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Determinants of Dementia Among the Elderly in Jakarta, Indonesia

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ABSTRACT

Background: The incidence of dementia rises sharply, and it is expected to grow worldwide in the decades ahead. This study aimed to investigate the determinants of dementia among the elderly in Jakarta, Indonesia.
Subjects and Method: A cross-sectional design was employed in the Aisyah organization at Jakarta City, Indonesia. A total of 65 elderly people were selected using Stratified random sampling. The dependent variable was dementia. The independent variables were education, occupation, married status, and exercise routine. The dementia was assessed using the Mini-Mental State Examination (MMSE) questionnaire, which was translated into Bahasa.
Results: The participants had an education level of high school or below (52.31%), were not married (53.85%), and were not working (55.38%). The majority reported frequent exercise (92.31%), and 44.62% were identified with dementia. Bivariate analysis showed that higher education (OR = 0.92; 95% CI= 0.26 to 3.22; p= 0.002) and being married (OR= 0.94; 95% CI= 0.34 to 2.61; p= 0.020) were significantly associated with lower dementia risk. Exercise routine showed a strong protective effect (OR = 0.17; 95% CI= 0.01 to 1.79; p= 0.043), while occupational status was not significantly associated (p= 0.074). In multivariate analysis, only exercise routine remained significantly associated with dementia (OR= 0.17; 95% CI= 0.01 to 1.78; p= 0.042), suggesting it as an independent protective factor after controlling for confounders.
Conclusion: Regular physical activity was identified as a significant protective factor against dementia among the elderly. Promoting exercise may be an effective strategy for dementia prevention in this population.

Keywords: Cognitive function, dementia, determinants, elderly

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BACKGROUND

The WHO (2018) reports that dementia prevalence increases with age, making it a growing concern as global demographics shift towards an older population. In Indonesia, particularly in Jakarta, the incidence

of dementia is on the rise due to the increasing elderly population. This trend is reflected in the Aisyiyah Organization's efforts to support elderly members through targeted programs and interventions, such as those with Diabetes Mellitus (Rahayu et al., 2025). Indonesia is currently experiencing a significant demographic shift with an increasing elderly population, entering what is known as the aging population era. As of 2023, the elderly accounted for 11.75% of the population, with the number expected to rise in the coming years (Dinkes DKI Jakarta, 2021). In Jakarta, this demographic change mirrors a growing prevalence of dementia, presenting substantial challenges to healthcare systems and affecting the quality of life for many elderly individuals.

Cognitive function involves a set of mental processes that enable individuals to acquire, process, and store information. These processes include memory, attention, language skills, and decision-making. A decline in cognitive function can lead to dementia, a syndrome significantly affecting memory, thinking, orientation, comprehension, and judgment. Research has shown that cognitive function is influenced by various factors, including genetic predisposition, environmental conditions, educational background, and overall physical health (Lee et al., 2019). Furthermore, maintaining cognitive function through physical activity, a balanced diet, and social interaction is essential in preventing or delaying the onset of dementia (Smith et al., 2016).

Recognizing the importance of community-based approaches. This involves not only understanding the factors influencing cognitive function but also promoting practices that can sustain or improve mental health among older adults. Through a comprehensive examination of cognitive function and its impact on dementia prevalence, the study provides valuable insights for enhancing elderly health and well-being in urban Indonesia. This study aimed to explore the relationship between cognitive function and dementia prevalence among elderly members of the Aisyiyah Organization. By identifying the key determinants of cognitive health, this research seeks to inform the development of targeted intervention strategies that can improve quality of life and reduce dementia risk among the elderly.

SUBJECTS AND METHOD

1. Study Design

This study utilizes an observational quatitative design with cross-sectional aproach. The research was conducted from July to November 2024.

2. Population and Sample

The study involved elderly participants aged 60 and above, who were recruited from those enrolled in the Aisyiyah Organization. Stratified random sampling was employed to ensure the sample's representativeness. Recruitment was carried out through announcements at organizational meetings and direct contact by the research team, ensuring a representtative sample of active organization members. The inclusion criteria was elderly aged 60 and above. Those with severe medical conditions, such as significant hearing impairments or major neurological disorders, were excluded to ensure reliable cognitive assessments and maintain data integrity.

3. Study Variables

The dependent variable was dementia. The independent variables were education, occupation, married status, and exercise routine.

4. Operational Definition of Variable

Dementia: refers to a clinical condition characterized by a decline in cognitive function that interferes with daily life and activities. In this study, dementia is the outcome being measured—whether or not an elderly

individual is diagnosed or shows signs of dementia.

Education: indicates the highest level of formal education completed by the respondent.

Occupation status: describes whether respondent held job or not during their productive years.

Married Status: indicates whether the respondent is currently being married or not.

Exercise Routine: refers to the frequency and regularity of physical activity performed by the respondent

5. Study Instruments

Dementia diagnosis adhered to criteria from DSM V under the diagnosis of Major Neurocognitive Disorder (APA, 2013), ensuring alignment with internationally recognized standards. Cognitive function was meticulously assessed using the Mini-Mental State Examination (MMSE) Indonesian version, which is a widely recognized and validated tool for evaluating various cognitive domains, including memory, attention, language, and orientation.

6. Data Analysis

All assessments were conducted by trained professionals to ensure consistency and reliability. Data were analyzed using STATA13, employing univariate, bivariate, and multivariate analysys. Statistical significance was set at p-value < 0.05, and potential confounders were controlled by multivariate logistic analysis.

7. Research Ethics

To ensure ethical standards and minimize biases, standardized protocols were employed throughout participant recruitment and data collection processes. Informed consent was obtained from all participants, and they were assured of the confidentiality and anonymity of their responses

RESULTS

1. Sample Characteristics

Table 1 shows distribution characteristics of respondents with dementia among the elderly in Jakarta. The majority of participants had an education level of high school or below (52.31%), while 47.69% had education beyond high school. Slightly more than half of the respondents were not married (53.85%), with the remainder (46.15%) being married. In terms of occupational status, 55.38% were not working, and 44.62% were still working. Most participants (92.31%) reported engaging in frequent exercise, while only 7.69% did not exercise. As for dementia status, 44.62 of respondents were identified with dementia, whereas 55.38% did not show signs of dementia (Table 1).

Table 1. Distribution characteristics of respondents with dementia among the elderly in Jakarta

Characteristic	Category	Frequency (n)	Percentage (%)
Education	>High School	31	47.69
	≤High School	34	52.31
Marital Status	Married	30	46.15
	Not Married	35	53.85
Occupational Status	Working	29	44.62
	Not Working	36	55.38
Exercise Routine	Frequently	60	92.31
	None	5	7.69
Dementia	Yes	29	44.62
	No	36	55.38

2. Bivariate Analysis

Education showed a protective effect against dementia, with an odds ratio (OR) of 0.92 and a 95% confidence interval (CI) ranging from 0.26 to 3.22 (p= 0.002), indicating that individuals with higher education levels

were less likely to develop dementia. Marital status also showed a significant association (OR= 0.94; 95%CI= 0.34 to 2.61; p= 0.020), suggesting that being married may slightly reduce the risk of dementia, although the strength of the association is modest.

Occupational status had an odds ratio of 1.19 (95%CI= 0.34 to 0.22; p= 0.074), indicating a higher risk of dementia among those not working, though this result was not statistically significant. Meanwhile, exercise routine demonstrated a strong protective effect, with an odds ratio of 0.17 (95%CI= 0.01 to 1.79; p= 0.043), suggesting that individuals who engaged in regular physical activity had a significantly lower likelihood of experiencing dementia (Table 2).

Table 2. Bivariate analysis of determinants of dementia among the elderly in Jakarta

Variables	OR	CI95%		p
		Lower limit	Upper Limit	
Education	0.92	0.26	3.22	0.002
Marital Status	0.94	0.34	2.61	0.020
Occupation Status	1.19	0.34	3.22	0.074
Exercise Routine	0.17	0.01	1.79	0.043

3. Multivariate Analysis

The multivariate analysis examined the combined effect of education, marital status, and exercise routine on dementia prevalence while controlling for potential confounders. Education had an odds ratio (OR) of 1.02 (95%CI= 0.36 to 2.86; p= 0.061), indicating no significant association between education level and dementia when adjusted for other variables. Similarly, marital status was not significantly associated with dementia (OR= 0.93; 95%CI= 0.34 to 2.54; p=0.090), suggesting that its protective effect observed in the bivariate analysis may be influenced by other factors. In contrast, exercise routine remained significantly associated with a lower risk of dementia even after adjustment, with an odds ratio of 0.17 (95%CI= 0.01 to 1.78; p= 0.042). This result supports the finding that regular physical activity may serve as a strong protective factor against dementia in the elderly population (Table 3)

Table 3. Multivariate analysis of determinants of dementia among the elderly in Jakarta

Variables	OR	CI95%		p
		Lower limit	Upper Limit	
Education	1.02	0.36	2.86	0.061
Marital Status	0.93	0.34	2.54	0.090
Exercise Routine	0.17	0.01	1.78	0.042

DISCUSSION

The results of the bivariate analysis indicated that three variables educational attainment, marital status, and regular physical exercise—were each significantly linked to the prevalence of dementia. Specifically, individuals with higher education levels, those who were married, and those who engaged in routine physical activity appeared to have a lower likelihood of developing dementia. However, when these factors were analyzed together in the multivariate model, only the variable related to physical exercise maintained its statistical significance. This suggests that engaging in regular exercise independently contributes to a reduced risk of dementia, exerting a strong protective effect. In contrast, the associations observed

for education and marital status diminished after controlling for potential confounding variables. This reduction implies that the initially observed effects of education and marital status may be explained by their correlations with other variables, such as socioeconomic status, social engagement, or overall health behaviors, rather than exerting direct independent influences on dementia risk.

This result was supported by Sun (2024), who stated that higher educational levels coupled with being married are associated with a lower risk for severe cognitive impairment in older people. A meta-analysis by Sommerlad et al. (2018) also adds that lower education partly accounts for the increased dementia risk seen in widowed individuals. In contrast, more critical analysis by Seblova et al. (2021) stated that prolonged education has very small or negligible causal effects on dementia risk, and without adult socioeconomic status being altered, it cannot be uncritically considered a modifiable risk factor for dementia. Additionally, merely being educated is not the same as engaging in lifelong learning. The brain is like a muscle it requires regular exercise to function optimally. Without consistent mental stimulation, cognitive decline, particularly in memory, is inevitable.

Many studies have supported that being married is consistently linked to a reduced risk of dementia compared to being widowed, divorced, or lifelong single (Fan et al., 2015; Skirbekk et al., 2023; Zhang et al., 2020). A few studies also accounted for these modifying factors in the gender criteria, where it was implied in men but not in women (Najar et al., 2021). Furthermore, Sundström et al. (2016) explained that nonmarried individuals, especially those living alone, may be at higher risk for early-onset and late-onset dementia. However, while it may seem logical that married individuals or those with companionship have a lower risk of dementia compared to those living alone, this is not always the case. Unmarried individuals who actively seek social interaction and engage in daily stimulating activities may similarly reduce their risk. The key factor appears to be consistent mental exercise through social engagement and conversation, rather than marital status alone.

Several studies supported the results of this study, which stated that regular exercise can positively influence cognition and reduce the risk of age-related cognitive decline and dementia (Alty et al., 2020; Blocker et al., 2020). A study by Souza et al. (2022) also added that older women are more responsive to the beneficial effects of physical activity for dementia than men. Lim et al. (2021) explained that regular exercise after atrial fibrillation diagnosis is associated with a lower risk of dementia, with the risk reduction maximizing at 5-6 times per week of moderate-to-vigorous physical activity. A meta-analysis by Dhana et al. (2020) also reported that a healthy lifestyle, including nonsmoking, regular physical activity, moderate alcohol consumption, a Mediterranean-DASH diet, and cognitive engagement, significantly reduces the risk of Alzheimer's dementia.

Study by Yen et al., (2023) explain that exercise affects the brain in many ways, which are: 1) increasing the size of the hippocampus, 2) reducing stress hormones that suppress brain activity, 3) improving sleep quality, and 4) stimulating the release of growth factors. In addition, exercise can provide the brain with blood and nutrients, increase neurotrophic factors (BDNF), neurotransmitters, number of neural stem cells (NeuN, GFAP), and cerebrovascular plasticity (VEGF), affect neuron-glia interactions, and regulate various molecules. These ion homeostasis has a protective effect on the

brain and slows cognitive degradation caused by neurodegenerative diseases and aging.

This study has several limitations that should be acknowledged. First, while key variables such as education, marital status, and exercise routine were included in the analysis, there remain numerous other potential modifying factors that were not accounted for. These may include genetic predispositions, dietary habits, cognitive engagement, social support networks, and environmental exposures, all of which could influence the risk of dementia. The absence of these variables may have led to residual confounding, potentially affecting the observed associations. Furthermore, the cross-sectional design of the study limits causal inferences, as temporal relationships between exposure and outcome cannot be firmly established. Future research should consider a more comprehensive set of covariates and adopt longitudinal approaches to better understand the complex interplay of factors influencing dementia prevalence.

The bivariate analysis showed that education, marital status, and exercise routine were significantly associated with dementia prevalence. However, in the multivariate analysis, only exercise routine remained significantly associated with a strong protective effect. Education and marital status, although initially significant, lost their statistical significance after adjusting for other variables, suggesting that their effects may be mediated or confounded by other factors.

Given that regular physical activity remained a significant protective factor in both analyses, interventions aiming to prevent dementia among the elderly should focus on promoting consistent exercise routines. Although education and marital support are important aspects of overall well-being, they may not independently reduce dementia risk without being accompanied by active lifestyle habits. Future research should explore these relationships further and consider longitudinal designs to assess causal effects.

AUTHOR CONTRIBUTION

M contributed to the study design, conducted field research, and drafted the manuscript. DM participated in data collection and supported manuscript preparation. LHHAS assisted with data analysis and interpretation. SM provided methodological guidance and supervised the research process. VA and AS, as student researchers, were actively involved in fieldwork, data organization, and initial data cleaning. All authors have read and approved the final version of the manuscript.

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CONFLICT OF INTEREST

The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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