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Factors Influence Risk of Dementia in Elderly

Nanik Dwi Astutik[1], Sr. Felisitas[2]
[1]Prodi S-I Keperawatan, Sekolah Tinggi Ilmu Kesehatan Panti Waluya Malang, Indonesia
[2]Prodi D-III Keperawatan, Sekolah Tinggi Ilmu Kesehatan Panti Waluya Malang, Indonesia

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Abstract

The population of elderly globally is predicted continue to increase. The number of dementia cases in Indonesia reaches 1 million cases with an increase in the average life expectancy of Indonesians. WHO estimated that by 2050 cases of dementia will increase drastically, from currently around 36 million to more than 115 million. In 2011 the number of dementia cases in Indonesia showed 1 million people which will increase due to high average life expectancy continue to increase. This caused in the quality of life for the sufferer decrease which potentially became a big problem especially for developing countries that were not ready to handle large amounts of the need for treatment. Factors influence the risk of dementia were divided into 3 domain factors cardiovascular risk factors, lifestyle risk factors and other risks. The purpose of this research analyzed factors that affect the risk of dementia among elderly in the elderly Posyandu, Tajinan Puskesmas work area Malang District. This research was cross sectional research methods. The sample Unit in this research was elderly who actively join elderly Posyandu in Tajinan Puskesmas, Malang District. Sample count 30 using proportionate stratified random sampling technique The Data analysis used SPSS software with logistics regression analysis tests. The results of this research showed that respondents who had high blood pressure had a chance of 23.9 times higher risk of cognitive problem compared to respondents who had normal blood pressure. This research also employed research articles, reports on research and teaching materials as the reference. The research recommends for elderly to maintain their health status especially blood pressure and emotions to prevent the occurrence of cognitive function/dementia.

✉Correspondence Address:
STIKes Panti Waluya Malang – East Java, Malang
Email: nanikd79@gmail.com
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INTRODUCTION

Dementia was a neurocognitive disease that counts with a decline in intellectual abilities including memory, orientation, language, comprehension, and prediction. (Toh etal., 2016).

Cognitive decline in dementia usually starts with memory or recall deterioration (Prince,2013).

It is estimated by WHO that by 2050 dementia cases will increase from the current 36 million to more than 115 million.

In 2011 the number of dementia cases in Indonesia was 1 million people which will potentially increase due to high increase of average life expectancy. The absence of reporting of dementia incidents is due to the public's ignorance about factors which caused of dementia and make this became iceberg phenomenon. This results the quality of life for sufferers decrease which potentially became big problem, especially for developing countries that were not ready to handle the large number of treatment needed. (Kemenkes, 2014).

The factors that affect risk of dementia were divided into 3 factors cardiovascular risk factors, lifestyle risk factors and other risk factors. Cardiovascular risk factors explain about diabetes, mid-life obesity, mid-life hypertension, and hyperlipidemia; lifestyle risk factors explaining smoking, physical activity, diet, and social engagement; and other risk factors were level of formal education, depression, and sleep. The risk factors above cause neurotransmitters to be inhibited so that cholinergic and dopaminergic production s also inhibited which causes little acetylcholine production, resulting in deficits in cognitive function (A.Robles, B & Sampedro, G, 2018).

The National Strategy objective realize of dementia prevention towards healthy and productive elderly people. One of the seven steps of action for the national strategic objectives was the implementation of early detection, diagnosis and holistic management of cognitive problems and dementia. (Kemenkes RI, 2015). Preliminary data from this research can contribute to the development of current global issues related to the increase in dementia in elderly and help realize one of steps in the fourth national strategy for overcoming dementia, were the implementation of early detection, diagnosis and holistic management of cognitive problems and dementia.

This study did not intervene or treat the independent variable to the dependent variable. But to get data on what factors can affect the risk of dementia in the elderly. This data was expected to contribute to government programs. In Indonesia, there still few research on dementia, especially the analysis of the factors that influence the risk of dementia. In the research field, there has never been a screening of the risk of dementia in the elderly. The researchers were interested in conducting research with the topic of analyzing factors that affect risk of dementia.

METHODS

This research used an analytical research design with a cross sectional research method, that emphasizes the observation of independent and dependent variable in the same time. This research was conducted on the elderly to see the effect of degenerative diseases on the incidence of risk of dementia in the elderly located in the Tajinan Puskesmas work area Malang District.

In the early stages, the researcher coordinated and handle the permission aspect with the Community Health Center (puskesmas). The researcher with the Puskesmas nurses will met the elderly at the Elderly Posyandu. From this activity the researchers got data on the elderly, and started distribute the questionnaires. If the data collection did not finish until the posyandu activity over, the researcher contracted a time to come to the elderly's house. This research was conducted from September 2019 to February 2020.

The population in this research were all elderly who were registered in the posyandu for the elderly in Tajinan Puskesmas work area, Malang District. The sampling technique in this research was the elderly who were actively participating in the elderly posyandu. The independent variables in this research were the factors that affect the risk of dementia in the elderly, while the dependent variable was the risk of dementia in the elderly. The sample in this research with total 30 samples and data was collected in November 2019.

The data used in this research were primary data which analyzed using SPSS 20 for Windows. In univariate analysis, all variables were analyzed using descriptive analysis. Data on the characteristics of respondents include age, gender, marital status, education, occupation, were analyzed

Table 1 Respondent Characteristics

No	Characteristics	Total (N)	Percentage (%)
1	Gender		
	a. Male	2	6,7
	b. Female	28	93,3
2	Education		
	a. Uneducated	3	10,0
	b. Elementary School	17	56,6
	c. Junior School	5	16,7
	d. High School	5	16,7
3	Age (years)		
	a. 45-59	14	46,7
	b. 60-74	14	46,7
	c. 75-90	2	6,6
4	Occupation		
	a. Private	2	6,7
	b. Labor	2	6,7
	c. Housewife	18	60,0
	d. Retired	8	26,6
5	Marital status		
	a. Married	19	63,4
	b. Widow	11	50
6	Vital sign		
	a. Normal	18	60,0
	b. Not Normal	12	40,0
7	Activity Involvement		
	a. Active	29	96,7
	b. Inactive	1	3,3
8	Illness		
	a. Yes	1	3,3
	b. No	29	96,7
9	Head injury		
	a. Ever	3	10,0
	b. Never	27	90,0
10	Sadness		
	a. Yes	4	13,3
	b. No	26	86,7
11	Sleep difficulty		
	a. Yes	18	60,0
	b. No	12	40,0
12	Independence Activity		
	a. Yes	1	3,3
	b. No	29	96,7
13.	Commorbidities		
	a. Hipertention	11	57,9
	b. Diabetes Mellitus	2	10,5
	c. Heart disease	6	31,6
14	Duration of illness		
	a. < 1year	10	52,6
	b. 1-5 years	6	31,6
	c. > 5year	3	15,8

and presented in the form of a frequency table where the existing scores were calculated and entered in the table in the form of numbers (frequency) and percentage. The bivariate analysis for hypothesis testing used a non-parametric statistical test the Bier Logistic Regression test with SPSS20 for Windows.

RESULTS

Based on Table 1, showed that most of the respondents were female (93.5%), with total of 28. A total of 14 respondents (46.7%) were between 45 - 59 years old and 14 respondents (46.7%) were between 60 - 74 years old. A total of 17 respondents (56.6) had the latest elementary education level and most of the 18 respondents (60%) did not work or were only housewives. A total of 19 respondents (63.4%) were married. Most of the respondents, a total of 18 respondents (60%), were examined for normal vital signs, most of the 29 respondents (96.7%) actively participated in community activities. Most of the 29 respondents (96.7%) did not smoke, a number of 27 respondents (90%) have never experienced a head injury, most of the respondents a total of 26 respondents (86.7%) were currently not feeling sad, most of the respondents a number of 18 respondents (60%) have sleep difficulty. Mostly 29 respondents (96.7)% did not do activities independently. Most of the respondents 11 (57.9%) suffered from hypertension / high blood pressure and most of the respondents 10 (52.6%) suffered from the disease experienced for <1 year.

Distribution of Respondents' Cognitive Function Frequency

Cognitive function was divided into two categories, were normal and probable cognitive impairment. The results showed that the average cognitive function in the normal category was 29, while in the probable category of cognitive impairment was 22. In the normal category, the minimum score was 26 and the maximum score was 30. In the Probable cognitive impairment category, the minimum score was 21 and the maximum score up to 23. More detailed information can be seen in Table 2.

Table 2 Frequency Distribution of Cognitive Functions Normal and Probable Categories of Disorders Cognitive

Variable	Normal Minimum-Maximum	Mean	*Probable* Cognitive impairment Minimum-Maximum	Mean
Fungsi Kognitif	26-30	29	21-23	22

Frequency Distribution of Cognitive Functions Based on Independent Variables

The independent variable frequency distribution consisting of vital signs, ideal body weight, community activeness, smoking habits, head injury, sadness, sleep difficulty, independent activity, and Illness conditions can be seen in Table 3.

Based on the results of the research in Table 3, showed that the proportion of respondents with probable cognitive impairment who had abnormal vital signs is 54.5%, while those who had Normal vital sign were 5.3%. The proportion of respondents with a probable cognitive impairment who were overweight or obese category was 54.5%, while those who had normal weight category were 22.0%. The proportion of respondents with a probable cognitive impairment who was not active in the community was 50.0%, while those who were active in the community were 21.4%. The proportion of respondents with a probable cognitive impairment who had a smoking habit was 0%, while those who did not smoke were 24.1%.

The proportion of respondents with a probable cognitive impairment who experienced a head injury was 66.7%, while those who did not experience a head injury were 18.5%. The proportion of respondents with a probable cognitive impairment who was sad was 50.0%, while those who were not sad were 19.2%. The proportion of respondents with a probable cognitive impairment who experienced sleep difficulty was 27.8%, while those who did not sleep difficulty was 16.7%. The proportion of respondents with a probable cognitive impairment who was unable to carry out activities independently was 0%, while those who were able to move independently were 24.1%. The proportion

Table 3 Frequency Distribution of Cognitive Functions Based on Independent Variables

Variable		Normal		*Probable* Cognitive impairment	
		n	%	n	%
Vital Signs	• Normal	18	94,7	1	5,3
	• Not Normal	5	45,5	6	54,5
Ideal Weight	• Normal	14	77,8	4	22,2
	• Overweight/Obesity	9	75,0	3	25,0
Community Activity	• Active	22	78,6	6	21,4
	• Inactive	1	50,0	1	50,0
Smoking Habit	• Not smoking	22	75,9	7	24,1
	• Smoking	1	100,0	0	0,0
Head Injury	• Yes	22	81,5	5	18,5
	• No	1	33,3	2	66,7
Sadness	• Yes	21	80,8	5	19,2
	• No	2	50,0	2	50,0
Sleep difficulty	• Yes	10	83,3	2	16,7
	• No	13	72,2	5	27,8
Independent Activities	• Independent	22	75,9	7	24,1
	• Not independent	1	100,0	0	0,0
Illness Conditions	• No	10	90,9	1	9,1
	• Yes	13	68,4	6	31,6

Table 4 Overview of Blood Pressure, Pulse, and RR in each Cognitive Function

Variable		n	Mean	SD	Min-Max
Sistole Blood Pressure	• Normal	23	131	16,230	110-166
	• *Probable Cognitive impairment*	7	158	17,920	135-184
Diastole Blood Pressure	• Normal	23	83	12,064	60-108
	• *Probable Cognitive impairment*	7	92	14,542	70-114
Pulse	• Normal	23	81	5,451	62-89
	• *Probable Cognitive impairment*	7	84	9,013	74-102
RR	• Normal	23	19	0,668	19-22
	• *Probable Cognitive impairment*	7	20	0,378	20-21

of respondents with a probable cognitive impairment who was Illness was 31.6%, while those who were not Illness were 9.1%.

Table 4 showed that the average systolic blood pressure in respondents with cognitive in the probable cognitive impairment category was higher than respondents with normal cognitive category, were 158 mmHg with a standard deviation of 17.920 where the lowest systolic blood pressure was 135 mmHg and the highest was 184 mmHg. The mean of diastolic blood pressure in respondents with cognitive function in the probable cognitive impairment category was higher than those with normal cognitive function categories, were 92 mmHg with a standard deviation of 14.542 where the lowest diastolic blood pressure was 70 mmHg and the highest was 114 mmHg. The average pulse rate of respondents with cognitive function in the probable category of cognitive impairment was higher than respondents with cognitive function in the normal category, were 84 times per minute with a standard deviation of 9.013 where the lowest pulse was 74 times per minute and the highest was 102 times per minute. Average Respiration (RR) of respondents with cognitive function in the probable cognitive impairment category was higher than respondents with normal cognitive function, were 20 times per minute with a standard deviation of 0.378 where the lowest RR was 20 times per minute and the highest was 21 times per minute.

Table 5 Overview of Illness Duration

Variable		Normal	%	*Probable* Cognitive Problem	%
Illness Duration	• < 1 year	8	88,8	1	11,2
	• 1-5 years	5	50,0	5	50,0

Based on the results of the research in Table 5, it can be seen that the proportion of respondents with a probable cognitive impairment has a duration of illness from 1 to 5 years of 50.0%, while the duration of illness less than 1 year was 11.2%.

The correlation between the independent variable and the dependent variable

Bivariate analysis was carried out to determine the correlation of the dependent variable (cognitive function) with nine independent variables consisting of vital sign, ideal weight, community activeness, smoking habits, head injury, feeling sad, sleep difficulty, independent activities, and illness conditions. In this analysis, the statistical test used was simple logistic regression with a significance level of 95%. The results of the analysis were said to be significantly related if the p value was <0.05.

Table 6 The Correlation between Independent Variables and Cognitive Function

Variable		Normal	*Probable* Cognitive impairment	P-Value	OR	95% CI
		%	%			
Vital Signs	• Normal	94,7	5,3	0,010	21,6	2,0-223,6
	• Not Normal	45,5	54,5			
Ideal Weight	• Normal	77,8	22,2	0,860	1,1	0,2-6,4
	• Overweight/Obesity	75,0	25,0			
Community Activity	• Active	78,6	21,4	0,382	3,6	1,1-67,6
	• Inactive	50,0	50,0			
Smoking Habit	• Not smoking	75,9	24,1	-	1	-
	• Smoking	100,0	0,0			
Head Injury	• Yes	81,5	18,5	0,100	8,7	0,6-117,2
	• No	33,3	66,7			
Sadness	• Yes	80,8	19,2	0,199	4,2	0,4-37,4
	• No	50,0	50,0			
Sleep difficulty	• Yes	83,3	16,7	0,485	1,9	0,3-12,0
	• No	72,2	27,8			
Independent Activities	• Independent	75,9	24,1	-	1	-
	• Not independent	100,0	0,0			
Illness Conditions	• No	90,9	9,1	0,187	4,6	0,4-44,7
	• Yes	68,4	31,6			

Correlation between Vital sign and Cognitive Function

The results of the analysis of the correlation between vital sign and cognitive function showed that respondents with abnormal vital sign had a 21.6 times probability of experiencing cognitive impairment (95% CI; 2.0 - 223.6) compared to respondents who had normal vital sign.

Correlation between Ideal Weight and Cognitive Function

The results of the analysis of the correlation between ideal weight and cognitive function showed that respondents with overweight or obesity had the odds of experiencing 1.1 times probable cognitive impairment (95% CI; 0.2 - 6.4) than respondents who had normal weight.

Correlation of Activity in Society with Cognitive Function

The results of the analysis of the correlation between community activeness and cognitive function showed that respondents who were not active in the community had the odds of experiencing cognitive impairment 3.6 times (95% CI; 1.1 - 67.6) than respondents who were active in the community.

The Correlation between Smoking Habits and Cognitive Function

The results of the analysis of the correlation between smoking habits and cognitive function showed that respondents who smoked had 1 time the probability of experiencing cognitive impairment compared to respondents who did not smoke.

The Correlation between head injury with cognitive function

The results of the analysis of the correlation between head injury and cognitive function showed that respondents who had a head injury had a probability of experiencing a cognitive impairment 8.7 times (95% CI; 0.6 - 117.2) than those who had no head injury.

The Correlation between Sadness with cognitive function

The results of the analysis of the correlation between sadness and cognitive function showed that respondents who experienced sadness had the odds of experiencing cognitive impairment 4.2 times (95% CI; 0.4 - 37.4) than those who did not experience sadness.

Sleep Difficulty Correlation with Cognitive Function

The results of the analysis of the sleep difficulty correlation with cognitive function showed that respondents who experienced sleep difficulty had a 1.9 times probability of experiencing cognitive impairment (95% CI; 0.3 - 12.0) than those who did not experience sleep difficulty.

The Correlation between independent activity with cognitive function

The results of the analysis of the correlation between independent activity and cognitive function showed that respondents who were unable to carry out activities independently had the odds of experiencing probable interference cognitive 1 time than those who were able to move independently.

The Correlation between illness condition with Cognitive Function

The results of the analysis of the correlation between illness and cognitive function showed that respondents who were in a Illness condition had a 4.6 times probability of experiencing cognitive impairment (95% CI; 0.4 - 44.7) than those who were not in a Illness condition.

Based on the results of the final model of multivariable analysis, it was known that the variable that has a significant correlation with cognitive function is vital sign. Meanwhile, the variable head injury, sadness, independent activity, Illness condition were confounding variables. vital sign was a variable related to cognitive function after being controlled by head injury variables, sadness, independent activity, and Illness condition. This was mean that

Table 7 Final Model of Cognitive Function Determinant

Variable	B	Pvalue	OR	95% CI
Not normal vital sign	3,175	0,018	23,9	1,7-335,0
Experiencing Head Injury	2,159	0,246	8,6	00,2-331,8
Sadness	1,847	0,254	6,3	00,2-151,5
Not independent	0	-	1	-
Illness	0,467	0,742	1,5	0,0-25,9

after being controlled by a head injury, sadness, independent activity, and Illness conditions, respondents who had abnormal vital sign had 23.9 times higher chance of experiencing probable cognitive impairment than respondents who had normal vital sign.

DISCUSSION

Elderly Health Status

The first stage in modelling to find the determinant factor was the identification of potential covariates which was done by making a logistic regression analysis of each covariate on the dependent variable. Covariates with p value <0.25 were covariate candidates for entry into the multivariate model. The p value limitation was 0.25 apart from being based on the p value, considerations according to the scientific substance must be included in the multivariate model, the covariate was still included in the model even though the p value was > 0.25. Elderly health which can be a risk factor for dementia, were vital sign examination results, ideal weight, community activeness, smoking habits, never having had a head injury, sadness, sleep difficulty, activity, and illness. After analysing, table 5.5 shows that the variables of ideal weight, activity in society, and sleep difficulty have p value> 0.25. So that only six covariate variables were included in the multivariate model, were the results of vital sign examination, smoking habits, never having had a head injury, sadness, activity, and illness.

Elderly cognitive function using MMSE

Based on Table 1, the frequency distribution of cognitive function in normal and probable categories of cognitive disorders showed that cognitive function was divided into two categories, were normal and probable cognitive disorders. The results showed that the average cognitive function in the normal category was 29, while in the probable category of cognitive impairment was 22. In the normal category, the minimum score was 26 and the maximum value was 30. In the Probable cognitive impairment category, the minimum score was 21 and the maximum value 23. This showed that most of the elderly have cognitive function within normal limits, while a small proportion of the elderly have probable cognitive impairment.

Factors that influence the risk of dementia in the elderly

The results of the research showed that the elderly found several factors that affect the cognitive function of the elderly, were Vital Signs, especially blood pressure, having experienced a injury in the head, sadness, dependence on other people / not independent and were experiencing a Illness condition. From the research results, it was found that from several of these factors, there was one variable / factor that had a significant correlation with cognitive function, were Vital Signs, especially abnormal blood pressure, where the results of statistical analysis tests obtained a value of 0.018 <0.05. This was mean that respondents who had abnormal (high) blood pressure were 23.9 times more likely to experience probable cognitive impairment than respondents who have blood pressure within normal limits. This was in line with what was stated (Buchman, A. S, 2010) that changes in blood pressure were known because of the effects of white matter hyperintensities, intima media thickness and carotid artery atherosclerosis. Recent evidence showed hypertension to be the most important factor in the pathological decline in cognitive function. Meanwhile, for a sadness, even though the p-value was 0.254> 0.05, which means that emotional sadness was not associated with a significant risk factor for cognitive decline, but in theory it was explained that sadness or anxiety that occurs especially at the end of life of the elderly influenced risk. increase in cortisol and inhibit neurotransmitters in producing cholinergic and dopaminergic which causes a little production of acetylcholine resulting in deficits in cognitive function (Bherer, L, 2013) so this can be a concern so that this condition did not last long which can result in changes in mood or mental status elderly who later can lead to a condition of depression which will have an impact on decreased cognitive function. Depression in the elderly can change the composition of the brain organs that impact on brain function itself. Elongated anxiety and frailty were important factors that cause the elderly to fall into depression. The variable regarding the experience of a injury to the head has a p-value of 0.254> 0.05 which means that the history of a injury on the head was not associated with risk factors for cognitive decline in the elderly, although in theory it was

explained that trauma to the brain can cause the risk of cognitive decline and dementia. . This trauma can cause injury to the part of the brain that functions as memory and recall (hippocampus) but if the head trauma has healed and was supported by other factors such as the elderly being active / independent, not smoking and having good mental status, it can reduce the risk of cognitive decline (Clare, L.& Woods. B, 2004).

CONCLUSION

Factors that influence dementia in the elderly were the results of vital sign examination, smoking habits, never having had a head injury, sadness, activity, and illness. Vital sign examination, especially the blood pressure was a contributing factor in the incidence of dementia in the elderly

SUGGESTION

The elderly need to maintain their health status, especially blood pressure and emotions to prevent cognitive impairment or dementia.

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