hormone melatonin which can be the main factor in changes in sleep patterns in the elderly.

CONCLUSION

Based on the results of the analysis test, it was found that there was no relationship between fiber intake and sleep quality in elderly people with hypertension. If connected with other research sources,

actually things related to elderly hypertension are usually correlated with psychological status, social relationships, and complication diseases that have been suffered by the elderly.

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