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Research Article

The Relationship Between Physical Activity And Cognitive Function In The Elderly In Rw 12 Kp. Haur Cucuk Sumbersari Village

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ABSTRACT

As the elderly population increases, the problem of diseases due to degenerative processes is increasing, the aging process is often accompanied by a decrease in cognitive abilities. In Indonesia, the number of elderly individuals experiencing cognitive function impairments has risen to 121 million. Engaging in physical activity is considered one of the key strategies to mitigate the risk of cognitive decline. This research seeks to explore the correlation between physical activity and cognitive function among the elderly population. This study utilizes a quantitative approach with an analytical survey design, employing a cross-sectional methodology. It was carried out in August 2024, with the research subjects of 51 elderly people in the RW 12 Kp. Haur Cucuk, Sumbersari Village using purposive sampling techniques. Data were collected by providing a PASE modification questionnaire for physical activity and an MMSE questionnaire for cognitive function. The data were analyzed through frequency distribution and the Chi-Square test. The study revealed that 56.9% of the elderly exhibited high levels of physical activity, while 51% demonstrated strong cognitive function. The Chi-square test yielded a p-value of 0.000, which is less than the 0.05 threshold. A significant correlation was found between physical activity and cognitive function among the elderly in the RW 12 Kp. Haur Cucuk Sumbersari Village. Health workers at the health center can facilitate physical activity activities for the elderly such as leisurely walks, gymnastics for the elderly and others. This activity is carried out regularly to support the physical and cognitive health of the elderly.

INTRODUCTION

As stated by the World Health Organization (WHO) in 2018, individuals who are 60 years old and above are considered elderly, often referred to as senior citizens. The elderly represent a demographic in the later stages of life, undergoing a natural process known as aging (Kholifah, 2016). So it can be concluded that, the elderly are a stage of life that has reached old age, usually over 60 years. This term emphasizes the health, social, and psychological aspects related to the aging process, such as physical decline, increased risk of chronic diseases, and

changes in mindset and behavior. In 2019, the global share of elderly individuals was 13.4%. Projections suggest that by 2050, this percentage will rise to 25.3%, and by 2100, it is expected to reach 35.1% of the total population (WHO, 2019).

The life expectancy of the elderly in the world will continue to increase. Life expectancy refers to a statistical estimate of the average duration a person is expected to live, determined from birth to death. In 2010, the life expectancy in Indonesia was 68 years for males and 72 years for females. By 2020, these figures rose to 70 years for men and 73 years for women (BPS, 2022). According to the Central Statistics Agency (BPS), the proportion of elderly individuals in Indonesia reached 11.75% in 2023, marking an increase of 1.27% from the previous year's figure of 10.48%. Meanwhile, 63.59% of the elderly are young elderly aged 60-69 years. 26.76% are middle-aged elderly aged 70-79 years and the remaining 8.65% are old elderly aged 80 years and over. Based on gender, 52.28% of the elderly are female and 47.72% are male (BPS, 2022). The Head of the West Java Central Statistics Agency (BPS) stated that the number of elderly in West Java in 2019 was 4.76 million people. This number is around 9.71% of the total population of West Java. The percentage of elderly in Bandung Regency reached 9.10% (BPS, 2021). Meanwhile, the population of Bandung Regency according to the age group 60 years and over reached 130,662.87 people (BPS Bandung Regency, 2022). The Elderly Health Program Report of the Bandung Regency Health Office, Sumbersari Health Center Working Area, shows that the number of elderly in the Sumbersari Health Center area is 3,192 people (Bandung Regency Health Profile, 2022). Meanwhile, the number of elderly people aged >60 years in Sumbersari Village is 1,922 people (Sumbersari Health Center Profile, 2024).

Along with the increasing elderly population, the problem of diseases due to degenerative processes is also increasing. One of the organs most susceptible to degenerative processes is the brain. The brain is a complex organ, the center that regulates the body's systems and cognitive functions (Noor & Merijanti, 2020).

Cognitive function refers to the mental processes involved in gaining knowledge or intellectual abilities, encompassing thinking patterns, memory, comprehension, planning, and execution. When cognitive function is impaired, it leads to issues such as poor memory and focus, challenges in learning new information or making choices, and difficulties with orientation in terms of time, space, and location, which in turn impacts daily activities (Noor & Merijanti, 2020).

The prevalence of cognitive dysfunction in the elderly worldwide reaches 65.6 million elderly people (WHO, 2022). Meanwhile, the prevalence of cognitive impairment in the elderly in Indonesia reached 121 million with a percentage of 5.8% male elderly and 9.5% female elderly (Wulandari et al, 2023). The percentage of cognitive impairment in the elderly population aged 65-70 years reached 10.15%. The elderly aged 75-79 years reached 5.8% and the elderly aged 80-84 years were 17.5% (Zainurridha et al., 2021). Multiple elements can help delay the deterioration of cognitive abilities and prevent dementia, with physical exercise being one of them. Engaging in physical activity serves as an effective approach to lowering the likelihood of cognitive decline in older adults, as it is an activity that can activate and stimulate the brain. In addition, physical activity not only stimulates the brain but can also reduce the incidence and prevalence of chronic diseases which are one of the risk factors for cognitive impairment (Noor & Merijanti, 2020).

Based on previous research, there are several research results related to physical activity and cognitive function in the elderly. Nurwati et al. (2021) discovered a notable connection between physical activity and cognitive abilities in elderly individuals residing in Cigugur Kidul Village, Pusakajaya District, Subang Regency. A deficiency in physical activity among the elderly may lead to a

deterioration in cognitive function. These findings are consistent with those of Ningrum et al. (2023), whose research also revealed a significant correlation between physical activity and cognitive function in older adults.

METHOD

This research employed a quantitative framework with an analytical survey method and a cross-sectional design. The participants included 51 elderly individuals, chosen through a purposive sampling method. Data collection was carried out using a questionnaire divided into two sections: the Physical Activity Scale for Elderly (PASE) to evaluate physical activity levels, and the Mini Mental State Examination (MMSE) to assess cognitive abilities. The data were analyzed using frequency distribution and the Chi-Square statistical test.

RESULTS

Frequency Distribution of Respondents Based on Age in RW 12 Area of Haur Cucuk Village, Sumbersari table 1 as follows:

Table 1 Characteristics of the Research Subject

Chracteristic	f	(%)
age		
60-74 years	44	86
70-80 years	7	13,7
Total	51	100
Gender		
Male	13	25,5
Female	38	74,5
Total	51	100
Pendidikan terakhir		
Sekolah dasar (SD)	46	90,2
Sekolah menengah pertama (SMP)	5	9,8
Total	51	100

Based on table 1, the average age of respondents in RW 12 Kp. Haur Cucuk, Sumbersari Village ranges from 60-74 years, namely 44 people (86.3%). Most of the respondents were female, namely 38 people (74.5%), while 13 respondents were male (25.5%). Most of the respondents were female, namely 38 people (74.5%), while 13 respondents were male (25.5%).

Table 2 frequency Distribution of Respondents Based on Physical Activity and Cognitive Function in the area of RW 12, Haur Cucuk Village, Sumbersari Village.

Aktivitas fisik	f	(%)
Baik	29	56,9
Buruk	22	43,1
Total	51	100
Fungsi kognitif	**f**	**(%)**
Baik	26	51
Buruk	25	49
Total	**51**	**100**

The based on table 2, 29 respondents (56.9%) had good physical activity, while 22 respondents (43.1%) had poor physical activity. Based on table 4.5, 26 respondents (51%) have good cognitive function. While 25 respondents (49%) have poor cognitive function.

Table 3 Correlation of Physical Activity with Cognitive Function in Elderly in RW 12 Area, Haur Cucuk Village, Sumbersari Village

variables		Cognitive function				Total		*p-value*
		baik		buruk				
		f	%	f	%	f	%	
aktivitas fisik	Baik	21	41,2	8	15,7	39	56,9	*0,000*
	kurang	5	9,8	17	33,3	22	43,1	
Total		26	51	25	49	51	100	

Statistical test results show that out of 51 respondents, most respondents had good physical activity with good cognitive function as many as 21 elderly people (41.4%), good physical activity with poor cognitive function as many as 8 elderly people (15.7%), less physical activity with good cognitive function as many as 5 elderly people (9.8%) and less activity and poor cognitive function 17 elderly people (33.3%).

The chi-square test results examining the relationship between physical activity and cognitive function in older adults yielded a p-value of 0.000, which is less than 0.05. This suggests a significant correlation between physical activity and cognitive function in the elderly.

DISCUSSION

The study's findings indicated that, on average, the elderly exhibited a high level of physical activity, with 29 individuals (56.9%) out of 51 respondents meeting this criterion. Based on the researcher's observations, it was noted that several elderly individuals remained engaged in various daily tasks, including sweeping the floor, visiting the rice fields, interacting with their grandchildren, and participating in other activities. Physical activity includes the movement of body parts carried out by skeletal muscles and causes an increase in calorie needs. Engaging in physical exercise serves as a cognitive enhancer and plays a role in lowering the likelihood of cognitive deterioration in older adults. Furthermore, consistent physical activity can decrease the prevalence of chronic illnesses and mitigate the risk of cognitive decline (Wicaksono & Handoko, 2020).

This study is in line with the research of Ningrum et al (2023) entitled "Physical Activity Can Maintain Cognitive Function in the Elderly" which was conducted at the Elderly Polyclinic, Garuda Health Center, Bandung City with 96 respondents. The results showed that 68 people (70.8%) of the elderly had good physical activity. Different from the research conducted by Nisa & Jadmiko (2019) entitled "The Relationship between Physical Activity Levels and Cognitive Function in the Elderly" conducted in Pucangan Village with a sample of 95 respondents. The results of the study showed that as many as 34 elderly people (35.8%) were included in inactive physical activity. This happens because of the aging process in the elderly. As age increases, a person's physical abilities will also decrease due to muscle atrophy which can cause interference in carrying out physical activities.

Based on the description above, the researcher argues that elderly people who have good activities are generally still active in carrying out physical activities or daily activities such as sweeping the floor, going to the fields, playing with grandchildren and others. Meanwhile, elderly people who have less activity are likely due to factors of advanced age or limited physical abilities. Because as age increases, physical abilities tend to decrease.

The study findings indicated that, on average, older adults exhibit strong cognitive abilities. This can be seen through the frequency distribution consisting of 51 respondents, namely 26 elderly people (51%) have good cognitive function and 25 elderly people (49%) have poor cognitive function. Cognitive function is a human thinking process that involves processing stimuli such as sight, hearing, and attitudes which are then processed and stored in the brain and then forwarded to the nerves so that a person can respond to these stimuli. When cognitive function is stimulated regularly, it can help train the brain and maintain optimal cognitive function. This researcher illustrates that the human brain functions like a muscle. If someone wants their muscles to continue to function well, then the muscles must be trained regularly.

Likewise with the brain, to maintain good cognitive function, cognitive stimulation needs to be done regularly (Djajasaputra & Halim, 2019) This study is in line with the research of Ningrum et al (2023) entitled "Physical Activity Can Maintain Cognitive Function in the Elderly" which was conducted at the Elderly Polyclinic, Garuda Health Center, Bandung City with 96 respondents. The results of the study showed that in general the elderly have normal cognitive function, namely 78 elderly (81.3%) have normal cognitive function and 18 elderly (18.8%) have mild cognitive impairment. This is different from the research conducted by Nurwati et al (2021) entitled "The Relationship between Physical Activity and Cognitive Function in the Elderly in Cigugur Kidul Village, Pusakajaya District, Subang Regency" with a sample of 87 respondents. The results showed that 49 respondents (56.3%) had cognitive disorders and 38 respondents (43.7%) had normal cognitive

function. The results of the study showed that most respondents were elderly people aged 60-74 years. As age increases, there is a decrease in brain cell function in the elderly which has an impact on short-term memory, concentration, and slows down the information processing process. These cognitive changes make it more difficult for the elderly to remember, make decisions, and act quickly.

According to Meyer (2008) in (Andriani et al., 2021: 89-90) there are several factors that can affect cognitive function such as gender, education, and physical activity. Based on gender, women have a higher risk of cognitive decline than men. This is due to the role of estrogen levels in changes in cognitive function. Meanwhile, education can also affect cognitive function because the education a person receives can indirectly affect cognitive function. According to the theory of anatomical reorganization, continuous external stimuli will facilitate internal brain reorganization. Less educated groups are never better than Less educated groups are never better than more educated groups. In addition, physical activity can also affect cognitive function, where continuous physical activity can train brain capacity and help prevent cognitive decline.

Based on the research results and descriptions above, researchers argue that elderly people who have good cognitive function are mostly influenced by physical activities carried out daily. Meanwhile, elderly people who have poor cognitive function are caused by other factors that affect the cognitive function of the elderly, such as age, gender, educational history and others. Most respondents have good physical activity with good cognitive function as many as 21 elderly people (41.4%), good physical activity with poor cognitive function as many as 8 elderly people (15.7%), less physical activity with good cognitive function as many as 5 elderly people (9.8%) and less activity and poor cognitive function 17 elderly people (33.3%).

The chi-square test results conducted to examine the relationship between physical activity and cognitive function in the elderly revealed a p-value of 0.000, which is less than 0.05. This suggests that the null hypothesis (H0) is rejected, and the alternative hypothesis (H1) is accepted, confirming a significant association between physical activity and cognitive function in the elderly. This finding is consistent with the research by Ningrum et al. (2023) titled "Physical Activity Can Maintain Cognitive Function of the Elderly," conducted at the Polyclinic Elderly Garuda Health Center in Bandung City with 96 participants. Their study also found a significant correlation between physical activity and cognitive function, with a p-value of 0.000. The study further highlighted that elderly individuals with low physical activity are seven times more likely to experience cognitive dysfunction compared to those with higher levels of physical activity. Another study conducted by Noor & Merijanti (2020) entitled "The Relationship Between Physical Activity and Cognitive Function in the Elderly" which was conducted at the Posyandu Lansia X Jakarta with 57 respondents, showed that there was a significant relationship between physical activity and cognitive function in the elderly with (p = 0.000). Physical activity can affect cognitive function in the elderly. Elderly with regular to active physical activity have normal cognitive function values compared to elderly without physical activity or under-active groups. The results of the study showed that when someone reaches old age they tend to experience decreased cognitive, cardiovascular, musculoskeletal and other functions. Cognitive function decreases with age, which is caused by changes in brain structure, including decreased brain mass and blood flow to the brain. In addition, the elderly also experience a decline in musculoskeletal function which results in bone and muscle weakness. This is caused by reduced physical activity in the elderly, so that the majority of the elderly experience decreased physical abilities (Marpaung, 2023). This research aligns with the work of Patungo & Mingkid (2022) titled "The

Relationship between Physical Activity and Cognitive Function in the Elderly at the Papua Province Elderly Care Center." Their findings indicated that the majority of elderly individuals engage in minimal physical activity, largely due to a decline in physical abilities associated with aging. As people age, their physical capabilities naturally deteriorate, leading to more significant limitations. The study concluded that a significant relationship exists between physical activity and cognitive function in older adults, with a p-value of 0.003, which is less than 0.05. Similarly, a study by Nurwati et al. (2021) titled "The Relationship between Physical Activity and Cognitive Function in the Elderly in Cigugur Kidul Village, Pusakajaya District, Subang Regency" found a strong correlation between physical activity and cognitive function in older adults, with a p-value of 0.000, which is also less than 0.05. The study highlights that insufficient physical activity in the elderly can contribute to cognitive decline. Regular physical activity can have substantial positive effects on cognitive health, potentially preventing cognitive impairments and conditions like dementia. Furthermore, engaging in physical exercise stimulates the brain, boosting the production of Brain-Derived Neurotrophic Factor (BDNF), a protein essential for maintaining nerve cell health. A low level of BDNF is associated with dementia (Nurwati et al., 2021).

According to researchers, elderly individuals who maintain an active lifestyle tend to experience better cognitive functioning. This is because physical activity enhances blood flow to the brain, stimulating cognitive processes and potentially slowing cognitive decline.

CONCLUSIONS AND RECOMMENDATION

The findings from the statistical analysis indicate a significant correlation between physical activity and cognitive function among the elderly in the RW 12 area of Haur Cucuk Village, Sumbersari Village, with a p-value of 0.000, which is less than the 0.05 threshold. It is recommended that elderly individuals engage in regular physical activities suited to their physical capabilities, such as walking and other exercises. This physical activity can help maintain and improve cognitive function and other body health. This activity can be done routinely to support the physical and cognitive health of the elderly. In addition, health centers can provide counseling on the importance of physical activity for cognitive function, explain how exercise can help prevent cognitive decline such as dementia and also conduct routine cognitive function checks on the elderly to monitor their mental health and detect cognitive decline problems early.

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