



Original Article

Prevalence of Malnutrition and Its Associated Factors Among Older Adults Using Mini Nutritional Assessment Tool in Sulaimani City Kurdistan Region of Iraq

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Received 04 January 2025; revised 14 March 2025;
accepted 09 April 2025; available online 31 May 2025

DOI: 10.24271/PSR.2025.449298.1543

ABSTRACT

Old age is the last phase of life, and malnutrition is linked to a loss of independence, reduced quality of life, and a high risk of death. Malnutrition encompasses both underweight and overweight conditions, representing an overall state of poor nutritional health due to imbalances in macronutrients or micronutrients. This study aims to assess the nutritional status of older adult patients at Sulaimani hospitals. A cross-sectional study was conducted in the Sulaymaniyah hospitals. The study included 300 elder female and male cases who stayed in the hospital for more than three days. The questionnaire form used for collecting data and for determine the elder nutrition states the mini nutritional assessment tool used which composed of 18 items; including anthropometric measurements, global assessment, dietary questionnaire and subjective assessment. The nutritional assessment, based on all mini nutritional assessment questions, revealed that 123 (41%) of the elderly were malnourished, 142 (47.3%) were at risk of malnutrition, and 35 (11.7%) had a normal nutritional status. Participants who were underweight had a nine-fold higher likelihood of being malnourished compared to extremely obese individuals, while those at a healthy weight were only three times more likely to be malnourished (P-value 0.001). People with chronic diseases were four times more likely to experience malnutrition than those without such conditions (P-value 0.001). Additionally, individuals with digestion problems were twice as likely to be malnourished (P value 0.001). A study found a high rate of malnutrition and malnutrition risk among hospitalized elderly individuals, mostly females from outside Sulaymaniyah City. They also discovered links between malnutrition and chronic diseases, as well as correlations with lower BMI and body weight in elderly participants.

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Keywords: elderly, malnutrition, mini-nutritional assessment, Sulaimani.

1 Introduction

The global population is experiencing a profound demographic shift, with a notable increase in the elderly population ^[1]. The World Health Organization defines older adults in developing countries as individuals aged 60 years or older, while in developed countries, this category comprises those aged 65 years and above ^[2]. This demographic transformation has brought about new challenges and considerations for healthcare professionals worldwide. Malnutrition within this demographic is characterized as "an imbalance between the intake of nutrients and energy and the body's requirements for sustaining growth, maintenance, and specific functions at the cellular level." It can result from either a deficiency in one or more nutrients (referred to as undernutrition) or an excess of nutrients (known as overnutrition) ^[3].

Assessing the nutritional status of elderly patients is crucial for maintaining their health and well-being. Nutrition is essential to overall health, regardless of age ^[4]. The aged population is more susceptible to malnutrition due to a combination of factors such as physiological changes, decreased appetite, chronic illnesses, and social isolation. Consequently, it assumes greater significance in the context of ageing. Malnutrition in older people diminishes quality of life and elevates the risk of various adverse health consequences, including falls, infections, hospitalizations, and mortality ^[5].

To address the complicated issues associated with malnutrition in the elderly, healthcare providers require trustworthy and efficient tools for nutritional assessment. Presently, there is a significant dearth of evidence and comprehensive guidance on the most appropriate approaches to assess the nutritional health of older adults ^[6]. Despite the absence of a globally accepted gold standard for evaluating nutritional status within this age category, the Mini Nutritional Assessment tool (MNA) has obtained universal prominence as an increasingly utilized method for

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Peer-reviewed under the responsibility of the University of Garmian.

estimating nutritional well-being [7]. The MNA is a comprehensive and validated instrument designed specifically for the evaluation of nutritional status in seniors [8]. The systematic approach of the tool takes into account multiple aspects of nutrition, such as dietary intake, anthropometric measurements, comprehensive health assessments, and self-reported health status, providing a thorough and holistic understanding of an individual's nutritional well-being [8].

The primary objectives of this research are to assess the nutritional status of older adult patients in Sulaimani city hospitals using the MNA tool, identify the prevalence of malnutrition and investigate possible contributing factors. Through comprehensive nutritional assessments and data analysis, this research aims to identify the specific nutritional needs of this vulnerable population, providing significant insights for healthcare providers and policymakers.

2 Methods and materials

2.1 Design of the study

A cross-sectional study was carried out to assess the nutritional status of the older adult patients in Sulaimani hospitals. The current study was approved by the research council at the College of Health and Medical Technology/ Sulaimani Polytechnic University, the directorate of health and the hospital administrations.

2.2 Settings of the Study and Sampling Procedure

Several governmental and non-governmental hospitals and healthcare centers in Sulaimani City were included in this study such as Shar Hospital, Hiwa Hospital, and Teaching Hospital. The target sample of the current study includes all elderly (60 years old and older) patients admitted to the hospital inside the city and for recruiting study participants a convenience sampling method was used. The study included (300) elderly patients (153 female and 147 males) who stayed in the hospital for more than 3 days. The nutritional status of older adults can be affected by medical interventions after 3 days in the hospital. Furthermore, it ensures that the assessment reflects a more stable and accurate picture of the patient's nutritional status.

2.3 Mini Nutritional Assessment tool

For data collection, a questionnaire form approach was used. The questionnaire form was constructed based on the literature reviews and previous studies on the same topic. The

questionnaire form consists of two parts; the first part included questions about demographic data (age, gender, ...etc.) of the elder patients and also included questions about malnutrition risk factors (BMI, smoking...etc.) [9].

The second part included the MNA tool for screening and assessing the patient's nutrition status. It is composed of 18 items, including anthropometric measurements (weight, height, and weight loss (3 questions)), a global assessment (6 questions linked to lifestyle, medications, and mobility), a dietary questionnaire (8 questions linked to meals, food, and fluid intake), and one question about subjective assessment (self-perception of health and nutrition) [8]. The attainable score is 30 points and the risk of malnutrition increases with lower scores. The MNA score is used to classify patients as well-nourished (a score of 25-30), at risk for malnutrition (a score of 17-24), or malnourished (a score of <17) [8].

2.4 Anthropometry

A bioimpedance analyzer (Inbody 770, Inbody Co, Seoul, Korea) was used to determine body weight to the nearest 0.1 kg. BSM 370 (Biospace Co, Seoul, Korea) was used to measure height. The formula for determining a person's body mass index (BMI) is weight (kg)/height (m²).

2.5 Statistical Analysis

Descriptive statistics including mean, and standard deviation calculated for the quantitate data, and frequency and percentage were generated for the qualitative data. Those variables with a P-value lower than 0.05 in the univariate analysis (crude analysis) were entered into the multiple models (adjusted model). For the comparison of the two categorical variables, the Chi-square test was used while for the association between tests between the two non-normally distributed quantitative variables Spearman correlation test was used with considering a P-value equal to or less than 0.05 as a significant limit.

3 Results and Discussions

Table 1 shows that the participants were 153 (51%) female and 147 (49%) male. For the occupation, most of them 145 (48%) were housewives, 97 (32.3%) retired or not working 39 (13%), and 19 (6.3%) people work for the government. Moreover, for residency 145 (48.3%) of the patients were live inside Sulaimani city, while 155 (51.7%) were live outside of the city. Regarding marital status, the majority 197 (65.7%) were married, widows 52 (17.3%) and 51 (17%) were single.

Table 1: Distribution of the demographic characteristics

Variable	Categories	Frequency	Percentage
Age	60-69	132	44
	70-79	105	35
	80-89	54	18
	90-100	9	3
Gender	Male	147	49
	Female	153	51

Education	Illiterate	194	64.7
	Elementary school	67	22.3
	Secondary	10	3.3
	High school	9	3.0
	Institution and bachelors	20	6.7
Marital state	Single	51	17.0
	Married	197	65.7
	Widow	52	17.3
Occupation	Retired or not working	97	32.3
	Housewife	145	48.3
	Governmental employee	19	6.3
	Non-governmental employee	39	13.0
Income	Mean $\pm$ SD	56448 $\pm$ 175536.7	
	Minimum - Maximum	0 – 1000100	
Address	Outside Sulaymaniyah city	155	51.7
	Inside Sulaymaniyah city	145	48.3

The patients' economic status monthly incomes ranged from (0 to 1100000 IQD) with the mean $\pm$ SD (56446 $\pm$ 175536.7), and the majority 133 (44.3%) of the elderly in the current study had a healthy weight, followed by 83 (27.7%) were overweight, obese

40 (13.3%), underweight 28 (9.3%) and 16 (5.3%) were severely obese. Also, the hospital stay duration from smallest 3 days to longest was 54 days, with mean $\pm$ SD (5.75 $\pm$ 6.02).

Table 2: Distribution and association between elder nutrition status with demographic variables

Variables	Categories	Normal nutritional status	At the risk of malnutrition	Malnourished	P- Value
Age	60 – 69	20 (57.1)	57 (40.1)	55 (44.7)	0.340
	70 – 79	8 (22.9)	58 (40.8)	39 (31.7)	
	80 – 89	6 (17.1)	22 (15.5)	26 (21.1)	
	90 – 100	1 (2.9)	5 (3.5)	3 (2.4)	
Gender	Male	22 (62.9)	63 (44.4)	62 (50.4)	0.135
	Female	13 (37.1)	79 (55.6)	61 (49.6)	
Address	Outside Sulaymaniyah	20 (57.1)	68 (47.9)	67 (54.5)	0.445
	Inside Sulaymaniyah	15(42.9)	74 (52.1)	56 (45.5)	
Job	Retired or not working	7 (20)	41 (28.9)	49 (39.8)	0.004
	Housewife	13 (37.1)	74 (52.1)	58 (47.2)	
	Governmental employee	3 (8.6)	11 (7.7)	5 (4.1)	
	Non-governmental employee	12 (34.3)	16 (11.3)	11 (8.9)	
Marital state	Single	2 (5.7)	24 (16.9)	25 (20.3)	0.091
	Married	30 (85.7)	93 (65.5)	74 (60.2)	
	Widow	3 (8.6)	25 (17.6)	24 (19.5)	
Level of education	Illiterate	22 (62.9)	89 (62.7)	83 (67.5)	0.488
	Elementary School	11 (31.4)	35 (24.6)	21 (17.1)	
	Secondary	1 (2.9)	3 (2.1)	6 (4.9)	
	High School	0 (0)	6 (4.2)	3 (2.4)	
	Instituted or bachelors	1 (2.9)	9 (6.3)	10 (8.1)	
BMI	Underweight	0 (0)	7 (4.9)	21 (17.1)	0.0001
	Healthy weight	6 (17.1)	57 (40.1)	70 (56.9)	
	Overweight	18 (51.4)	48 (33.8)	17 (13.8)	
	Obese	7 (20)	22 (15.5)	11 (8.9)	
	Extremely obese	4 (11.4)	8 (5.6)	4 (3.3)	
Smoking	No	30 (85.7)	128 (90.1)	111 (90.2)	0.716
	Yes	5 (14.3)	14 (9.9)	12 (9.8)	
Chronic disease	No	6 (17.1)	23 (16.2)	9 (7.3)	0.05
	Yes	29 (82.9)	119 (83.8)	114 (92.7)	

Drug use	No	9 (25.7)	23 (16.2)	27 (22)	0.317
	Yes	26 (74.3)	119 (83.8)	96 (78)	
Digestion Problem	No	23 (65.7)	78 (55.3)	50 (40.7)	0.009
	Yes	12 (34.3)	63 (44.7)	73 (59.3)	

Table 2 shows the distribution of the elderly nutritional status among different demographic variables. The Overall MNA assessment result reveals that malnourished (67(54.5%)) and normal nutritional status (20 (57.1%)) were higher among residents out of the city compared to those living inside the city, while the risk of malnutrition was higher (74 (52.1%)) among residents outside the city than they were inside (68 (47.9%)). However, the association between place of residency and elder nutritional status was not statistically significant (P-value 0.445). For the elder's occupation, malnutrition (58 (47.2%)), risk of malnutrition (74 (52.1%)), and normal nutritional status (13 (37.1%)) among housewives were higher than those in other occupations, according to the elder nutrition status, and there was a statistically significant difference between the various occupations and the total assessment score (P-value 0.004).

According to BMI, there was a significant (P-value 0.0001) difference between BMI and the elder nutrition status, with the malnourished (70 (56.9%)) and risk of malnutrition (57 (40.1%)) being higher among the healthy weight group compared to other BMI categories, while the normal nutrition state was highest (48 (33.8%)) among the overweight group.

The chronic diseases statistically had significant differences (P-value 0.05) in the elder nutrition status, with the number of malnourished elders (114 (92.7%)), the risk of malnutrition (119 (83.8%)), and the normal nutritional state (29 (82.9%)) being higher among chronic illness elders compare to who did not.

There was a significant substantial (P-value 0.009) difference between digesting issues and the elder nutrition status, with (73 (59.3%)) people who were malnourished and (78 (55.3%)) people who were at an increased risk of malnutrition, not suffered from digestion problems.

Table 3: Bivariable and multivariable logistic regression of factors associated with undernutrition among the older adults in Sulaymaniyah city.

Variables	Categories	COR (95% CI)	P- Value	AOR (95% CI)	P- Value
Age	60 – 69	1.42 (0.34-5.96)	0.567	-	
	70 – 79	1.18 (0.28-4.99)			
	80 – 89	1.85 (0.42-8.21)			
	90 – 100	1			
Gender	Female	1.11 (0.69-1.74)	0.685	-	
	male	1			
Address	Outside Sulaymaniyah	1.21 (0.76-1.91)	0.418	-	
	Inside Sulaymaniyah	1			
Job	Retired or not working	2.59 (1.16-5.80)	0.042	2.17 (0.79-5.96)	0.001
	Housewife	1.69 (0.78-3.67)		1.91 (0.72-5.05)	
	Governmental employee	0.91 (0.26-3.13)		1.02 (0.22-4.63)	
	Non-governmental employee	1		1	
Marital state	Single	1.12 (0.51-2.43)	0.238	-	
	Married	0.71 (0.37-1.31)			
	Widow	1			
Level of education	Illiterate	0.74 (0.29-1.87)	0.261	-	
	Elementary School	0.45 (0.16-1.26)			
	Secondary	1.51 (0.32-6.99)			
	High School	0.51 (0.09-2.57)			
	Instituted or bachelors	1			
BMI	Underweight	9.1 (2.17-37.17)	0.001	18.37 (3.18-22.14)	0.001
	Healthy weight	3.33 (1.02-10.86)		5.82 (1.34-10.03)	
	Overweight	0.77 (0.22-2.69)		0.94 (0.21-4.25)	
	Obese	1.13 (0.31-4.29)		1.45 (0.29-7.27)	
	Extremely obese	1		1	
Smoking	Yes	1.11 (0.51-2.38)	0.784	-	
	No	1			
Chronic disease	Yes	2.48 (1.13-5.45)	0.017	4.24 (1.66-10.82)	0.001
	No	1		1	
Drug use	Yes	1.27 (0.71-2.26)	0.408	-	
	No	1			

Digestion Problem	Yes	1.96 (1.23-3.13)	0.004	1.99 (1.09-3.64)	0.001
	No	1		1	

AOR = Adjusted Odds Ratio; CI = Confidence Interval, COR = Crude Odds Ratio

Table 3. shows bivariable and multivariable logistic regression of factors associated with undernutrition among the older adults in the city. In the COR model, participants who are Retired or not working, are 2.59 times more likely to be malnourished, and housewife is 1.69 times more likely to be malnourished than non-governmental employees (P value 0.042).

As for the nutritional status and BMI of the participants, those who were underweight were nine times more likely to be malnourished than those who were extremely obese, and those who were healthy weight were only three times more likely to be malnourished (P value 0.001). People with chronic disease are 2.48 times more likely to be malnourished than those without chronic disease (P value 0.017). People with digestion problems are 1.96 times more likely to be malnourished than those without digestion problems (P value 0.004).

In the AOR model, participants who are Retired or not working, are 2.17 times more likely to be malnourished, and housewife is 1.91 times more likely to be malnourished than non-governmental employees. (P value 0.001) As for the nutritional status and BMI of the participants, those who were underweight were 18 times more likely to be malnourished than those who were extremely obese, and those who were healthy weight were only six times more likely to be malnourished (P value 0.001). People with chronic diseases are 4 times more likely to be malnourished than those without chronic disease, (P value 0.001). People with digestion problems are 2 times more likely to be malnourished than those without digestion problems (P value 0.001).

The nutritional screen included questions (A-F) on the MNA, and the result shows that around 143 (47.7%) of the participant's elders were categorized as malnourished, 116 (38.7%) were at risk of malnutrition and 41 (13.7%) had normal nutritional status

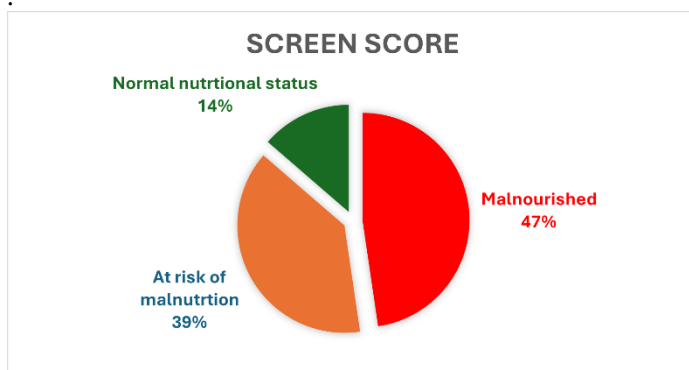


Figure 1: Distribution of the total nutritional screen score

The nutritional screen included all questions on the MNA, the result shows that; 123 (41%) of elders classified as malnourished, 142 (47.3%) were at risk of being malnourished and 35 (11.7%) had normal nutritional status.

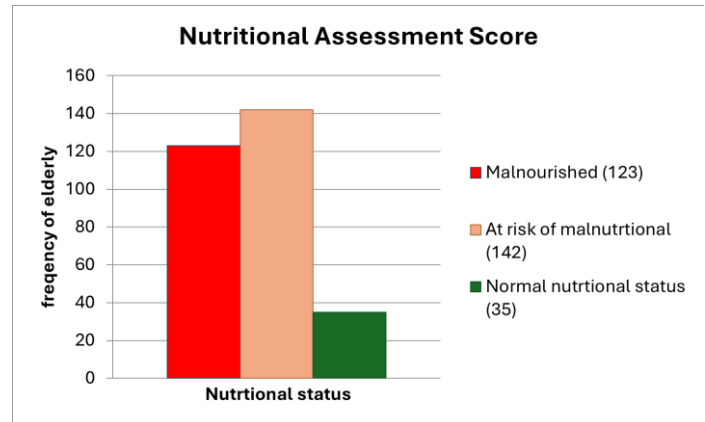


Figure 2: Distribution of the total nutritional assessment score

All of the Mini Nutritional Assessment (MNA) questionnaire's items were included in the nutritional screening procedure for this cross-sectional investigation. The results of this comprehensive evaluation provided valuable insights into the nutritional status of older individuals. Notably, a significant portion of the elderly patients studied was found to be experiencing dietary challenges. Specifically, malnutrition was identified in 41% of the elderly participants.

This finding is particularly concerning, as malnutrition in older adults can significantly impact their overall health and well-being. It can lead to a decline in muscle mass, weakened immune function, increased susceptibility to illness, and a decrease in cognitive abilities. Addressing this issue is essential, as proper nutrition plays a vital role in healthy aging.

The study also revealed that 47.3% of older adults are at risk of malnutrition. This group represents a significant portion of the population who, although not currently malnourished, are at an increased risk of developing nutritional deficiencies in the future. The findings underscore the importance of implementing preventive measures to address malnutrition in this at-risk group. Early intervention, dietary counseling, and nutritional support are crucial in preventing further deterioration of their nutritional health.

The study also revealed that 11.7% of older patients maintained a normal nutritional status, which represents a more promising outcome. While this proportion may seem relatively minor compared to those at risk of or already experiencing malnutrition, it is important to consider that this group is successfully preserving their nutritional health. Understanding the factors that contribute to their optimal nutritional status can provide valuable insights for developing targeted strategies to support the broader senior population.

The results of this study indicate that undernutrition is more prevalent among females than males, with women being approximately twice as vulnerable. These findings align with similar studies conducted in Debre Markos and Gonder, Ethiopia

[10, 11]. This tendency may be explained by the fact that older women frequently put their grandchildren's needs ahead of their well-being. The dietary difficulties that women encounter may also be caused by a combination of variables, including recurrent pregnancies, hard workloads, cultural standards, gender inequity, and a lack of chances for income-generating activities [12].

It was discovered in this study that 24.6% of the participants had a history of chronic illnesses, such as hypertension, joint pain (arthritis), asthma, vision issues, recognized hemorrhoids, and physical challenges. Only hemorrhoids among these disorders, nevertheless, showed a substantial correlation with malnutrition. This finding could be explained by the fact that elderly people with hemorrhoids may cut back on their food intake out of fear of discomfort during feces, which might then result in a reduction of appetite. In contrast to these findings, research from Turkey, Iran, and Austria found a strong link between chronic diseases such as cancer, hypertension, stroke, diabetes, heart disease, and respiratory syndromes with undernutrition [13, 14]. Rural residents (those living outside of the city) had a higher prevalence of malnutrition, which may be related to less access to essential services, a worsening financial situation, and/or the economy. People who are alone, separated, or divorced are more likely to suffer from malnutrition, according to Bardon and Alzahrani [15, 16]. Similarly, a recent study demonstrates the same outcome.

The current study has found a significant correlation between malnutrition and variables like BMI and body weight. It's interesting to note that underweight and healthy-weight persons had higher rates of both malnutrition and the risk of malnutrition, which may make malnutrition harder to detect in these populations. This result is by other studies that showed a drop in appendicular fat mass with ageing and an increase in central fat accumulation [17, 18].

The MNA tool, a commonly used and validated instrument for evaluating nutritional status among the elderly, is one of this study's strengths. Due to the MNA's extensiveness, it is possible to evaluate several facets of nutrition thoroughly, including nutritional consumption, movement, and anthropometric measures. This all-encompassing methodology strengthens the study's validity and guarantees a more realistic depiction of older persons' nutritional state.

It is crucial to determine the prevalence of malnutrition, as this study's findings demonstrate. Knowing the scope of the problem gives a starting point for more investigation and intervention techniques. The fact that a large percentage of older individuals are either malnourished or at risk of malnutrition highlights the pressing need for specialized nutritional treatments in this population.

Also, the limitation of the study is the power of the analysis may be compromised and generalization may be constrained by the small sample size and the fact that this study is only being undertaken in a few health settings.

4 Conclusion

A high prevalence of malnutrition and malnutrition risk was observed among hospitalized elderly individuals in this study, with the majority of these cases being female and residing outside

Sulaimani city. Furthermore, a significant association was identified between malnutrition and chronic diseases, along with notable correlations between malnutrition and lower BMI among the elderly participants.

Acknowledgements

We thank a group of students in the Nursing Department/ College of Health and Medical Technology/ Sulaimani Polytechnic University named Shagwl Nasradin Mustafa, Snoor Othman Muhammad, Bakhan Hussein Hassan, Hawzhin Amin Ibrahim, Savin Yasin Mahmoud, Raz Saman Omer and Sahira Nasih Aziz, for their effort in collaboration of data collection.

Authors contribution

Zana Faris Muhammed designed the study, and Ramand Mohammed Haji analyzed the data. Zana Faris Muhammed prepared the draft of the manuscript.

Ethics approval and consent to participate

The current study was approved by the research council at the College of Health and Medical Technology/ Sulaimani Polytechnic University also approved optioned by the directorate of health in Sulaimani province and from Sulaimani hospital administrations. All methods were carried out according to their relevant guidelines and regulations.

Funding Sources

This study was self-funded.

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