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Association between sarcopenia and the prevalence of depression among community-dwelling older adults

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ABSTRACT

Background: Depression is a common mental health issue among older adults, especially those living in nursing homes, and sarcopenia is suspected to be a contributing factor. This study aimed to explore the association between sarcopenia and depressive symptoms in elderly residents of social care institutions in Jakarta.

Methods: A descriptive–correlational study with a quantitative approach was conducted. A total of 422 older adults were randomly selected from 1,168 residents of Panti Sosial Tresna Werdha Budi Mulia. Inclusion criteria were willingness to participate, ability to speak Indonesian, residence in the institution, and age ≥60 years. Residents hospitalized during data collection or who declined participation were excluded. Data were collected using the Geriatric Depression Scale (GDS-15) and validated instruments assessing psychosocial status, cognition, sleep quality, physical activity, and sarcopenia markers based on AWGS criteria. Statistical analysis was performed using the Chi-square test, with significance set at $p < 0.05$.

Results: Depressive symptoms were strongly associated with sarcopenia. Older adults with sarcopenia were nearly twice as likely to experience depression as those without (OR = 2.02; 95% CI: 1.35–3.03; $p = 0.001$). Reduced muscle strength, limited mobility, and social withdrawal may increase vulnerability to depression.

Conclusion: Among institutionalized older adults, sarcopenia is a strong predictor of depressive symptoms. These findings highlight the importance of early screening and integrated interventions including physical rehabilitation, nutritional support, and psychosocial programs to reduce depression and improve overall well-being.

Keywords: depression, elderly, institutional care, mental health, sarcopenia.
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INTRODUCTION

Depression is a major global public health problem with a high prevalence. According to World Population Review (2023), Ukraine has the highest prevalence, with 2,800,857 cases (6.3%), followed by the United States with 17,491,047 cases (5.9%) and Estonia with 75,667 cases (5.9%). In Indonesia, 9,162,886 cases of depression have been reported, corresponding to a prevalence of 3.7%.[1] In Southeast Asia, depression remains highly prevalent, particularly among older adults, due to rapid population aging, increasing chronic disease burden, and limited access to mental health services, including in Indonesia. Depression in the elderly is a critical concern, as it significantly reduces quality of life and increases mortality; approximately 27.2% of suicide-related deaths occur among individuals aged ≥60 years.[2] Estimates suggest that 15–20% of community-dwelling older adults experience depression, compared with 25–40% of those residing in nursing facilities.[3] In Indonesia, the prevalence of depression among older adults is 6.1%, with higher rates observed in individuals aged 55–64 years (6.5%), 65–74 years (8.0%), and ≥75 years (8.9%).[4] Notably, the prevalence among older adults living in social care institutions is markedly higher (56.9%) than among those living with family members.[5]

Sarcopenia and depression in the elderly have been shown to be significantly correlated in several research. Between 8% and 87% of older persons with sarcopenia experience depressive symptoms.[6] Sarcopenia and depression were found to be positively correlated in one study, with an odds ratio (OR) of 6.87 (95% CI: 2.06–22.96). However, other research revealed that older people with sarcopenia were 1.7 times more likely to experience depression than people without sarcopenia.[7,8] These findings indicate that sarcopenia is a significant risk factor for depression in older populations. The mechanisms underlying this relationship involve biological factors, such as inflammatory mediators and hormonal changes, as well as psychosocial factors, including decreased mobility and social isolation.[3]

In Indonesia, biopsychosocial factors, such as negative mood and low social support, play a key role in depression among the elderly. Data from the Indonesian Family Life Survey (IFLS) show that older adults with a negative mood have a 1.12 times higher risk of depression, while those with limited social

support have a 0.76 times increased risk.[4] Elderly residents of social institutions often experience restricted social interaction, physical activity, and emotional support-factors protective against both depression and sarcopenia. Greater social support is linked to lower depression risk, as it buffers psychological stress and promotes social engagement and physical activity, both of which reduce the risk of depression and sarcopenia.[9] Moreover, sustained or increased social participation in later life is associated with fewer depressive symptoms, highlighting the importance of social activities for mental health in older adults.[10]

Sarcopenia, the loss of muscle mass and function, is a common condition among older adults and is closely associated with both physical and mental health. It increases the risk of weakness, cognitive impairment, and depression.[5] The prevalence of sarcopenia varies: 1–29% in nursing homes, 14–33% in long-term care facilities, around 10% among hospitalized elderly patients, 10% in Thailand (rising to 30.5% among community-dwelling older adults), and 9.1% in Indonesia based on AWGS criteria.[6,11] Sarcopenia significantly increases the risk of depression and cognitive impairment, with affected individuals having more than twice the risk of depression and nearly twice the risk of cognitive impairment compared to those without sarcopenia, even after adjusting for confounding factors. These findings underscore that sarcopenia affects both physical and mental health, highlighting the need for integrated interventions that address functional capacity and psychosocial well-being in older adults.[9,12]

Evidence on the relationship between sarcopenia and depression remains inconsistent. Research in Indonesia is limited, particularly among elderly residents of social homes, who exhibit higher rates of depression and greater risk factors for sarcopenia compared to community-dwelling older adults.[3] This study therefore aims to examine the association between sarcopenia and depression in elderly individuals living in social homes in Indonesia.

METHODS

This quantitative, descriptive-correlational study examined the association between depression and sarcopenia among older adults at Panti Sosial Tresna Werdha Budi Mulia, Jakarta. The population included all 1,168 residents, with inclusion criteria of age ≥60 years, residency ≥6 months, ability to communicate in Indonesian, and informed consent. Residents with sudden health decline requiring hospitalization or those who withdrew were excluded. A simple random sampling technique was used. Eligible residents were numbered and selected via computer-generated randomization. Sample size, calculated using the Lemeshow formula (95% confidence, $p = 0.05$, 5% margin of error), yielded 384 respondents; adding 10% for non-response resulted in 422 participants.

Data were collected through structured interviews, direct observation, and standardized questionnaires, administered face-to-face by trained research assistants (licensed nurses and public health graduates) to ensure accuracy and accommodate reading or visual limitations. Sarcopenia was assessed according to Asian Working Group for Sarcopenia (AWGS) criteria, and depression was measured using the Geriatric Depression Scale (GDS-15). Procedures included participant selection, instrument preparation, team training, coordination with staff, field data collection, verification, and statistical analysis.

Ethical approval was obtained from the Universitas Indonesia Research Ethics Committee (Ket-597/UN2.F10.D11/PPM.00.02/2024, May 2024), with strict adherence to informed consent, confidentiality, anonymity, voluntariness, and fairness.

RESULTS

The analysis of the relationship between potential sarcopenia and depression in older adults is presented in **Table 1**. Of the 422 respondents, 207 experienced depression, while 215 had normal mental status. The proportion of older adults with potential sarcopenia who experienced depression was higher than those without sarcopenia, at 60.1% versus 42.8%.

Chi-square analysis indicated a significant association between potential sarcopenia and depression ($p = 0.001$). The odds ratio (OR) of 2.02 (95% CI: 1.35–3.03) suggests that older adults with potential sarcopenia are nearly twice as likely to experience depressive symptoms compared to those without potential sarcopenia.

DISCUSSION

This study found that the prevalence of depression among older adults with sarcopenia was 60.1%, significantly higher than among those without sarcopenia (42.8%). Statistical analysis demonstrated a significant association between sarcopenia and depression (OR = 2.02; $p = 0.001$), indicating that older adults with sarcopenia have approximately twice the risk of experiencing depression. These findings highlight the importance of addressing sarcopenia in mental health prevention strategies for older populations. Characterized by reduced muscle mass and strength, sarcopenia leads to decreased physical activity, increased fall risk, and diminished quality of life, all of which may worsen depressive symptoms.

Previous studies consistently demonstrate a strong association between sarcopenia and depressive symptoms in older adults. Sarcopenia has been shown

Table 1. Odds ratio (OR) of depression based on sarcopenia status

Variable	Mental disorder		*P*-value	OR (95% CI)
	Normal (n=215)	Depression (n=207)		
Sarcopenia status				
No	154 (57.2%)	115 (42.8%)	0.001	2.02 (1.35 – 3.03)
Yes	61 (39.9%)	92 (60.1%)		

CI, confidence interval; n, number of participants.

to increase the risk of depression, with a reported relative risk of 1.65 (95% CI: 1.09–2.51).[13] Low muscle strength and slow gait speed are also closely linked to depressive mood, and their combined presence further elevates depression risk.[14,15] A cross-sectional study of community-dwelling older adults in China found that individuals with sarcopenia had higher depression scores, with reduced muscle strength and poorer physical performance (e.g., gait speed) significantly associated with depressive symptoms (p = 0.002).[16] Moreover, mendelian randomization analyses indicated that genetically predicted depression is causally associated with reduced skeletal muscle mass (OR = 0.91; 95% CI: 0.86–0.97; p = 0.004), supporting a bidirectional relationship between depression and sarcopenia.[17]

These findings align with a previous study, which reported that 40% of older adults had sarcopenia and 42.6% experienced depressive symptoms, with quality of life mediating the effects of sarcopenia, malnutrition, and physical inactivity on depression. Path analysis showed that quality of life negatively influenced depression, while malnutrition had a direct positive effect.[7] Consistent with these results, older adults with sarcopenia in the current study were twice as likely to develop depression (OR = 2.02; p = 0.001). Loss of muscle mass and strength can impair mobility, increase fall risk, and reduce independence, leading to psychological distress and social isolation. Therefore, early detection and interventions including nutritional support, strength training, and mobility enhancement are essential to reduce depression risk in institutionalized elderly populations.

Consistent with these findings, previous research confirms that sarcopenia is not only a physical health issue but also a key contributor to mental health decline. Studies have shown that sarcopenia is associated with faster progression of depressive symptoms and a higher incidence of depression over time, particularly among non-smokers.[18] Along with malnutrition and reduced physical activity, sarcopenia negatively affects quality of life and mediates the development of depressive symptoms.

Figure 1. Interview and questionnaire administration with an older adult at Tresna Werdha Budi Mulia Nursing Home, Jakarta. This documentation was conducted with informed consent from the participant and the institution, ensuring confidentiality and adherence to research ethics.

These results underscore the importance of early screening and targeted interventions such as exercise programs, nutritional support, and psychosocial engagement to enhance both physical and mental well-being in institutionalized older adults.[19]

From a biological perspective, sarcopenia is associated with low-grade chronic inflammation, characterized by elevated pro-inflammatory cytokines such as interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α), which also contribute to muscle catabolism and declining muscle function in older adults.[20] Clinical studies have shown that individuals with sarcopenia have significantly higher levels of IL-6 and TNF-α compared to non-sarcopenic groups, indicating a systemic inflammatory component in age-related muscle loss.[21,22] With aging, anabolic hormones such as insulin-like growth factor-1 (IGF-1) decline, further impairing muscle regeneration.[23] Psychologically, the gradual loss of muscle strength and functional capacity reduces independence, increases fear of falling, and lowers self-efficacy, which can lead to feelings of helplessness, low self-esteem, and hopelessness, thereby increasing vulnerability to depressive symptoms.[24]

In Indonesia, social factors such as low educational attainment and inactive

employment are significantly associated with depressive symptoms in the elderly. These findings underscore the need for comprehensive interventions that combine physical activity programs, monitoring of nutrition and muscle health, and strengthened social support in care settings. They also highlight sarcopenia as a key determinant of mental health among older adults.[25] However, this study has limitations. The cross-sectional design prevents causal inference, recruitment from social institutions may introduce selection bias, and potential confounders such as comorbidities, nutrition, medication use, and cognitive status were not fully controlled.

This study contributes novel empirical evidence on the association between sarcopenia and depression in a low and middle-income country (LMIC) context, where access to healthcare, nutrition, and rehabilitation services is limited. Focusing on institutionalized older adults in Indonesia, it demonstrates how physical vulnerability and social dependence jointly increase the risk of depression. The finding that individuals with sarcopenia are twice as likely to experience depression aligns with global evidence while underscoring the need for context-specific interventions in LMICs. Future research should employ longitudinal designs to clarify causal pathways, and intervention studies targeting resistance exercise, nutritional supplementation, and psychosocial stimulation are needed to identify effective strategies for reducing both sarcopenia and depressive symptoms in institutionalized older populations.

CONCLUSION

This study shows a significant association between sarcopenia and depression among older adults living in nursing homes. Individuals with sarcopenia were twice as likely to experience depressive symptoms as those without the condition. These findings underscore the importance of early detection and management of sarcopenia through physical exercise, nutritional support, and functional rehabilitation to reduce depression risk and enhance overall well-being in institutionalized older adults.

ETHICAL CLEARANCE

This study has received ethical approval from the Research Ethics Committee of the Faculty of Public Health, Universitas Indonesia, under approval letter number Ket-597/UN2.f10.d11/ppm.00.02/2024, and has been deemed ethically feasible to conduct.

CONFLICT OF INTEREST

The authors affirm that there are no conflicts of interest, either financial or non-financial, that could potentially influence the conduct, responsibilities, or decision-making processes of this study. This statement reflects the authors' commitment to transparency and scientific integrity.

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AUTHOR CONTRIBUTIONS

RAR, SK, ANLS, and PAA conceived the study and defined its intellectual content. All authors contributed to the literature review and data collection. Data and statistical analyses were conducted by RAR and SK. The manuscript was drafted by RAR and critically reviewed by SK, ANLS, and PAA. All authors revised and approved the final version and take responsibility for all aspects of the work.

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