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Utilization of Mini Nutrition Assessment-Short Form to Identify Nutritional Status of Hospitalized Elderly Patients at Dr Sardjito General Hospital, Yogyakarta

Pemanfaatan Mini Nutrition Assessment-Short Form *untuk Mengidentifikasi Status Gizi Pasien Lansia Rawat Inap di RSUP Dr Sardjito Yogyakarta*

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ABSTRACT

Background: Identification of nutritional status upon their admission as well as influencing factors related to changes in nutritional status during hospital treatment need to be done to prevent the risk of worsening of the patient's clinical outcomes.
Objectives: This study aimed to find out the nutritional status of hospitalized elderly patients at hospital admission using the Mini Nutrition Assessment-Short Form (MNA-SF) screening tool.
Methods: This study was an observational design with a cross sectional design and conducted at dr. Sardjito Yogyakarta Hospital from September-November 2021. Basic characteristic data is gathered, nutritional screening is performed using MNA-SF, and nutritional status is measured using weight, height, Mid-Upper Arm Circumferences (MUAC), calf circumference, Hand Grip Strength (HGS), total fat percentage, visceral fat, muscle mass and hemoglobin.
Results: A total of 86 elderly patients, ranging in age from 60 to 80 years, were recently admitted to the hospital. The results showed the prevalence of malnutrition in the hospitalized elderly was 46.5%. According to the assessment results, malnourished elderly patients had statistically significant lower Body Mass Index (BMI) (19.4±3.1), total fat levels (20.0±10.9), visceral fat levels (4.4±4.6), muscle mass (34.4±7.7), MUAC (22.6±3.4), calf circumference (27.2±6.7) dan hemoglobin (10.7±3.2) ($p<0.05$).
Conclusions: According to MNA-SF, half of the elderly patients in hospitals were malnourished at hospital admission. Therefore, it is crucial to evaluate the nutritional state of elderly patients as soon as they are admitted and to implement the proper nutritional therapy in order to reduce its negative effects on the patients and healthcare system.

INTRODUCTION

Deficit, excess, or imbalance of nutrients that have a negative impact on body composition, function, and clinical outcomes are referred to as malnutrition[1]. Malnutrition can develop before it is treated as a result of the illness or the effects of inadequate food intake. Malnutrition does, however, occasionally develop while a patient is hospitalized[2].

Malnutrition is common in the older population; internationally, hospital malnutrition rates for senior patients range from 12 to 75%[3]. Malnutrition in the elderly is attributable to a variety of factors, including decreased appetite, depression, functional reliance, cognitive decline, poly-pharmaceuticals, less favorable socioeconomic circumstances, and difficulties chewing and swallowing[4]. Parkinson's disease, constipation, and acute illnesses that raise nutritional demands and alter metabolism are other risk factors that may be present[5].

According to United Nations, those above 60 are considered to be elderly[6]. The number of elderly in Indonesia is 9.6% of the total population with the composition of age dominated by young elderly (60-69 years) with 6.12%, elderly (70-79 years) with 2.66%, the rest are elderly (>80 years). This number is followed by the population of the pre-elderly group (45-59 years old) with 17.16% of the total population[7].

Malnutrition has been demonstrated to have a negative impact on patient clinical outcomes, according

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to hospital consensus[8]. These unanticipated consequences include changes in body composition, the existence of metabolic stress, inflammation linked to mechanisms in disorders that cause anorexia, and depletion of the body's cell cells brought on by decreased intake or assimilation of energy and protein. Clinical outcomes for the patient, including length of hospital stay, home feeding, cost of care, and mortality, are impacted by this[9,10].

Malnutrition in the hospital can occur as a result of eating intakes not meeting nutritional needs caused by decreased nutritional intake, increased nutritional needs due to disease suffered or impaired utilization of nutrients[9]. Mini Nutrition Assessment (MNA), is one of the methods of assessing nutritional status for the elderly that has been developed since 1994. Prior study in hospitals has proven that MNA has high sensitivity, specificity and reliability[11].

Studies found that approximately 75% of patients admitted to the hospital decreased their nutritional status compared to their nutritional status when they began to be treated. This proves that the decrease in nutritional status occurs in hospitals. Decreased nutritional status can raise mortality rates and extend hospitalization days. Adequate intake of nutrients for patients hospitalized is needed to prevent the decrease in nutritional status that occurs during the treatment period because nutrition is integral to treatment or the healing process and shortens the length of hospitalization. Elderly malnutrition prevention and treatment are crucial, thus interdisciplinary collaboration, patient and family involvement, and nutrition care plan and monitoring must be taken into consideration as soon as patients reach the hospital[5].

Hospital malnutrition can occur due to inadequate nutritional intake, increased nutritional needs due to disease, or impaired utilization of nutrients. Identification of nutritional status at the initial time the patient is admitted to hospital as well as influencing factors related to changes in nutritional status during hospital treatment is crucial to prevent the risk of worsening of the patient's clinical outcomes. Therefore, this study aimed to find out the nutritional status of hospitalized elderly patients using the Mini Nutrition Assessment-Short Form (MNA-SF) screening tool.

METHODS

The purpose of this cross-sectional research study with an observational design was to determine the nutritional status of elderly patients at the time of hospital admission. The study was carried out at dr. Sardjito Yogyakarta Hospital. Data collection was carried out in September - November 2021. The study was conducted after obtaining ethical approval from The Medical and Health Research Ethics (MHREC) Faculty of Medicine, Public Health, and Nursing (KE/FK/0383/EC/2021). The study population was all elderly patients who were hospitalized at Dr. Sardjito Hospital I Hospital Inpatient Installation. The sample size was estimated using the Lemeshow formula (1997); the prevalence of malnutrition in the elderly at hospital admission was 10.43% and minimum sample of 78[12], selected using the purposive sampling method. The inclusion criteria in this study were patients aged > 60 years who could communicate well, participate in the study, and sign informed consent.

Basic characteristic data is gathered, nutritional screening is performed using MNA-SF[13,14], and nutritional status is measured using weight, height, Mid-upper arm circumferences (MUAC), calf circumference, Hand grip strength (HGS), total fat percentage, visceral fat, and muscle mass administered using Bio Impedance Analysis (BIA). The secondary data were acquired from the patient's medical file in the form of hemoglobin levels. A trained research enumerator collected the data within the first 24 hours of the patient's admission to the hospital. The patients' weight and height were obtained using the formula: BMI = weight (kg)/height (m). The cut-off using Asian Body Mass Index was <18.5 kg/m^2 if <70 years old, or <20 kg/m^2 if >70 years old[15]. If it was not possible to measure weight and height on the respondent, knee height and upper arm circumference were measured and converted into weight and height estimates.

- Estimated weight Crandal Formula with estimated MUAC
  Male = $((-93.2) + (3.29 \times \text{MUAC}) + (0.43 \times \text{Height}))$
  Female = $((-64.6) + (2.15 \times \text{MUAC}) + (0.54 \times \text{Height}))$

- Formula for estimating height by knee height
  Male = $64.19 - (0.04 \times \text{Age}) + (2.02 \times \text{Knee Height})$
  Female = $84.88 - (0.24 \times \text{Age}) + (1.83 \times \text{Knee Height})$

The six questions on the MNA-SF questionnaire covered appetite, weight loss, mobility, psychological illnesses, cognitive disorders, and either calf circumference or body mass index (BMI). The MNA-SF score has a range of 0 to 14, with the following categories included: malnourished (0–7), at risk of malnutrition (8–11), and well-nourished (12–14) being included[16]. Descriptive analysis, the Chi-square test to determine the relationship between category variables, and analysis of variance (ANOVA) to compare the average nutrient status variable based on the risk of malnutrition with the level of significance statistics of $p<0.05$ are all performed using IBM SPSS version 23 software for statistical data analysis.

RESULTS AND DISCUSSION

All wards at The Inpatient Installation dr. Sardjito General Hospital, Yogyakarta, with the exception of isolation wards, were visited during a 2-month period in 2021 to collect research data. A total of 86 older patients, ranging in age from 60 to 80 years, who had either an infection or a non-infection medical diagnosis was included in the study's participants. Most of the patients' medical diagnoses were non-communicable diseases,

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particularly cancer. Characteristic subjects included 67.4% of patients living with partners and families, 93% of patients treated with a non-infectious medical diagnosis, 57% of men, and 70.9% had never received dietary education related to the disease condition.

Table 1. Characteristics of Subjects

Characteristic	n	%
Gender		
Male	49	57.0
Female	37	43.0
Education		
No formal education	6	7.0
Elementary school	31	36.0
Junior high school	11	12.8
Senior high school	7	8.1
College	31	36.0
Work		
Work	41	47.7
Not working/housewife/retired	45	52.3
Marital Status		
Marry	66	76.7
Widower/widow/unmarried	20	23.3
Smoking Habits		
Smoke	37	43.0
No smoking	49	57.0
Living Environment		
Stay alone	10	11.6
Living with a partner	18	20.9
Living with children and family	58	67.4
Medical Diagnosis		
Infection	6	7.0
Non-infection (cancer, kidney disease, hypertension, DM)	80	93.0
History of Nutrition Education		
Not yet	61	70.9
Had experienced nutrition education	25	29.1
MNA-SF		
Malnutrition	40	46.5
Risk of malnutrition	25	29.1
Well nourished	21	24.4

MNA-SF: Mini Nutrition Assessment-Short Form; DM: Diabetes Mellitus

The findings indicated that 46.5% of the elderly patients suffered from malnutrition. There was no evidence of a relationship between nutritional status and gender, education, employment, marital status, smoking habits, living situation, disease diagnosis, or history of nutritional education (p>0.05). Table 2 illustrates the relationship between demographic factors and the nutritional status of elderly patients.

Table 2. Association between Characteristic Variable with Malnutrition Risk

Variable	Malnutrition n (%)	at Risk of Malnutrition n (%)	Well-nourished n (%)	p
Sex				
Male	21 (42.9)	16 (32.7)	12 (24.5)	0.660
Female	19 (51.4)	9 (24.3)	9 (24.3)	
Education				
No formal education	4 (66.7)	2 (33.0)	0 (0.0)	
Elementary school	19 (61.3)	8 (25.8)	4 (12.9)	
Junior high school	3 (27.3)	4 (36.4)	4 (36.4)	0.092
Senior high school	3 (42.9)	0 (0.0)	4 (57.1)	
College	11 (35.5)	11 (35.5)	9 (29.0)	
Work				
Work	20 (48.8)	14 (34.1)	7 (17.1)	0.285
Not working/housewife/retired	20 (48.8)	11 (24.4)	14 (31.1)	
Marital Status				
Marry	7 (41.2)	5 (29.4)	5 (29.4)	0.841

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Variable	Malnutrition n (%)	at Risk of Malnutrition n (%)	Well-nourished n (%)	p
Widower/widow/unmarried	33 (47.8)	20 (29.0)	16 (203.2	
Smoking Habits				
Smoke	17 (45.9)	12 (32.4)	8 (21.6)	0.793
No smoking	23 (46.9)	13 (26.5)	13 (26.5)	
Living Environment				
Stay alone	3 (30.0)	4 (40.0)	3 (30.0)	
Living with a partner	8 (44.4)	5 (27.8)	5 (27.8)	0.822
Living with children and family	29 (50.0)	16 (27.6)	13 (22.4)	
Medical Diagnosis				
Infection	2 (33.3)	3 (50.0)	1 (16.7)	0.504
Non-infection	38 (47.5)	22 (27.5)	20 (25.0)	
History of Nutrition Education				
Not yet	28 (45.9)	21 (34.4)	12 (19.7)	0.134
Had experienced nutrition education	12 (48.0)	4 (16.0)	9 (36.0)	

Significant: p<0.05

Table 3 displayed the differences in BMI, total fat percentage, visceral fat, muscle mass, MUAC, calf circumference, handgrip strength, and hemoglobin level between the groups of patients who were malnourished, at risk of malnutrition, and well-nourished according to MNA-SF. The ages of the patients in the malnourished and at-risk of malnutrition groups were similar, while a minor, non-statistically significant age difference was observed in the well-nourished group. According to the assessment results, malnourished elderly patients had statistically significant lower BMI (19.4±3.1), total fat levels (20.0±10.9), visceral fat levels (4.4±4.6), muscle mass (34.4±7.7), MUAC (22.6±3.4), calf circumference (27.2±6.7) dan hemoglobin (10.7±3.2) (*p<0.05*Even though the difference was not statistically significant (p=0.055), the average handgrip strength followed a similar pattern across the groups. The well-nourished group had the highest average strength at 23.7 kg, followed by the group at risk of malnutrition with an average of 19.2 kg, and the malnourished group with an average of 13.3 kg. During the admission process, the patient's nutritional condition can be assessed using the MNA-SF, which incorporates characteristics derived from anthropometric measurements and physical examination. Anthropometric and clinical examination rates are positively correlated with better nutritional health, according to statistical analysis.

Table 3. Mean Difference in Measurement of Nutritional Status based on Malnutrition Risk

Parameter	Malnutrition Mean±SD	Risk of Malnutrition Mean±SD	Well-nourished Mean±SD	p
Age (years)	67.6±5.6	67.7±6.0	65. 2±5. 4	0.337
BMI (kg/m^2)	19.4±3.1	22.2±3.9	25.6±2.4	<0.001[a]
Total Fat (%)	20.0±10.9	25.9±8. 4	31.0±10.8	0.002[a]
Visceral Fat	4.4±4.6	9.2±4.8	12.8±6.7	<0.001[a]
Muscle Mass	34.4±7.7	38.3±6.0	43.6±7.5	0.002[a]
MUAC (cm)	22.6±3.4	25.3±2.5	27.8±3.3	<0.001[a]
Calf Circumference (cm)	27. 2±6. 7	29. 4±3.2	32.38±4. 6	0.005[a]
HGS (kgs)	13.3±13.2	19.2±16.6	23.7±17.2	0.055
Hemoglobin (g/dl)	10.7±3.2	12.7±2.5	11.6±2.1	0.025[a]

BMI: Body Mass Index; MUAC: Mid-Upper Arm Circumference; HGS: Hand Grip Strength, [a] = p<0.05

Numerous changes often take place as people age and have an impact on nutritional status. When older patients are hospitalized, the issue of malnutrition becomes more pronounced and notable[17]. On admission to the hospital, patients may already be malnourished for a number of medical, social, or psychological reasons. According to reports, 40% of all hospital patients are malnourished, with half of them being seriously malnourished. One common ailment that might appear in the elderly population is malnutrition. Prolonged hospital stays are linked to worsening disease outcomes, and both are related to the deterioration in nutritional status that occurs during hospital stays[9]. Hence, it is imperative to asses the risk of malnutrition among hospitalized patients in order to enhance the precision of nutritional interventions, thereby facilitating improved patient outcomes and overall cost-effectiveness in healthcare.

Malnutrition is present in 12% to 75% of hospitalized geriatric patients globally[18]. According to BMI criteria, the prevalence of malnutrition in older patients ranged from 8.0 to 26.6%, based on a prior study conducted in Indonesia. In contrast, malnutrition was prevalent in 18–78% of the population with the MNA, while its frequency varied from 2.1–14.6%[19]. The study found that 46.5% of the elderly hospitalized in the study were malnourished, and 29.1% were at risk of malnutrition. These findings were consistent with those of other studies conducted in Indonesia. These findings show that among elderly hospital patients, malnutrition is a significant problem. Reduced appetite, depression,

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functional dependence, cognitive decline, poly-pharmaceuticals, unfavorable socioeconomic conditions, problems chewing and swallowing, and others can all contribute to malnutrition in the elderly[4,17].

The discharge status of elderly patients is correlated with the first screening of hospital admissions using the MNA-SF approach. Patients who were at risk of release in an uncured state were 1.29 times more likely to be discharged than patients who were not malnourished. Based on the results of the logistic regression test there was an influence between the screening results and the status of returning with an OR value of 9.21. Similarly, there is an influence between age and gender with home status ($p<0.05$)[10].

Sarcopenia, a loss of lean muscle mass associated with a noticeable drop in strength, functional deterioration, and poor endurance, is a hallmark of aging[17,20]. When people get older, their BMI, muscle mass, total fat percentage, and visceral fat values decline. It has been established that lean body mass declines with age and that body fat levels typically rise until the age of 70, at which point they begin to decrease again. Therefore, it appears likely that as people age, the relationship between body fatness and BMI changes[21].

This study showed that malnourished elderly patients had lower hemoglobin. As people age, anemia's incidence and prevalence have sharply increased in the elderly. The 2012 FADOI National Congress demonstrated that as people age, lean body mass also declines in addition to the level of anemia. Thus, it is recommended that while evaluating the nutritional status of elderly patients who are institutionalized, anemia should be taken into account as it may be a sign of a protein shortage[22]. The ESPEN Guideline recommends routine screening for malnutrition using a validated test, followed by assessment, individual intervention, monitoring, and intervention adjustment[23]. MNA-SF seems to be the most appropriate nutrition assessment tool for use with older adults. When it came to identifying malnutrition in the elderly, MNA-SF demonstrated good sensitivity and specificity[14].

The findings of this study have the potential to be generalized to elderly patients with both infectious and non-infectious medical disorders who are admitted to the hospital in a conscious state. The MNA-SF is a simple and useful screening tool for older patients that can be used to determine the nutritional status of patients prior to when they are admitted to the hospital. The findings indicate that the measurement outcomes obtained through the implementation of MNA-SF screening are comparable to those obtained by conventional nutritional status assessments. Therefore, it can be concluded that MNA-SF is a reliable tool for assessing nutritional status.

The present study exhibits a number of advantages and disadvantages. One notable benefit of this study is its ability to provide a comprehensive depiction of the nutritional status of elderly patients upon their admission to the hospital. This data may subsequently be utilized to implement appropriate interventions and mitigate the risk of hospital malnutrition. However, the scope of this study was limited to patients' initial condition upon hospital admission, without tracking their progress until discharge. Hence, the prognosis of geriatric patients remains unobservable and unquantifiable.

CONCLUSIONS

According to MNA-SF, half of the elderly patients in hospitals were malnourished at hospital admission. The findings of the anthropometric average nutritional status assessment indicated significant differences between the groups classified as malnourished, at risk of malnutrition, and well-nourished. Therefore, in order to minimize its detrimental effects on the patients and the healthcare system, it is imperative to assess the nutritional status of elderly patients as soon as they are admitted and to apply the appropriate nutritional therapy.

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Author Contributions

SS: conceptualization, funding acquisition, investigation, methodology, supervision, validation, visualization, roles/writing-original draft; HW: data curation, investigation, methodology, project administration, resources, validation; AR: data curation, investigation, methodology, project administration, resources, validation; SH: data curation, investigation, methodology, project administration, resources, validation; NDGS: data curation, formal analysis, resources, software, roles/writing-original draft; ASS: formal analysis, software, writing-review & editing.

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