

Is There a Relationship between Daily Exercise and the Risk of Dementia in the Elderly? A Cross-Sectional Study

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Abstract. Aging is often followed by health problems, such as the declining of cognitive function. Cognitive decline can lead to dementia which may interrupt to the elderly's daily activities. Therefore, it is important to understand the risk factors of dementia beforehand as to reduce the risk of it. This study aimed to discover the association between regular exercise and the risk of dementia on a group of older adults in East Jakarta. This study employed the secondary data with quantitative approach and cross-sectional study design. 106 respondents were selected for the study through inclusion and exclusion criteria. The instruments used was Hopkins Verbal Learning Test (HVLT) to measure the cognitive status of the respondents. All data were analyzed using Chi Square. It was later found that regular exercise (three times a week) did not have significant relationship to the risk of dementia on the elderly (p value = 0.138). However, it was also found that there was a statistically significant relationship between age factor and the risk of dementia (p value = 0.014). Even though the regular exercise is proven to be not having significant relationship to the risk of dementia, having regular exercise is still considered to be good, and may be able to reduce the risk of dementia, if it was combined with other activities such as cognitive stimulation and social activities.

Keywords: dementia prevention, elderly, physical exercise, risk of dementia

Introduction

According to Indonesian constitution No 13 Year 1998 on Elderly, older adults are a certain group of people aged 60 or more. There are approximately about 727 million of older adults within the year of 2020 (UN, 2020). The number projection may double up to 1.5 billion in 2050. Meanwhile, the total lifespan of the elderly around the globe has been increasing from 68.8 years (2015) to 76.2 (2050). The average population of a global older adults aged 80 is projected to rise three times from 126,5 million to 446,6 million. Meanwhile in Indonesia, the number of elderly populations will increase by 15.77% or 42.2 million in 2035 (BAPPENAS, 2013).

The occurring problem within the elderly population can be various, one of it is cognitive impairment. The sign of cognitive impairment can be noticed by individual's cognitive decline, ranging from communication disorder, memory loss, concentration difficulties, and inability to perform daily tasks (Muzamil, Afriwardi & Martini, 2014). Moreover, the early stage of cognitive impairment can be marked with forgetfulness. In Indonesia, the number older adult's population aged more than 60 are 7% of the total population. It is later be projected that among the 7%, there will be about 3% of the elderly population who will experience forgetfulness. Forgetfulness can progress to mild cognitive impairment to dementia, the most severe clinical form of intellectual and progressive decline that interferes social, work, and daily activities (WHO, 2019).

Dementia is a syndrome characterized by progressive cognitive decline in intellectual abilities that causes functional and cognitive deterioration, resulting to social, work, and daily activities interferences (Sancho et al. 2016; Ong et al. 2015). The prevalence of dementia is

increasing rapidly every year. The World Health Organization estimates that more than 55 million elderly people worldwide suffer from dementia (WHO, 2019). Among 55 million elderly, 20.9 million are from the Asia Pacific region, and there are about 10 million new cases of dementia each year (Alzheimer's Association, 2017). The Association of Alzheimer's Disease International (ADI) has determined that Indonesia is included in the top 10 countries with the highest number of people with dementia in Southeast Asia and even in the world. Moreover, it is estimated that 1.2 million people suffer from dementia in 2016, and the number will increase to 2 million in 2030 and 4 million in 2050 (ADI, 2019).

There are some of the risk factors associated to dementia, such as physical activity, cognitive activity, age, gender, education level, heritability, and medical history (hypertension, and diabetes mellitus) (Kemenkes, 2017). Regular exercise has been shown to reduce the risk of dementia by up to 50%, including Alzheimer's disease. High intensity of regular and continuous exercise are associated with high cognitive function scores. Meanwhile, reducing the intensity and duration of exercise can accelerate the cognitive decline. Activities that can be categorized as cognitive stimulus, are playing tennis, walking, cycling, or daily chores. According to Effendi, Mardijana, and Dewi (2014), there was a significant relationship between physical activity and dementia. The elderly who were more active tend to get less exposure to cognitive decline.

The increasing prevalence of dementia has become a challenge for health care providers, especially in Indonesia. The elderly with dementia tend to be exposed to fatal consequences, yet they have to carry out daily activities in order to fulfil their needs (Suardiman, 2011). However, the elderly whose condition has completely been compromised by dementia, will inevitably need a caregiver to provide attention and comfort in order to fulfil their daily needs, to improve their health, and mental status until their time has come (Bandiyah, 2009). However, there was something concerning regarding to the caregiver understanding on the elderly. Chiquita and Krisnatuti (2017) stated that 51 out of 100 caregivers (52%) had inadequate knowledge about elderly care.

Currently, a lot of countries in the world, including Indonesia, are experiencing the COVID-19 pandemic which forces the elderly to isolate themselves in their houses limiting their activities since the elderly are vulnerable group that are very likely to get exposed to corona virus infection. The current situation may put the elderly into a concerning impact, such as cognitive function decline. Moreover, the area of East Jakarta has a fairly high prevalence of the elderly, in which there are around 560 thousand elderly whose daily activities are being limited due to the pandemic. This situation has triggered the researchers to know more about the relationship between physical activity and the risk of dementia in the elderly in East Jakarta. Hopefully, through this research, the risk of dementia can be reduced effectively to optimize the elderly's life.

Methodology

This study used a quantitative descriptive method with a cross-sectional design. The data used the secondary data from the research conducted by Maryam and Sahar (2019). The population in this study was the family who took care of their elderly (60 years old to above), who had met the inclusion and exclusion criteria, residing in the East Jakarta Region, The sample was selected using the total sampling method resulted in 106 respondents who were willingly to participate in the study.

Ethical Consideration

Ethical considerations were carried out by researchers in regard to respect the respondents' privacy through anonymity, respondents' autonomy through voluntary participation and informed consent, and confidentiality as their data remained used only

within the study. The ethical clearance was issued by the ethics committee of Poltekkes Kemenkes III Jakarta Number: LB.02.02/KEPK/030/2020.

Results

Table 1. The Distribution of Age, Gender, Marital Status, Employment Status, BADL, IADL, Physical Exercise, and Social Activities Frequencies of the Respondents (N=106)

Characteristics	Frequency (F)	Percentage (%)
<i>Age</i>		
60 – 69	74	69.8
≥ 70	32	30.2
<i>Gender</i>		
Male	44	41.5
Female	62	58.5
<i>Marital status</i>		
Married	57	53.8
Widow	39	36.8
Widower	9	8.5
Not married	1	0.9
<i>Employment Status</i>		
Full-time	7	6.6
Contract	18	17.0
Unemployed	81	76.4
<i>BADL</i>		
Independent	71	67.0
Dependent	35	30.0
<i>IADL</i>		
Independent	53	50.0
Dependent	53	50.0
<i>Participation in Social Activities</i>		
Actively participating	74	69.8
Remained inactive	32	30.2
Amount	106	100

Table 2. The Distribution of Cognitive Function Status on the Elderly in East Jakarta Region

Cognitive Status (HVLIT)	Frequency (F)	Percentage (%)
Normal	62	58.5
Risk of dementia	44	41.5
Amount	106	100

Table 3. The Mean Differences of Age, Gender, Marital Status, Employment Status, BADL, IADL, Physical Exercise, and Social Activities with Cognitive Function Status of the Respondents (N=106)

Variable(s)		Cognitive Status				Total		P
		Normal		Risk of dementia		F	%	
		F	%	F	%			
Age	60 – 69	49	66.2	25	33.8	74	100	0.014
	≥70	13	40.6	19	59.4	32	100	
Gender	Male	27	61.4	17	38.6	44	100	0.613
	Female	35	56.5	27	43.5	62	100	
Marital status	Married	38	66.7	19	33.3	57	100	0.141
	Widow	20	51.3	19	48.7	39	100	
	Widower	3	33.3	6	66.7	9	100	
	Not married	1	100.0	0	0.0	1	100	
Employment Status	Full-time	4	57.1	3	42.9	7	100	0.714
	Contract	9	50.0	9	50.0	18	100	
	Unemployed	49	60.5	32	39.5	81	100	
BADL	Independent	45	63.4	26	36.6	71	100	0.146
	Dependent	17	48.6	18	51.4	35	100	
IADL	Independent	35	66.0	18	34.0	53	100	0.115
	Dependent	27	50.9	26	49.1	53	100	
Social Activities	Active	47	63.5	27	36.5	74	100	0.110
	Inactive	15	46.9	17	53.1	32	100	
Physical Exercise	Regularly	14	73.7	5	26.3	19	100	0.138
	Irregular	48	55.2	39	44.8	87	100	
Amount						106	100	

Discussion

Table 3 shows that there is statistical significance between variable age with cognitive status, in which the p-value is $0.014 < 0.05$ meaning the respondents who are over 70 are at risk of suffer from dementia compared to those aged between 60-69. Accordingly, similar results had been shown by Uliyah, Aisyah & Rahmina (2015) stating a significant relationship between age and memory loss or dementia within the elderly while the respondents' aged between 60-74 had a small chance of having the risk of dementia with p-value $0.028 < 0.05$. Study with same results, such as Deharnita, Syahrurn and Dahlia (2016) research, also shows that the correlation test results demonstrate a significant relationship between age and cognitive function in the elderly with p-value $0.004 < 0.05$. Moreover, Purwaningsih (2017) stated that the aging process cannot be separated from cell theory, aging, or dead cells in which it is related to the nucleotide structure at the ends of chromosomes within the nucleus of eukaryotic cells called telomeres. The number of dead cells within the organs will continually increase as people experience aging, affecting to the organs' function, in this case, brain will eventually lose its function and potential which gradually lead to dementia.

However, the study also shows insignificant relationship between gender and cognitive status which can be interpreted as gender does not correlate to the risk of dementia. Similarly, study by Rasyid, Syafrita & Sastri (2017) showed that there was not significant relationship between gender and cognitive function in the elderly. Mardiyanto, Jahja & Limyati (2017) also proved the same results, in which the correlation test showed no significant relationship between gender and cognitive function with p-value $0.343 > 0.05$. Although, the possibility of variable gender being one of the risk factors of dementia cannot be tossed off as there are

also studies shown the opposite results. A study conducted by Yaffe et al. (2007), showed that the relationship between estradiol and cognitive decline in women was stronger than men. Women seem to be more at risk of cognitive decline due to the role of endogenous sex hormone levels, namely estrogen, playing its role in cognitive function changes. In this case, women are likely to develop dementia due to hormonal changes. The difference between the results of this study and previous findings is due to the larger number of samples.

Marital status also seemed to be not having significant correlation with cognitive status in the study. The results of this study are supported by research conducted by Wahid and Sudarma (2018) which shows that there is no relationship between marital status and cognitive function in the elderly. The results of this study are also supported by research conducted by Silalahi, Hastono & Kridawati (2017), which shows that there is no relationship between marital status and cognitive function in the elderly. This is in accordance with Hakansson et al. (2009) research, which states that the elderly who are married experience a slight decline in cognitive function compared to those who are widow/widower for more than 5 years resulting greater risk of cognitive decline. Having a partner or spouse will add a support system in life which can maintain a good stimulation to brain.

BADL and IADL also show to have no significant relationship cognitive status for the study. This is in accordance with research conducted by Maryam, Hartini & Sumijatun (2016) stating that the independent elderly is able to perform basic activities (BADL) including taking a bath/shower, eating, defecating, moving, using toilet, and changing clothes. This is also in line with research conducted by Ikeda et al.(2019) revealed that with subjective memory complaints can reduce the ability of the elderly to carry out the IADL shopping process,cook, take care of the house, manage finance, and managing drugs. Besides that, the elderly with subjective memory complaints also has a low degree of independence in many processes that require use of tools, operation of machines,goods management, tool selection, and IADL performance monitoring.

The study also shows that regular physical exercise does not have any correlation with the cognitive status. The results of this study are supported by research conducted by Wicaksono and Safei (2020), which states that the results of the correlation test have no significant relationship between exercise and cognitive function with a p-value of $0.153 > 0.05$. There is a relationship between the level of physical fitness and the status of cognitive function in the elderly (Rasni, Susumaningrum & Farisi, 2019). Meanwhile, Lestari (2019) states that exercise, such as walking, can prevent memory loss in the elderly, and can increase blood flow to the brain which stimulates energy and increase oxygen for it. Another benefit of walking exercise in the elderly, such as a maintaining the physical strength, decreasing the risk of various diseases, and stabilizing mental conditions.

Conclusion and Recommendations

It is found that gender, marital status, BADL, IADL, social activities, physical exercise do not have significant relationship with cognitive status in the elderly. However, the variable age is statistically significant to the cognitive status in the elderly aged 70. It is expected that the study can improve health services aimed for the elderly group to prevent the risk of dementia. Activities that can be conducted besides exercises are BADL and IADL activities, social activity, and cognitive stimulation such as crossword puzzles, gardening, singing, recreation, etc. as well as having to socialize with existing application, such as whatsapp, video call, email, etc.

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