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Correlation of Smoking Habits, Physical Activities and Fat Intake with Cognitive Ability in Indonesian Elderly

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ABSTRACT

Background: The aging process that occurs in elderly makes the elderly more vulnerable to health threats, such as decreased cognitive abilities. Lifestyle is a factor that plays an important role in several diseases, such as smoking, lack of physical activity, and consuming unhealthy foods. The purpose of this study was to find the correlation of smoking habit, physical activities and fat intake with cognitive abilities in elderly.

Methods: This study used a cross sectional design involving 182 elderly over the age of 60 years in six integrated services post (Posyandu) in Klaten Regency, Indonesia. Data of smoking habits and physical activities were obtained by interview and fat intake was determinated by food recall. Data of cognitive ability was obtained through interview using Mini Mental State Exam (MMSE) questionnaire. Data were tested using Spearman correlation to determine the relationship between variables.

Results: The results showed that there was a significant relationship between smoking habit with cognitive ability in elderly (P<0.001). There was a significant relationship between physical activity and cognitive ability in elderly (P<0.001). There was no significant relationship between fat intake and cognitive ability in elderly (P=0.494).

Conclusion: Low smoking habits and high physical activity was correlated to a better cognitive function in Indonesian elderly.

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Introduction

Elderly is the last period in the cycle of human life that will be experienced later by everyone. As one gets older, physiological functions will decrease due to degenerative processes (aging), so the problems related to older age will require more attention in future (1).The aging process in elderly makes the elderly more vulnerable to various health threats (2). Elderly will experience a decrease in tissue capacity too (3) and body function will also experience setbacks, a decreased memory, and a cognitive health decline (4, 5). Lifestyle is a factor that plays an important role in the occurrence of several diseases, such as smoking, lack of physical activities, and consuming unhealthy foods (6).

Smoking is a habit that has a huge impact on health (7). The prevalence of elderly smoking in Indonesia is relatively high. It was shown that as many as 37.5% of the elderly are active smokers who smoke an average of 13 cigarettes per day (8). Central Java is one of the provinces with the highest number of smokers. In 2017, the number of smokers reached

62.7% with an average number of 10 cigarettes per day and in Klaten Regency, the number of active smokers was 36.2% (9). Smoking is thought to have a negative effect on cognitive ability. Studies conducted in Australia, showed that seniors who smoked experienced greater cognitive decline each year than seniors who did not smoke (10). Cataldo et al.'s study (2010) revealed that the duration of smoking increased the risk factors for cognitive disability associated with increased oxidative stress and inflammation in smokers (11).

Physical activity is an indicator that can be utilized to evaluate overall health status of elderly (12, 13). Regular physical activity is beneficial to health, extends independent and active life expectancy, and improves quality of life in elderly. Aging is very influential in physical activity in elderly, for instance, the reduced ability to perform daily activities, independently (14). Scientific evidences also demonstrated that elderly people aged 60 years or older and with low physical activity had a high risk of experiencing cognitive disability, depression, and dementia (15).

Two thirds or more of diseases in elderly are closely related to nutrition. According to gerontologists and geriatrics, it is estimated that 30-50% of nutritional factors are important to achieve and maintain the elderly health (4). Fat is a nutrient that influences cognitive ability. A study has shown that there is a decrease in memory status in rats fed with high saturated fat for three months (16). Another study conducted on mice also showed that a high-fat diet lowered haptoglobin, a molecule that plays a role in the pathogenesis of neurodegenerative diseases (17).

Physical activity in the elderly over 60 years tends to be lower than the elderly with a younger age (18). In addition, the elderly also tend to have high fat intake due to poor diet (19). High smoking habits, lack of physical activity, and high fat intake in the elderly underlie the importance of conducting a research on the correlation of smoking habits, physical activity and fat intake with cognitive ability in Indonesian elderly.

Materials and Methods

This study was a cross sectional research design and the population of study were elderly over 60 years old in Klaten Regency, Central Java (n=182). The inclusion criteria were elderly men and women over 60 years old, able to chew and live with family. The exclusion criteria were elderly with overnutrition status [Body mass index (BMI)≥23.5] and to be illiterate. This study was approved by the Health Research Ethics Commission Sebelas Maret University No.74/UN27.06/KEPK/2019.

Data on smoking habits and physical activity were obtained from respondents by interview, and fat intake results were obtained using a 24-hour recall questionnaire. Classification of smokers was based on World Health Organization (WHO) report in 2013 (20), classification of physical activity was based on Physical Activity Scale for Elderly (PASE) (21), and fat intake was classified based on the 2013 Nutrient Adequacy Ratio (NAR) according to the Indonesian Ministry of Health (22). Data on cognitive ability were obtained by interview using Mini Mental State Exam (MMSE) questionnaire together with categories based on the 2010 Shigemon et al.'s study (23). The classification of these variables was presented in Table 1. SPSS software (Version 21, Chicago, IL, USA) was used for statistical nalysis and the data were compared using the statistical test of bivariate analysis, and Spearman. A p value less than 0.05 was considered significant.

Table 1: Classification of the study variables

Variable	Category	Classification
Smoking habits*	<1 stick per day	Not a smoker
	1-10 sticks per day	Light smoker
	11-20 sticks per day	Moderate smoker
	>20 sticks per day	Heavy smoker
Physical activities**	>16	High
	9-16	Moderate
	<9	Low
Fat intake***	<70%	Low
	70-79%	Relatively low
	80-99%	Sufficient
	>100%	High
Cognitive ability****	<16	Low
	17-23	Moderate
	>24	Normal

*World Health Organization (WHO, 2013), ** Physical Activity Scale for Elderly (PASE), *** Nutrient Adequacy Ratio (NAR, 2013), ****Shigemon et al. (2010)

Results

The number of elderly women involved in the study was higher than men, which was 52.1%. Based on the age category, the majority of elderly were ranging from 60 to 70 years (69.2%), 71-80 years as much as 25.9% and the least number was among those older than 80 years which only reached 4.9%. Based on bivariate analysis, there was a significant relationship between smoking habits and cognitive ability (P<0.001, Table 2). The correlation coefficient also showed a positive relationship between smoking and cognitive ability. Based on bivariate analysis, there was a significant relationship between physical activity and cognitive ability (P<0.001, Table 3). The correlation coefficient also showed a positive relationship between physical activity and cognitive ability. Based on bivariate analysis, there was no significant relationship between fat intake and cognitive ability (P=0.494, Table 4).

Discussion

In this study, there was a significant relationship of smoking habits and physical activity with cognitive abilities in the elderly, while fat intake was not significantly related with cognitive abilities in the elderly. The difference between this study and other studies was the variable of fat intake. There were no studies to discuss specifically the relationship of fat intake with cognitive abilities in elderly. Aging is often associated with an increase in the number of chronic disease conditions and physical decline that can negatively impact health status. Lifestyle has become an important component affecting health and well-being in elderly. Most health problems can be prevented through healthy living habit such as avoiding smoking, doing physical activity and dietary modification (24).

Elderly with a nutrition-rich dietary and conducting regular physical activities was illustrated to have a lower risk of diseases. The risk of anxiety and depression can also be prevented through healthy eating and active lifestyle (25). Smoking can cause an accumulation of oxidants and free radical. Consequently, excess oxidants and free radical trigger oxidative stress. Research conducted on adults who smoke shows increased oxidative stress contributes to the formation of neurofibrillary plaques, which triggers cognitive decline (26).

In line with these findings, Wang et al. stated that oxidants and free radicals can oxidize DNA, RNA, protein, and fat which will cause damage to cells too (27). Smoking is also a risk factor for cardiovascular and cerebrovascular disease, stroke, increased oxidative stress, atherosclerosis, and inflammation which can negatively impact cognitive function and the occurrence of dementia (28). Physical activity is very useful for elderly. Regular physical activity can prevent cognitive decline and improve independent

Table 2: Correlation of smoking habit and cognitive abilitiy in elderly

Smoking habit	Cognitive ability (182)			Correlation coefficient	P value*
	Low	Moderate	Normal		
Heavy smoker	2	3	3	0.348	
Moderate smoker	28	13	15		<0.001
Light smoker	8	14	19		
Not a smoker	3	32	42		

*Significant at α=0.05, using the Spearman Correlation test

Table 3: Correlation of physical activities and cognitive abilitiy in elderly

Physical activity	Cognitive ability (182)			Correlation coefficient	P value*
	Low	Moderate	Normal		
Low	16	24	18	0.248	<0.001
Moderate	21	24	30		
High	4	14	31		

*Significant at α=0.05, using the Spearman correlation test

Table 4: Correlation of fat intake and cognitive abilitiy in elderly

Fat intake	Cognitive ability (182)			Correlation coefficient	P value*
	Low	Moderate	Normal		
Low	4	9	8	0.051	0.494
Relatively low	1	1	4		
Succifient	7	7	6		
High	29	45	61		

*Significant at α=0.05, using the Spearman Correlation test

life in elderly. The results of this study are in line with research conducted in Taipei on 275 elderly people showing that physical activity can increase happiness and mental health, because it can stimulate anti-anxiety effects and also improve sleep quality (29).

Physical activity is a lifestyle that can be modified and brings advantages in maintaining cognitive function as one gets older (30, 31). Physical activity is able to regenerate old cells and increase the number of young cells, thus it slows down cognitive decline (32, 33). The nutrition needs of elderly are influenced by several factors such as age, sex, physical activities, occupation, body posture and health conditions (34). The intake needed by elderly must be in accordance with the Nutrient Adequacy Ratio (NAR) to achieve a balanced nutritional status (35).

Excessive fat consumption is one of the causes of accumulation of oxidative stress and may bring damage to antioxidant defenses. In this study, there was no significant relationship between fat intake and cognitive ability in the elderly, which is in contrast to previous studies done on mice with a significant increase in lipid peroxidation along with a decrease in antioxidant activity, and this can trigger cognitive decline in the elderly (36). The Wyss-Coray et al.'s study also stated that excess fat will accumulate and cause inflammation in brain and triggers cognitive decline (37). The difference in results can be caused by bias during the recall process, a less in-depth approach to the food recall process (38).

Conclusion

The findings in this study highlighted that elderly with intense smoking habits have low cognitive ability. It was shown that elderly with high physical activities have good cognitive ability. This study showed no significant relationship between fat intake and cognitive ability in elderly. It is expected that in the future the elderly can maintain a good lifestyle by avoiding smoking, excessive fat consumption and increase in physical activity to maintain good cognitive abilities too.

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Conflict of Interest

None declared.

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