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DEPRESSIVE SYMPTOMS AND SELF-RATED POOR SLEEP QUALITY AMONG INDONESIAN OLDER ADULTS: A GENDER-STRATIFIED CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Depressive symptoms and sleep disturbances are major challenges in healthy aging. A previous study highlighted the bidirectional consequences of depressive symptoms and sleep disturbances in older adults. However, gender differences in this association remain unclear. The study aimed to examine the association between depressive symptoms and self-rated poor sleep quality based on gender in older Indonesian adults.
Methods: A cross-sectional study was conducted using door-to-door interviews with total sampling in a sub-village in Indonesia. The study included 121 older adults from one sub-village. Depressive symptoms were measured using the Geriatric Depression Scale (GDS). Sleep disturbance was assessed using a self-rated measure of overall sleep quality. Pearson's chi-square and crude logistic regression by gender were utilized to infer the significant association.
Results: The prevalence of depressive symptoms and sleep disturbances was 19% and 15.7%, respectively. Older women experience more sleep disturbances. Pearson chi-squared analysis resulted in the significant effects of depressive symptoms and sleep disturbance in older men only. Moreover, higher depressive symptoms corresponded to a higher probability of sleep disturbance in the general population (OR=3.135, $p<0.05$).
Conclusion: The study confirms previous findings that underline the negative effects of depressive symptoms on sleep in older adults. The current study's results can be used by health professionals to tailor specific programs to reduce depressive symptoms and improve sleep quality in older adults.
Keywords: aging, depressive symptoms, older adults, sleep disturbance

INTRODUCTION

The global increase in life expectancy has led to a dramatic rise in the number of older adults, accompanied by an increase in comorbidity. The World Health Organization (WHO) projects that 80% of older adults will be concentrated in low-and middle-income countries, including Indonesia. The findings using the Global Burden of Disease (GBD) showed that the prevalence of depression at all ages is increasing every year. The GBD findings also highlight

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the switch of high burden of depression from young and middle-aged individuals to older adults (Wu et al., 2024). The increasing population and prevalence of depression in older adults have significant public health implications. This is based on previous research that consistently shows a link between depression in older adults and sleep quality related to healthy aging concerns (Qin et al., 2025). Furthermore, the number of previous studies found a distinctive effect of depressive symptoms and sleep quality by gender difference, with older women experiencing higher negative effects (Niu et al., 2025). Nevertheless, another finding highlighted that older men experience more negative effects in the association of feeling depressed and poor sleep quality (Broström et al., 2018). Finding the association between depressive symptoms and sleep disorders in older adults is a prominent issue in efforts to develop geriatric health programs, especially in approaches based on gender differences.

Sleep disturbance is a significant problem among older adults. Sleep disturbance was highlighted across all countries. A recent systematic review and meta-analysis highlighted that the pooled prevalence of sleep disturbance in older adults reached 40%-50%, and depressive symptoms were one of the common contributors (Fu et al., 2025). Poor sleep quality is also associated with a higher risk of cardiovascular disease and cognitive decline in some preceding studies (Keil et al., 2023; Liu et al., 2024). Moreover, sleep apnea and insomnia were the most prevalent cases of sleep disturbance in older adults; gender differences might show a different result (Fernandes et al., 2024). However, studies examining the context of gender or other demographic factors remain limited, especially in Asia, where the proportion of older adults is rapidly increasing. Thus, addressing the factors associated with sleep disturbance is a critical issue in healthy aging.

Prior investigations on depressive symptoms and sleep disturbance in older adult populations have consistently shown a relationship. Some studies have highlighted bidirectional effects on depressive symptom status and sleep quality. Thus, feeling depressed might induce sleep disturbance and otherwise (de Feijter et al., 2023; Qin et al., 2025). Furthermore, the type of sleep disturbance in older adults could differ by gender, whereas older women are more likely to report insomnia, and older men are more likely to report obstructive sleep apnea (OSA) (Peng et al., 2021). Both of which are highlighted as a pivotal determinant of depressive symptoms in older adults (You & Kim, 2023). Earlier findings also reported socio-demographic effects on depressive symptoms, including gender, social participation, and living arrangements (Hidayati & Wardani, 2025; Naviganuntana et al., 2022). These previous findings highlight the importance of understanding the different types of sleep disturbances that may vary by gender.

The living status of older adults is a significant social determinant of sleep quality, especially in rural areas. A study in Asia highlighted that older adults living in rural areas possessed higher depressive symptoms than in urban areas (H. Liu et al., 2021). Furthermore, living in a rural area, which is disadvantaged in terms of healthcare availability, also increased the probability of sleep impairment (Budiman et al., 2024). Given these concerns, studies related to depressive symptoms and sleep quality in older people based on gender are important.

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Hence, the present study investigated the role of depressive symptoms and sleep disturbances in older adults. We also examined the discrepancy in gender differences in the association between depressive symptoms and sleep disturbance.

RESEARCH METHOD

This study employed a cross-sectional design and collected data in one sub-village in Bantul Regency, Indonesia. Total sampling was employed in the data collection method. Data were collected from older adults in the Kedon Hamlet area, Bantul Regency. The inclusion criteria for selecting respondents were: being aged 60 years or older, no cognitive impairment, and no difficulty with nonverbal communication. Based on Puskesmas (primary healthcare) data, there were initially 157 older adults residing in the Kedon hamlet area of Bantul Regency. During the data collection phase, 35 older adults refused to participate in the study, and one individual was excluded for refusing to have their blood pressure measured. Consequently, the final study included 121 respondents, yielding a response rate of 77.1%. Data collection was performed by a trained data collector in January 2025 through door-to-door interviews.

This study focused on the effects of depressive symptoms and sleep quality in older adults. Demographic information was collected from all respondents to describe their health and social determinants of health. The instrument of the Geriatric Depression Scale (GDS) 15-question version was used to assess the depressive symptoms in older adults (Nassir, 2025). The GDS-15 scores range from 0 to 15, with scores of 5 or higher indicating depressive symptoms. Thus, this study treated depressive symptoms as binary (yes or no). Furthermore, we used one question from the Pittsburgh Sleep Quality Index (PSQI) to examine sleep quality, specifically the question on overall self-rated sleep quality in the last 30 days (yes/no).

The demographic and health-related variables comprised age (numeric), gender (male and female), marital status (married and others), smoking status (yes/no), self-rated health (healthy/unhealthy), hypertension (yes/no), and social participation level (high/low). Social participation was measured by the number of programs respondents were involved in over the last 12 months (0 to 6 activities) and categorized as low (0 to 2 programs) or high (3 to 6 programs).

Univariate, bivariate, and multivariate analyses were conducted to address the association between depressive symptoms and sleep quality in older adults using a cross-sectional study design. For the univariate analysis, frequency, percentage, and mean were employed to illustrate the respondents' characteristics. Pearson's chi-squared test was used to highlight the association between categorical variables. Using the chi-squared test, we assessed the significance of the association between depressive symptoms and sleep quality across all respondents, females only, and males only. Furthermore, we used a crude logistic model to quantify the effects of independent variables on dependent variables across three models: all genders, males, and females. The association was calculated using a 95% Confidence Interval (CI). SPSS Version 22 (IBM, SPSS Inc.) was used for all statistical analyses. This study was

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approved by the Health Research Ethics Committee of STIKES Guna Bangsa Yogyakarta (No. 209/KEPK/XII/2024).

RESULTS

Table 1. presents the characteristics of respondents by sleep quality status among Indonesian older adults. The respondents' mean age was 69.42 (SD = 7.13), and the majority were female (51.2%). The age range of respondents was 60 to 91 years old. In terms of sociodemographics, we also found that most of the respondents were married, had no smoking status, and had high participation, accounting for 81.0%, 86.8%, and 81.8%, respectively. Regarding health-related status, 28.9% and 19.0% of female and male respondents were categorized as unhealthy and having depression symptoms, respectively. The results of blood pressure measurements indicated that 64.5% of the respondents had hypertension.

The bivariate analysis illustrating the factors associated with sleep quality was also elucidated using Pearson's chi-square test (Table 1). In health-related behavior, we found that older adults who were non-smokers and did not have hypertension were more likely to have good sleep quality, but the difference was not statistically significant ($p>0.05$). Social participation level, gender, and self-rated health were not statistically significant. However, the significant effect of feeling depressed was highlighted as a contributor to poor sleep quality in male and female respondents. Furthermore, a separate gender analysis was conducted to examine the effects, as shown in Table 2. The results showed that only older adult males experienced an association between depressive symptoms and sleep quality status ($p<0.05$).

The crude logistic regression results, with 95% confidence intervals, quantifying the effects of depressive symptoms and sleep quality, are shown in Table 3. Patients with depressive symptoms showed an increased probability of depressive symptoms (OR: 3.135, $p<0.05$). Thus, older adults with depressive symptoms experienced poor sleep quality three times more frequently. Moreover, Models 2 and 3 illustrate the increment of poor sleep quality for older adults with depression, but not statistically significant ($p>0.05$).

Table 1. Respondent Characteristics (n=121)

Variable	Total (%)	Sleep quality		p-value
		Good	Poor	
Mean age (SD)	-	69.50 (7.28)	69.00 (6.38)	0.780
Gender				0.527
Male	59 (48.8%)	51 (84.4%)	8 (13.6%)	
Female	62 (51.2%)	51 (82.3%)	11 (17.7%)	
Marital status				0.697
Married	98 (81.0%)	82 (83.7%)	16 (16.3%)	
Others (single/widowed)	23 (19.0%)	20 (87.0%)	3 (13.0%)	
Smoking status				0.705
No	105 (86.8%)	88 (83.8%)	17 (16.2%)	
Yes	16 (13.2%)	14 (87.5%)	2 (12.5%)	
Self-rated health				0.410
Healthy	86 (71.1%)	71 (82.6%)	15 (17.4%)	
Unhealthy	35 (28.9%)	31 (88.6%)	4 (11.4%)	

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Variable	Total (%)	Sleep quality		p-value
		Good	Poor	
Depressive symptoms				<0.05
No	98 (81.0%)	86 (87.8%)	12 (12.2%)	
Yes	23 (19.0%)	16 (69.6%)	7 (30.4%)	
Hypertension				0.515
No	43 (35.5%)	35 (81.4%)	8 (18.6%)	
Yes	78 (64.5%)	67 (85.9%)	11 (14.1%)	
Social participation				0.317
Low	22 (18.2%)	17 (77.3%)	5 (22.7%)	
High	99 (81.8%)	85 (85.9%)	14 (14.1%)	

Table 2. Association of depressive symptoms and sleep quality using Pearson Chi-squared

Depressive symptoms	Sleep quality in men			Sleep quality in women		
	Good	Poor	p-value	Good	Poor	p-value
No	42 (39.8%)	4 (6.2%)	<0.05	44 (42.8%)	8 (9.2%)	0.268
Yes	9 (11.2%)	4 (1.8%)		7 (8.2%)	3 (1.8%)	

Table 3. Depressive symptoms and sleep quality

Variable	Model 1	Model 2 (Men)	Model 3 (Women)
Depressive symptoms			
No	Reference	Reference	Reference
Yes	3.135 (1.07 – 9.18) *	4.667 (0.98 – 22.25)	2.357 (0.50 – 11.08)

Note: n = 121. All models used crude odds ratios. Model 1 explained the odds ratio for all respondents. Model 2 explains the odds ratio for male respondents. Model 3 explains the odds ratio for female respondents. *p<0.05. All models used a 95% Confidence Interval.

DISCUSSIONS

Our study found that the prevalence of depressive symptoms and poor sleep quality in older adults living in rural areas was 19% and 15.7%, respectively. Older women experience more sleep disturbances than older men. However, the significant effects of depressive symptoms and poor sleep quality were only highlighted in older men. Using all gender data in the regression model, we found that the effects of depression in older adults are crucial for sleep quality.

Depressive symptoms were a significant contributor to sleep quality in older adults. Our study highlights that higher depressive symptoms are significantly related to poor sleep. The finding supports previous findings that higher depressive symptom scores forecast the probability of inadequate sleep (Diallo et al., 2024). Our findings also confirmed prior research that revealed the significant consequences of depression and poor sleep patterns in the older adult population (Niu et al., 2025). The progressivity of depressive symptoms and sleep quality can increase in older adults. Aging can be associated with the bidirectional effects of depressive symptoms and older adults' sleep quality over time (Brouwer et al., 2022). There is one main explanation to interpret our findings. The previous study utilized the national health insurance data, highlighting that a high proportion of older adults experience chronic diseases or multimorbidity, which can contribute to the increased risk of depressive symptoms (Husnayain et al., 2020; Zheng et al., 2024). Comorbidities may predict individual mood linked to sleep

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quality. The significant association between comorbidities, depressive symptoms, and sleep quality was found in the preceding study (Zhang et al., 2022).

Some biological mechanisms may link depressive symptoms and sleep disturbances in older adults, and aging may increase this risk. A preceding study using older adults in China revealed that older adults with depression experience a greater elevation of cortical thickness in the left transverse temporal gyrus of the brain. The phenomenon could increase mood and sleep disturbance (W. Li et al., 2023). Depressive symptoms may be associated with elevated proinflammatory cytokines TNF-α and IL-6. The enhancement of TNF-α and IL-6 was associated with cell inflammation, which increases the risk of sleep disturbance. Besides sleep disturbance, a previous study also reported that inflammation can increase the risk of progression of cognitive dysfunction (Köhler et al. 2017 and Ren et al., 2021). These studies underline the bidirectional neurobiological effects between depressive symptoms and sleep disturbance.

The negative effects of depressive symptoms on sleep quality in older adult males were highlighted in our study. Some possible explanations can be provided to support our findings. Related to metabolic syndromes, a previous study highlighted that older men are more likely to experience hypertension. The syndrome could significantly increase the probability of sleep (Hussainy & Shereen, 2024; L. Li et al., 2020). Furthermore, testosterone hormone levels naturally decrease with age, especially in older men. The testosterone levels are significant predictors of nocturnal awakening that increase the probability of sleep disturbance (Hirokawa et al., 2022). However, the association between sleep disturbance and gender differences in the older population needs to be explored further.

This study has several strengths and limitations as a methodological consideration for future studies. The study's strength includes the use of total sampling at the sub-village level in one community, which can be used to describe the context of physical and social health, especially in sleep disturbance research. The implementation of total sampling within sub-village units, along with the utilization of cross-sectional methodologies, effectively elucidates the phenomenon of sleep disorders in relation to current depression status. This study also highlighted gender differences in the association between depressive symptoms and sleep disturbance in older adults. Furthermore, the study's limitations should be considered, as it only focused on one community at the sub-village level. Thus, the study was unable to describe the issue at the national level in Indonesia. Moreover, the assessment of sleep quality relied solely on a single self-reported question in the Pittsburgh Sleep Quality Index (PSQI) rather than a gold-standard observational sleep method, such as actigraphy. Self-reported data may increase the risk of recall bias and may not fully explain the clinical severity of the sleep disorder. Future studies could address the utilization of longitudinal and national surveys to highlight the association between depressive symptoms and sleep disturbance based on gender in the older adult population.

CONCLUSION

This study addressed the association between depressive symptoms and sleep disturbance in older Indonesian adults. Older adults with depressive symptoms are three times more likely to experience sleep disturbances. The bivariate analysis results highlighted the effects of depressive symptoms on sleep quality in older men. However, the statistical significance of the result was not found in the multivariate model with gender interaction. Based on our findings, we highly recommend that the community health nurses or other health professionals integrate

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the routine sleep quality and mental health screenings during the community involvement program. Furthermore, our results suggest that policymakers should enhance the capacity of community health workers and health professionals to detect sleep quality and depressive symptoms in older adults.

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