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THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND COGNITIVE FUNCTION IN THE ELDERLY

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ABSTRACT

Cognitive function in the elderly occurs as a result of brain function and decline. As the elderly age increases, the ability to regenerate brain cells decreases, this is one of the factors that causes cognitive function in the elderly. The physical activity carried out by the elderly in the Cilacap area is farming. Farming activity by the elderly is a type of physical activity in the moderate stage. Inadequate physical activity will result in cognitive impairment in the elderly so that it will impact the quality of life for the elderly and their families. The aim of this research is to examine the relationship between physical activity and cognitive function in elderly people who farm. The research method for this type of research uses a quantitative method with a cross sectional approach which was carried out on elderly people who were still engaged in farming at an elderly posyandu in the Cilacap area. Elderly people who meet the inclusion criteria are assessed for physical activity using the International Physical Activity Questionnaire (IPAQ) while cognitive function in the elderly is assessed using the Mini Mental State Exam (MMSE). The research results show that there is a significant relationship between physical activity and cognitive function in the elderly, elderly who engage in moderate physical activity reduce the risk of cognitive impairment.

Keywords: Physical Activity, Cognitive Function of the elderly

INTRODUCTION

Life expectancy in Indonesia has increased to 72.2 years. Increasing a person's life expectancy has an impact on elderly problems, including problems with physical activity and cognitive function in the elderly. Someone who is over 80 years old tends to experience a decline in neurocognitive function, this occurs due to changes in the prefrontal brain and changes in the hippocampus as a place to control memories, planning or certain initiatives.

The number of elderly people suffering from cognitive impairment tends to increase. People with cognitive impairment dementia are currently estimated at 27 million and will increase by 80% by 2050, therefore there is a need for a clear strategy to prevent cognitive impairment in the elderly a strategy that can be an alternative to reduce the risk of impaired cognitive function in the elderly is through physical activity. Elderly people who experience impaired cognitive function have a decreased ability to solve problems and a lower ability to control emotions and personality.

Increasing age in the elderly will result in a decrease in the ability to grasp the information obtained. Cognitive function will affect the quality of life of the elderly, especially in terms of Activity Daily Living (ADL)[1]. Quality of life in the elderly is the achievement or satisfaction of the physical and mental conditions experienced by the elderly. Quality of life is related to a person's physical, economic, social and mental well-

being. Low quality of life tends to be a burden on caring for the family. Good cognitive function in the elderly will increase self-confidence and concentration power, being able to remember things related to time orientation.

Physical activity is body movement produced by muscles, bones and skeleton to control body activities or produce energy. Energy produced by physical activity can be assessed or measured in kilocalories (KCal). Physical activity in daily life is classified into work, household activities, sports activities or activities that produce energy from muscle, bone and skeletal movement. Physical activity is divided into three categories: light, moderate and heavy physical activity.

Light physical activity is a category of physical activity that releases energy amounting to <3.5Kcal/minute. Light physical activity includes doing housework, taking a leisurely walk, stretching muscles with warm-up exercises or slow movements.

The second physical activity is moderate physical activity, moderate physical activity is a category of physical activity that requires energy of 3.5 to 7 Kcal/minute, moderate physical activity generally has characteristics including heart rate and breathing frequency which tends to be faster, the type of activity included in Physical activities include walking at a speed of 5km/hour, carpentry, moving light furniture, gardening and farming. The last physical activity category is heavy physical activity, which is a category of physical activity that expends more than 7 Kcal/hour of energy. Clinically, heavy physical activity is characterized by rapid, panting breathing and profuse sweating.

This research focuses on assessing the physical activity and cognitive function of the elderly, especially on preventing neurological diseases resulting from changes in the elderly's age. Other research found that there is an influence between physical activity and cognitive function in the elderly but there is no significant relationship, and there are no factors that influence the research results. Therefore, researchers are interested in conducting a study on the relationship between physical activity and cognitive function in the elderly.

RESEARCH METHODS

This research uses quantitative methods with the inclusion criteria of someone aged 60 years or more and still active or working as a farmer, willing to be a respondent, and able to read and write. Research location at the elderly POSYANDU in the Jeruk Legi I Community Health Center area. Instruments to determine physical activity in the elderly using the International Physical Activity Questionnaire (IPAQ) to assess cognitive function in the elderly using the MMSE. The elderly population was 89 people. Samples were taken using inclusion criteria to obtain 60 respondents.

The sampling technique in this research used simple random sampling. Elderly people who are willing to be respondents are given the International Physical Activity Questionnaire (IPAQ) questionnaire to assess the physical activity of elderly people by choosing one of seven statements regarding daily physical activity. Cognitive function in the elderly was assessed using the Mini Mental State Exam (MMSE) instrument which contains 11 questions and commands. Data analysis to determine the relationship between physical activity and cognitive function in the elderly using Chi-Square analysis.

RESULTS AND DISCUSSIONS

Respondent characteristics based on demographic status, demographic status is classified based on the characteristics of gender, age, and education level.

Table 1.Demographic Characteristics

Characteristics	f	%
Gender	53	63,85
male	30	36,15
female	30	
Age		
60-70	67	80,73
70-80	16	19,27
Educational Level		
Elementary	64	77,10
Senior High School	16	19,28
Higher Education	3	3,62

Based on Table 1. Regarding the characteristics of respondents, there were 30 women (36.15%) while there were 53 men (63.85%). Characteristics of respondents based on age were 67 people (80.73%) aged 60 to 70 years, while there were 16 respondents aged 70-80 years (19.27%). Characteristics of respondents based on education level, 64 respondents with primary education (77.10%), 16 people with secondary education (19.28%), while 3 respondents with higher education (3.62%).

Tabel 2. Physical Activity

Variables	f	%
Physical Activity		
Less	44	53
Good	39	47
Cognitive Function		
Impaired	54	65,1
Unimpaired	29	34,9

Table 2 shows that the physical activity of respondents in the poor category was 44 people (53.0%) and good physical activity was 39 people (47.0%) while based on the respondents' cognitive function, Impaired cognitive function was 54 people (65.1%) and not disturbed amounted to 29 people (34.9%).

Based on the results of tests on the relationship between physical activity and cognitive function in the elderly, it shows that there are 43 elderly people who have physical activity in the less category and have impaired cognitive function (97.7%), while the number of elderly people who have good physical activity and impaired cognitive function is 11 people (28.2%). There were 28 respondents (71.8%) who had unimpaired cognitive function and good physical activity, while 1 respondent who had less physical activity and unimpaired cognitive function was 1 person (2.3%). The results of statistical tests using Chi square show that there is a relationship between physical activity and the cognitive function of elderly people in the Jeruklegi area, this is in accordance with the p value = 0.000 <0.05.

Physical activity in the elderly that is carried out continuously can have an effect on increasing cardiovascular function of the heart and the speed of blood flow pumped by the heart throughout the body, the amount of blood flow transported by the heart throughout the body has an impact on oxygen saturation or increased oxygen levels in the blood, resulting in blood flow to the brain. Blood flow into the brain has an effect on increasing the volume of the part of the brain called the hippocampus. According to Brown, 2021 shows the results of brain imaging using neuroimaging that elderly people who have good physical activity tend to have increased cognitive function in memory, imagination and cognitive abilities.

The results of this research are in line with other research which states that regular physical activity from a young age will reduce the risk of impaired cognitive function in the elderly[2]. According to Alzi, 2021 stated that aerobic exercise is effective in slowing down the degenerative process which influences the decline in cognitive, mental and social function in the elderly, cognitive impairment dementia (Alzheimer's) or Mild Cognitive Impairment (MCI) who have a lifestyle that is lacking in physical activity[3]. This research is in accordance with other studies

which state that physical activity has beneficial effects, especially reducing the risk of Alzheimer's (dementia) and visuospatial or a person's ability to manipulate objects in the mind in three dimensions[4]. Reading activity, which is one of the cognitive activities, has a very important role in stimulating the brain's cognitive functions, namely executive function, working memory and episodic memory[5]. Participation in various cognitive activities is closely related to improved cognitive function in older adults[3]. Health problems experienced by the elderly include immobility, instability and falls, incontinence, impaired/decreased cognitive function, decreased sensory function, infection, depression and isolation.

Of the total health problems in the elderly, cognitive impairment is one of the problems that causes decreased productivity in the elderly[6]. Decreased cognitive abilities in general and information processing in particular. Age-related declines were evident in speed, short-term memory, working memory, and long-term memory. These changes are also related to changes in brain structure and function[7]. Other researchers report a variety of postmortem changes in the aging brain, including loss of brain volume and weight, ventricular enlargement and sulcus widening, loss of neurons in the neocortex, hippocampus, and cerebellum, as well as brain morphology. brain and brain decline[8]. Synaptic density, mitochondrial damage, and reduced DNA repair capacity. White matter hyperintensity occurs, which can extend not only to the frontal lobe but also to the posterior region due to decreased cerebral blood flow[9].

Age-related deterioration of the frontal lobe has given rise to the frontal lobe hypothesis, based on the assumption that cognitive decline in older adults is similar to cognitive decline in patients with frontal lobe lesions.In both groups, 44 people experienced impaired working memory, attention, and executive function.

Tabel 3. Relationship between Physical Activity and Cognitive Function in the Elderly

Physical Activity	Cognitive Function				Total		*p*
	Impaired		Unimpaired				
	n	%	n	%	n	%	0,000
Less	43	97,7	1	2,3	44	100	
Good	11	28,2	28	71,8	39	100	
Total	54	65,1	29	34,9	83	100	

CONCLUSION

In this study, there was a significant relationship between physical activity and cognitive function in the elderly with a P value of 0.00 <0.05, which means that the better the physical activity of the elderly, the better the cognitive function in the elderly.

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