



**PREVALENCE OF RISK FOR DEMENTIA AND IT'S RELATIONSHIP TO  
PHYSICAL ACTIVITY**

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## **ABSTRACT**

*As seen in the field, there are still many elderly who have dementia risk status. Recognizing the factors associated with dementia is the proper treatment to mitigate the likelihood of developing dementia, one of which is physical activity. The primary objective of this investigation is to establish a correlation between the extent of physical activity and the susceptibility to dementia within the premises of the Andalas PHC. The current investigation utilizes a cross-sectional design and employs purposive sampling to acquire a sample size of 104 individuals. Physical activity was measured using the GPAQ instrument, while determining dimensions used the MMSE instrument. The chi-square test was employed to analyze the data. The study's findings revealed a distribution pattern in the frequency of physical activity, with a majority (51%) engaging in moderate physical activity. Additionally, it was observed that a significant proportion (51.9%) of the elderly population exhibited symptoms of dementia. The results of statistical tests show that there is a relationship between physical activity levels and the risk of dementia. It is hoped that health workers at the PHC can provide education and motivation for the elderly to engage in physical activity so that the incidence of dementia can be reduced.*

*Keywords: Physical Activity Level, Risk of Dementia Incidence, Elderly*

## **ABSTRAK**

*Fenomena saat ini masih banyak lansia yang memiliki status risiko demensia. Banyak faktor-faktor yang berhubungan dengan demensia yang merupakan penanganan yang tepat untuk mengurangi kemungkinan terjadinya demensia, salah satunya adalah aktivitas fisik. Tujuan utama dari penelitian ini adalah untuk mengetahui hubungan antara tingkat aktivitas fisik dengan risiko kejadian demensia di wilayah kerja Puskesmas Andalas. Penelitian ini menggunakan desain cross-sectional dan menggunakan purposive sampling untuk mendapatkan jumlah sampel sebanyak 104 orang. Aktivitas fisik diukur dengan menggunakan instrumen GPAQ, sedangkan untuk menentukan demensia menggunakan instrumen MMSE. Uji chi-square digunakan untuk menganalisis data. Temuan penelitian menunjukkan pola distribusi frekuensi aktivitas fisik, lebih dari setengah (51%) melakukan aktivitas fisik sedang. Selain itu, ditemukan bahwa besar dari sebagian (51,9%) dari populasi lansia menunjukkan gejala demensia. Hasil uji statistik menunjukkan bahwa terdapat hubungan antara tingkat aktivitas fisik dan risiko demensia. Diharapkan petugas kesehatan di puskesmas dapat memberikan edukasi dan motivasi kepada lansia untuk melakukan aktivitas fisik agar kejadian demensia dapat berkurang.*

*Keywords: tingkat aktivitas fisik, risiko kejadian demensia, lansia*

## **INTRODUCTION**

The current global population is experiencing a significant shift towards an ageing population, with over 7% of individuals aged over 60 years (Kementerian Kesehatan RI, 2017). The 2019 World Population Prospect predicts that by 2050, 1 in 6 individuals worldwide will be over 65 years old, representing a substantial increase from 2019, when the ratio was 1 in 11 people. This trend is not limited to the global population, as the elderly population in Indonesia has doubled from 4.46% (13.41 million people) in 1971 to 9.92% (26.82 million people) in 2020. In 2020, six provinces in Indonesia had an ageing population structure, with the elderly population exceeding 10%. West Sumatra is one of these provinces, with an elderly population of 10.07% (Badan Pusat Statistik, 2020).

The increasing population ageing brings challenges in the health, social and economic fields. One of the challenges that arise is the problem of health and care for the elderly population. Approximately 48.14% of the elderly population in Indonesia encounter health issues encompassing both physical and psychological ailments. (Badan Pusat Statistik, 2020). More than 20% of the elderly suffer from psychological and neurological disorders that cause limited daily activities. The most common neuropsychiatric disorder is dementia (WHO, 2017).

Dementia is a gradual decrease in brain ability, especially cognition and memory, which interferes with daily activities (Marisza Cardoba Foundation, 2017). The number of older people with dementia

is increasing, and it is estimated that nearly 46.8 or 50 million people are diagnosed with dementia globally. Dementia cases in the Asia Pacific region are estimated to reach 20.9 million people. Every year, it is estimated that more than 10 million new cases of dementia are found. In addition, more than 5.5 million Americans, including approximately 5.3 million people 65 years of age and older, currently live with dementia (ATZI Center, 2019). Dementia cases in Indonesia in 2016 reached 1.2 million people. It is estimated that this will increase by two million people by 2030.

Brain cell damage leads to dementia, causing a decline in memory, advanced skills, emotional disturbances, and changes in daily behaviour (Pieter et al., 2011). Dementia can be identified by both cognitive and behavioural changes, with memory impairment, confusion, and personality changes being the most common symptoms (Albugami, 2018). Memory decline is the most common problem in the elderly. Some cognitive disorders often experienced by the elderly are memory forgetfulness, orientation disorders, and thinking and problem-solving disorders (Sihotang & Saragi, 2023). Older people with dementia also experience a wide range of emotions, including sadness, loss, anger, and disbelief. Moreover, their high level of dependence requires long-term care, which can be an economic burden for their families and reduce their quality of life (WHO, 2017). Unfortunately, the increase in dementia cases cannot be prevented as new and effective drugs to combat dementia are not available. However, physical activity is a recommended preventive measure against dementia (Gregory, Parker, & Thompson, 2012). Physical activity involves skeletal muscle movement, increasing energy and energy expenditure (Kemenkes, RI., 2017). Studies have shown that physical activity reduces the risk of dementia and promotes nerve growth, which can help prevent cognitive decline in older individuals. During physical activity, the brain is stimulated to produce Brain-Derived Neurotrophic Factor (BDNF), a protein that plays a crucial role in brain function. Physical activity is essential in protecting against cognitive decline and dementia through neuroplasticity processes (Panza, et al., al 2018). Neuroplasticity is a structural and functional change in the ability of the brain and nervous system due to environmental input (Said, Alamsyah., Dian, 2017). According to the findings presented in the Lancet series on Physical Activity, Progress, and Challenges, Sallis et al. (2016) and their research team have demonstrated that engaging in regular physical activity has the potential to avert approximately 300,000 instances of dementia annually on a global scale, provided individuals maintain an active lifestyle.

According to a study carried out by Cunningham et al. in 2020, engaging in regular physical exercise can significantly decrease the likelihood of dementia in healthy elderly individuals. The study discovered that an increase in the level of physical activity intensity was linked to a 28% reduction in the overall risk of dementia among the elderly population. In addition, moderate-intensity physical activity was found to reduce the risk of all types of dementia by 24%. The objective of the researchers is to investigate the association between the degree of physical activity and the danger of dementia in the elderly population who visit the Andalas Public Health Center in Padang City, based on these previous discoveries and theories.

## **METHODS**

In this study, a quantitative research methodology was employed with an analytical design and a cross-sectional approach. The individuals aged between 60 and 74 years, residing near the Andalas Public Health Center in Padang City, were the target population. Purposive sampling was used to select 104 participants, primarily older individuals. The research instrument used to measure the level of physical activity was the Global Physical Activity Questionnaire, which comprised 16 questions with three physical activity domains. The level of physical activity was calculated according to the GPAQ scoring protocol and expressed in MET-minutes/week units, with results classified into three categories: high activity, moderate physical activity, and low physical activity. The risk of dementia was assessed using the Mini-Mental State Examination questionnaire, which consisted of five

domains. The data analysis employed univariate and bivariate approaches, with univariate analysis presented using a frequency distribution table and bivariate analysis utilizing a cross table/Chi-Square test.

## RESULTS AND DISCUSSION

### Results

Based on Table 1, it can be seen that all (100%) respondents were aged 60-74 years. Most of the respondents (54.8%) were female. Most (69.2%) of respondents are not working, almost half (37.5%) of respondents have a high school education, and most (60.6%) of respondents are married.

Characteristics	<i>F</i>	%
Age	104	100
60-74 years old		
Gender		
Man	47	45,2
Woman	57	54,8
Work		
Work	32	30,8
Does not work	72	69,2
The educational journey		
Higher Education	14	13,5
high school	39	37,5
middle school	27	26,0
elementary school	24	23,1
Marital Status		
Marry	63	60,6
Widow widower	41	39,4

Table 1. Characteristics of Respondents

Table 2 shows that more than half of the elderly have moderate physical activity (51.0%), low physical activity level (43.3%), and only (5.8%) of respondents have high physical activity levels. Table 2 also shows that most (51.9%) of the elderly are at risk of developing dementia, and almost half (48.1%) have normal status. This indicates that most of the elderly in the Andalas Public Health Center work area, Padang City, have a risk of developing dementia, so they are at risk of showing moderate physical activity.

Category	<i>F</i>	%
Physical Activity Level:		
High	6	5,8%
Currently	53	51,0%
low	45	43,3%
Risk of Dementia Occurrence:		
Normal	50	48,1%
At risk of Dementia	54	51,9%

Table 2. Frequency Distribution of Elderly Physical Activity Levels

Table 3 shows that of the 53 respondents who have moderate physical activity levels, most (56.6%) do not have a dementia risk status or are normal. Then from 45 respondents with low physical activity, most (68.9%) had a dementia risk status. The analysis results showed that statistically, there was a significant relationship between the level of physical activity and the risk of dementia, with a p-value of 0.001.

Physical Activity Level	Risk of Dementia				Total		<i>p value</i>
	Normal		At risk of Dementia		<i>f</i>	<i>%</i>	
	<i>f</i>	<i>%</i>	<i>f</i>	<i>%</i>			
High	6	100	0	0%	6	100	0,001
Currently	30	56,6	23	43,4	53	100	
Low	14	31,1	31	68	45	100	

Table 3. Frequency distribution of the relationship between the level of physical activity and the risk of dementia

## Discussion

### Physical Activity

Based on the frequency distribution of physical activity levels, most (51.0%) of the elderly have moderate physical activity levels, and almost half (43.3%) have low physical activity levels. In research, almost all (92.3%) of the elderly perform moderate physical activities such as walking, lifting light weights, cleaning floors, planting plants, and swimming. According to the World Health Organization, this follows the recommendations for moderate activity types for the elderly.

The ability of the elderly to carry out daily physical activities depends on age, whereas as age increases, the ability to carry out physical activities decreases. Then, in work, some jobs involve heavier physical movements in men than women. In addition, most men have a hobby of sports. It is different with women who do many activities at home in this study. Although work or activities at home are counted as light activities, they can increase to moderate and heavy physical activity (Muzamil et al.)

This study also found that most (70.2%) of the elderly participated in moderate sports such as gymnastics, cycling, and brisk walking. Exercise benefits the physical elderly by increasing strength, balance, and flexibility (Dewi, 2014). The elderly who often do sports will affect their level of physical activity of the elderly.

The findings of the present investigation align with the research carried out by (Purnama, & Suhada 2019), indicating that 77.6% of the elderly engaged in moderate physical activity out of a sample of 58 older individuals. Similarly, the results of this study are consistent with the research conducted by (Sylvia, & Sutanto, 2017), which revealed that 71.4% of the elderly had moderate physical activity levels out of sample of 110 older adults. Furthermore, the study (Dese & Wibowo, 2019) also demonstrated that the majority (56.25%) of the elderly had moderate physical activity.

Any physical movement that requires energy and is generated by the skeletal muscles is referred to as physical activities. Sports, physical activities, and exercise that are done for fun, work, daily living, or active transportation are all included in physical activities. Exercise is a subset of physical activity that is repetitive, planned, and structured with the ultimate or intermediate goal of enhancing or maintaining physical fitness. The ability of an individual to carry out the physical tasks required for daily existence is known as physical function. Physical function reflects habitual PA, physical fitness, motor function and control (Langhammer, Bergland and Rydwick, 2018).

When a person remains inactive for a prolonged period, it can lead to a significant increase in the body's fat percentage and a decrease in lean body mass." this is in line with the findings of a study about the impact of step reduction on muscle health in ageing, stating that acute periods of physical inactivity lead to reductions in skeletal muscle size (Oikawa et al.,2019).

One of the most noticeable impacts of inactivity is the occurrence of skeletal muscle atrophy. Skeletal muscle adaptations with age, inactivity, and therapeutic exercise state that a consistent feature of age and inactivity is limb muscle atrophy and the loss of peak force and power (Distefano et al.,2018).

Engaging in regular physical activity is essential to maintain good health and prevent the onset of detrimental conditions like sarcopenia. The association of physical activity with sarcopenia was evaluated based on muscle mass and strength in older adults, emphasizing that adequate physical activity is essential for preventing sarcopenia in older adults (Seo, Lee.,2022).

### **Risk of Dementia**

Based on the study results, most (51.9%) of the elderly had a risk of dementia status, which amounted to 54 older people, and almost half (48.1%) had normal status, namely 50 older people. Of the five aspects of cognitive function, there are disturbances in three aspects, namely orientation, attention and calculation, and language. Judging from the orientation aspect, almost half (31.8%) of respondents could only answer below a score of eight, and a small portion (24%) of the elderly were able to answer all questions related to year, season, day, date, month, road, village, sub-district, city, and province. A small proportion (24%) were able to answer eight questions. This happens because the elderly have started forgetting the day, month, year, road, etc. This follows Untari's (2019) statement that one of the signs of dementia is subjective forgetfulness.

Based on attention and calculation, almost half (31.7%) of the elderly can only count backward three out of five numbers with a difference of seven. This is because the elderly have rarely done counting activities at home. Then, in addition to the aspects of orientation, attention, and calculation, half (51.0%) of the elderly have a seven out of 10 total scores on the language aspect.

This study found that the elderly with an age range of 60-74 years had a risk of developing dementia. Albugami (2018) says that dementia is usually found in those older than 65 years, but it does not rule out the occurrence of young-onset dementia (symptom onset before 65 years). In addition, if it is associated with gender, it turns out that there is a relationship between gender and the risk of dementia, where older women are at risk of dementia as much as 56.1%. Older men are at risk of dementia by 46.8%. This study is in line with research conducted by Sylvia (2017) on the elderly in "Cita Sehat Yogyakarta", with 110 elderly respondents. It was found that most (59.1%) of the elderly had cognitive impairment status (risk of dementia), and almost half (40, 9%) had normal status (no cognitive impairment).

Liao et al. (2023) stated that age affects the risk of dementia, in addition to contributing factors that occur at that age, such as early menopause. Someone who experiences early menopause. After adjusting for confounding factors, women with early menopause showed a higher risk of developing all-cause dementia compared to those aged  $\geq 50$  years.

In addition, work experience also affects the cognitive function of the elderly because it can help train the brain continuously so that cognitive function can remain sound and not decline, likewise with social interactions and nutritional status of the elderly. Good social interaction will support the elderly's emotions, which affects cognitive function. Then, regarding their nutritional status, the elderly must pay attention to the food consumed every day to decrease their cognitive function (Chung et al., 2015). The closest social interaction is with family or caregivers who provide support to meet the needs of the elderly. Rahmawati et al. (2023) explained that it takes caregivers from families who have good knowledge so that the risk of dementia can be reduced by caregivers' ability to detect early symptoms of dementia. In addition, the ability to detect symptoms of dementia by allowing activities beneficial to the elderly will reduce the negative symptoms of the impact of the elderly on themselves and others.

### **The Correlation between Physical Activity Levels and the Risk of Dementia in the Elderly**

The findings reveal that most elderly individuals in this area exhibit a moderate level of physical activity, accounting for 53 respondents. Among these respondents, the majority (56.6%) have a regular status, comprising 30 individuals, while nearly half (43.4%) are at risk of developing

dementia, totalling 23 individuals. Furthermore, the study demonstrates that approximately 43.3% of the respondents engage in low levels of physical activity, encompassing 45 individuals. Among these individuals, the majority (68.9%) are at risk of dementia, amounting to 31 respondents, while nearly half (31.1%) have a normal status. The bivariate data analysis, employing the chi-square test, reveals a statistically significant relationship between the level of physical activity and the risk of dementia in the elderly population within the Andalas Public Health Center work area, Padang City, in the year 2021, with a p-value of 0.001 ( $p < 0.05$ ). It is important to note that physical activity capacity in the elderly is closely linked to brain health and cognitive function. Engaging in physical activity offers numerous benefits, including enhanced brain function, increased capillary growth around neurons, improved oxygen and nutrient supply from the blood, and heightened synaptic density (Nelson, 2016). Moreover, physical activity is crucial in safeguarding against cognitive decline and dementia through neuroplasticity (Panza et al., 2018).

The World Health Organization (WHO) defines physical activity as any bodily movement produced by skeletal muscles that requires energy expenditure (World Health Organization, 2020). This includes movement during leisure time, for transport, or as part of a person's work. Both moderate and vigorous physical activity are beneficial for improving health. Popular ways to stay active include walking, cycling, sports, active recreation, and play, which can be enjoyed by people of all skill levels. Regular physical activity has been shown to reduce the risk of non-communicable diseases like heart disease, stroke, diabetes, and cancer. It can also help manage hypertension, maintain a healthy weight, and improve mental health, quality of life, and overall wellbeing (Stiexs et.al., 2023; Ruegsegger & Booth, 2018). The evidence supports the idea that physical activity is essential for promoting health and preventing various diseases because it is evident from the results of research by Kurnia et al. (2023) that physical condition factors are very influential on the quality of life of older people with dementia.

The findings of this investigation align with the outcomes of a study conducted by Polan (2018), which demonstrated a noteworthy correlation between the extent of physical activity and cognitive function, as evidenced by a p-value of 0.000. Additionally, these results are consistent with the research carried out by Lee (2018), which revealed a connection between physical activity and cognitive function, explicitly concerning dementia. Another study conducted by Lee (2018) indicated a p-value of 0.002 ( $< 0.005$ ), signifying a significant association between physical activity and the prevalence of dementia in Totaka Village, Ujung Tanah District, Makassar City. This investigation highlights the role of physical activity in cognitive function, as it aids in enhancing blood circulation to the brain facilitating the delivery of essential nutrients. Notably, the brain relies on nutrients, particularly oxygen and glucose, which serve as fuel to optimize its functionality.

In older individuals, there is a correlation between physical activity and the risk of developing dementia, as shown by this study. These findings can be implemented into nursing homes' routine activity programs. To prevent the onset of dementia, nurses can regularly provide the elderly with light physical activity. The results of this research align with the studies of Yoon et al. (2021) and Iso-Markku et. Al (2022), which also found a significant correlation between physical activity and dementia prevention. The physical activity provided to the elderly is adjusted according to their health condition. Furthermore, the results of this study can also be useful for nurses visiting families with elderly dementia.

This paragraph proposes that the elderly can benefit from the support of their families and nurses when increasing their physical activity. Research has shown that social support, particularly from family and nurses, can positively impact the physical activity levels of older adults. The research results by Sulfianti et al. (2023) show that social support provides physical and psychosocial comfort to the elderly. Sulfianti explained that social support can reduce anxiety in the elderly. The presence of the elderly in the family can support the elderly in carrying out their daily activities. For instance, one study published in the International Journal of Environmental Research and Public Health

discovered a significant correlation between social support specific to physical activity (SSPA) and the physical activity levels of individuals between the ages of 60 and 65, suggesting that SSPA could be used as a way to encourage physical activity among older adults (Tchounwou et al., 2023). The results of this study align with the statement of Kurnia et al. (2023), which supports the idea that social support is the only one that affects the incidence of dementia in the elderly.

Another study in the International Journal of Behavioral Nutrition and Physical Activity highlighted the strong connection between SSPA and physical activity, especially when it was provided by family members The Associa (Lindsay Smith et al., 2017). Additionally, a study in the Journal of the American Geriatrics Society emphasized the importance of nurses in promoting physical activity and function among older adults, noting that physical activity is a key part of care management for all older adults and that nurse practitioners play a vital role in monitoring and improving their physical activity levels and function. Overall, these findings support the idea that both families and nurses can play a valuable role in promoting physical activity among the elderly.

## **CONCLUSION AND SUGGESTIONS**

### **Conclusion**

Most of the elderly residing in the work area of the Andalas Public Health Center in Padang City exhibit a moderate level of physical activity. Additionally, a considerable number of these elderly individuals are susceptible to developing dementia. Upon analysis, a significant correlation has been observed between the level of physical activity and the risk of dementia among the elderly population in the Andalas Public Health Center, Padang City, in 2021.

To address this issue, it is recommended that the elderly population increase their frequency of physical activity and tailor it to their circumstances. By doing so, the physical activity levels of the elderly can be enhanced. Furthermore, it is advised that the elderly engage in continuous interaction and cognitive stimulation through both physical and cognitive activities in order to sharpen their cognitive function.

### **Suggestion**

For the Elderly, researchers suggest increasing the frequency of exercise in the elderly and adjusting it to the circumstances of each older person so that the elderly's activity increases. For Community Health Centers; researchers suggest carrying out health screening examinations for the elderly to determine what physical activities and sports suit them; it is recommended that community health centres provide education regarding preventing the risk of dementia in the elderly, especially by carrying out physical activities determined by the community health centre according to the condition of the elderly in the Andalas Health Center working area, Padang City and researchers recommend prioritizing and increasing physical activity that trains muscles and balance to avoid the risk of falls and injury in the elderly. Finally, for further research it is hoped that there will be research using different research designs and considering other factors that can influence the risk of dementia in the elderly.

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## Conflict of Interest

This study has no conflicts of interest.

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