ORIGINAL RESEARCH

Low Self-Perception of Malnutrition in Older Hospitalized Patients

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Background: Studies focusing on self-perception of nutritional status in older hospitalized patients are lacking. We aimed to examine the self-perception of body weight and nutritional status among older hospitalized patients compared to their actual body weight and nutritional status based on medical assessment.

Materials and Methods: This observational cross-sectional study investigated 197 older participants (mean age 82.2±6.8 years, 61% women) who were consecutively admitted to the geriatric acute care ward. Body weight status and nutritional status were assessed using WHO-BMI classification and Mini Nutritional Assessment-Short Form (MNA-SF), respectively. Self-perceived body weight status and nutritional status were assessed with a standardized questionnaire. A follow-up was performed with a short telephone interview after three months.

Results: According to MNA-SF, 49% and 35% were at risk of malnutrition and malnourished, respectively. There was no agreement between self-perceived nutritional status and objective nutritional status according to MNA-SF (Kappa: 0.06). A slight agreement was found between subjective body weight status and objective body weight status according to WHO-BMI classification (Kappa: 0.19). A total of 184 patients completed the 3 months follow-up and additional 9 patients died during this time, of which 7 and 2 were malnourished and at risk of malnutrition according to MNA-SF, respectively. Of those who were malnourished and at risk of malnutrition based on MNA-SF and died during follow-up, 67.7% did not realize their malnutrition. Compared to the patients with normal nutritional status during hospitalization, malnourished patients based on MNA-SF had higher rates of unplanned hospital readmission and further weight loss and more often reported health deterioration and experienced death within three months after discharge.

Conclusion: No agreement between self-perceived nutritional status and objective nutritional status among older hospitalized patients was found. Our study highlights the need to raise knowledge about the issue of malnutrition and increase awareness of health risks associated with malnutrition among older hospitalized patients.

Keywords: body weight, geriatrics, malnutrition, older patients, self-perception

Introduction

Malnutrition is a frequent finding in older patients and has commonly a multifactorial etiology. Malnutrition is associated with a low quality of life, prolonged hospitalization and rehabilitation, more frequent complications and higher morbidity and mortality.[1] Although the prevalence of malnutrition is between 30% and 50% in hospitalized older persons,[2–4] it remains widely unrecognized and untreated.[1]

However, even if malnutrition is recognized, its treatment may be challenging, especially in an older frail population. In this population, the successful treatment of malnutrition mostly takes weeks and months. Particularly for a sustained treatment after

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hospital discharge, the perception and comprehension of malnutrition by the patient may be critical. Older patients need to be aware of the fact that they are underweight, malnourished or at risk of malnutrition. Without this awareness and the comprehension of the consequences of malnutrition, a behavioral change is unlikely to happen, and management of malnutrition may not be successful.

The agreement between self-perception and measured body weight has already been investigated in previous studies on different populations including older subjects.[5–7] The findings of a cross-sectional study of 1295 healthy older adults aged 60–96 years demonstrated low agreement between objective and self-perceived body weight status.[7] However, to the best of our knowledge data about self-perception of malnutrition are missing for older hospitalized patients. In the present study, we aimed to examine the self-perception of body weight and nutritional status among older hospitalized patients compared to their actual body weight and nutritional status based on medical assessment and their relevance for outcome.

Subjects and Methods

This observational cross-sectional study was undertaken between November 2018 and April 2020 at eight acute care geriatric hospital departments in Germany. The study population comprised 197 consecutively hospitalized older participants aged between 66 and 101 years. Exclusion criteria were age <65 years, missing or withdrawn informed consent, severe disturbance of fluid status (ie, severe cardiac decompensation, decompensated kidney failure and dehydration), moderate to severe dementia, impossibility to measure body weight and inability to cooperate. The study protocol had been approved by the ethical committee of Ruhr-University, Bochum (no 18–6451 approved on 22.10 2018). The participants were informed about the purpose of the study, and that it was conducted in accordance with the Declaration of Helsinki. Written consent was obtained by each study participant.

Self-Reported and Medical Assessment Variables

Reported variables were obtained using two structured questionnaires with predefined answers, where adequate. The first questionnaire about patient's self-perception was distributed by a trained physician at each department and completed by the study participants within 24 hours after hospital admission. Help was given when necessary.

The second questionnaire about medical assessment was filled out by the attending physician during the hospital stay and at hospital discharge.

To assess patient's self-perception, we used the following main questions: 1) How is your actual body height and weight? 2) Do you think you are normal weight, underweight or overweight? 3) Do you rate your nutritional status as good, undernourished or overnourished? 4) Are you satisfied with your nutritional status? 5) Did your weight change during the last 3 months (no, decrease, gain or do not know)? 6) If you have lost weight, how much did you lose within the last three months? 7) If you have lost weight, what do you think is the main reason (12 predefined answers and free text)? 8) Would you like to change your weight (keep it, lose weight, gain weight, do not know)? Regarding the self-perception of patients' appetite, the Simplified Nutritional Appetite Questionnaire (SNAQ)[8] was integrated at the end of the questionnaire.

The medical assessment questionnaire asked about the main reason of hospitalization, current measured body weight and height, weight loss in last three months, need for nutritional therapy due to weight loss and kind of treatment of malnutrition, if present. At each center, a trained nurse measured body weight in light clothing with an accuracy of 0.1 kg using a calibrated chair scale and height to the nearest 0.5 cm with a stadiometer. BMI was calculated and patients were categorized according to the WHO-BMI classification (underweight: BMI <18.5 kg/m^2, normal weight BMI 18.5–24.9 kg/m^2, overweight BMI 25.0–29.9 kg/m^2 and obesity BMI ≥30.0 kg/m^2).[9] In addition, geriatric assessment was performed at hospital admission except the Barthel-Index, which was evaluated on admission and at discharge. Risk of malnutrition was measured according to the Mini Nutritional Assessment Short Form (MNA-SF)[10] which is a validated tool for the screening of nutritional status of geriatric patients across settings. Participants are stratified as having normal nutritional status (12–14 points), being at risk of malnutrition (8–11 points) and being malnourished (0–7 points).

Activities of daily living were determined using the Barthel-Index (BI).[11] The point's range of the German version of the BI is 0–100 pts., with 100 pts indicating independence in all activities of daily living. Cognitive function was measured with either the Mini Mental Status Examination (MMSE)[12] or the Montreal Cognitive Assessment (MoCA),[13] according to the standard assessment of each center. Medical comorbidities were evaluated using Charlson Comorbidity Index (CCI).[14] The geriatric

assessment was performed within the clinical routine of each center and the results were validated by the attending physician.

A follow-up was performed with a short telephone interview after three months, performed by the trained physician at each study center. Patients were asked about their general health status compared to hospital discharge (worse, same, better) and body weight compared to hospital discharge (stable, decreased, increased, unclear) and unplanned readmission to hospital. If the patient was not able to give reliable answers or it was not possible to get in contact with him, a relative was asked.

Statistical Analysis

The statistical analysis was completed using SPSS statistical software (SPSS Statistics for Windows, 137 IBM Corp, Version 26.0, Armonk, NY, USA). For an approximate sample size calculation, we expected 50% of older patients to systematically overestimate their body weight by an average of 2 kg (SD = 8 kg) and 50% of the patients to estimate with an average difference of 0 kg, ie, correctly (SD = 2 kg). A sample size of N = 200 in a 1:1 design with a power of 0.8 and a Type I error of 0.05 was calculated (http://PowerAndSampleSize.com). Means and standard deviations (SDs) were used for continuous data with normal distribution whereas median values are expressed with interquartile ranges (IQR) for non-normally distributed data. Categorical variables are shown as n (%). In order to compare the self-reported nutritional status and the objective nutritional status, we divided the patients into three groups according to the MNA-SF classification (malnourished, risk of malnutrition and normal nutritional status). Group differences were analyzed by using paired samples t test and Wilcoxon signed rank for normally and non-normally distributed values, respectively. Categorical variables were compared by the Chi square test. Pearson's correlation was applied for normally distributed variables whereas Spearman correlation was used for nonparametric data. Multivariate analysis was used to examine the relationship between nutritional status and outcomes while adjusting for age, gender, comorbidity and cognitive function. In addition, the Kappa coefficient was used to assess the agreement between self-perceived and objective body weight status and nutritional status. A kappa of 1 indicates perfect agreement, whereas a kappa of 0 indicates agreement equivalent to chance. A p-value of <0.05 was considered as the limit of significance.

Results

Characterization of Study Population

Baseline characteristics of study participants are summarized in Table 1. Of 197 patients with a mean age of 82.2 ± 6.8 years, 121 (61%) were women. Major reasons for hospitalization were cardiovascular disease, falls, fractures, osteoarthritis, neurodegenerative diseases and general disease, including infections.

Patient Perception of Body Weight, Nutritional Status and Appetite

As shown in Table 2, 53% and 25% of the patients regarded their body weight as normal and underweight, respectively. Mean current body weight reported by the patients was 69.7 ± 17.1 kg. In addition, 77% of the patients reported a good nutritional status whereas 17% considered themselves undernourished. In terms of appetite perception, 43% of patients regarded their appetite as good and very good and 39% as average. Half of the patients (52%) reported weight loss in the last three months (mean weight loss: 6.1 ± 4.9 kg), 46% intended

Table 1 Characteristics of Study Population on Admission

	All (n=197)
Gender (number, %)	
Females	121 (61)
Males	76 (39)
Age (y)	82.2 ± 6.8
BMI (kg/m^2)	25.3 ± 6.3
Geriatric assessments, Median (IQR)	
MNA-SF	9 (7–11)
Barthel-Index on admission	55 (35–70)
Barthel-Index at discharge	75 (65–85)
MMSE	28 (25–29)
MoCA	21 (17–24)
Charlson Comorbidity Index	2 (1–4)
Reason for admission	
Cardiovascular disease	39 (20)
Falls and fractures	72 (37)
Osteoarthritis	16 (8)
Neurodegenerative diseases	6 (3)
General diseases	64 (32)

Notes: For MMSE and MoCA, scores <26 considered as cognitively impaired. MMSE and MoCA were performed in 93 and 93 patients, respectively. Values are given as number (%), mean ± SD or median (IQR, interquartile range).
Abbreviations: MNA-SF, Mini Nutritional Assessment Short Form (normal nutritional status 12–14 points, at risk of malnutrition 8–11 points and malnourished 0–7 points); MMSE, Mini Mental Status Examination; MOCA, Montreal Cognitive Assessment.

Table 2 Patient Perception of Body Weight, Nutritional Status and Appetite (n=197)

	Number (%)
Body weight status	
Underweight	49 (25)
Normal weight	104 (53)
Overweight	42 (22)
Nutritional status	
Good	150 (77)
Undernourished	34 (17)
Overnourished	12 (6)
Satisfaction with nutritional status	
Satisfied	143 (73)
Unsatisfied	51 (27)
Appetite according to SNAQ	
Very poor	9 (5)
Poor	26 (13)
Average	76 (39)
Good	73 (38)
Very good	9 (5)
Body weight change in last 3 months	
No	67 (35)
Decreased	101 (52)
Increased	14 (7)
Unknown	11 (6)
Willing to change body weight in the next 3 months	
No	91 (46)
Willing to decrease	`48 (24)
Willing to increase	52 (27)
Unknown	5 (3)

Abbreviation: SNAQ, Simplified Nutritional Appetite Questionnaire.

to maintain their current body weight whereas 27% wanted to gain weight in the future. Among those who reported weight loss, 43% and 15% intended to gain and lose body weight in the future, respectively. The main reasons of weight loss reported by the patients were acute illness, loss of appetite, psychological stress and dysphagia.

Medical Assessment of Body Weight and Nutritional Status

The results of the medical assessment are summarized in Table 3. Mean measured body weight was 70.1 ± 18.8 kg which was similar to the weight reported by the patients (P=0.436). When compared to the WHO-BMI classification, almost half of the patients were within the healthy weight range and only 9% were classified as underweight.

Table 3 Results of Medical Assessment of Nutritional Status (n=197)

	Total Population
Current body weight (kg)	70.1 ± 18.8
Height (m)	1.66 ± 0.1
BMI (kg/m^2)	25.3 ± 6.4
Objective body weight status	
Underweight (BMI <18.5 kg/m^2)	16 (9)
Normal weight (BMI 18.5–24.9 kg/m^2)	91 (47)
Overweight (BMI 25.0–29.9 kg/m^2)	45 (23)
Obesity (BMI ≥30.0 kg/m^2)	41 (21)
Weight loss in last 3 months	
No (n, %)	83 (46)
Yes (n, %)	97 (54)
Nutritional status according to MNA-SF	
Normal nutritional status (n, %)	31 (16)
At risk of malnutrition (n, %)	95 (49)
Malnourished (n, %)	69 (35)
SNAQ score, Median (IQR)	14 (11–15)
<14 (n, %)	86 (48)
≥14 (n, %)	92 (52)
Nutritional therapy of weight loss	
No (n, %)	42 (40)
Yes (n, %)	62 (60)

Notes: Body weight was measured using a calibrated chair scale. Values are given as number (%), mean ± SD or median (IQR, interquartile range).
Abbreviations: MNA-SF, Mini Nutritional Assessment Short Form (normal nutritional status 12–14 points, at risk of malnutrition 8–11 points and malnourished 0–7 points); SNAQ score, Simplified Nutritional Appetite Questionnaire (maximum score 20, score <14 indicates risk of at least 5% weight loss within six months).

According to MNA-SF, 16% and 49% had normal nutritional status and were at risk of malnutrition, respectively, whereas 35% were malnourished. In addition, 18% and 32% of the patients had a severe and moderate decrease in food intake over the past three months, respectively. According to the SNAQ, over half of the patients (52%) were at nutritional risk.

According to the information given by the attending physician, 54% of the patients had weight loss in the last three months. The main reasons for weight loss as reported by the attending physician were general disease, gastrointestinal disorders, dementia and pain. Furthermore, 60% of the patients with weight loss received nutritional therapy (mainly high protein and/or high energy oral nutritional supplements) during the hospital stay. The group treated with nutritional therapy was more malnourished (median MNA-SF: 6, IQR: 4–8 vs 9, IQR: 7–11; P<0.001) and had lower mean BMI (22.3 ± 4.6 kg/m^2 vs 28.4 ± 7.6 kg/m^2, P<0.001) compared to those who did not receive nutritional therapy.

Concordance Between Patient Perception and Medical Records

With regard to body weight, 55% and 84% of patients who were malnourished or at risk of malnutrition according to MNA-SF reported their body weight, as normal weight and overweight, respectively (Table 4). In addition, 64% of malnourished patients and 87% of patients at risk of malnutrition according to MNA-SF classified their nutritional status as good. Furthermore, 58% and 82% of patients who were satisfied with their nutritional status were malnourished and at risk of malnutrition based on MNA-SF, respectively. When compared to the objective nutritional status, only 33% of malnourished patients based on MNA-SF correctly perceived their nutritional status as undernourished (Table 4). The Kappa coefficient (0.06) showed no agreement between self-perceived nutritional status and objective nutritional status according to MNA-SF. In addition, we found only a slight agreement between subjective body weight status and objective body weight status according to the WHO-BMI classification (Kappa coefficient: 0.19).

Follow-Up

A total of 184 patients completed the 3 months follow-up and additional 9 patients died during this time (9/193; 4.6%), of which 7 (78%) and 2 (22%) were malnourished and at risk of malnutrition according to MNA-SF, respectively. None of the patients with a normal nutritional status died during the follow-up period. Of those who were malnourished or at risk of malnutrition based on MNA-SF and died during follow-up, 67.7% (6/9) perceived their nutritional status incorrectly (P=0.01), ie, they did not believe to be malnourished. Further, results of multivariate analysis showed that compared to the patients with normal nutritional status during hospitalization, malnourished patients based on MNA-SF had higher rates of unplanned hospital readmission (36%, n=23 vs 18%, n=5; respectively, P=0.097), further weight loss (44%, n=28 vs 14%, n=4; respectively, P=0.073), more often reported health deterioration (29%, n=18 vs 17%, n=5; respectively, P=0.218) and death (11%, n=7 vs 0%, n=0; respectively, P=0.021) within three months after discharge. In addition, no significant associations between self–perceived malnutrition and adverse outcomes were found except a further weight loss within three months after discharge (P= 0.04).

Discussion

In the present study, 35% of the patients were malnourished and 49% were at risk of malnutrition, respectively, according to MNA-SF. However, we found major discrepancies between nutritional status (MNA-SF) and body weight status (WHO-BMI classification) and the self-perception of nutritional status and body weight status by older hospitalized patients. Previous studies have investigated exclusively the agreement between self-perception of body weight and measured body weight mainly in young and middle age adults[15,16] and healthy older individuals.[6,7] To the best of our knowledge, this is the first study evaluating the agreement between subjective and objective nutritional status in older hospitalized patients.

Table 4 Concordance Between Patient Perception and Medical Assessment of Nutritional Status

Self-Reported by Patients	MNA-SF Classification (n, %)				P value
	Malnourished (n=69, 35%)	At Risk (n=95, 49%)	Normal (n=31, 16%)	Total	
Body weight status					P<0.001
Normal weight	31 (45)	54 (58)	19 (61)	104	
Underweight	31 (45)	16 (16)	2 (6)	49	
Overweight	7 (10)	25 (26)	10 (33)	42	
Nutritional status					P<0.001
Good	44 (64)	82 (87)	24 (77)	150	
Undernourished	23 (33)	8 (8)	3 (10)	34	
Overnourished	2 (3)	5 (5)	4 (13)	11	
Satisfaction with nutritional status					P=0.002
Satisfied	39 (58)	78 (82)	26 (87)	143	
Unsatisfied	30 (42)	17 (18)	4 (13)	51	

Abbreviation: MNA-SF, Mini Nutritional Assessment Short Form (normal nutritional status 12–14 points, at risk of malnutrition 8–11 points and malnourished 0–7 points).

The findings of the present study demonstrated only a slight agreement between subjective and objective body weight status (Kappa coefficient, 0.19) in older hospitalized patients. These findings extend the results of previous cross-sectional study among healthy older adults (aged 60–96 years) which reported a low agreement between objective and self-perceived body weight status.[7] In another cross-sectional study among 76 older individuals aged 65 and 97 years, 40% perceived their body weight status incorrectly.[6] In this respect, it seems that older adults substantially misperceive their body weight status may be due to a lack of awareness of changes in body weight with advancing age.[17] In a cross-sectional study among women 14–79 years, Park et al[16] indicated that age is the most important factor associated with deviations in weight status perception with increasing misperception as age increased. Further, a low agreement between self-reported and measured body weight with increasing age was also observed in previous cross-sectional and longitudinal studies covering a wide age range.[17,18]

Besides body weight status perception, studies focusing on self-perception of nutritional status in older hospitalized patients are lacking. This is remarkable, since correct self-perception of nutritional status could be a key factor for successful treatment and management of malnutrition in older individuals.[19] In the present study, we found no agreement between self-perceived nutritional status and objective nutritional status among older hospitalized patients (Kappa coefficient, 0.06), which confirms a substantial misperception of nutritional status in older persons. Findings of a small pilot study among ten hospitalized seniors (ages 65 and older) who were classified to be at risk of malnutrition by nutrition screening indicated that none of the patients believed to be at risk of malnutrition whereas they reported to have a good nutritional intake.[20] The same is true for our study since the majority of those who were classified as malnourished (67%) or at risk of malnutrition (92%) according to MNA-SF did not see themselves malnourished or at risk of malnutrition.

Previous studies demonstrated significant associations between weight loss and risk of malnutrition and higher mortality rate among community-living older adults.[21,22] In the present study, over half of the population reported weight loss in the past three months whereas 15% of them intended to lose even more body weight, which should be considered as harmful for most older patients. Further, in this study, 5% of patients who were malnourished or at risk of malnutrition according to MNA-SF died during the 3 months follow-up period. Nearly three-quarters of whom did not perceive their reduced nutritional status. Indeed, this misperception indicates a potential problem.

Nutritional deficiencies are frequently observed in older persons; however, poor knowledge about their own nutritional status could be involved in the development of nutritional inadequacy. Malnutrition mostly develops very slowly over time and is associated with unspecific symptoms.[23–25] A better understanding and awareness of malnutrition by affected patients may be a factor to slow or even prevent the development of malnutrition.[25] In a survey in Australia, dietitians have reported a lack of knowledge by community-living older adults about malnutrition as the strongest barrier in performing malnutrition screening.[26] Poor understanding of malnutrition and the misperception of nutritional and body weight status in older persons as seen in our study and previous studies[7,17,27] may seriously hamper the successful implementation of nutrition therapy. Our study highlights the need to raise knowledge and awareness about malnutrition and associated health risks among older hospitalized patients.

This study has some limitations. It was undertaken in eight different acute care geriatric hospital departments with different numbers of included patients. Therefore, the results may be biased by two departments recruiting half of the patients. Another limitation is the exclusion of patients with a high risk of malnutrition such as patients with dementia which, however, cannot be avoided when enquiring self-perception. Further, self-perception of nutritional status was only obtained at hospital admission. For further research, it would be of interest to measure how the perception of nutritional status changes after discussing the malnutrition diagnosis with the patients and after nutritional counseling.

Conclusion

In this study, no agreement between self-perceived nutritional status and objective nutritional status among older hospitalized patients was found. Since malnourished older patients were more susceptible to death, especially if there were not aware of their malnutrition, our study highlights the need to raise knowledge about the issue of malnutrition and increase awareness of health risks associated with malnutrition among older hospitalized patients.

Abbreviations

SNAQ, Simplified Nutritional Appetite Questionnaire; MNA-SF, Nutritional Assessment Short Form; MMSE,

Mini Mental Status Examination; MoCA, Montreal Cognitive Assessment; CCI, Charlson Comorbidity Index.

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Author Contributions
All authors contributed to data analysis, drafting or revising the article, have agreed on the journal to which the article will be submitted, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

Disclosure
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