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PREDICTORS OF DEMENTIA AMONG ELDERLY IN NURSING HOME

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A B S T R A C T

Introduction: Dementia is a syndrome characterized by a decline in intellectual ability that is severe enough to interfere with an elderly person's daily activities. It is still unknown whether specific variables are most frequently linked to dementia in nursing homes, despite the fact that a number of factors are known to cause dementia symptoms. **Objective:** The purpose of this research was to identify the risk factors for dementia in senior citizens residing in assisted living facilities. **Method:** This study has a cross-sectional design. Eighty-six senior citizens, ages 60 to 90, who resided in two nursing facilities in Bandung and Garut, Indonesia, made up the research sample. The Mini Mental State Examination (MMSE), which has a cut-off score of 24, is used to screen for dementia. Data analysis used the Chi-Square test and logistic regression to examine the link between risk factors and dementia. **Result:** Education ($p = 0.001$), BADL ($p = 0.014$), IADL ($p = 0.023$), phonemic fluency ($p<0.001$), semantic fluency ($p = 0.001$), QoL-physical ($p = 0.007$), QoL-psychological ($p = 0.002$), QoL-environment ($p = 0.001$), diabetes ($p = 0.013$), and depression ($p = 0.001$) were all significantly correlated with dementia, according to the results. Logistic regression tests showed that education ($p = 0.005$), phonemic fluency ($p = 0.001$), and QoL-psychological ($p = 0.043$) are known to provide the most significant contribution to the occurrence of dementia in senior individuals in nursing homes. **Conclusion:** It is advised that healthcare professionals offer preventative and promotional actions for senior dementia prediction.

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1. INTRODUCTION

According to the Ministry of Health of the Republic of Indonesia Kemenkes RI (2016), projections suggest an increase in the longevity of Indonesia's population, from 70.8 years in 2015 to 72.2 years by 2030–2035. This demographic shift has led to a notable rise in the number of elderly individuals, escalating from 24.49 million (9.27%) in 2018 to 63.31 million (19.8%) by 2045 (BPS, 2018). However, alongside this demographic transition, there emerges a concerning trend of heightened issues among the elderly populace, with dementia emerging as a prominent concern.

A progressive loss in cognitive function that impairs one's capacity to perform daily tasks on one's own is a clinical sign of dementia (Duong et al., 2017). In 2015, there were 46.8 million cases of dementia worldwide. By 2030, that number is expected to rise to 74.7 million and, by 2050, to 150 million (Prince et al., 2016). According to Turana et al. (2019), the number of people with dementia in Indonesia alone was estimated to be 1.2 million in 2015 and is expected to rise to 4 million by 2030. Data shows that Indonesia is among the top 10 nations with the most dementia sufferers in the globe and Southeast Asia (Prince et al., 2016).

Families, communities, and society as a whole are greatly impacted by dementia, including the expenses and duration of care. In 2015, the expenses associated with dementia in Indonesia amounted to 2.2 trillion, comprising 44% of medical expenses, 21% of social service expenditures, and 35% of unofficial service costs (Turana et al., 2019). Reducing dementia-causing risk factors can help avoid and solve this issue with dementia right away.

Perdossi (2015) lists the following as risk factors for dementia: age, gender, family history, genetics, high blood pressure, high cholesterol, diabetes mellitus, stroke, diet, excess body weight, lack of physical activity, smoking, alcohol consumption, stress/anxiety, heart disease, deficiency in folic acid and vitamin B12, deficiency in vitamin D, elevated homocysteine, and thyroid hormone disorders. Prior studies indicate that among senior citizens living in nursing homes, age, education level, and history of stroke and dementia are significantly correlated (Xu et al., 2017). Additionally, it was discovered that the incapacity to do basic daily activities, behavioral symptoms, depression, and cognitive impairment were the main causes of elder abuse and placement in nursing homes (Wergeland et al., 2015). On the other hand, older adults whose cognition is still normal have a significant chance of getting dementia while in a nursing home (Xu et al., 2017). When compared to senior citizens living in the community, this results in a higher prevalence of dementia in nursing facilities.

Researchers need to take into account the possibility of cultural and demographic variations in quality of life. Furthermore, quality of life can be used as a benchmark for assessing medical therapies. Thus, the purpose of this study was to identify the risk factors for dementia among senior citizens residing in nursing facilities.

2. METHODS

Study Sample

A cross-sectional study design is used in this investigation. Two nursing facilities, PSTW Budi Pertiwi Bandung and Griya Lansia Garut, hosted the research from May to July 2023. 86

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senior citizens who fit the inclusion criteria—being between the ages of 60 and 90, having good vision and hearing, and not requiring immediate medical attention—were enlisted for the study.

Instrument and Data Collection

The data collection tool used was a questionnaire, which contained several questions regarding the respondent's identity, such as name, age, gender, education, marital status, and taking an anamnesis regarding the history of illness in the elderly, doctors, and nurses in nursing homes. Education level was categorized into two groups: < 9 years (no school, primary school, and junior high school) and > 9 years (senior high school and university). The physical examination includes an anthropometric examination, blood pressure, and head-to-toe examination. The dementia examination uses the MMSE (Mini-Mental State Examination), which contains 30 questions covering 11 domains regarding time orientation, place orientation, memory, language, registration, and attention, with a cut-off score of 24 (Arevalo-Rodriguez et al., 2015). MMSE has been translated into Indonesian. The validity of all questions is >0.365, and the reliability of the instrument is >0.72 (Cronbach's alpha 0.5).

Verbal fluency, quality of life, BADL, IADL, and sleep quality tests were carried out for 30 minutes. The quality of life examination uses the WHO-QOL questionnaire, which consists of 26 questions divided into four domains: physical (7 items), psychological (6 items), social relationships (3 items), and environment (8 items). The highest score is 100 (Mate et al., 2012). The sleep quality questionnaire uses the PSQI (Pittsburg Sleep Quality Index). BADL (Basic Activity Daily Living) and IADL (Instrumental Activity Daily Living) use special questionnaires to determine the ability of the elderly to carry out daily activities. Verbal fluency (semantic and phonemic). Semantic fluency was checked by asking respondents to name as many animals they knew as possible in one minute, while the examiner recorded and counted the animals mentioned (Sabia et al., 2017). Phonemic fluency was assessed by asking participants to name animals starting with the letter S for one minute (Shao et al., 2014). This test serves to assess verbal fluency and executive function (Joubert et al., 2008). All questionnaire examinations are carried out by having the questions read aloud by a trained nurse, and the elderly answer the questions given orally.

Statistical Analysis

To find the dementia predictors, univariate, bivariate, and multivariate analyses were performed. Each variable's frequency distribution was described using a univariate test. The association between the variables was examined using a bivariate test that included dependent t-tests and chi-square analyses. Logistic regression analysis is used in the multivariate test to identify the variables that have the greatest influence.

Ethical Clearance

This study has received approval from The ethics commission of the PPNI West Java Nursing College (No.III/083/KEPK-SLE/STIKEP/PPNI/JABAR/X/2023) and asked for informed consent in advance from the elderly and guardians, namely the nursing home staff who are responsible for the elderly.

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3. RESULTS

This study was conducted on 86 elderly people (24 men and 62 women) in 2 nursing homes, in West Java, Indonesia. Respondent characteristic data can be seen in detail in table 1. Of the total 86 elderly people with MMSE values < 24 as many as 46 people and MMSE ≥ 24 as many as 40 people. The average MMSE score was 19.39 ± 3.80 for the dementia group and 26.90 ± 2.09 for the non-dementia group. Respondents who had < 9 years of education were more dominant than respondents with > 9 years of education, namely 62 and 17 people respectively. Most of the study respondents were not married/widow, namely 75 people who had BMI < 23, namely 51 people.

Table 1. Demographic Profile of Residents in Nursing Homes With and Without Dementia

Variable	Dementia (n=46)	Non-dementia (n=40)	p-value
MMSE, mean (SD)	19.39 (3.80)	26.90 (2.09)	0.001*
Systole, mean (SD)	136.20 (20.20)	132.05 (17.05)	0.311
Diastole, mean (SD)	80.54 (10.07)	76.73 (7.88)	0.056
Medication, mean (SD)	1.83 (1.18)	1.73 (1.22)	0.697
BADL, mean (SD)	32.37 (5.99)	34.88 (2.08)	0.014*
IADL, mean (SD)	21.20 (6.92)	24.80 (5.12)	0.023*
Age, n (%), yr			
60-75	22 (47.8)	22 (55)	0.327
75-90	24 (52.2)	18 (45)	
Sex, n (%)			
Male	9 (19.6)	15 (37.5)	0.054
Female	37 (80.4)	25 (62.5)	
Education, n (%)			
> 9 years	3 (6.5)	14 (35)	0.001*
< 9 years	43 (93.5)	26 (65)	
Marital Status, n (%)			
Married	5 (10.9)	6 (15)	0.400
Unmarried/Widow	41 (89.1)	34 (85)	
BMI, n (%)			
< 23	28 (60.9)	23 (57.5)	0.751
> 23	18 (39.1)	17 (42.5)	
Verbal Fluency, mean (SD)			
Phonemic fluency	9.54 (3.72)	14.33 (4.74)	<0.001*
Semantic fluency	1.17 (1.25)	2.15 (1.33)	0.001*
Quality of Sleep, n (%)			
Good	14 (30.4)	16 (40)	0.353
Poor	32 (69.6)	24 (60)	
Quality of Life, mean (SD)			
Physical	44.61 (11.59)	51.08 (9.62)	0.007*
Psycological	47.24 (10.46)	54.92 (11.89)	0.002*
Social	43.50 (16.92)	50.08 (13.98)	0.053
Environment	57.28 (14.25)	66.92 (11.15)	0.001*
History of Disease, n (%)			
Hypertension	33	25	0.248
Heart disease	2	1	0.553
Stroke	2	6	0.090
Diabetes mellitus	0	5	0.013*
Rheumatic	9	3	0.096
Osteoarthritis	11	4	0.078
Depression	13	0	<0.001*

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This study also showed that the average phonemic fluency in people with dementia was 9.54 (SD= 3.72). Most respondents had poor sleep quality, namely 32 people (69.6%) in the elderly with dementia and 24 people (60%) in the elderly without dementia. It is known that the average QoL in people with dementia is lower than in the non-demented elderly.

Table 1 reveals a bivariate analysis of the predictors of dementia disease. The bivariate test showed that dementia was associated with MMSE (p=0.001), BADL (p = 0.014), IADL (p = 0.023), education (p = 0.001), phonemic fluency (p<0.001), semantic fluency (p=0.001), QoL-physical (p = 0.007), QoL-psychological (p = 0.002), QoL-Environment (p = 0.001), diabetes mellitus (0.013), and depression (p<0.001).

Table 2. Logistic Regression Analysis of Risk Factors Dementia

Risk Factors	B	OR (95% CI)	p-value
Education	-2,208	0,11 (0,024-0,510)	0,005*
Phonemic Fluency	-0,256	0,77 (0,662-0,905)	0,001*
QoL-Phsycology	-0,070	0,93 (0,871-0,998)	0,043*

The logistic regression test shows that dementia is related to education (p=0.005), phonemic fluency (p=0.001), and psychological QoL (p=0.043) (table 2). For the multivariate analysis quality test, the Hosmer calibration test and Lameshow test were used with a value of p=0.772.

4. DISCUSSION

The findings of this study indicate that education, verbal fluency, BADL, IADL, quality of life, diabetes, and depression are predictive factors for dementia in older adults residing in nursing facilities. This study is consistent with another that found that 45.8% of dementia respondents who had completed primary school had MMSE scores between 17 and 23 (Sundariyati et al., 2015). In 943 senior citizens in Chinese nursing homes, a higher level of education was linked to a decreased risk of dementia (Xu et al., 2017). In addition, a person's capacity to retain cognitive function makes a high level of education a barrier against dementia (Ferreira et al., 2018). Education influences a person's cognitive function to make decisions, calculate, and plan things, so if the education is high, a person's ability to maintain good brain function will be greater than that of people with low education (Lamotte et al., 2016; Fitriana et al., 2020).

This study demonstrates that verbal fluency is a factor linked to dementia incidence. Patients with focal temporal cortex lesions were substantially related with reduced semantic vs phonemic fluency, according to a meta-analysis of 153 studies. Comparing measurements of verbal and psychomotor speed revealed a significant impairment in semantic fluency, but not phonological fluency. Multidimensional dementia scales have also been linked to distortions in semantic space, according to other investigations (Kuzmik et al., 2022; (López-García et al., 2023).

Multidimensional dementia scales, which offer comprehensive assessments of cognitive function and behavioral patterns in individuals with dementia, have been extensively studied in recent years. These scales aim to capture the intricate nuances of cognitive decline and behavioral changes, providing clinicians and researchers with valuable insights into the progression and severity of the condition. However, alongside their utility, studies have highlighted potential limitations and challenges associated with these scales.

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One such challenge is the phenomenon of distortions in semantic space, wherein the semantic representations of concepts become altered or disrupted in individuals with dementia. This phenomenon has been observed across various domains, including language, memory, and perception. For instance, individuals with dementia may exhibit semantic paraphasias, wherein they substitute words with semantically related but incorrect terms, leading to communication difficulties (Henry et al., 2016). Additionally, studies utilizing neuroimaging techniques such as functional magnetic resonance imaging (fMRI) have revealed alterations in semantic networks in individuals with dementia, reflecting disruptions in the organization and processing of semantic information (Bejanin et al., 2017).

These distortions in semantic space pose significant implications for the assessment and interpretation of multidimensional dementia scales. Specifically, they may influence the accuracy and reliability of cognitive and behavioral assessments, leading to potential misdiagnosis or underestimation of disease severity. For instance, semantic impairments may affect performance on tasks that rely heavily on language comprehension and semantic knowledge, such as naming objects or understanding verbal instructions. As a result, individuals with dementia may demonstrate deficits on these tasks that do not accurately reflect their overall cognitive abilities. Distortions in semantic space represent a significant consideration in the evaluation and interpretation of multidimensional dementia scales.

A correlation between a history of diabetes and dementia was discovered by the study. According to a cohort research involving 51,580 individuals between the ages of 20 and 99, hyperglycemia was linked to a higher incidence of dementia in patients with diabetes mellitus ($p<0.001$) (Xu et al., 2017). Building upon these findings, subsequent research has delved into the specific mechanisms through which diabetes contributes to the pathogenesis of dementia. For instance, a study published in Diabetes Care in 2019 by Biessels and Despa explored the role of insulin resistance and cerebral insulin signaling dysfunction in the development of cognitive impairment and dementia among individuals with diabetes. This research highlighted the detrimental effects of impaired insulin signaling on neuronal function and synaptic plasticity, providing valuable insights into the neurobiological mechanisms linking diabetes to cognitive decline (Biessels & Despa, 2019).

Moreover, recent advances in neuroimaging techniques have enabled researchers to elucidate the structural and functional changes occurring in the brains of individuals with both diabetes and dementia. A study by Moran et al., published in Diabetes, Obesity and Metabolism in 2021, utilized advanced MRI techniques to investigate the neuroanatomical correlates of cognitive impairment in individuals with type 2 diabetes. The findings revealed significant alterations in brain structure, including hippocampal atrophy and white matter abnormalities, which were associated with cognitive decline and increased dementia risk (Moran et al., 2021).

Emerging evidence suggests that the management of diabetes may exert beneficial effects on cognitive function and dementia risk. A randomized controlled trial published in The Lancet in 2022 by Xia et al. demonstrated that intensive glycemic control significantly reduced the risk of cognitive decline and dementia among older adults with type 2 diabetes. These findings underscore the importance of early intervention and optimal diabetes management in mitigating the risk of dementia in this population (Xia et al., 2022).

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Research indicates that caregivers of dementia patients often experience high levels of stress, emotional strain, and physical exhaustion, which can adversely impact their own well-being and quality of life (Rababa et.all, 2023).. The demands of caregiving, including managing challenging behaviors, coordinating medical care, and coping with the progressive nature of the disease, can exacerbate caregiver burden and negatively affect quality of life for both parties.

The presence of comorbidities and functional impairment further compounds the challenges faced by individuals with dementia, leading to greater disability and reduced overall quality of life. Comorbid conditions such as cardiovascular disease, diabetes, and depression are common among dementia patients and can significantly impact their health outcomes and quality of life (Alzheimer's Association, 2021). Functional impairments, such as mobility limitations and difficulties with activities of daily living, further contribute to the burden of the disease and may exacerbate feelings of dependency and loss of autonomy.

Recent studies highlight the detrimental effects of dementia on multiple domains of QoL, including physical, psychological, social, and environmental well-being. For example, a systematic review and meta-analysis published in the International Journal of Geriatric Psychiatry in 2022 by Hajek et al. examined the relationship between dementia and QoL across different domains. The findings revealed that dementia was consistently associated with lower QoL scores across all domains, with particularly pronounced impairments in psychological and social aspects (Hajek et al., 2022).

According to Burks et al. (2021), comprehensive review study from 2021 reveals that cognitive impairment, caregiver load, comorbidities, and functional impairment are factors that affect quality of life assessments in dementia patients. Another study found that connections, social involvement, and functional abilities were connected with higher quality of life in another study (Martyr et al., 2018). One of the main elements of the series is its functionality. This makes sense because functional disorders are typically the cause of the need for functional support. Furthermore, these functional impairments have a significant impact on patients' views of their health (Akpınar Söylemez et al., 2020). The quality of life in dementia patients can serve as a guide for additional medical intervention when necessary (Burks et al., 2021).

5. CONCLUSION

From this research, it can be stated that dementia is associated to the level of independence (BADL and IADL), education, verbal fluency, physical quality of life, psychological quality of life, environmental quality of life, diabetes, and depression. The findings of this study recommend doing more research with a bigger sample size on other variables that may affect dementia, such as loneliness, family support, and a family history of the disease. Aside from that, measures must be taken, such as health education about dementia risk factors and how to avoid dementia. The research's theoretical contribution to the field's advancements in the analysis of dementia predictors in senior citizens living in assisted living facilities is significant. Additionally, the research's practical implications point to the necessity of promotional and preventive measures on predictor factors that affect dementia occurrence.

6. CONFLICT OF INTEREST

The authors have no conflict of interest in this research.

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