Original Article

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Diagnostic Accuracy of the Dietary Screening Tool for Detecting Malnutrition in Hospitalized Older Adults: Comparison with the Mini Nutritional Assessment-1999 and Nutritional Risk Screening-2002

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Abstract

Aim: Malnutrition is a common and clinically important problem among hospitalized older patients, and accurate screening tools are essential for the early identification of nutritional risk. The aim of this study was to determine the prevalence of malnutrition in hospitalized older patients and to evaluate the compatibility of the dietary screening tool (DST) for older adults with the Mini Nutritional Assessment-1999 (MNA-1999) and the Nutritional Risk Screening-2002 (NRS-2002).

Methods: This single-center analytical cross-sectional study was conducted between January 1 and March 31, 2025, and included 302 older adults aged 65-87 years. Participants were assessed using a questionnaire that included general information, the DST, MNA-1999, and NRS-2002. Data were analyzed using descriptive statistics, the chi-square test, Pearson correlation analysis, and parametric and non-parametric tests. The diagnostic performance of the DST was evaluated using receiver operating characteristic analysis [area under the curve (AUC), sensitivity, specificity, and cut-off values].

Results: According to the DST, MNA-1999, and NRS-2002, the prevalence of malnutrition was 5%, 40.7%, and 32.8%, respectively. Advanced age, low body mass index, reduced mid-upper arm and calf circumferences, greater weight loss during the previous three months, prolonged hospital stay, and hospitalization in hematology or palliative care units were significantly associated with malnutrition according to the DST (all $p<0.001$), whereas sex was not. Using MNA-1999 as the reference standard, the DST demonstrated a sensitivity of 50.4%, specificity of 86.6%, positive predictive value of 72%, and negative predictive value of 71.8%. In contrast, NRS-2002 showed a sensitivity of 27.6%, specificity of 5.6%, positive predictive value of 16.7%, and negative predictive value of 10.1%. Receiver operating characteristic analysis showed good discriminative ability against MNA-1999 [AUC=0.851, 95% confidence interval (CI): 0.808-0.893] and acceptable performance against NRS-2002 (AUC=0.779, 95% CI: 0.729-0.830). The optimal DST cut-off value was 51.5 for both reference standards. Moderate correlations were observed between DST and MNA-1999 ($r=0.694$) and between DST and NRS-2002 ($r=-0.637$), whereas NRS-2002 showed a strong negative correlation with MNA-1999 ($r=-0.842$) (all $p<0.001$).

Conclusion: Healthcare professionals should exercise caution when using the DST as a malnutrition screening tool. Moreover, the applicability of the DST in different populations needs to be further evaluated.

Keywords: Dietary screening tool, hospitalization, malnutrition, Mini Nutritional Assessment-1999, nutrition assessment, Nutritional Risk Screening-2002

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Introduction

The population of Europe is progressively aging. Recent statistics as of January 1, 2025, indicate that over one-fifth (22.0%) of the European population is aged 65 years and older (1). Advancements in health technologies, including diagnostics, medical devices, and pharmaceutical treatments, have contributed to the extension of life expectancy. Further developments in medical care, such as improved control of infectious diseases, enhanced hemodynamic management, and advances in mechanical ventilation and intensive care units, have also contributed to prolonging life expectancy (2). However, studies have indicated that a longer hospital stay is associated with a heightened risk of malnutrition (3,4). A recent study reported an incidence of hospital-acquired malnutrition of 1% among patients hospitalized for more than 14 days (5). The same study also identified hospital-acquired malnutrition as being associated with prolonged hospital stays, cognitive impairment, and pressure sores (5). A meta-analysis evaluating the prevalence of malnutrition among older adults aged 65 years and over in European countries reported a prevalence of 28.0% among hospitalized older patients (6). A recent study conducted in 10 geriatric centers in Spain found that 13.4% of participants were classified as malnourished, while 47.4% were at risk of malnutrition (7). Globally, the prevalence of malnutrition among older adults has been reported as 18.6% (8).

Malnutrition remains a frequent issue among hospitalized older patients. It increases patient morbidity and mortality, leading to substantial healthcare costs (9). Therefore, screening for malnutrition and providing nutritional support are essential components of patient management (9). Various screening tools recommended by scientific organizations are available to assess patients' risk of malnutrition (10-13). The European Society for Parenteral and Enteral Nutrition (ESPEN), followed by the Turkish Society of Clinical Enteral and Parenteral Nutrition, recommends the use of the Mini Nutritional Assessment-1999 (MNA-1999) screening tool for older patients and the Nutritional Risk Screening-2002 (NRS-2002) for hospitalized patients (10). Recently, a new screening tool called the dietary screening tool (DST) has also been proposed to assess the nutritional status of older adults (14). However, only a limited number of studies have evaluated the effectiveness of the DST.

Although the DST has been developed for nutritional screening in older adults, evidence regarding its diagnostic performance in hospitalized older patients remains limited. Moreover, direct comparisons of the DST with the two most widely recommended nutritional screening tools, the MNA-1999 and the NRS-2002, are scarce. Therefore, the aim of this study was to determine the prevalence of malnutrition among hospitalized older adults and to evaluate the diagnostic performance, agreement, and optimal cut-off value of the DST using MNA-1999 and NRS-2002 as reference standards. We hypothesized that the DST would demonstrate significant agreement with MNA-1999 and NRS-2002 and acceptable diagnostic performance for identifying malnutrition risk in hospitalized older adults.

Materials and Methods

Compliance with Ethical Standards

To ensure the ethical significance of the study, approval was obtained from the Scientific Research Ethics Committee of Agri Ibrahim Cecen University with (approval no.: 384, date: 31.10.2024). In addition, the study was conducted in accordance with the Declaration of Helsinki.

Study Period, Design, Location, Population, and Sample

This was a single-center analytical cross-sectional study conducted among hospitalized older patients between January 1, 2025, and March 31, 2025. The research took place in the inpatient service units of Agri Training and Research Hospital, located in Agri province, Türkiye. Verbal and written informed consent were obtained from all participants. The study population and sample comprised older adults aged 65 and above who were hospitalized in the inpatient units of Agri Training and Research Hospital from January 1 to March 31, 2025. The sample size was based on data collected from all patients who met the inclusion criteria during the three-month period.

Inclusion Criteria

The inclusion criteria for the study included patients aged 65 years and above who possessed intact communication abilities, demonstrated normal cognitive function, and provided informed consent to participate.

Data Collection Tools

Data were collected using the "General Information Questionnaire," "DST," "MNA-1999," and "NRS-2002" tools.

General Information Questionnaire: The data collection instrument, developed by the researchers based on an extensive review of relevant literature, encompassed demographic variables such as age and sex, anthropometric measurements, and information regarding the duration of hospital stay and the clinical department of admission. Body weight (kg) and height (m) were measured. [Body mass index (BMI)=kg/m^2] was calculated based on the participants' body weight and height measurements and subsequently categorized in accordance with World Health Organization standards: underweight (<18.5 kg/m^2), normal weight (18.5-24.9 kg/m^2), overweight (25.0-29.9 kg/m^2), and obese (≥30 kg/m^2) (15).

Mid-upper arm circumference was measured with the participant's elbow flexed at 90°, using a measuring tape placed at the midpoint between the acromial process of the scapula and the olecranon process of the ulna (16). Calf circumference was measured according to the method described by Erdoğan et al. (17).

Dietary Screening Tool: The DST was originally developed by Bailey et al. (14) as a dietary screening instrument for older adults. Its validity and reliability for the Turkish population were established by Toklu Baloğlu (18). The DST consists of 25 questions evaluated out of a total of 105 points (18). Based on the DST score, participants were classified into three groups: those in the lowest 25th percentile were categorized as "at risk," those between the 25th and 75th percentiles as "potentially at risk," and those in the highest 25th percentile as "not at risk" (18).

The Food and Nutrition Photo Catalogue: Measurements and quantities was used to help participants estimate the quantities and portion sizes of the food groups included in the DST (19). Portion sizes were evaluated according to the food portion guidelines provided in the Turkish Nutrition Guidelines 2022 and were used in calculating the DST score (20).

Mini Nutritional Assessment-1999: It was developed by Guigoz et al. (21) to assess malnutrition in older adults receiving home care, residing in nursing homes, or being hospitalized. Its validity and reliability for the Turkish population were established by Sarıkaya (22). The tool includes assessments of anthropometric measurements, general evaluation, a brief dietary assessment, and subjective self-perceptions. The MNA-1999 consists of two main parts: a screening (21,22) and an assessment section. If the score obtained in the initial screening section is ≤11, the assessment section is administered in order to calculate the total score. A total score of <17 indicates the "presence of malnutrition" (14,18); a score between 17 and 23.5 indicates a "risk of malnutrition," and a score ≥23.5 reflects "adequate nutritional status" (21,22). In the present study, since all patients had an MNA-1999 screening (21,22) ≤11, the assessment section was completed for all participants, and final classifications were made based on the total scores.

Nutritional Risk Screening-2002: It was developed by Kondrup et al. (23) to assess the nutritional status of hospitalized patients, and its validity and reliability for the Turkish population were established by Bolayır (24). The tool comprises four components that assess nutritional status based on weight loss, dietary intake, BMI, disease severity, and age. An additional 1 point is assigned to patients aged ≥70 years. Based on the total score, patients are classified as "not at nutritional risk" if they score <3 points and "at nutritional risk" if they score ≥3 points (23,24).

Statistical Analysis

The data obtained in the study were analyzed using SPSS software version 27.0 (IBM Corp., Armonk, NY, U.S.A.). Descriptive statistical methods were used to summarize the data. The normality of data distribution was assessed through Q-Q plots, and normal distribution was considered present when skewness and kurtosis values fell within the ±3 range. For normally distributed data, the relationships between continuous variables were examined using Pearson correlation analysis. Associations between categorical variables were analyzed using the chi-square test. Differences among more than two independent groups were assessed using one-way analysis of variance for normally distributed variables and the Kruskal-Wallis H test for non-normally distributed variables. The discriminatory power of DST was evaluated using receiver operating characteristic (ROC) analysis; diagnostic performance metrics, including area under the curve (AUC), sensitivity, specificity, and cut-off values with corresponding diagnostic measures, were calculated. A $p<0.05$ value was considered statistically significant.

Results

The baseline characteristics of the older adult participants are presented in Table 1. A total of 302 individuals aged 65-87 years (mean age: 70.22±3.48 years) were included in the study, of whom 54.3% were male and 45.7% were female. Most patients were within the normal BMI range. Most hospitalizations lasted 4-5 days, and the most common admitting departments were general surgery, pulmonology, and orthopedics.

The prevalence of malnutrition according to the characteristic (ROC) analysis is shown in Table 2. According to DST, 28.5% of patients were classified as high-risk and 47.0% as potentially at risk. Based on MNA-1999, 40.7% of participants were malnourished and 42.4% were at risk of malnutrition. According to NRS-2002, 32.8% of patients were at nutritional risk.

Table 3 presents a comparison of categorical variables according to DST classification. Significant associations were observed between DST categories and age group, current BMI, length of hospital stay, hospitalization department, and BMI three months prior (all $p<0.001$). In contrast, sex was not significantly associated with DST classification ($p=0.422$).

Comparisons of continuous variables across DST categories are presented in Table 4. Patients in the risk group were significantly older and had lower BMI and smaller mid-upper arm and calf circumferences compared with those in other groups ($p>0.05$). In addition, individuals in the risk group had longer hospital stays and greater percentage weight loss in the preceding three months ($p<0.001$).

Table 1. Baseline characteristics of the study population (n=302)

Variables		n	%
Age (years) (mean ± SD = 70.22±3.48)	<75	284	94.0
	≥75	18	6.0
Sex	Female	138	45.7
	Male	164	54.3
Current BMI	Underweight	7	2.3
	Normal weight	250	82.8
	Overweight	43	14.2
	Obese	2	0.7
BMI values from three months prior	Normal weight	230	76.2
	Overweight	67	22.2
	Obese	5	1.7
Length of hospital stay (days)	≤3	38	12.6
	4-5	200	66.2
	≥6	64	21.2
Hospitalization department	General surgery	85	28.1
	Internal medicine	30	9.9
	Pulmonology	70	23.2
	Orthopedics	47	15.6
	Palliative	21	7.0
	Hematology	30	9.9
	Oncology	19	6.3

Descriptive statistics were expressed as mean ± standard deviation or frequency (n) and percentage (%)
BMI: Body mass index, SD: Standard deviation

The diagnostic performance of DST and NRS-2002, using MNA-1999 as the reference standard, is presented in Table 5. Dietary screening tool showed a sensitivity of 50.4%, a specificity of a greater positive predictive value of 72.1%, a negative predictive value of 72.1% (p<0.001) and a value of 71.8%. In contrast, specificity demonstrated a positive value of 27.6%, a specificity of 5, a positive predictive value of 16.7%, and a negative predictive value of 10.1%.

Table 2. Malnutrition prevalence of patients according to three different malnutrition screening tools (n=302)

Malnutrition screening tools	Score	n	%
DST	At risk	86	28.5
	Potentially at risk	142	47.0
	Not at risk	74	24.5
MNA-1999	Malnutrition	123	40.7
	At risk of malnutrition	128	42.4
	Normal nutritional status	51	16.9
NRS-2002	No risk of malnutrition	203	67.2
	Risk of malnutrition	99	32.8

Descriptive statistics are expressed as frequency (n) and percentage (%)
DST: Dietary screening tool, MNA-1999: Mini Nutritional Assessment-1999, NRS-2002: Nutritional Risk Screening-2002

Table 3. Comparison of selected categorical variables across the study population classified according to DST (n=302)

		DST						Chi-square	p
		At risk		Potentially at risk		Not at risk			
		n	%	n	%	n	%		
Age groups (years)	<75	73	84.9	138	97.2	73	98.6	15.221[FE]	<0.001
	≤75	12	15.1	4	2.8	1	1.4		
Sex	Female	40	46.5	69	48.6	29	39.2	1.761[P]	0.422
	Male	46	53.5	73	51.4	45	60.8		
Current BMI	Underweight	5	5.8	2	1.4	0	0.0	41.948[FE]	<0.001
	Normal weight	78	90.7	126	88.7	46	62.2		
	Overweight	3	3.5	13	9.2	27	36.4		
	Obese	0	0.0	1	0.7	1	1.4		
Length of hospital stay (days)	≤3	9	10.5	13	9.2	16	21.6	26.928[P]	<0.001
	4-5	45	52.3	103	72.5	52	70.3		
	≥6	32	37.2	26	18.3	6	8.1		
Hospitalization department	General surgery	20	23.25	38	26.8	27	36.5	57.211[FE]	<0.001
	Internal medicine	7	8.1	12	8.4	11	14.9		
	Pulmonology	14	16.3	31	21.8	25	33.8		
	Orthopedics	14	16.3	24	16.9	9	12.1		
	Palliative	8	9.3	13	9.2	0	0.0		
	Hematology	20	23.25	10	7.0	0	0.0		
	Oncology	3	3.5	14	9.9	2	2.7		
BMI categories from three months prior	Normal weight	77	89.5	115	81.0	38	51.3	33.612[FE]	<0.001
	Overweight	9	10.5	25	17.6	33	44.6		
	Obese	0	0.0	2	1.4	3	4.1		

Descriptive statistics are expressed as frequency (n) and percentage (%). [FE]=Fisher Exact chi-square. [P]: Pearson chi-square
BMI: Body mass index, DST: Dietary screening tool

Table 4. Comparison of general characteristics across the study population classified according to DST (n=302)									
	DST	**Mean**	**SD**	**Q25**	**Q50**	**Q75**	**Test value**	**p**	**Post-hoc**
Age (years)	At risk (1)	71.88	4.14	70.00	72.00	73.00	34.497[KW]	<0.001	1>3 2>3
	Potentially at risk (2)	70.06	2.81	69.00	70.00	72.00			
	Not at risk (3)	68.58	2.94	66.00	70.00	70.00			
Current BMI	At risk (1)	20.77	1.72	19.50	20.70	21.30	44.551[F]	<0.001	3>1 3>2
	Potentially at risk (2)	21.98	2.34	20.70	21.60	22.90			
	Not at risk (3)	24.17	2.68	22.30	23.50	26.20			
Hospital length of stay (days)	At risk (1)	5.45	1.91	4.00	5.00	7.00	15.857[F]	<0.001	1>2 1>3 2>3
	Potentially at risk (2)	4.64	1.25	4.00	5.00	5.00			
	Not at risk (3)	4.09	1.14	4.00	4.00	5.00			
MUAC (cm)	At risk (1)	22.08	2.30	21.00	22.00	23.00	89.854[F]	<0.001	3>1 3>2 2>1
	Potentially at risk (2)	24.85	4.18	22.00	24.00	27.00			
	Not at risk (3)	30.07	4.85	27.00	28.50	34.00			
Calf circumference (cm)	At risk (1)	29.63	2.31	29.00	30.00	31.00	90.830[F]	<0.001	3>1 3>2 2>1
	Potentially at risk (2)	32.71	4.19	30.00	31.00	34.00			
	Not at risk (3)	37.84	5.10	34.00	36.00	42.00			
Percentage weight loss over the preceding three months (%)	At risk (1)	7.65	3.37	5.00	7.90	10.00	70.178[F]	<0.001	1>2 1>3 2>3
	Potentially at risk (2)	6.06	2.97	4.00	6.00	8.00			
	Not at risk (3)	2.99	2.07	0.00	3.15	4.60			
BMI values from three months prior	At risk (1)	22.47	1.64	21.40	22.15	23.20	24.757[F]	<0.001	3>1 3>2 2>1
	Potentially at risk (2)	23.47	2.08	22.10	23.10	24.20			
	Not at risk (3)	24.92	2.69	22.80	24.55	26.70			

Descriptive statistics are expressed as mean ± standard deviation. [KW]: Kruskal-Wallis H test. [F]=ANOVA
BMI: Body mass index, DST: Dietary screening tool, MUAC: Mid-upper arm circumference, ANOVA: Analysis of variance

Table 5. Comparison of the diagnostic accuracy (sensitivity, specificity, PPV, NPV) of three screening tools using MNA-1999 as the reference standard								
		MNA-1999				**Chi-square**	**p**	**Phi coefficient**
		Malnutrition		**Normal nutritional status**				
		n	**%**	**n**	**%**			
DST	At risk	62	50.4	24	13.4	48.999	<0.001	0.403
	Not at risk	61	49.6	155	86.6			
NRS-2002	No risk of malnutrition	34	27.6	169	94.4	147.507	<0.001	-0.699
	Risk of malnutrition	89	72.4	10	5.6			

DST: Dietary screening tool, MNA-1999: Mini Nutritional Assessment-1999, NRS-2002: Nutritional Risk Screening-2002

Figure 1 presents the ROC curves demonstrating the diagnostic performance of the DST, using MNA-1999 (a) and NRS-2002 (b) as reference standards. Specificity analysis based on positive 9, the AUC was 0.851 [standard deviation (SD)=0.022; 95% negative 0.808-0.893; p<0.001], indicating that the DST demonstrated good, statistically significant discriminatory performance for normal nutritional status. According to the NRS-2002-based analysis, the AUC was 0.779 [SD=0.026; 95% confidence interval (CI): 0.729-0.830; p<0.001], suggesting that the DST demonstrated acceptable and statistically significant discriminatory performance in identifying individuals without risk of malnutrition. In both analyses, the CIs above 0.5 indicate consistent discriminative ability. The optimal cut-off value (NRS-2002-based) was determined using the Youden index. When MNA-1999 was used as the reference standard, the highest Youden index was 0.622 at a cut-off value of 51.5, corresponding to a sensitivity of 68.7% and a specificity of 93.5%, indicating the best balance between sensitivity and specificity. Similarly, when NRS-2002 was used as the reference standard, the highest Youden index (0.540) was

obtained at the cut-off value of 51.5, with a sensitivity of 61.1% and a specificity of 92.9%. Although higher cut-off values (e.g., 57.5) produced greater positive likelihood ratios due to increased specificity, they were associated with substantially lower sensitivity. Therefore, a DST cut-off value of 51.5 appears to provide the most appropriate overall diagnostic performance for identifying malnutrition risk in hospitalized older patients.

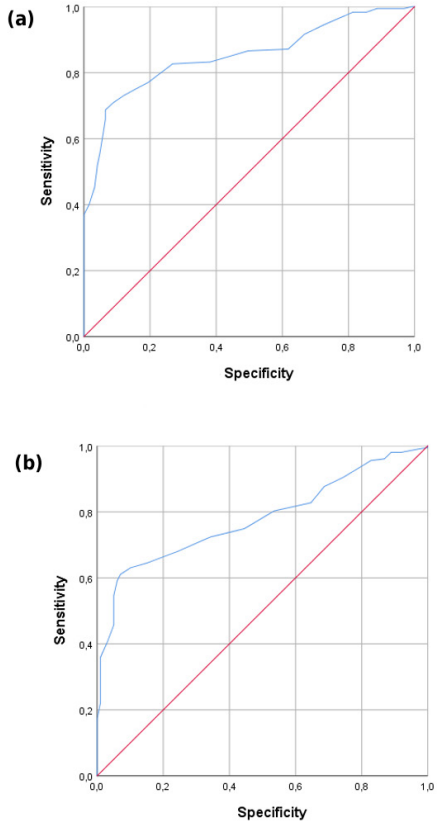

Figure 1. ROC curves demonstrating the diagnostic performance of DST against MNA-1999 (a) and NRS-2002 (b) as reference standards
ROC: Receiver operating characteristic, DST: Dietary screening tool, MNA-1999: Mini Nutritional Assessment-1999, NRS-2002: Nutritional Risk Screening-2002

Table 6. Concordance analysis among the three screening tools

		DST	MNA-1999	NRS-2002
DST	r	1		
	p			
MNA-1999	r	0.694	1	
	p	<0.001		
NRS-2002	r	-0.637	-0.842	1
	p	<0.001	<0.001	

r: Pearson correlation coefficient
DST: Dietary screening tool, MNA-1999: Mini Nutritional Assessment-1999, NRS-2002: Nutritional Risk Screening-2002

The correlation analysis between the screening tools is shown in Table 6. A moderate positive correlation was found between DST and MNA-1999 (r=0.694, p<0.001), whereas a moderate negative correlation was found between DST and NRS-2002 (r=-0.637, p<0.001). A strong negative correlation was observed between NRS-2002 and MNA-1999 (r=-0.842, p<0.001).

Discussion

Despite advances in health technologies that have contributed to increased life expectancy, malnutrition remains a significant issue among hospitalized older adults. This study evaluated the prevalence of malnutrition in hospitalized older adults and assessed the diagnostic performance and agreement of the DST compared with the MNA-1999 and NRS-2002.

In the present study, between 28.5% and 40.7% of patients were at risk of malnutrition based on the three screening tools used (Table 2). Similarly, a meta-analysis conducted across European countries, which evaluated the outcomes of 22 different screening tools in individuals aged 65 and over, reported rates of malnutrition risk ranging from 17.5% to 40.6% in hospital, nursing home, and community-based screenings (6). In a prospective cohort study conducted in Ireland involving patients aged 70 years and older and utilizing the short form of the MNA-1999, 18% of the patients were identified as malnourished, and 45% were found to be at risk of malnutrition (25). In another study conducted across 25 European countries, the average prevalence of malnutrition among hospitalized patients was reported to be 12.9% (26). In a study conducted in Tehran using the MNA-1999 to assess the nutritional status of older patients, only 41.9% of individuals were found to have a normal nutritional status (27). In the United States, the prevalence of malnutrition among hospitalized patients was reported to be 8.6%, varying in severity (28). A recent study conducted in Istanbul, Türkiye, in which older patients were assessed using the MNA-1999, found that 50% of the participants were at risk of malnutrition, while 8% were already malnourished (29). The varying prevalence of malnutrition observed in the current study suggests that the choice of screening instrument may substantially influence the identification of at-risk patients in clinical settings. The higher prevalence observed, particularly with the MNA-1999, may be explained by its more comprehensive structure, which includes anthropometric, dietary, and functional parameters, potentially allowing earlier detection of nutritional decline. The prevalence observed in our cohort appears higher than that reported in studies conducted in Europe and the

United States. This difference may be related to several factors, including differences in healthcare systems, nutritional support practices, patient case mix (e.g., higher proportion of severe or chronic conditions), and possible underutilization of routine nutritional screening in certain settings. These findings highlight the need for more systematic and standardized nutritional assessment approaches in hospitalized older adult populations.

According to the DST classification used in our study, the following factors were identified as associated with a higher risk of developing malnutrition: advanced age, low BMI, reduced mid-upper arm circumference, reduced calf circumference, significant weight loss over the previous three months, prolonged hospital stay, and hospitalization in hematology or palliative care units. However, sex was not a significant factor (Tables 3 and 4). In the United States, the DST was utilized as a tool for NRS and the effectiveness of nutritional education programs was investigated (30). In a study involving individuals aged 60 and above who participated in community-based nutrition education and physical activity programs, DST assessments indicated that 2 participants were classified as being at high nutritional risk, while 53.7% were in the possible risk group (31). In a study conducted by Bailey et al. (32) investigating dietary intake among older adults, individuals classified as being at risk according to the DST were found to have significantly lower protein intake and higher total and saturated fat intake compared to those in the possible risk and not-at-risk groups (32). In a study involving patients with a prevalence, individuals in the malnourished group (n=70) demonstrated significantly lower values for body weight, mid-upper arm circumference, waist circumference, waist-to-height ratio, serum albumin, total serum cholesterol, and blood hemoglobin compared to the non-malnourished group (n=82) ($p<0.05$); however, no statistically significant difference was observed between the groups' case mix (e.g., age) ($p>0.05$) (33). In a study conducted (under specific conditions), researchers found that older adults with sarcopenia had significantly longer hospital stays compared to those without sarcopenia ($p<0.05$); however, no significant differences were observed based on sex ($p<0.05$) (34). The prolonged hospital stay, observed particularly among individuals at high-risk of malnutrition, underscores the critical importance of nutritional support in clinical management. A meta-analysis that included only longitudinal studies investigating malnutrition risk factors in older adults identified advanced age as a significant determinant of malnutrition risk, while sex was not found to be a distinguishing factor in this context (35). Similarly, several studies have reported a higher prevalence of malnutrition among older adults hospitalized in hematology and palliative care units (36,37). The current literature indicates that malnutrition is highly prevalent among older adults and is closely associated with factors such as low BMI, weight loss, and disease burden (38). Additionally, it has been reported that as the risk of malnutrition increases, so do hospital length of stay, complication rates, and mortality (39). A recent study conducted in Türkiye indicates that the prevalence of malnutrition among older adults can reach up to 50% depending on the method used and is associated with food insecurity (40). Given that the early use of screening tools in hospitalized older adults can improve clinical outcomes (41), integrating these tools into routine assessment processes could facilitate the early identification of at-risk individuals and the initiation of appropriate interventions at the earliest possible stage, thereby contributing to the reduction of morbidity and mortality. Collectively, these findings underscore the clinical importance of early ($p<0.05$) nutrition risk screening and timely, targeted nutritional intervention ($p<0.05$) in older adults, both of which can contribute to shorter hospital stays, reduced complication rates, and decreased mortality.

When comparing the diagnostic accuracy of DST and NRS-2002 with reference to the MNA-1999, MNA-1999 demonstrated moderate concordance with DST and very strong concordance with NRS-2002 (Tables 5 and 6, Figure 1). In a study population, 59.7% of individuals were classified as "at risk" according to the DST, whereas only 40.7% were found to be malnourished based on the MNA-1999. Moreover, no significant association was identified between the total scores of the DST and MNA-1999 (18). In a separate study evaluating patients with Paronlyn's disease or acquired brain injury, a positive correlation was observed between DST scores and general activity scores ($r=0.697$, $p=0.012$) (42). A study conducted in Istanbul among cancer patients demonstrated moderate concordance between MNA-1999 and NRS-2002 (43). These two instruments are the primary screening tools recommended by ESPEN (10). However, compared with MNA-1999 and NRS-2002, the DST is less commonly used for malnutrition screening. In the present study, the DST exhibited moderate concordance with both the MNA-1999 and NRS-2002. The relatively low sensitivity but high specificity of the DST obs (36,37). This study suggests that, while the tool may be effective in confirming malnutrition risk, it may fail to identify a substantial proportion of at-risk individuals. One possible explanation is that the DST primarily focuses on dietary patterns rather than clinical and functional parameters, which are more comprehensively captured by tools such as the MNA-1999. Therefore, our findings suggest that DST should be considered a complementary, rather than a standalone, screening tool in hospitalized older adult populations. While its relatively high specificity

may support confirmation of nutritional risk, its limited sensitivity indicates that relying solely on DST could result in under-identification of vulnerable patients. This study provides evidence on the clinical performance of the DST in hospitalized older adults, a population for which validation data are currently limited. Our findings, derived from direct comparison of DST with both MNA-1999 and NRS-2002 within the same patient cohort and from identification of an optimal DST cut-off value, provide practical information for clinicians regarding the strengths and limitations of DST in routine hospital practice. These findings may help guide the selection of appropriate nutritional screening strategies for hospitalized older patients.

Study Limitations

The present study has several limitations. First, it was conducted at a single center with a relatively small sample size, which may restrict the generalizability of the findings. In addition, only patients who were able to communicate effectively and who had preserved cognitive function were included in the study. This eligibility criterion may have introduced selection bias by excluding frailer, cognitively impaired older adults, who may be at even higher risk of malnutrition, thereby limiting the generalizability of the findings to the overall hospitalized older adult population. Second, body composition parameters such as muscle and adipose tissue mass were not evaluated using objective methods such as bioelectrical impedance analysis. Third, biochemical nutritional markers common to assess malnutrition, including albumin and prealbumin, were not available. Additionally, socioeconomic and familial factors that might indirectly influence nutritional status were not assessed.

Despite these limitations, this study has important strengths. To our knowledge, this is the first study to simultaneously compare the diagnostic performance and concordance of DST with both MNA-1999 and NRS-2002 in hospitalized older adults. Furthermore, the use of multiple validated nutritional screening tools within the same patient population provides a comprehensive comparison and contributes valuable data on the clinical applicability of DST in hospitalized older adults. These findings extend the current evidence regarding the clinical utility of DST and provide practical guidance for its use in hospital-based nutrition comparisons of older adults.

Conclusion

Malnutrition affected nearly one-third of hospitalized older adults in this study, highlighting the importance of routine nutritional screening in this population. Although DST showed good overall discriminative ability and moderate agreement with MNA-1999, its relatively low sensitivity suggests that relying solely on DST may result in underdiagnosis of malnutrition. Accordingly, DST should not replace established nutritional assessment tools but may serve as a complementary screening instrument. Additional prospective multicenter validation studies are needed before its routine use in hospitalized older adults can be recommended.

Ethics

Ethics Committee Approval: To ensure the ethical conduct of the study, approval was obtained from the Scientific Research Ethics Committee of Agri Ibrahim Cecen University with (approval no.: 384, date: 31.10.2024).

Informed Consent: Informed consent was obtained from all subjects involved in the study.

Footnotes

Authorship Contributions

Concept: H.S., Design: H.S., Data Collection or Processing: H.S., Z.E., Analysis or Interpretation: H.S., Literature Search: H.S., Z.E., Writing: H.S., Z.E.

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