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Determining factors of dementia in elderly individuals residing in the special capital region of Jakarta☆

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Abstract
Objective: Dementia is one of the major causes of disability and dependency in elderly individuals around the world, affecting their physical, psychological, social, and economic well-being as well as that of their caretakers and families. Early understanding of the risk factors of dementia is crucial to preventing the disease. This study aimed to identify the factors influencing the incidence of dementia.
Method: This study was a non-experimental research study with a cross-sectional approach. The population consisted of elderly individuals within the special capital region of Jakarta, and a sample of 106 subjects was acquired through multistage random sampling.
Result: A meaningful correlation was found between age, Instrumental Activity Daily Living, and a history of high cholesterol with the incidence of dementia ($p = 0.039$, $p = 0.041$, and $p = 0.042$). The history of high cholesterol was the most significant risk factor ($p = 0.042$ and odds ratio = 3.2).
Conclusion: A history of high cholesterol is a major risk factor for dementia. Thus, elderly individuals could enhance their quality of life by reducing their intake of high cholesterol foods, having regular cholesterol screenings, and doing physical exercise.

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Introduction

The incidence of dementia in the world is increasing, with the disease currently affecting around 40 million people (6.9%). Dementia affects a higher proportion of individuals between 55 and 64 years of age (7.9%), and the prevalence increases to more than one in ten for individuals over 65 years of age (12.3%). Moreover, risk is doubling every five years. Importantly, elderly individuals over 85 years of age have a 50% greater chance of suffering from dementia.[1]

The estimated number of Alzheimer's sufferers in Indonesia in 2013 was approximately one million. This number is predicted to double by 2030, and it may be as high as four million in 2050.[2] The increasing number of dementia cases is a major challenge for health workers, as dementia affects the physiological, mental, social, and economic well-being of elderly individuals while also impacting their caretakers, families, and social environments.

Elderly individuals are a vulnerable group within society since they are exposed to many risk factors, such as economic, social, physiological, biological, genetic, and lifestyle factors. The factors related to vulnerability include low social status, unhealthy lifestyle, low self-esteem, and self-care inability and incompetence. Meanwhile, environmental, intake nutritional, and sociocultural factors predispose the elderly to health problems.[3] Therefore, understanding the risk factors for dementia is crucial to preventing and treating dementia.

Method

This study was a non-experiment research study with a cross-sectional approach. The population consisted of elderly individuals within the special capital region of Jakarta, and a sample of 106 subjects was acquired through multistage random sampling. Data were collected through a questionnaire related to the elderly individuals' characteristics, including age, sex, educational background, cholesterol ratio, history of diabetes mellitus (DM), body mass index, daily activities, daily physical exercise, social activity involvement, smoking habit, cholesterol check, blood glucose check, and blood pressure check. The Geriatric Depression Scale questionnaire was used to measure the respondents' level of depression. In addition, the Hopkins Verbal Learning Test (HVLT) questionnaire was used to measure the risk of dementia.

Results

A total of 106 elderly individuals who reside with their families participated in this research. Their characteristics are described in detail in Table 1. Most of the individuals were above 66 years of age (56.6%), female (58.5%), poorly educated, with only an elementary school education (77.4%), not doing routine physical exercise (82.1%), still dependent on doing daily activities based on the Instrumental Activity Daily Living (IADL) instrument (50.9%), and had a high of blood cholesterol check (74.5%).

Most of the elderly respondents could perform daily activities autonomously (70.8%), such as eating, taking a

Table 1 Distribution of elderly individuals' characteristics in the special capital region of Jakarta in 2018.

Characteristic(s)	Frequency ($N = 106$)	Percentage (%)
Age		
60–65 years old	46	43.4
≥66 years old	60	56.6
Sex		
Male	44	41.5
Female	62	58.5
Educational background		
Poor	82	77.4
High	24	22.6
Basic Activity Daily Living (BADL)		
Partially dependent	19	17.9
Fully dependent	12	11.3
Autonomous	75	70.8
History of high cholesterol		
High	24	22.6
Low	82	77.4
History of diabetes mellitus		
Yes	20	18.9
No	86	81.1
Social activity involvement		
Yes	74	69.8
No	32	30.2
Physical exercise		
Yes	19	17.9
No	87	82.1
Smoking habit		
Yes	19	17.9
No	87	82.1
Body mass index		
Underweight	15	14.2
Normal	54	50.9
Overweight	37	34.9
Depression level		
Normal	67	63.2
Mild	30	28.3
Severe	9	8.5
IADL		
Autonomous	52	49.1
Dependent	54	50.9
Blood cholesterol check		
Normal	27	25.5
High	79	74.5
Blood glucose check		
Normal	87	82.1
Diabetes mellitus (DM)	19	17.9
Blood pressure check		
Normal	74	69.8
High	32	30.2

Table 2 Distribution of the incidence of dementia in elderly individuals in the special capital region of Jakarta in 2018 ($N = 106$).

Dementia	Frequency	Percentage (%)
Yes	44	41.5
No	62	58.5

shower, secretion, and getting dressed. Table 1 also shows that most of the elderly individuals were still involved in social activities, such as recitation in their community (69.8%). A total of 18.9% of the elderly individuals had a history of diabetes mellitus, 34.9% were overweight, 17.9% had a smoking habit, 30.2% had high blood pressure, and 8.5% suffered from depression. These issues require vigilance on the part of the families and caretakers.

A translated Hopkins Verbal Learning Test (HVLT) was used to identify dementia.[4] The results (Table 2) indicated that 41.5% of the elderly individuals in Jakarta were suffering from dementia.

As can be seen in Table 3, individuals over 66 years of age were most likely to have dementia (51.7%) compared to individuals 60–65 years of age (28.3%). The statistical test revealed a meaningful correlation between age and dementia ($p = 0.026$). Based on the odds ratio values, it can be concluded that individuals ≥66 years of age have a 2.7-fold greater chance of having dementia than individuals aged between 60 and 65 years.

A greater number of elderly females (49.1%) than elderly males (40.9%) suffered from dementia. However, this result was not statistically significant ($p = 1.000$), which means that there was no meaningful correlation between sex and dementia. Meanwhile, the odds ratio values indicate that elderly females had a higher chance of suffering from dementia than elderly males.

The correlation analysis between educational background and dementia shows that the elderly individuals with poor education were more likely to suffer from dementia (45.1%) than those who were well-educated (29.2%), although this result was not statistically significant ($p = 0.246$). Based on the odds ratio, however, it can be concluded that elderly individuals who are poorly educated have twice the chance of getting dementia compared to well-educated elderly individuals.

Elderly individuals with a history of high cholesterol were more likely to have dementia (50%) than those who did not (39%). However, the results were not statistically significant ($p = 0.469$). Conversely, the odds ratio values indicate that the elderly individuals with a history of high cholesterol were 1.5 times more likely to have dementia compared to those who did not have a history of high cholesterol.

Table 4 shows that elderly individuals who did not routinely exercise three times per week were more likely to get dementia (44.8%) than those who exercised routinely (26.3%). However, this result was not statistically significant ($p = 0.220$). Meanwhile, based on the odds ratio, it can be concluded that elderly individuals who do not exercise regularly three times a week have a 2.3-times greater chance of suffering from dementia than their peers who exercise regularly.

Elderly individuals who smoked suffered more from dementia (47.4%) than non-smokers (40.2%), although the result was not statistically significant ($p = 0.753$). Based on the odds ratio, it can be concluded that elderly individuals who smoke have a 1.3-times greater chance of experiencing dementia.

Table 3 Correlation between elderly individuals' characteristics and the incidence of dementia of Jakarta in 2018 ($N = 106$).

Variable(s)	Dementia				Total		*p*-Value	Odds ratio (95% CI)
	Yes		No					
	N	%	*N*	%	*N*	%		
Age								
60–65 years old	13	28.3	33	71.7	46	100	0.026	2.714(1.198–6.146)
≥66 y.o.	31	51.7	29	48.3	60	100		
Sex								
Male	18	40.9	26	59.1	44	100	1.000	1.043(0.476–2.286)
Female	26	41.9	36	58.1	62	100		
Educational background								
Poor	37	45.1	45	54.9	82	100	0.246	1.997(0.748–5.330)
High	7	29.2	17	70.8	24	100		
BADL								
Partially dependent	12	63.2	7	36.8	19	100	0.072	–
Fully dependent	3	25.0	9	75.0	12	100		
Autonomous	29	38.7	46	61.3	75	100		
History of high cholesterol								
Yes	12	50.0	12	50.0	24	100	0.469	1.563(0.626–3.901)
No	32	39.0	50	61.0	82	100		

Table 4 Correlation of elderly individuals' characteristics with dementia of Jakarta in 2018 ($N = 106$).

Variable(s)	Dementia				Total		*p*-Value	Odds ratio (95% CI)
	Yes		No					
	N	%	*N*	%	*N*	%		
History of DM								
No	7	35.0	13	65.0	20	100	0.686	0.713 (0.259–1.964)
Yes	37	43.0	49	57.0	86	100		
Social activity involvement								
Yes	27	36.5	47	63.5	74	100	0.167	0.507 (0.219–1.174)
No	17	53.1	15	46.9	32	100		
Participating in regular physical exercise								
Yes	5	26.3	14	73.7	19	100	0.220	2.27 (0.753–6.869)
No	39	44.8	48	55.2	87	100		
Smoking habit								
Yes	9	47.4	10	52.6	19	100	0.753	1.337 (0.493–3.625)
No	35	40.2	52	59.8	87	100		
Body mass index								
Underweight	7	46.7	8	53.3	15	100	0.381	–
Normal	25	46.3	29	53.7	54	100		
Overweight	12	32.4	25	67.6	37	100		

Table 5 Correlation of elderly individuals' characteristics and dementia of Jakarta in 2018 ($N = 106$).

Variable(s)	Dementia				Total		*p*-Value	Odds ratio (95% CI)
	Yes		No					
	N	%	*N*	%	*N*	%		
Depression level								
Normal	23	34.3	44	65.7	67	100	0.117	–
Mild	17	56.7	13	43.3	30	100		
Severe	4	44.4	5	56.6	9	100		
IADL								
Autonomous	16	30.8	36	69.2	52	100	0.045	2.423(1.094–5.365)
Dependent	28	51.9	26	48.1	54	100		
Blood cholesterol check								
Normal	12	44.4	15	55.6	27	100	0.895	0.851(0.352–2.056)
High	32	40.5	47	59.5	79	100		
Blood glucose check								
Normal	35	40.2	52	59.8	87	100	0.753	1.337(0.493–3.625)
DM	9	47.4	10	52.6	19	100		
Blood pressure check								
Normal	16	50.0	16	50.0	32	100	0.341	0.609(0.264–1.406)
High	28	37.8	46	62.2	74	100		

Table 5 shows that the elderly individuals who were dependent on IADL suffered from dementia more than those who were autonomous (51.9% vs 30.8%), and this result was statistically significant ($p = 0.045$). From the odds ratio values, it can be concluded that elderly individuals who are dependent on IADL have a 2.4-times greater chance of suffering from dementia.

Elderly individuals with a history of diabetes were more likely to suffer from dementia (47.4%) than those without diabetes (40.2%), although this result was not statistically significant ($p = 0.753$). Based on the odds ratio, elderly individuals who have diabetes have a 1.3-times greater chance of experiencing dementia.

Table 6 Final model of logistic regression.

Model	*B*	Wald	Sig	Odds ratio	95% CI
Smoking habit	0.818	1.754	0.185	2.267	0.675–7.610
The history of high cholesterol	1.166	4.122	0.042	3.208	1.041–9.887
The history of DM	−0.660	0.878	0.349	0.517	0.130–2.056
Physical exercise	0.870	1.648	0.199	2.387	0.632–9.006
Blood glucose check	1.177	2.780	0.095	3.243	0.813–12.930
Blood pressure check	−0.590	1.387	0.239	0.554	0.208–1.479
Blood cholesterol check	−0.417	0.572	0.449	0.659	0.224–1.941
Body mass index (1)	1.121	2.008	0.156	3.066	0.651–14.445
Body mass index (2)	0.394	0.313	0.576	1.482	0.373–5.883
IADL	0.953	4.170	0.041	2.594	1.039–6.477
Age	1.031	4.267	0.039	2.803	1.054–7.453
Educational background	1.104	3.123	0.077	3.018	0.887–10.271

Multivariate analysis using multiple logistic regression begins with the selection of multivariate variable candidates by connecting all independent variables with the dependent variable. In this study, 15 variables met the requirements for entry into the multivariate model. Variables that had a significance of $p > 0.05$ were excluded consecutively, from the largest to the smallest *p*-value. The final logistic regression model can be seen in Table 6.

In the multivariate analysis, it was found that the variables that were significantly related to the incidence of dementia were age ($p = 0.039$), IADL ($p = 0.041$), and history of high cholesterol ($p = 0.042$). The other variables were controlling variables. The odds ratio of the history of high cholesterol variable was 3.2 (95% CI: 1.041–9.887), meaning that elderly individuals with high cholesterol are three times more likely to have dementia than those who do not have high cholesterol, after controlling for smoking habits, the history of DM, regular exercise, blood sugar check, blood pressure check, blood cholesterol check, body mass index, IADL, age, and education. The variable with the greatest influence on the incidence of dementia was a history of high cholesterol.

Discussion

This study found that 41.5% of elderly individuals within the community in Jakarta suffer from dementia. Dementia is a clinical syndrome that involves the loss of intellectual function and memory, leading to dysfunction in daily living activities.[5,6] Dementia has psychological and behavioral effects, including delusions, hallucinations, depression, anxiety, inability to take action (which also means an inability to carry out daily activities independently), mood changes, resistation, apathy, and running away from home.[3,5–7] The results of this study support the research conducted at the Nursing Home Foundation, which found that 27.5% of the elderly population suffered from dementia.[8]

Elderly individuals with dementia require special attention and treatment from their families and health workers. Support from health workers is particularly important for dementia sufferers, especially in terms of providing education to improve the health condition, prevent health problems, maintain an existing healthy lifestyle, and maximize individual functions and roles.[9,10]

The results also show that individuals over 66 years of age are significantly associated with dementia ($p = 0.026$) and have a 2.7-times greater disease risk than those aged between 60 and 65 years. This is supported by research showing that individuals ≥65 years of age have a 2.5-times higher dementia risk than those 60–64 years of age.[8,11] Increasing life expectancy will increase cases of degenerative diseases including dementia and an increase in the number of elderly will have an impact on increasing health facilities for the elderly.[12,13] One elderly health care facility that is effectively providing healthcare for the elderly is Posyandu (integrated service place), which is conducted through the community health center program. Among other activities, Posyandu provides counseling to elderly individuals related to their health problems.

The results also show that there is a meaningful correlation between daily activities based on IADL and dementia ($p = 0.045$). Meanwhile, there was no meaningful correlation with Basic Activity Daily Living (BADL). However, the results do support research showing a meaningful correlation between BADL and dementia ($p = 0.038$), as the increased severity of dementia tends to make elderly individuals dependent on BADL.[6] This is also in line with research on elderly individuals with dementia who have problems performing daily activities, for example, taking a shower (30.3%), getting dressed (42.4%), go to toilet (48.5%), moving (54.5%), urination (30.3%), and eating (54.5%).[14] This indicates that when elderly individuals are dependent on BADL, they will be dependent on IADL as well.

Based on this research, a history of high cholesterol is the most influential factor for dementia incidence in the elderly population ($p = 0.042$; odds ratio 3.2). Elderly individuals with a history of high cholesterol ratio have a 3.2 times greater risk of dementia compared to their peers without a history of high cholesterol. Moreover, high cholesterol can increase the risk of Alzheimer's disease by creating more plaque on the brain where 62% of plaque occurs in low cholesterol and 86% in high cholesterol.[15–17]

Conflict of interests

The authors declare no conflict of interest.

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