# The Correlation Between Geriatric Depression Scale and Mini Nutritional Assessment in Geriatric Patients

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## ABSTRACT

**Background:** Geriatric patients often face a combination of physical, psychological, and social challenges, with depression and malnutrition being significant health concerns. This study aims to investigate the correlation between depression, as measured by the Geriatric Depression Scale (GDS), and nutritional status, assessed through the Mini Nutritional Assessment (MNA) in elderly patients.

**Methods:** This cross-sectional study included patients from the Geriatric Outpatient Clinic and Inpatient Department at Haji Adam Malik General Hospital Medan. The GDS and MNA were used to assess depression and nutritional status, respectively. Data analysis was performed using SPSS version 26.0, with correlation tests to explore the relationships between depression and malnutrition.

**Results:** A total of 55 subjects were included in this study. Based on depression assessment, 12 subjects (21.81%) were found to have suggestive symptoms of depression, while 43 (78.19%) had no depression. Regarding nutritional status, 14 subjects (25.45%) had normal nutrition, 9 (16.36%) had malnutrition, and 32 (58.19%) were at risk of malnutrition. No significant associations were found between depression and variables such as age, gender, BMI, or comorbidities, nor with malnutrition. However, a significant correlation was observed between depression and malnutrition (p = 0.001), with depressed individuals more likely to be malnourished or at risk of malnutrition.

**Conclusion:** The findings of this study indicate that depression and malnutrition geriatric patients are closely among correlated. Early screening for both conditions using the GDS and MNA can assist in providing comprehensive care for geriatric patients. Further studies are needed to explore additional factors influencing these conditions in the elderly.

*Keywords:* depression, geriatric depression scale, malnutrition, mini nutritional assessment, geriatric

#### **INTRODUCTION**

Geriatric patients are elderly individuals who suffer from multiple diseases and/or experience a decline in organ function, psychological, social. economic. or environmental factors. These patients integrated healthcare require services multidisciplinary through a approach involving interdisciplinary collaboration.<sup>1</sup> In

2017, Indonesia's elderly population exceeded 9%, surpassing the 7% threshold that marks the onset of an aging population. According to data from the Central Bureau of Statistics and Information, the percentage of elderly individuals in South Sumatra reached 7.47%, while North Sumatra had 13,042,317 elderly people, accounting for 6.3% of the total population in the region.<sup>2</sup> Elderly individuals commonly experience health issues known as "geriatric syndromes," which include conditions such as immobility, instability, incontinence, intellectual impairment (dementia), infections, vision and hearing impairments, constipation, isolation (depression), malnutrition, poverty, iatrogenic conditions medication). insomnia. (due to immunodeficiency, and impotence. Among these, depression is a significant mental health concern for the elderly. Globally, the prevalence of depression in the elderly was estimated at 28.4% in 2022.<sup>3</sup> In Indonesia, studies show that 16.3% of the elderly experience depression.<sup>4</sup> population Depression in the elderly can result from neurotransmitter disturbances (such as reduced beta-adrenergic receptor regulation, decreased serotonin, and dopamine levels), genetic predispositions, psychosocial factors, and personality traits. <sup>5</sup> A commonly used initial screening tool for detecting depression in elderly patients is the Geriatric Depression Scale (GDS), which assesses symptoms and the likelihood of depression. Nutritional status in patients is influenced by various factors, including food intake, comorbidities, medication use, physical activity, and depression. Depression can significantly impact nutritional status by reducing food intake. Malnutrition is defined as an imbalance of macro- and micronutrient intake that negatively affects body.<sup>6</sup> Elderly individuals the are particularly at risk of malnutrition due to physiological changes.<sup>7</sup> These include sensory decline, digestive system changes,

and difficulties accessing nutritious food.

Early detection of malnutrition in elderly

patients can be conducted using the Mini

Nutritional Assessment (MNA), an internationally validated questionnaire designed to identify malnutrition and the risk of malnutrition in elderly patients.<sup>8,9</sup>

A study conducted at UPTD Griva Werdha Surabaya found that elderly patients with depression are nine times more likely to experience malnutrition. This is primarily due to psychological factors, such as mood disturbances, stress, appetite loss, and reduced interest in food, as well as the impact of illnesses and medications. Depression in the elderly is often associated with a loss of appetite, leading to weight loss and malnutrition. Additionally, reduced motivation to purchase and prepare food exacerbates this condition. Conversely, studies also indicate that malnutrition can worsen depressive symptoms. Lower MNA scores are significantly more common in patients with depression compared to those highlighting a bidirectional without, relationship between malnutrition and depression in the elderly.

Despite its significant impact on mental and physical health, nutritional issues in psychogeriatric patients often receive limited attention. Geriatric patients face various physiological challenges, such as difficulty swallowing or chewing. gastrointestinal disorders, diminished taste smell, reduced appetite, mobility and limitations, chronic inflammation, chronic cognitive impairments. illnesses, and particularly depression. Changes in food intake are а hallmark symptom of depression, leading to weight loss and malnutrition in the elderly. The inability of elderly individuals to accurately report their symptoms and the frequent misjudgment of psychological aspects by clinicians make diagnosing geriatric depression more challenging.<sup>10,11</sup> Given this context, the researchers aim to study the correlation between the GDS and the MNA in geriatric patients.

## **MATERIALS & METHODS**

This cross-sectional study was performed in Haji Adam Malik General Hospital Medan.

The inclusion criteria for this study are as follows: patients aged over 60 years who visit the Geriatric Outpatient Clinic or are admitted to the Geriatric Inpatient Department, patients must be able to communicate and read well, have signed the informed consent form, and be willing to participate in the study. Meanwhile, the exclusion criteria are as follows: geriatric patients with cognitive impairments, those unable to complete the questionnaire independently, and those who fail to fill out the questionnaire completely. Patients experiencing cognitive disturbances or decreased consciousness, patients with a prior diagnosis of depression, and those with more than three comorbidities are also excluded from the study.

All patients will be required to complete the provided questionnaire in full. The primary data collected from these patients include age, gender, educational status, marital status, medical history, GDS scores, and MNA scores, which are obtained directly from the fully completed questionnaires. The instrument used to assess depression was GDS, while instrument for malnutrition assessment was MNA. The GDS categorizes depression levels based on the following scores: A GDS score of less than 5 indicates no depression. Scores between 5 and 9 suggest the presence of depression, while a score of 10 or higher is indicative of depression. The MNA is a widely used tool for evaluating the nutritional status of elderly individuals. A score of 24 or higher indicates that the individual is wellnourished, scores ranging from 17 to 23.5 identify individuals who are at risk of malnutrition, and score below 17 signifies malnutrition.

## STATISTICAL ANALYSIS

The collected data will be processed using the programme of Statistical Package for the Social Sciences (SPSS) ver 26.0. А descriptive analysis will be performed to determine the frequency distribution of the characteristics of the study subjects. Next, a normality test will be conducted using the Kolmogorov-Smirnov test. Inferential analysis will be performed using correlation tests. The Pearson correlation test will be applied if the data are normally distributed, while the Spearman correlation test will be used for non-normally distributed data. The results will be presented in terms of pvalues, with a p-value <0.05 indicating statistical significance.

## RESULT

A total of 55 samples were included in this study. Data on the basic characteristics of the study subjects can be seen in Table 1. The median age of the subjects in this study was 71 (60-91), with a higher proportion of females compared to males (72.7% and 27.3%). The average weight of the study subjects was 54.77 (+8.26) kg, and the median height was 1.56 (1.46-1.7). The majority of subjects had a normal body mass index (BMI) (67.3%), followed by overweight (16.4%), obesity (9.1%), and underweight (7.3%). A total of 69.1% of subjects had comorbidities, while 30.9% did not. In this study, most subjects had two comorbidities (34.5%). All subjects underwent depression screening using the questionnaire and malnutrition GDS screening using the MNA questionnaire during admission. The median GDS score of the subjects was 4 (0-9), with 43 (78.19%)subjects not depressed and 12 (21.81%) subjects with suggestive of depression. The median MNA score for the study subjects was 17 (10-23.5). Screening results showed that 14 (25.45%) subjects were normal, 9 (16.36%) subjects were malnourished, and 32 subjects (58.19%) were at risk of malnutrition.

Table 1. Baseline characteristics

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Variable	Mean ± SD/ Median (range)
Age (years)	71 (60-91)
Gender	40 (72.7%)
• Female	15 (27.3%)

Male	
Weight (kg)	$54.77 \pm 8.26$
Height (m)	1.56 (1.46-1.7)
Body mass index (kg/m <sup>2</sup> )	21.76 ( <u>+</u> 2.72)
• Normal	37 (67.3%)
Underweight	4 (7.3%)
Overweight	9 (16.4%)
Obesity	5 (9.1%)
Comorbidities	
No comorbidity	17 (30.9%)
• 1 comorbidity	11 (20.0%)
• 2 comorbidity	19 (34.5%)
• 3 comorbidity	14.5 (14.5%)
GDS score	4.0 (0-9)
• Suggestive of depression	12 (21.81%)
No depression	43 (78.19%)
MNA score	17 (10-23.5)
Normal	14 (25.45%)
Malnutrition	9 (16.36%)
Risk of malnutrition	32 (58.19%)

Most subjects detected with a suggestive of depression on the GDS screening were aged 60-79 years (83.34%), female (66.67%), had a normal body mass index (83.34%), and had 1-3 comorbidities (91.66%). However,

the results of the bivariate test showed no statistically significant differences between the variables of age, gender, BMI, and comorbidities in relation to the depression screening results (Table 2).

Table 2 Depression Prevalence
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		GDS score		Total (n=55)	P
		Suggestive of depression	No depression		
		(n=12)	(n=43)		
Age	60-79 years	10 (83.34%)	34 (79.07%)	44	1.000
	$\geq$ 80 years	2 (16.66%)	9 (20.93%)	11	
Gender	Male	4 (33.33%)	11 (25.58%)	15	0.716
	Female	8 (66.67%)	32 (74.42%)	40	
BMI	Normal	10 (83.34%)	27 (62.79%)	37	0.376
	Overweight	0 (0.0%)	4 (9.31%)	4	
	Underweight	2 (16.66%)	7 (16.27%)	9	
	Obesity	0 (0.0%)	5 (11.63%)	5	
Comorbidities	None	1 (8.34%)	16 (37.21%)	17	0.08
	Presence	11 (91.66%)	27 (62.79%)	38	

Based on malnutrition screening using the MNA (Table 3), subjects at risk of malnutrition were predominantly found in the 60-79 age group (84.37%), female (78.12%), with a normal BMI (68.75%), and the majority had 1-3 comorbidities (65.63%). Malnutrition was more prevalent among subjects aged 60-79 years (66.67%),

male (55.56%), with a normal BMI had (66.67%), nearly 1-3 and all comorbidities (88.89%). Bivariate analysis showed no statistically significant relationship between age, gender, BMI, and comorbidities with malnutrition screening results.

Table 3. Malnutrition	prevalence
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	MNA score	•		Total	P
	Normal (n=14)	Risk of malnutrition (n=32)	Malnutrition (n=9)	(n=55)	
Age 60-79 years	11 (78.57%)	27 (84.37%)	6 (66.67%)	44	0.492

	≥80 years	3 (21.43%)	5 (15.63%)	3 (33.33%)	11	
Gender	Male	3 (21.43%)	7 (21.88%)	5 (55.56%)	15	0.114
	Female	11 (78.57%)	25 (78.12%)	4 (44.44%)	40	
BMI	Normal	9 (64.28%)	22 (68.75%)	6 (66.67%)	37	0.663
	Underweight	2 (14.29%)	2 (6.25%)	0 (0.0%)	4	
	Overweight	3 (21.43%)	4 (12.50%)	2 (22.22%)	9	
	Obesitity	0 (0.0%)	4 (12.50%)	1 (11.11%)	5	
Comorbidities	None	5 (35.71%)	11 (34.37%)	1 (11.11%)	17	0.371
	Presence	9 (64.29%)	21 (65.63%)	8 (88.89%)	38	

Among all subjects with suggestive of depression, 1 (8.33%) had a normal nutritional status, 5 (41.6%) were at risk of malnutrition, and 6 (50%) were malnourished (Table 4). Meanwhile, out of 43 patients without depression, the MNA screening results showed 13 (30.23%) with

normal nutrition, 27 (62.79%) at risk of malnutrition, and 2 (6.98%) with malnutrition. Bivariate analysis revealed a statistically significant relationship between depression and malnutrition based on GDS and MNA screenings (P = 0.001).

Table 4. Correlation between ODS score and MINA score
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		MNA score			Total	Р
		Normal	Risk of	Malnutrition	(n=55)	
		( <b>n=14</b> )	malnutrition	( <b>n=9</b> )		
			(n=32)			
GDS	Suggestive of depression	1 (8.33%)	5 (41.67%)	6 (50%)	12	0.001
score	No depression	13 (30.23%)	27 (62.79%)	3 (6.98%)	43	

## **DISCUSSION**

## **Depression Screening**

In this study, the GDS score for the subjects was 4 (0-9), with 43 (78.19%) subjects not depressed and 12 (21.81%) subjects likely depressed. Previous studies using the GDS questionnaire reported depression rates ranging from 24-84%.<sup>12-15</sup> Both this study and previous research align with a metaanalysis that found the prevalence of depression in the elderly to be 28.4%.<sup>16</sup> The prevalence of depression in individuals aged 60 years or older is 5.7%, and it increases with age, peaking at 85 years with a prevalence of 27%.<sup>17</sup> However, in this study, depression was more common in the 60-79 age group (83.34%) compared to those over 80 years (21.43%). This may be due to the unequal number of subjects in the two age groups.

Gender significantly affects the prevalence and manifestation of depression in the elderly. Previous studies have shown that elderly women are more likely to exhibit depressive symptoms compared to men. This may be due to differences in functional ability, health status, social support, and arrangements.<sup>18,19</sup> Women living also display more depressive symptoms than men, such as loss of interest, hopelessness, disturbances, fatigue, sleep and Additionally, concentration problems. women tend to experience more severe and persistent symptoms.<sup>20</sup> Cognitive levels significantly influence depression in elderly men, while in women, depression is more influenced by functional status, which includes the ability to perform complex daily activities.<sup>21</sup> Consistent with these findings, more female subjects (66.67%) possible depression showed in the screening. However, this study did not compare symptoms between male and female subjects.

There is a bidirectional relationship between BMI and depression in the elderly. Underweight in the elderly is associated with a higher incidence of depression compared to those with a normal BMI or overweight. In women, overweight is associated with a lower incidence of depression, which can be considered a

protective factor. In contrast, for men, being overweight is associated with higher depression scores.<sup>22</sup> In this study, most subjects with likely depression had a normal BMI (83.34%), followed by those who were overweight (16.67%).

Depression in the elderly is often found in those with multiple comorbidities, which negatively affect their health and quality of life. Studies have shown that depression is significantly linked to frailty syndrome, diabetes mellitus, obesity, chronic pain, and multimorbidity. Multimorbidity, or the presence of multiple medical conditions, is associated with а 29% increase in depressive symptoms (odds ratio 1.29). Additionally, multimorbidity is linked to polypharmacy, with elderly patients experiencing polypharmacy having a 60% higher risk of depression (odds ratio 1.6).<sup>23</sup> This study found similar results, with the highest incidence of possible depression occurring in subjects with 1-3 comorbidities (62.79%).

## Malnutrition Screening

Malnutrition is a condition that requires attention in elderly subjects. The prevalence of malnutrition in the elderly varies, on conditions depending living and individual health status. Studies have shown that the prevalence of malnutrition is 4-10% among patients living at home, 15-38% among those in nursing homes, and nearly 50% among hospitalized patients.<sup>24</sup> A study by Praneetvatakul et al., using the MNA questionnaire, found that 4.4% of elderly patients were malnourished and 18.7% were at risk of malnutrition.<sup>25</sup> In this study, the screening results showed that 14 (25.45%) subjects were normal, 9 (16.36%) were malnourished, and 32 (58.19%) were at risk of malnutrition.

A study by Gkiouras et al. showed that elderly individuals are at risk of malnutrition, with 50.4% expressing concerns about the nutritional adequacy of their food. Previous studies indicate that elderly individuals aged 80 and above have a higher risk of malnutrition, influenced by

combination of physiological, a psychological, and social factors that exacerbate nutrient deficiencies, absorption issues, and nutrient utilization problems. About 37.2% of subjects aged 80 and above had swallowing difficulties, which affected their ability to maintain adequate nutrition. In this study, the risk of malnutrition and malnutrition itself was more common in the 60-79 age group, likely due to the larger sample size compared to the group aged over 80.<sup>26,27</sup>

Research conducted by Carrasco in Portugal showed a higher proportion of malnutrition or risk of malnutrition in women compared to men. Women are more vulnerable to malnutrition due to their longer life expectancy, which increases the risk of chronic diseases and functional impairments. Comorbidities and functional impairments can limit mobility and the ability to perform daily activities, including food intake and maintaining nutritional status. Regression analysis found that female gender is an independent risk factor for malnutrition. This study showed that women had a higher risk of malnutrition compared to men, but men had a higher rate of malnutrition. However, this difference was not statistically significant.<sup>28</sup>

BMI is often used to assess nutritional status. The relationship between BMI and malnutrition in the elderly is complex, as both low and high BMI can indicate nutritional disorders and increase the risk of worse health outcomes.<sup>29</sup> In the elderly, malnutrition mav indicated be bv involuntary weight loss or a low BMI. However, even with normal or higher BMI, an elderly person may still experience hidden micronutrient deficiencies that often go unnoticed. Elderly individuals with a BMI < 25 kg/m<sup>2</sup> are at higher risk for malnutrition, which can lead to functional decline, gait and balance issues, increased fall risk, and muscle weakness. Elderly individuals with a BMI > 35 kg/m<sup>2</sup> are associated with poor health outcomes, including an increased risk of malnutrition despite excessive weight. A study by Kiskac

et al. found that the optimal BMI for reducing complications and maintaining good geriatric assessment was 31-32 kg/m<sup>2</sup> for women and 27-28 kg/m<sup>2</sup> for men.<sup>29</sup> In this study, most subjects with malnutrition and at risk of malnutrition had a normal BMI.

Malnutrition in the elderly is often exacerbated by comorbid diseases, such as chronic illnesses and acute inflammation. which can affect metabolism. Comorbid diseases can cause a loss of appetite, metabolic changes, and increased nutritional needs, all of which contribute to the onset and progression of malnutrition. Comorbid conditions such as dementia and Parkinson's disease can significantly cause malnutrition in the elderly, as both are cognitive decline, linked to motor dysfunction, and swallowing difficulties, reducing the elderly's ability to obtain adequate nutrition.<sup>30</sup> In this study, subjects with malnutrition and at risk of malnutrition were more likely to have 1-3 comorbidities (88.89% and 65.63%, respectively), though this was not statistically significant (p-value = 0.371).

## **Correlation Between Depression and Malnutrition**

The bivariate analysis in this study showed a statistically significant relationship between depression and malnutrition based on the GDS and MNA screenings (p =0.001). This finding aligns with previous studies. Research conducted by Velazquez-Alva et al. demonstrated an inverse correlation between MNA the and depression scores, where subjects with better nutritional status had lower depression scores (p < 0.001). This study also found that subjects with depression had a five-fold higher risk of malnutrition (OR 5.85, 95% CI 2.27-14.89).<sup>31</sup> Similarly, the study by Salis et al. established a significant correlation between the MNA and GDS (p <being 0.0001), with malnutrition significantly associated with depression (OR 5.16).<sup>32</sup> Research by Islam et al. showed that malnutrition occurred significantly more often in subjects with depression (p < 0.01), and malnourished elderly individuals had three times the risk of experiencing depression compared to non-malnourished elderly (OR 3.155, 95% CI 1.53-6.49, p = 0.002).<sup>33</sup>

Elderly individuals with depression show weight loss, anorexia, sarcopenia, decreased anthropometric indices, reduced energy intake, and changes in biochemical markers, all of which can contribute to malnutrition. Depression in the elderly can lead to changes in eating patterns, reduced interest in food, and decreased motivation to prepare or eat meals, resulting in inadequate food intake and suboptimal nutritional status.<sup>31</sup> Decreased appetite, weight loss, and reduced mobility are components assessed in the MNA, so depression may affect the MNA score. The study by Islam et al. also identified other risk factors associated with malnutrition and depression, such as unemployment, low socioeconomic status, poor food intake, living alone (without a partner), and a history of smoking.<sup>33</sup>

Acute pain is another significant factor that affects depression and malnutrition in the elderly. A study by Pinto et al. found that patients experiencing acute pain had a 2.45-fold higher risk of depression. Additionally, pain can lead to immobilization and isolation, which can influence eating behavior. This highlights the impact of acute pain on both nutritional status and mental health.<sup>34</sup> The present study did not examine other factors that might influence depression and malnutrition in the elderly.

# LIMITATIONS

Several limitations in this study include the small sample size, which may affect the causal relationship and statistical analysis between variables such as age, gender, body mass index (BMI), comorbidities, and the dependent variables (depression and malnutrition). The limited sample size and the absence of subjects with a GDS score above 10 (indicating depression) could lead to results that may not accurately reflect the general population. This study used a

bivariate Chi-square test, which, while showing a significant relationship between depression and malnutrition, cannot determine the strength of the relationship or whether the relationship is positive or negative. Confounding bias may also have occurred in this study. When performing Chi-square statistical analysis between depression and malnutrition, the researchers did not control for the variables of age, gender, BMI, and comorbidities.

## CONCLUSION

The findings of this study reveal several important aspects regarding depression and malnutrition in the elderly. The average age of the subjects was 71 years, with the majority being female (72.7%) and most having a normal BMI (67.3%). A significant portion of the subjects (69.1%) had comorbidities, with two comorbid conditions being the most common (34.5%). Depression screening, using the GDS, showed that 21.81% of the subjects were Additionally, possibly depressed. malnutrition screening using the MNA indicated that 58.19% of the subjects were at risk of malnutrition. Importantly, a significant relationship was found between depression and malnutrition in the elderly.

#### **Declaration by Authors**

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