

Early detection and determinants of dementia in the working area of Mojolangu Public Health Center, Malang (Indonesia)

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Abstract

Lack of public awareness about the symptoms of dementia and the absence of dementia screening can lead to delays in diagnosis. This study was aimed to determine the prevalence and determinants of dementia in the working area of Mojolangu Public Health Center Malang. This cross-sectional study was conducted in January-March 2020. A total of 84 respondents aged ≥ 45 years old who registered at the Integrated Health Service Post for the Elderly were selected using the proportionate stratified random sampling method. Dementia was assessed by using The Mini-Mental State Examination (MMSE). Multiple logistic regression analysis was used to determine the determinants of dementia. The prevalence of dementia from mild to severe was found to be 69%. Sex, smoking behavior, and education level had a significant relationship with dementia. Therefore, it is necessary to carry out early detection of dementia to the public. People can be encouraged to stop smoking and optimize various activities that can hone cognitive functions, such as reading, discussing, doing hobbies to prevent early dementia.

Introduction

Globally, the elderly population continues to increase. The proportion of the population aged over 60 years will reach 22% in 2050, almost double compared to 2015.¹ Indonesia is one of the countries with an aging population structure. The elderly population in Indonesia is more than 7% of the total population.² The elderly population is estimated to reach 20% of Indonesia's population in 2045, which is around 63.31 mil-

lion.³ DI Yogyakarta (13.81%), Central Java (12.59%), and East Java (12.52%) are three provinces with the largest elderly population.²

The elderly are faced with various risks of health problems due to the decline in their physical, cognitive, and mental functions. One of them is dementia which is the major cause of disability and dependency in the elderly.⁴ Every three seconds, there will be a new case of dementia, and it is estimated to be 152 million cases in 2050.⁵ The burden of dementia in Indonesia also shows an increase. By 2050, the number of people living with dementia in Indonesia is estimated at 4 million.⁶ Dementia not only has significant implications on the sufferer's life but also for the family.⁴ People that living with dementia is unable to carry out their activities optimally. The burden of care costs that must be incurred is also quite much.⁷ Dementia cases are described as an iceberg. Many people do not report their condition because they do not know that dementia is a disease. The lack of awareness of the symptoms and signs of dementia impacts the number of undiagnosed and unreported cases.⁴ Early diagnosis is an effort that should be optimized for primary health services to improve dementia case management.

Prior studies showed that determinants of dementia include modifiable factors and nonmodifiable factors such as age, gender, education, physical activity, smoking, and hypertension.⁸⁻¹¹ The risk of dementia increases with age, especially people over 65 years old.^{10,12} Females have a twofold risk of getting dementia than males.¹² Lower education level and physical activity have a significant association with the risk of dementia among the elderly.^{9,12,13} Being a smoker and having hypertension also increased the risk of dementia.¹⁴

Lowokwaru District is an area that has the highest prevalence of people indicated for dementia in Malang City.¹⁵ Early detection of dementia carried out by primary health care is also still limited. Most previous studies have only identified the prevalence of dementia and its related factors among adults aged 60 years old and above.^{11,12} Currently, there are still limited studies that assess the emerge of dementia symptoms in younger adults, especially in Indonesia. Early detection of dementia is very useful for optimizing case management and improving their quality of life. Therefore, this study was conducted to identify the prevalence of dementia among younger adults and its determinants so we can detect dementia early and prevent the occurrence of dementia in the community.

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Materials and Methods

The cross-sectional study was conducted in the working area of Mojolangu Public Health Center, Lowokwaru District, Malang City, between January-March 2020. The population of this study was all residents aged ≥ 45 years old registered at the Integrated Health Service Post for the Elderly (673 people). As many as 84 older adults were selected using a proportionate stratified random sampling technique, generated from sample size calculation for comparing two population proportions.¹⁶ The number of samples was proportional to the number of elderly that were registered at

the Integrated Health Service Post for the Elderly in each village, namely Mojolangu, Tasikmadu, Tunjung sekar, and Tunggulwulung village.

The dependent variable in this study was dementia. It was assessed using the Mini-Mental State Examination (MMSE). The 11-items of MMSE measured the respondent's cognitive function, including orientation to time and place, attention and calculation, memory, registration, language, and ability to draw.¹⁷ MMSE is an instrument that has been widely used to detect a decline in cognitive function that is a part of dementia with high reliability and validity.^{17,18} The sensitivity and specificity of MMSE in detecting dementia in the general population was more than 85%.^{17,18} A respondent who had a score lower than 24 was indicated dementia.¹⁷

Sex (male and female), level of education, age group, physical activity, hypertension status, and smoking behavior were independent variables. The level of education was determined by asking respondents about the highest level of education that had been completed.¹⁹ The level of education was classified into low (no education and primary school), medium (secondary school), and high education level (university or college).¹⁹ The age of respondents was calculated based on the last birthday, then classified into 45-54 years old, 55-64 years old, and > 65 years old.

Physical activity was measured by using the International Physical Activity Questionnaire (IPAQ). Respondents were asked about their physical activities in the last 7 days.^{20,21} It was categorized into low, moderate, and high.^{20,21}

Hypertension status was determined based on the respondent's blood pressure measurement record that was available at the Integrated Health Service Post for the Elderly. Respondents were defined as having hypertension if they had the systolic ≥ 140 mmHg and or the diastolic ≥ 90 mmHg.^{22,23}

Smoking behavior was measured by asking respondents whether they smoked or not. If they were active smokers, they were also asked to state the average number of cigarettes consumed during the day. Respondents were classified as light to moderate smokers if they smoked on average less than 20 cigarettes per day and as heavy smokers if they smoke ≥ 20 cigarettes per day.²⁴

Descriptive analysis was used to describe the frequency distribution of the variables studied. Chi-square with a degree of significance ($\alpha=5\%$) and multiple logistic regression were used to assess the association between independent variables and

dependent variable. This study passed the approval of the Health Research Ethical Commission of Universitas Muhammadiyah Malang No. E.5.a/012/KEPK-UMM/II/2020.

Results

Of the 84 respondents who participated in this study, most of them were male (59.5%), had lower education levels (54.8%), and were aged 55-64 years (53.8%). Based on the level of physical activity, as many as 36.9% of respondents had moderate physical activity, while respondents who were classified as having less physical activity were 27.4%. The majority of respondents (72.6%) had hypertension. More than half of the total respondents were smokers (51.2%) consisting of light-to-moderate smokers (40.5%) and heavy smokers (10.7%). Screening results found that more than half of the total respondents had dementia (69.0%) (Table 1).

The results of bivariate and multiple logistic regression analysis were shown in Table 2. Only education level had a significant association with dementia in bivariate analysis (p -value 0.015). After controlling with other covariates in multiple logistic regression, sex, education level, and smoking behavior remained in the final model as determinants of dementia. Elderly women had higher odds of suffering dementia than

elderly men (AOR=8.10; 95% 1.21–54.2). Respondents with low education had 12.02 times higher odds of suffering dementia than respondents with high education (AOR=12.02; 95% CI 1.95–73.88). Respondents with middle education had 8.21 times higher odds of developing dementia than high educated respondents (AOR=8.21; 95% CI 1.34–50.26). Become a smoker, whether light to heavy smoker, increased the odds of suffering dementia.

Discussion

This study found that more than half of the respondents were indicated dementia. This finding was higher than studies conducted in Yogyakarta and India.^{11,25} The screening method might be contributed to this different finding. This study used MMSE to assess the presence of cognitive impairments to indicate dementia. A prior study in Yogyakarta used a combination of three screening tools, such as MMSE, Instrumental Activities of Daily Living Scale (IADL), and AD8 to determine dementia.¹¹ While, a study in India measured the presence of dementia by using MMSE and validated further based on diagnosis according to DSM IV criteria.²⁵

Determinants of dementia that were identified in multivariate analysis by this study were sex, education level, and smoking. Our study reported that females had

Table 1. Characteristics of respondents (n=84).

Characteristics	No	%
Sex		
Male	50	59.5
Female	34	40.5
Level of education		
Low	46	54.8
Medium	29	34.5
High	9	10.7
Age group (years)		
45-54	27	32.1
55-64	49	58.3
≥ 65	8	9.5
Physical activity		
Low	23	27.4
Moderate	31	36.9
High	30	35.7
Hypertension		
No	23	27.4
Yes	61	72.6
Smoking behavior		
Non-smoker	41	48.8
Light to moderate smoker	34	40.5
Heavy smoker	9	10.7
Dementia		
No	26	31.0
Dementia	58	69.0

higher odds of living with dementia than males. This finding was in line with study conducted in Padang, Manado, Yogyakarta, and Vietnam.^{8,11,12} Generally, women reached menopause between the age of 45 to 55 years old with the median around the age of 52 years old.²⁶ During menopause, the level of estrogen decreased. This condition might play a role in increasing the risk of developing dementia.¹¹ Low estrogen level was associated with decreased brain bioenergetics. It might lead to an increased risk of dementia. Moreover, women had a longer life expectancy than men. They also often experienced inequality for accessing the resources needed to improve their health.

Education level was significantly associated with dementia. People with low and middle education levels had higher odds of living with dementia than high-educated people. This finding was consistent with other studies.^{11,12} The likelihood of dementia among people who had completed more than 12 years of school was between 0.01 – 0.03 times compared to those who had not attended formal education.^{11,12} Education can affect the brain structure by increasing synapses or vascularity and creating cognitive reserves.²⁷ A high-educated person had many synapses in the brain. The more synapses connect between nerve cells, the greater ability to receive, process, store, and respond to stimuli.²⁸ If the synapse was damaged due to Alzheimer's disease, it could be replaced by other synapses.⁹

Smoking behavior was also found to

remain in the final model of multivariate analysis as a determinant of dementia. Being a smoker, both light to moderate and heavy smoker, increased the risk of dementia. Smoking could increase the amount of plasma homocysteine, as well as risk factors for stroke, cognitive impairment, Alzheimer's, and other types of dementia.¹⁴ Smoking also accelerated oxidative stress that increased the risk of dementia.^{14,29} Oxidative stress led to senile plaque and neurofibrillary tangles formation that indicated the presence of dementia.²⁹

This study did not find a significant relationship between age, hypertension, and physical activity with dementia. A study conducted in Surakarta found that age was not associated with dementia.³⁰ Although age was known to be the strongest risk for dementia, dementia was not an unavoidable consequence of aging. Dementia could be experienced by younger age groups called young-onset dementia.^{4,30} A study conducted in Yogyakarta reported that hypertension did not have a significant association with dementia.¹¹ In brief, this study showed that early detection in younger adults aged 45 years and over could provide an overview of the risk of young-onset dementia in the community. It could be beneficial for better case management and prevention strategies.

Conclusions

This study gave a piece of evidence that the proportion of dementia among respon-

dents was high enough. Dementia was associated with sex, smoking behavior, and education level. Being a woman, a smoker, and having a lower education level increased the risk of suffering dementia. This study suggests carrying out early detection of dementia to the public. People can be encouraged to stop smoking and optimize various activities that can hone cognitive functions, such as reading, discussing, doing hobbies to prevent early dementia.

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Table 2. Determinants of dementia.

Variable	Bivariate		Multivariate	
	OR (95% CI)	p-value	AOR (95% CI)	p-value
Sex		0.146		0.031*
Male	Ref		Ref	
Female	2.36 (0.86 – 6.48)		8.10 (1.21 – 54.2)	
Educational level		0.015*		0.027*
Low	12.60 (2.26 – 70.41)		12.01 (1.95 – 73.88)	
Middle	7.78 (1.34 – 45.09)		8.21 (1.34 – 50.26)	
High	Ref		Ref	
Age group (years)		0.586		
45-54	Ref			
55-64	1.63 (0.60 – 4.46)			
≥ 65	0.98 (0.19 – 5.01)			
Physical activity		0.186		
Low	2.75 (0.81 – 9.38)			
Moderate	2.20 (0.75 – 6.48)			
High	Ref			
Hypertension		0.555		
No	Ref			
Yes	0.724 (0.247 – 2.12)			
Smoking behavior		0.716		0.114
Non-smoker	Ref		Ref	
Light to moderate smoker	0.76 (0.29 – 2.01)		5.92 (0.91 -38.4)	
Heavy smoker	1.49 (0.26 – 8.00)		10.51 (0.95- 116.65)	

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