Prevalence and Associated Factors of Depression Among Indonesian Elderly with Stroke: Finding from A Nationwide Study

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ABSTRACT

Introduction: Depression is one of the most prevalent neuropsychiatric complications following stroke, particularly among the elderly. It significantly affects recovery outcomes, quality of life, and long-term mortality. However, limited data are available on the prevalence and associated factors of depression among elderly stroke survivors in Indonesia. Depression is one of the most prevalent neuropsychiatric complications following stroke, particularly among the elderly. It significantly affects recovery outcomes, quality of life, and long-term mortality. However, limited data are available on the prevalence and associated factors of depression among elderly stroke survivors in Indonesia.

Objective: This study aimed to examine the prevalence and associated sociodemographic and health-related factors of depression among Indonesian elderly with stroke.

Methods: A cross-sectional study was conducted using secondary data from the 2018 Indonesian Basic Health Research (RISKESDAS), which includes nationally representative health data. A total of 3,025 stroke patients aged ≥ 18 years were included. Depression was assessed using the Mini-International Neuropsychiatric Interview (MINI). Descriptive analysis, chi-square tests, and multivariate logistic regression were performed to identify predictors of depression.

Results: The overall prevalence of depression among elderly stroke survivors was substantial. Bivariate analysis revealed significant associations between depression and variables such as age, sex, education, marital status, urbanization, fruit and vegetable consumption, and BMI ($p < 0.05$). In the final regression model, female sex (OR = 1.789, 95% CI = 1.648–1.962), higher education (OR = 1.268, 95% CI = 1.048–1.534), and being overweight/obese (OR = 1.697, 95% CI = 1.106–1.982) were associated with increased odds of depression. Living in rural areas was associated with a reduced risk of depression (OR = 0.328, 95% CI = 0.106–0.982).

Conclusion: Several sociodemographic factors were significantly associated with depression among elderly stroke survivors in Indonesia.

Implications: Screening and tailored interventions targeting high-risk groups are critical for improving mental health outcomes in post-stroke care settings.

Keywords: depression, elderly, gender differences, prevalence, stroke

INTRODUCTION

Depression is a major public health concern, especially among older adults. Globally, it affects approximately 5.7% of individuals aged 60 and above, contributing to decreased quality of life, increased disability, and greater healthcare utilization (World Health Organization, 2017). In Indonesia, the growing elderly population has placed increased focus on the mental health challenges faced by this demographic. Despite its prevalence, depression in the elderly often remains underdiagnosed and untreated, partly due to stigma, limited access to mental health services, and underrecognition by healthcare providers. As a result, depression can go unnoticed, exacerbating functional decline and increasing morbidity in older individuals (Gunawan & Huang, 2022). Understanding the burden and predictors of depression in this population is critical for effective public health planning.

Among elderly individuals, stroke is a significant risk factor for developing depression. Post-stroke depression (PSD) is a well-documented complication that affects a substantial proportion of stroke survivors. It is associated with poor recovery outcomes, greater functional impairment, and increased mortality (Handajani et al., 2022). Studies have suggested that both biological and psychosocial factors, including neurological damage, decreased mobility, and lack of social support, contribute to depression following stroke. However, in the Indonesian context, limited large-scale studies have examined depression specifically in elderly stroke survivors. This gap highlights the need for research that explores depression not only as a clinical outcome but also in relation to sociodemographic and lifestyle characteristics.

Sociodemographic variables such as age, gender, education level, urban-rural residence, and nutritional behavior have been shown to influence depression risk among older adults. Evidence from Indonesian population-based studies indicates that elderly individuals with low education levels, unmarried status, and poor dietary habits are more likely to experience depression (Handajani et al., 2022). Regional disparities also play a role, with rural areas often associated with poorer access to mental health resources. Furthermore, findings from a recent study found that elderly individuals living in nursing homes had high rates of depression due to isolation and lack of emotional support (Gunawan & Huang, 2022). These findings underscore the need to evaluate multiple contributing factors in understanding depression among elderly stroke survivors.

Building on prior work, including our own study on physical activity and depression among Indonesian adults with stroke (Apriliyasari et al, 2022), this study aims to examine the prevalence and associated factors of depression specifically among elderly stroke survivors in Indonesia using nationwide data. By analyzing sociodemographic, lifestyle, and health-related factors, this study seeks to provide comprehensive insights into depression in this vulnerable population. The findings are expected to inform policies and interventions targeting mental health promotion and early detection of depression among elderly Indonesians with a history of stroke.

MATERIALS AND METHODS

Study Design and Setting

This cross-sectional study utilized secondary data from the 2018 Basic Health Research (*Riset Kesehatan Dasar*, RISKESDAS), a nationally representative survey conducted by the Indonesian Ministry of Health. RISKESDAS collects comprehensive health-related data across all provinces in Indonesia, including information on stroke prevalence and associated physical and mental health conditions.

Study Population and Sampling

The study population included individuals with a diagnosis of stroke, as identified in the RISKESDAS 2018 dataset. A total of 3,025 individuals with stroke were included in the analysis. Stroke diagnosis was based on self-reported medical history or confirmation by healthcare

professionals during the survey. Inclusion criteria were: (1) age 60 years or older, (2) confirmed diagnosis of stroke, and (3) complete data on depression status, age, and gender.

Variables and Measurement

The primary outcome variable was depression. Depression was assessed using the Mini International Neuropsychiatric Interview (MINI). The MINI has demonstrated good inter-rater reliability ($\kappa = 1.00$), test–retest reliability (Spearman's $\rho = 0.87$), sensitivity (0.86), and specificity (0.84) for detecting depression (Sheehan et al., 1998). The Indonesian version of the MINI has also shown acceptable inter-rater reliability ($\kappa = 0.62$) and sensitivity ranging from 0.60 to 0.80 (Idaiani, 2020). The independent variables included age and gender. Age was categorized into three groups: 60-69 years, 70-79 years, and ≥80 years. Gender was categorized as male or female.

Data Collection

Data on depression status, age, gender, and stroke diagnosis were extracted from the RISKESDAS 2018 dataset. The prevalence of depression was calculated for each age and gender group.

Statistical Analysis

Descriptive statistics were used to summarize participants' demographic characteristics and the prevalence of depression. Continuous variables are presented as mean and standard deviation (SD), while categorical variables are presented as frequencies and percentages. Bivariate analysis using chi-square tests was conducted to assess associations between independent variables and depression status. Variables with a p-value < 0.25 in the bivariate analysis were included in a multivariate binomial logistic regression model to identify predictors of depression. A forward stepwise method was used in the regression analysis. Statistical significance was set at $p < 0.05$. All analyses were conducted using SPSS version 26.

Ethical Considerations

Ethical approval for this secondary data analysis was obtained from the Ethics Committee of the Indonesian Ministry of Health. The dataset used was fully anonymized to ensure confidentiality, and permission to access and use the RISKESDAS data was granted by the relevant data authority.

RESULTS

Table 1 presents the distribution of participants' characteristics and their association with depression status. Several sociodemographic and behavioral variables were significantly associated with depression, including age, sex, education level, marital status, urbanization, fruit and vegetable consumption, and body mass index (BMI) ($p < 0.05$).

Table 1 Demographic Characteristics and Depression Status of Stroke Patients

Variables	All participants (N = 3025)	Depression (n = 628)	No depression (n = 2397)	p value
Age				0.005*
60 - 69 years	1900	371	1529	
70 – 79 years	870	185	685	
≥80 years	255	72	183	
Sex				0.001*
Male	1582	290	1292	
Female	1443	338	1105	
Education				<0.001*
Below primary school	1157	292	865	
Primary school and above	1868	336	1532	

Marital Status				0.001*
Single	1995	379	1616	
Married	1030	249	781	
Urbanization				<0.001*
Rural	1436	343	1093	
Urban	1589	285	1304	
Smoking status				0.067
Non smoker	1953	428	1525	
Former smoker	576	101	475	
Current smoker	496	99	397	
Alcohol consumption				0.283
No	2994	618	2376	
Standard	6	2	4	
Over	25	8	17	
Fruit and vegetables consumption				0.009*
Enough	121	19	102	
Less	2826	583	2243	
No	78	26	52	
Sweet food				0.224
Highest	1556	336	1220	
Moderate	1095	209	886	
Lowest	374	83	291	
Sweet drink				0.220
Highest	1082	234	848	
Moderate	1208	258	950	
Lowest	735	136	599	
Body Mass Index				<0.001*
Underweight	278	65	213	
Overweight and Obesity	876	139	737	
Normal weight	1871	424	1447	

*$p<0.05$

Figure 1 illustrates the prevalence of depression across age groups and sex. Among elderly stroke survivors, the prevalence of depression increased with age in both males and females. However, female participants consistently exhibited higher prevalence rates than males across all age categories. The highest prevalence was observed among females aged 70–79 years.
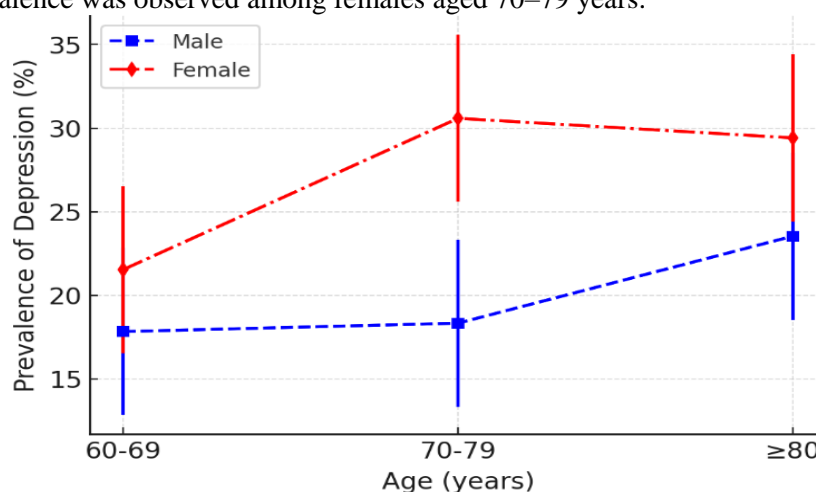
Figure 1. Age and gender-specific prevalence of depression. The prevalences of depression in females are higher than those in males in all age groups.

Table 2 displays the results of the multivariate binomial logistic regression analysis, identifying predictors of depression among elderly stroke survivors. Female sex was associated with significantly higher odds of depression compared to males (OR = 1.789, 95% CI [1.648, 1.962], p = 0.019). Participants with education at the level of primary school or above had higher odds of experiencing depression compared to those with less than primary education (OR = 1.268, 95% CI [1.048, 1.534], p = 0.014). Additionally, overweight and obese individuals had significantly higher odds of depression than those with normal or underweight BMI (OR = 1.697, 95% CI [1.495, 1.982], p = 0.039). Interestingly, living in urban areas was associated with a lower likelihood of depression compared to residing in rural areas (OR = 0.328, 95% CI [0.106, 0.595], p = 0.002).

Table 2. Multivariate binomial logistic regression model predicting depression among Indonesian elderly with stroke

Variable	Odds ratio	Standard error	*p* value	95% confidence interval
Sex				
Male	Ref	-	-	-
Female	1.789	0.101	0.019[*]	1.648 to 1.962
Education				
Below primary school	Ref	-	-	-
Primary school and above	1.268	0.097	0.014[*]	1.048 to 1.534
Urbanization				
Urban	Ref	-	-	-
Rural	0.328	0.093	0.002[*]	0.106 to 0.595
Body Mass Index				
Others	Ref	-	-	-
Overweight and Obesity	1.697	0.175	0.039[*]	1.495 to 1.982

[*]p<0.05

DISCUSSION

This study explored the prevalence and associated factors of depression among Indonesian elderly with stroke. The findings indicated that female gender, higher educational attainment, and being overweight or obese were associated with increased odds of depression. Conversely, residing in rural areas was linked to lower odds of depression.

The higher prevalence of depression among females aligns with existing literature indicating greater vulnerability to post-stroke depression due to biological, psychosocial, and cultural factors (Bartoli et al., 2013; Guiraud et al., 2015). Hormonal differences, caregiving expectations, and greater emotional expressiveness may contribute to this trend.

Interestingly, individuals with primary education or higher were more likely to experience depression. Although higher education is often associated with better health outcomes, it may also correlate with increased awareness of disability or health-related quality-of-life declines post-stroke, thus increasing vulnerability to psychological distress (Hackett & Pickles, 2014).

Contrary to some findings in high-income settings, living in rural areas was associated with a reduced risk of depression. This may reflect greater social cohesion and community-based support systems common in rural Indonesian settings (Subedi et al., 2021), which can act as protective factors against psychological burden after stroke. Alternatively, rural populations may underreport depressive symptoms due to stigma or lack of access to mental health services.

Overweight and obesity were also associated with an increased risk of depression, which is consistent with a growing body of evidence describing a bidirectional link between adiposity and depression (Luppino et al., 2010). Mechanisms may include systemic inflammation, reduced physical activity, and stigma related to body image.

Although age, marital status, and fruit/vegetable intake were significantly associated with depression in the bivariate analysis, they did not remain significant in the multivariate model. This suggests their effects may be mediated or confounded by stronger predictors in the final model.

These findings highlight the importance of routine depression screening and integrated care approaches for elderly stroke survivors, particularly for women, those with higher education, and individuals who are overweight. Mental health promotion strategies in rural areas should be strengthened to maintain existing protective factors and ensure equitable access to mental health care.

CONCLUSIONS

This study highlights a substantial prevalence of depression among Indonesian elderly stroke survivors, with notable disparities based on gender, education, urbanization, and body mass index. Female participants, those with higher education levels, individuals with higher BMI, and those living in rural areas were more likely to experience depression. These findings underscore the importance of integrating mental health screening and tailored interventions into post-stroke care, especially for at-risk populations. Addressing depression in elderly stroke patients requires a comprehensive approach that considers both sociodemographic and health-related factors. Future research should explore longitudinal data to better understand causal relationships and inform evidence-based mental health strategies in stroke rehabilitation services.

Availability of Data and Materials

The datasets generated and analyzed during this study are available from the corresponding author upon reasonable request.

Authors' Contributions

R.W.A and F.H conceptualized the study and designed the methodology. N.P.W and F.Z analyzed the data. R.W.A and D.S.P wrote the original draft, and all authors contributed to reviewing and editing the manuscript. All authors have read and approved the final version of the manuscript.

Conflict of Interest

There is no conflict of interest in this researches.

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