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Correlation between The Level of Independence of Elderly and Dementia in West Java

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Abstract

Dementia, which the sufferer is estimated to be 153 million people in 2050, is a public health problem, especially for the elderly, which will slowly make the sufferers more dependent on other people to do daily activities. The aim of this study is to analyze the correlation between the level of independence of the elderly and dementia in West Java. This study used a cross-sectional design using primary data from 68 elderly people in Sentra Terpadu Pangudi Luhur based on the inclusion and exclusion criteria. Univariate analysis showed that most respondents were young elderly (48.5%), males (55.9%), had no history of smoking (52.9%), no history of consuming alcohol (91.2%), had normal body mass index (58.8%), had hypertension (69.1%), did not have diabetes mellitus (92.6%), did not have depression (75%), had mild dependence (50%), and did not have dementia (50%). The results of the hypothesis test of the Rank Spearman correlation between the level of independence of the elderly and dementia showed a strong correlation in a significant positive direction with a correlation coefficient of 0.561. Daily physical activities with moderate intensity are required to prevent dementia.

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INTRODUCTION

Dementia is a brain disorder where someone experiences a decline in cognitive function (Arvanitakis, 2019). Dementia is chronic and progressive, and almost all dementia patients are from the elderly population (Hoare, 2023). The elderly define as person who reach 60 years old for minimum age (KBBI, 2024). They separate in several group based on age that they have. Badan Pusat Statistik classify into in a 3 grups, early elderly (60-69 years old), middle elderly (70-79 years old), and late elderly (>80 years old) (BPS, 2023). As the leading cause of disability and dependency in the elderly around the world, dementia can affect memory, cognitive function, and behavior, so it ultimately interferes with someone's ability to do daily activities (WHO, 2019). Nowadays, we face the reality that dementia cannot be cured with recent medicine. Current treatment aim will be focused on slower the progression of diseases than without treatment. Determining a diagnosis of dementia requires several evaluations of cognitive abilities, thinking ability, memory and problem solving (Kemenkes, 2025)

The number of dementia patients around the world in 2019 was estimated at 57 million and is projected to increase to 153 million in 2050 (Nichols, Emma, et al. 2022). Currently, more than 4.2 million people have dementia in Indonesia (Farina et al., 2023), and in West Java, the prevalence of dementia is 57% of all elderly people (Adiutama., 2023). WHO, in the Global Action Plan on the Public Health Response to Dementia, has 7 strategic actions and supports for countries that have regulations to potentially reduce the number of dementia from modifiable risk factors, where the third action is to reduce the risk factors of dementia and the seventh action is to increase the studies about dementia (WHO, 2019).

The Indonesian government through the Ministry of Health has launched 'Strategi Nasional Penanggulangan Penyakit Alzheimer dan Demensia Lainnya' since 2016 (Alzi, 2019). This national strategy is a reference for implementing comprehensive, integrated and efficient health efforts with the aim of reducing the incidence of Alzheimer's dementia and other dementias with a life cycle approach. The increasing number of elderly people can be a national asset if they are healthy and productive. However, unhealthy and non-independent elderly people will have a major impact on the nation's social and economic conditions.

Risk factors of dementia, according to WHO, are depression, social isolation (Joyce, 2021), elderly (Maryam, 2019), hypertension (Bao, 2022), diabetes mellitus (Verma, 2021), obesity and overweight, active smoker (Johnson, 2022), consuming alcohol (Sabia, 2018) and not physically active/sedentary lifestyle (Raichlen, 2023).

Moreover, low social participation as a modifiable risk factor for dementia has become the most dominant factor in causing dementia (Janaris, 2020). Independent elderly who are able to do daily activities without others' help tend not to have problems with social participation (Luo et al, 2022). If a country has many elderly who are not independent (old age dependency ratio is high), this country will lack a productive age population that supports the elderly's quality of life, so it will have a negative impact on the economic status of a country (Lee, 2021).

Old age dependency ratio is the ratio between the population in productive age (15-59 years old) and the population in non-productive age (more than 60 years old) (Skirbekk, 2022). Old age dependency ratio around the world in 2017 was 13.4, increasing to 15.1 in 2023. This means that 100 people of productive age in the world have to support 15 elderly (World Bank, 2023). This is not much different from Indonesia, where the old age dependency ratio in Indonesia increased from 14.02 in 2017 to 17.08 in 2023 (BPS, 2023). Meanwhile, in West Java Province, the old age dependency ratio increased from 14.52 in 2019, which is projected to be 16.12 in 2023 (BPS of West Java Province, 2023). An increase in old age dependency ratio is directly proportional to the increase in the number of elderly. From 2015 to 2050, the percentage of elderly is estimated to grow from 12% to 22% (WHO, 2022). An increase in the percentage of elderly in Indonesia was 10% (2020) to 20% (2024) (SMERU Research Institute, 2024). West Java has a percentage of elderly people of 11.21% and is in the top 10 provinces with the highest

number of elderly people in Indonesia (Statistica, 2023).

Elderly in nursing home has different characteristics from elderly in the community because elderly in nursing home tend to has problems related to social isolation, decreased physical activity and changed in cognitive function (Fagundes, 2021). Another difference is that the elderly in rehabilitation centers have different characteristics, especially regarding quality of life (QOL). QOL is a concept regarding the general welfare status of a person in relation to values, environment, culture and social in the place of residence (Phyo AZZ, 2020). A different approach is needed in providiving good services to fulfill the daily activity and mobilization needs of elderly who is living in nursing home. (Nugraha S & Aprilia YT, 2020).

The examination related to the level of elderly independence in this study used primary data with the ADL Barthel Index instrument of the Indonesian version. The advantage of the ADL Barthel Index is able to be a diagnostic instrument for elderly independence in assessing Basic Activity Daily Living (BADL) or the elderly's ability to care for themselves (Agung, 2006). The examination related to dementia used primary data with the Mini-Mental State Examination (MMSE) instrument. The advantage of MMSE is that it is a practical and non-invasive instrument for diagnosing and monitoring improvement in cognitive function (Setyopranoto, 2002). The aim of this study is to analyze the relationship between the level of independence of the elderly and dementia in West Java.

METHOD

This study used primary data obtained directly from respondents in Sentra Terpadu Pangudi Luhur (STPL) of Bekasi City under the Ministry of Social of the Republic of Indonesia (Permensos, 2022). STPL has a work area coverage of 7 regencies and cities in West Java, including Depok City, Bekasi Regency, Bekasi City, Karawang Regency, Purwakarta Regency, Tasikmalaya Regency, and Tasikmalaya City. The design of this study was correlative descriptive with the cross-sectional method. Respondents involved in this study were the elderly, aged at least 60 years (Kemkes RI, 2021). The population in this study was all elderly in STPL of Bekasi City, which was 82 people. The sampling scheme in this study used simple random sampling so that a minimum sample size of 68 elderly people was obtained. The inclusion criteria in this study were more than 60 years old, able to communicate well verbally, and willing to be a respondent. Furthermore, the exclusion criterion was elderly people with physical and psychological limitations that prevent them from reading and writing.

Independent variables in this study were 9. Age is categorized into early elderly (60-70 years old), middle elderly (70-80 years old), and late elderly (>80 years old) (Statistics Indonesia, 2023). The gender consists of male and female. Smoking history consists of Yes and No and the history of consuming alcohol consists of Yes and No (Wood AM et al., 2018). Overweight or obese based on body mass index (BMI) is categorized as fat (>25), normal (18.5-25), and thin (<18.5) (Kemkes, 2019). Diabetes Mellitus based on the random blood sugar level is categorized into diabetes mellitus (>200) and non-diabetes mellitus (<200) (American Diabetes Association Professional Practise Committee, 2024). Hypertension based on blood pressure is categorized into hypertension (systolic ≥130 and/or diastolic ≥80mm Hg) and non-hypertension (Flack J.M, 2020). Depression based on Geriatric Depression Scale-15 score in Indonesian version is categorized into normal (0-5), probable depression (6-10), and depression (>10) (Utami, N. 2019). Level of Independency Level of elderly based on Activity Daily Living Barthel Index Indonesian version is categorized into independent (20), mild dependency (12-19), moderate dependency (9-11), severe dependency (5-8), and total dependency (0-4) (Agung, I. 2006).

The Indonesian Barthel ADL index questionnaire is an instrument consisting of 10 questions and has been proven reliable for assessing basic functional status in the elderly in Indonesia (Agung & Soejono, 2006). Doctors play a very important role because by using this Barthel ADL Index they can easily determine the ADL of the elderly when visiting elderly

rehabilitation centers (nursing homes) that function effectively for the elderly who live with or are neglected by their family members (Gupta et al, 2016)

This study also conducted further analysis of each component of the Barthel ADL Index. The average score obtained by all respondents in each component of independence was divided by the maximum score in each component of independence and then multiplied by 100 to obtain the percentage of the average score of respondents so that later it would be obtained which activity had the smallest percentage score (being the most difficult activity to do) and which activity had the largest percentage score (being the easiest activity to do. The types of activities in the Barthel ADL Index include controlling defecation (maximum score 2), controlling urination (maximum score 2), cleaning oneself (maximum score 1), toileting (maximum score 2), eating (maximum score 2), moving around (maximum score 3), mobilization (maximum score 3), dressing (maximum score 2), going up and down stairs (maximum score 2) and bathing (maximum score 1).

The dependent variable in this study was dementia based on the Mini-Mental State Examination score Indonesian version, which is categorized into normal (24-30), probable dementia (17-23), and definitive dementia (<17) (Creavin, ST. 2016). MMSE is a cognitive function examination instrument that is performed to determine the diagnosis of dementia. The use of this instrument is indicated especially in the elderly who generally have experienced a decline in cognitive function, thinking ability and ability to perform daily activities. This process is usually accompanied by changes in emotions and moods as well as changes in behavior. The score is calculated based on the actual answers from the elderly. The examiner should not give a score based on assumptions or correct the elderly's answers based on these assumptions. For example, in the elderly who are depressed, the examiner should not assume that depression causes a decrease in concentration so that the patient has difficulty calculating, then this affects the score given to the elderly. Each examination point is asked a maximum of 3 times. If the patient does not respond after being asked 3 times, give a score of zero. If the patient gives the wrong answer, then give a score of zero and the question does not need to be repeated (Arevalo, 2015).

This study also conducted further analysis on each component of the MMSE. The researcher calculated the average score on each component of the MMSE on the respondents then divided it by the maximum score on each component of the MMSE then multiplied by 100 to get the percentage of the average score of the respondents so that it was obtained which component had the smallest score (being the most difficult component to do) and which component had the largest score (being the easiest component to do). The components in the MMSE include Orientation (maximum score 10), Registration (maximum score 3), Attention and Calculation (maximum score 5) and Recall (maximum score 12). Univariate analysis was used to determine the frequency distribution. Univariate analysis is an important first step of any clinical trial. The variables used can be either categorical or numeric. Data should be presented by not only providing percentages for each class, but also frequency distributions (Canova S, et al. 2017). Bivariate analysis used the Pearson test or Rank Spearman (if data are not normally distributed). Bivariate analysis is a mandatory step if you want to describe the relationship between observed variables. Bivariate analysis and the strength of the relationship between observed variables can change based on the type of variable observed (Bertani et al. 2018).

RESULTS AND DISCUSSIONS

Table 1 shows that of all respondents (68), most of them are early elderly (48.5%), males (55.9%), no history of smoking (52.9%), no history of consuming alcohol (91.2%), normal BMI (58.8%), non-diabetes mellitus (92.6%), and hypertension (69.1%). Moreover, Table 1 also shows that of all respondents, most of them are not depression (75.0%), mild dependency (50%), and not dementia (50%).

If we compared to the percentage of dementia in Indonesia which is 27.9% (Farina, 2023), the percentage of dementia in STPL Bekasi City in 2024 is higher. The results of this

Table 1. Characteristic of Respondents (Univariate Analysis)

Variable	Frequency	%
Age		
Early Elderly (60-69 years old)	33	48.5
Middle Elderly (70-79 years old)	30	44.1
Old Elderly (>80 years old)	5	7.4
Gender		
Male	38	55.9
Female	30	44.1
Smoking History		
Yes	32	47.1
No	36	52.9
History of Consuming Alcohol		
Yes	6	8.8
No	62	91.2
***Overweight*/Obesity**		
Thin	12	17.6
Normal	40	58.8
Fat	16	23.5
Diabetes Mellitus		
Yes	5	7.4
No	63	92.6
Hypertension		
Yes	47	69.1
No	21	31.9
Depression		
Normal	51	75.0
Probable Depression	15	22.1
Depression	2	2.9
Level of Independence of Elderly		
Independent	26	38.2
Mild Dependency	34	50.0
Moderate Dependency	2	2.9
Severe Dependency	4	5.8
Total Dependency	2	2.9
Dementia		
Normal	34	50.0
Probable Demensia	28	41.2
Definitive Demensia	6	8.8

Source: Primary Data on Independence of Elderly with Dementia, 2024

study also strengthen the conclusions of other studies which state that elderly people in rehabilitation centers suffer from dementia more than elderly people in the community (Hoffmann, 2014). The results of this study are in line with research conducted by Sihaloho (2022) on 35 elderly people in Padang Bulan Village, Medan Bahru District, the results of which showed that many elderly people experienced mild dependence, namely 37.1%, moderate dependence 11.4%, severe dependence 8.6% and total dependence 5.7%. Independent elderly people and elderly people with mild dependence have the largest proportion, namely 37.1%. (Sihaloho N, 2022). The results of this study are also in line with research conducted by Rohaedi (2016) on 21 elderly people at the Senjarawi Social Home in Bandung City which showed that the largest proportion of elderly people were those who had partial dependence (72%). While the rest were independent elderly people (14%) and total dependence (14%) (Rohaedi, et al. 2016).

Table 2. Frequency Distribution based on Barthel ADL Independence Components

Component	Average score	Percentage of Respondents with Maximum Answer Scores (%)
Controlling Defecation (maximum score 2)	1,82	91,15%
Controlling Urination (maximum score 2)	1,80	90,40%
Cleaning oneself (maximum score 1)	0,88	88,23%
Toileting (maximum score 2)	1,73	86,76%
Eating (maximum score 2)	1,97	98,50%
Moving (maximum score 3)	2,75	91,67%
Ambulation (maximum score 3)	2,41	80,39%
Dressing (maximum score 2)	1,79	89,70%
Going up and down stairs (maximum score 2)	1,38	69,0%
Bathing (maximum score 1)	0,86	86,76%

Source: Primary Data on Independence of Elderly with Dementia, 2024

The researcher then assessed each component of independence asked to the respondents based on the ADL Barthel index. The results are in Table 2. The table shows that from the total of 68 respondents whose level of

independence was assessed using the Barthel ADL index instrument, only 69.0% of respondents were able to go up and down stairs independently and became the lowest percentage activity component that could be done by the respondents.

The researchers then also assessed each component in the MMSE. The results are in table 3. The table shows that from the total of 68 respondents whose cognitive function was assessed using the MMSE, only 69.4% of respondents were able to answer the attention and calculation components with the maximum score and became the lowest percentage MMSE component that could be done by the respondents.

Table 3. Frequency Distribution by MMSE Cognitive Function Components

Component	Average Score	Percentage of Respondents with Maximum Answer Score (%)
Orientation (maximum score 10)	7,9	79,5
Registration (maximum score 3)	2,8	94,6
Attention and Calculation (maximum score 5)	3,4	69,4
Recall (maximum scorel 12)	9,1	76,1

Source: Primary Data on Independence of Elderly with Dementia, 2024

Table 4. Data Normality Test

Variable	Total	*p-value* Normality Test	Data Centralization Measure		Data Distribution		
			Median	Modus	Min	Max	Range
Independence Level	68	<0.001	19.0	20	2	20	18
Dementia (MMSE score)	68	0.014	23.5	23	13	30	17
Age	68	0.002	70	66	60	87	27
Body Mass Index	68	0.059	21.5	18.6	16	33.3	17.3
Systolic Blood Pressure	68	0.038	138.5	128	92	207	115
Diastolic Blood Pressure	68	0.047	80	82	49	139	90
Random Blood Sugar	68	0.000	119.5	120	69	411	342
Geriatric Depression Scale	68	<0.001	2.0	1	0	14	14

Source: Primary Data on Independence of Elderly with Dementia, 2024

Table 4 shows the data normality test for each numeric scale variable using the Kolmogorov-Smirnov test. Based on the table of results of the numeric scale variable normality test, the data was not normally distributed ($p < 0.005$), so the median and mode data are displayed as a measure of data centralization and the minimum, maximum and range as a measure of data distribution.

Table 5 shows the results of the Rank Spearman correlation test as an alternative Pearson test used because the data distribution in this study was not normal. The results of this test showed a strong correlation (correlation coefficient of 0.561) between the variable of elderly independence level and dementia with a positive direction so that the relationship of the two variables was unidirectional. Furthermore, there is ** in the correlation coefficient, so correlation has a significant value at $\alpha = 0.01$. Sig. or signification (2-tailed) value was 0.000. Thus, the Sig. (2-tailed) value was $0.000 < 0.01$, so it can be found that there is a positive and significant correlation between elderly independence level and dementia.

Table 5 shows that the more independent an elderly person is, the higher the cognitive function assessment score, which means that the elderly will have a lower chance of developing dementia. The results of this analysis are in line with the study conducted by Fitriana et al. (2019), where there is a significant relationship between elderly independence level (using BADL and IADL) and dementia (using MMSE) in 3 Tresna Werdha Social Homes in the Garut and Bandung areas (Fitriana, 2019).

Table 5. Correlation between The Level of Independence of Elderly and Dementia (Bivariate Anaysis)

Correlation		Level of Independency of Elderly	Dementia
Level of Independency of Elderly	*Corelation Coefficient*	1.000	0.561**
	Sig. (2 Tailed)	-	0.000
	N	68	68
Dementia	*Corelation Coefficient*	0.561**	1.000
	Sig. (2 Tailed)	0.000	-
	N	68	68

Source: Primary Data on Independence of Elderly with Dementia, 2024

The results of this study are also in accordance with the study conducted by Ikeda et al. (2020) on 159 elderly in Kagoshima Jepang, where there is a relationship between the type of daily activity of the elderly and psychological symptoms of dementia (Ikeda et al., 2020). It can be found that moderately intense physical activities carried out daily can reduce the rate of neurocognition in the elderly (Kimura, 2013).

There were a several limitations of this study, such as modifying smoking and alcohol consuming as variables in the theoretical framework to smoking history and alcohol consumption history in the conceptual framework because respondent who is living in STPL are no longer allowed to smoke or consume alcohol. More over, there were limitations in the number of enumerators that help for collected data and STPL's operational hours meant that duration of collecting data time was divided into 3 times of visiting and number of respondents were limited.

We may find bias factors in this study, especially differences in perception between main researcher and enumerators when conducting interviews. Prevention is carried out by having several practice interviews to equalize perceptions before collecting data as well as having an interview guidebook, especially in using MMSE, GDS and ADL Barthel (Indonesian version) questionnaires.

CONCLUSION

The conclusion of this study is that there is a strong correlation in a significant positive direction between elderly independence level and dementia, with walking up and down stairs as the most difficult activity for most elderly based on the ADL Barthel Index and recall (calling up new memories) as the most difficult thing to do based on the MMSE. The next researcher is expected to be able to use the results of this study as a data source for further research related to the elderly independence level against dementia and studying the risk factors of dementia.

For policymakers related to the welfare of the elderly, mainly in West Java, it is expected to maximize programs related to the prevention of dementia, especially in making the elderly independent in their old age. For the local citizens, especially who lived in West Java, hope can increase awareness for the elderly regarding the importance of independence in order to prevent dementia.

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