The problem of malnutrition amongst acutely hospitalized elderly patients

Problem niedożywienia u pacjentów w wieku podeszłym hospitalizowanych w trybie pilnym

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ABSTRACT

INTRODUCTION: The aim of the study was to assess the occurrence of malnutrition in patients who were hospitalized as a matter of urgency in the internal medicine ward, while taking into account the diseases that cause hospitalization.

MATERIAL AND METHODS: A cross-sectional observational study was carried out on a sample of 320 elderly persons consecutively admitted to the department of internal medicine from September 2019 to January 2020. The nutritional status was measured by: a Subjective Global Assessment (SGA) questionnaire followed by anthropometric measurement (body mass and height) as well as the body mass index (BMI) and body composition analysis using the electric bioimpedance (BI) method.

RESULTS: The studies showed malnutrition in 42.6% of men and in 44.7% of women, and severely malnutrition in 24% of men and 24.1% of women. Malnutrition was most often found in patients with chronic obstructive pulmonary disease (COPD) and urinary tract infections, and severe malnutrition in patients with cardiovascular diseases.

CONCLUSIONS: High rates of malnutrition and severe malnutrition occur in elderly patients urgently hospitalized due to internal diseases. SGA and BI are useful tools for controlling the nutritional status in this group of patients.

KEY WORDS

malnutrition, geriatrics, hospitalization, Subjective Global Assessment, body mass index, electric bioimpedance

STRESZCZENIE

WSTĘP: Celem pracy była ocena niedożywienia u pacjentów hospitalizowanych w trybie pilnym na oddziale internistycznym z uwzględnieniem chorób będących przyczyną hospitalizacji.

MATERIAŁ I METODY: Przekrojowe badanie obserwacyjne przeprowadzono na próbie 320 osób w wieku podeszłym przyjmowanych kolejno na oddział chorób wewnętrznych od września 2019 r. do stycznia 2020 r. Stan odżywienia sprawdzano za pomocą: kwestionariusza Subiektywnej Globalnej Oceny (SGA), pomiaru antropometrycznego (masa ciała i wzrost), wskaźnika masy ciała (BMI) oraz analizy składu ciała za pomocą bioimpedancji elektrycznej (BI).

WYNIKI: Badania wykazały niedożywienie u 42,6% mężczyzn i 44,7% kobiet oraz poważne niedożywienie u 24% mężczyzn i 24,1% kobiet. Niedożywienie stwierdzano najczęściej u osób z przewlekłą obturacyjną chorobą płuc (POChP) i z zakażeniami układu moczowego, a poważne niedożywienie u osób z chorobami układu krążenia.

WNIOSKI: U pacjentów w wieku podeszłym hospitalizowanych w trybie pilnym z powodu chorób wewnętrznych występuje wysoki wskaźnik niedożywienia i poważnego niedożywienia. SGA i BI są przydatnymi narzędziami do kontroli stanu odżywienia w tej grupie chorych.

SŁOWA KLUCZOWE

niedożywienie, geriatria, hospitalizacja, Subiektywna Globalna Ocena, wskaźnik masy ciała, bioimpedancja elektryczna

INTRODUCTION

Proper nutrition is one of the most important factors influencing the health of the elderly. Nutritional disorders, including malnutrition, are a serious medical, psychological and social problem. The prevalence of malnutrition is significant in old age. In Europe and North America, malnutrition affects from 1 to 15% of elderly people living in their own homes, but from 25 to 60% in the case of elderly people in geriatric care facilities, reaching 35–65% of elderly people in hospitals [1]. As shown, in the representative population of PolSenior, it concerns as much as 7.5% of people aged 65 and up [2]. It is almost twice as common in women as in men, but the risk also increases with age. In addition, the following factors are of importance when considering the increased risk of malnutrition in Poland: living in the countryside, living without a life partner and living in a (declared) poor financial situation. When considering the dangers of malnutrition, special attention should be paid to age as a risk factor because according to the prognoses for Poland, the 60–64 age group will only slightly increase, while the 80 and up age group will more than double by 2050 [3].

In order to standardize the criteria and create the possibility of conducting analyses on malnutrition in various regions of the world, the Global Leadership Initiative on Malnutrition (GLIM) initiative was published at the beginning of 2019 [4,5]. The criteria are defined as two-step: the first stage is screening of malnutrition, and the second stage – proper diagnostics completed with an analysis of the severity of malnutrition.

For the screening tests, GLIM experts did not explicitly recommend a specific tool, but indicated the possibility of using any that have been validated for this purpose, e.g. Nutritional Risk Score-2002 (NRS-2002), Subjective Global Assessment (SGA), Mini Nutritional Assessment (MNA) or the MNA-short version.

According to Polish legislation, all hospitalized persons are to be screened (with the exception of patients in the emergency department) – in the case of adults, using NRS-2002 or SGA [6].

Nutritional disorders occurring in the elderly over 65 are most often the result of changes in the body during the aging process, social and economic conditions, and the occurrence of diseases [7].

The most important factor in malnutrition is chronic diseases, as well as their related therapeutic treatments. Malnutrition is observed in people suffering from diseases of the cardiovascular, respiratory and neurological systems, mental disorders (especially depression and dementia), cancer, acute and chronic infections, gastrointestinal diseases, and diseases of the endocrine system [8].

Untreated and unrecognized malnutrition may cause: deteriorated efficiency of organs and systems, atrophy of intestinal villi (digestive and absorption disorders), weakening of intestinal peristalsis, a decrease in protein synthesis, in particular albumin, the occurrence of hypochromic anaemia (a reduced supply of vitamin B12 and iron), weight loss and a decrease in muscle strength (sarcopenia) [9,10]. In the case of exacerbation of a chronic disease, concomitant malnutrition may be an additional factor hindering the stabilization of the disease process and requiring hospitalization [11,12]

Thus, the aim of the study was to assess the occurrence of malnutrition in patients who were hospitalized as a matter of urgency in the internal medicine ward, while taking into account the diseases that cause hospitalization.

MATERIAL AND METHODS

Ethics

The current study was conducted in accordance with the Declaration of Helsinki. The project was approved by the Bioethics Committee of the Medical University

of Silesia in Katowice – decision No. KNW/0022/KB1/28/18 of April 17, 2018. The participants were informed in detail about the study and gave their written consent. Participation in the study was voluntary and informed.

Patients

The cross-sectional observational study was carried out on a sample of 320 elderly persons consecutively admitted to the department of internal medicine from September 2019 to January 2020. The patients were qualified according to the order of reporting, who had indications for admission to the Department of Internal Medicine, Medical University of Silesia in Katowice. The exclusion criteria from the study were as follows: non-Polish speaking, transferred from another hospital, alcoholism, severe dementia/confusion, terminal stage of chronic diseases, with advanced cancer, noncooperative/refused, alcohol/drug addicted, implanted pacemaker, endoprosthesis, metal implants, as well as generalized chronic body oedema.

Methods

The nutritional status of each senior was assessed on the second or third day of their stay, always in the morning. In Poland, in accordance with the regulation of the Minister of Health, September 15, 2011 (amendment on November 22, 2013), one of the two scales: NRS--2002 or SGA is the recommended tool for the routine assessment of the nutritional status of hospitalized patients.
The study used the translated version of the SGA questionnaire followed by anthropometric measuring of body weight and height as well as the body mass index (BMI) and body composition analysis using the electric bioimpedance (BI) method.
The 7-point SGA scale consisted of 2 categories: medical history and physical examination. The medical history section includes weight change, dietary intake, gastrointestinal symptoms, functional capacity, in addition to disease and comorbidity data. The physical examination section includes the loss of subcutaneous fat, muscle wasting, and oedema. The trained investigators rated each item from 1 to 7, and decided on the overall SGA score. Based on the overall SGA score, the patients were categorized into 3 groups as SGA A (SGA score 6–7, well nourished – WN), B (SGA score 3–5, mildly to moderately malnourished – MN), or C (SGA score 1–2, severely MN) [13].
Body height was measured to the nearest 0.1 cm using a non-metallic and non-stretchable tape. The weight and body composition analysis were determined by bioelectrical BI using the Tanita MC-780 multi--frequency segmental Body Composition Analyzer (Tanita Corporation, Tokyo). The MC-780 uses the latest multi-frequency technology to record a comprehensive range of measurements in just

20 seconds, from segmental fat levels, phase angle and intra/extra cellular body water [12]. BMI was calculated as weight/height^2 (kg/m^2).

Statistical analysis

The results were statistically analysed using the Statistica 13.1 program. The obtained results were based on an MS Excel spreadsheet and presented in the form of tables. In the statistical analysis, the significance level was $p < 0.05$ and the following were used: descriptive statistics, multi-way tables and Pearson's Chi-squared test of independence.

RESULTS

In the end, the study involved 320 geriatric patients (170 women and 150 men) hospitalized in the Department of Internal Medicine. The mean age of the entire cohort was 75 ± 5.2 years. The characterization of the group for morbidity is shown in Table I.

Table I. Most frequent causes of acute hospitalization and associated disorders in elderly
Tabela I. Najczęstsze przyczyny nagłej hospitalizacji i związanych z nią zaburzeń u osób starszych

Causes of hospitalization	
Disease	Frequency (%)
Cardiac insufficiency	36
COPD	22
DMt2	17
Infection of pulmonary or urinary tract	15
Gastritis with duodenitis	10
Associated disorders	
Electrolyte disturbances	43
Arterial hypertension	31
Secondary anemia	15
Renal failure	11

COPD – chronic obstructive pulmonary disease, DMt2 – type 2 diabetes mellitus decompensated

Nutritional assessment

The following results were obtained from the Subjective Global Nutritional Assessment. Changes in body weight were analysed in the last 2 weeks prior to hospitalization. No change in body weight was confirmed by 88% of the respondents, while in 12% of the cases the body weight had decreased. Changes in food intake compared to previous nutrition were declared by 9% of the respondents, a statistically significant greater number of patients did not introduce changes in food intake (91%) and followed a diet similar to the optimal diet based on solid foods (an easily digestible diet). A complete liquid diet was used by 2% of the respondents, and a soft foods diet by 2% of the respondents.

The occurrence of gastrointestinal symptoms (lasting for more than 2 weeks) applied to a smaller group of subjects (29%), while 71% of subjects did not experience any symptoms. In the group of people who experienced gastrointestinal symptoms, 14% of respondents reported constipation, 7% acid reflux, 6% lack of appetite, and 2% nausea.

Limitations in both physical activity and independence was noted in 24% of the respondents, while 76% of the patients did not experience changes in their physical capacity. Finally, the analysis of the subjective global nutritional status assessment results allowed the advancement of changes to be determined in the group of hospitalized patients in the internal medicine ward. The well-nourished status (SGA A) was present in 50 men (33.33%) and in 53 women (31.2%), 64 men (42.6%) and 76 women (44.7%) were moderately or suspected of being malnourished (SGA B) and severe malnutrition (SGA C) was found in 36 men (24%) and 41 women (24.1%).

The greatest undernourishment was found in patients with chronic obstructive pulmonary disease (COPD) and urinary tract infections and malnutrition was found in the highest ratio in patients with cardiovascular diseases (Table II).

Table II. Nutritional status assessed by SGA method depending on reason for acute hospitalization
Tabela II. Stan odżywienia oceniany za pomocą kwestionariusza SGA w zależności od przyczyny nagłej hospitalizacji

| Type of disease | Nutritional status group | | | | | |
| | SGA A | | SGA B | | SGA C | |
	M (%)	F (%)	M (%)	F (%)	M (%)	F (%)
Cardiovascular disease	7.7	18.6	38.5	27.1	53.8	54.3
COPD	33.3	42.3	66.7	57.7	–	–
Pneumonia	37.5	52.9	62.5	47.1	–	–
DMt2	18.2	20	45.5	46.7	36.3	33.3
Urinary tract infection	–	28.6	100	57.1	–	14.3
Gastrointestinal diseases	–	44.4	100	55.6	–	–

COPD – chronic obstructive pulmonary disease, DMt2 – type 2 diabetes mellitus decompensated, M – male, F – female

Analysis of body composition using BI method

The analysis of body composition of the patients using BI method depending on the causes of hospitalization is illustrated in Table III.

In the patients with cardiovascular diseases, a normal BMI value was found in 83.3% of men and 79.35% of women. On the other hand, an incorrect value of BMI occurred in 16.7% of men and 20.6% of women (p = 0.00). Adipose tissue at a normal level was present in 25.0% of men and 51.1% of women, higher adipose tissue indicating: overweight in 63.9% of men and 39.1% of women, and obesity in 11.1% of men and 9.8% of women (p = 0.089). A proper water content in the body was found in 30.8% of men and 25.4% of women; the water content was found to be either above or below the norm in 69.2% of men and 74.6% of women (p = 0.707).

In the patients with COPD, a normal BMI value was found in 60% of men and 56% of women, an incorrect BMI value for men 40%, and 44% for women (p = 0.000). A normal level of adipose tissue was present in 17.5% of men and 40% of women, higher adipose tissue indicating: overweight in 52.5% of men and 30.4% of women, obesity in 30% of men and 29.6% of women (p = 0.012). A proper water content in the body was found in 50% and 38.4% of women; the water content was found to be either above or below the norm in 50% of men and 61.6% of women (p = 0.01).

In the patients hospitalized due to pneumonia, a normal BMI value was found in all the men and in 94.1% of women, and an incorrect BMI value for women in 5.9% (p = 0.001). A normal level of adipose tissue was present in 37.5% of men and 64.7% of women, higher adipose tissue indicating: overweight in 62.5% of men and 29.4% of women, obesity in 5.9% of women (p = 0.437). A normal water content in the body was found in 37.5% of men and 35.3% of women, while a water content that was either above or below the norm was found in 62.5% of men and 64.7% of women (p = 0.021).

In diabetic patients, a normal BMI value was found in 45.5% of men and 60% of women, an incorrect BMI value for men was 54.5% and for women 40% (p = 0.635). A normal level of adipose tissue was found in 18.2% of men and 36.7% of women, higher adipose tissue indicating: overweight in 45.5% of men and 40% of women, obesity in 36.3% of men and 29.6% of women (p = 0.261). A proper water content in the body was found in 50% of men and 38.4% of women, with an incorrect water content in 50% of men and 23.3% of women (p = 0.194).

In the patients with urinary tract infections, a normal BMI value was found in all the men and in 85.7% of women, and an incorrect BMI value for women was 14.3% (p = 0.003). A normal level of adipose tissue was present in 28.6% of women, higher adipose tissue indicating: overweight in all the men and in 57.1% of women, obesity was found in 14.3% of women (p = 0.386). A normal water content in the body was found in 57.1% of women, with an abnormal water content in all the men and in 42.9% of women (p = 0.552).

Table III. Analysis of body composition of elderly using electric bioimpedance method depending on causes of hospitalization
Tabela III. Analiza składu ciała osób starszych za pomocą bioimpedancji elektrycznej w zależności od przyczyn hospitalizacji

		Level of BMI		p	Level of adipose tissue			p	Water body content		P
		within norm (%)	outside of the norm (%)		within norm (%)	overweight (%)	obese (%)		correct (%)	incorrect (%)	
Cardiovascular disease	M	83.3	16.7	0.000	25	63.9	11.1	0.089	30.8	69.2	0.707
	F	79.35	20.6		51.1	39.1	9.8		25.4	74.6	
COPD	M	60	40	0.000	17.5	52.5	30	0.012	50	50	0.010
	F	56	44		40	30.4	29.6		38.4	61.6	
Pneumonia	M	100	–	0.001	37.5	62.5	–	0.437	37.5	62.5	0.021
	F	94.1	5.9		64.7	29.4	5.9		35.3	64.7	
DMt2	M	45.5	54.5	0.635	18.2	45.5	36.3	0.261	45.5	54.5	0.194
	F	60	40		36.7	40	23.3		63.3	36.7	
Urinary tract infection	M	100	–	0.003	–	100	–	0.386	–	100	0.0552
	F	85.7	14.3		28.6	57.1	14.3		57.1	42.9	
Gastrointestinal diseases	M	100	–	0.053	–	100	–	0.302	–	100	0.314
	F	77.8	22.2		66.7	33.3	–		66.7	33.3	

COPD – chronic obstructive pulmonary disease, DMt2 – type 2 diabetes mellitus decompensated, M – male, F – female

DISCUSSION

Assessing nutritional status is a very important aspect of treating elderly patients. Due to the complexity of malnutrition in the elderly and the unreliability of individual indicators of nutritional status, for the best methods are still being sought for assessing the risk of malnutrition, especially in this demographic.

A tool which enables the diagnosis of malnutrition is BMI, the abnormal range below the range of 23.5 kg/m^2 for women in the current study was 60.49%, and for men 84.21%, which indicates the risk of malnutrition. In the screening of the independently-living elderly population, an abnormal range of BMI was present in 72% of the respondents, while in the study by Charzewska et al. [14] a range of BMI over 30 kg/m^2 was found in 44% of the respondents. Similar results were obtained in a study on the evaluation of selected anthropometric and biochemical parameters in a group of women over 60, where excessive body weight was found in 87.5% of the respondents [15]. Among the group of elderly people studied by Ptasińska et al. [16], the range of abnormal body mass index was found in 70.3% of the participants, and in the study by Cierzniakowska et al. [17] the range of overweight and obese participants over 70 years of age was 45.8%. In the study conducted by Pawlińska-Chmara [18] on a group of Polish centenarian women, the percentage overweight or obesity was 22.1% of the respondents. Additionally, in the study of the relationship between the self-esteem of women over 60 and their body shape, posture and physical activity, obesity was present in 27% studied women [19]. In a study by Shah and Braverman [20] a BMI over 30 kg/m^2 was present in 24% of men and 26% of women.

In the present study based on the SGA scale, a well--nourished status (SGA A) was present in 50 men (33.33%) and in 53 women (31.2%), 64 men (42.6%) and 76 women (44.7%) were moderately or suspected of being malnourished (SGA B) and severe malnutrition (SGA C) was found in 36 men (24%) and 41 women (24.1%). According to Sun et al. [21] the suspicion of malnutrition was found in 40% of hospitalized patients. Similar results were obtained by van Bokhorst-de van der Schueren et al. [22]. In a study conducted by Dutch researchers, the risk of malnutrition among outpatients was 58%, compared to Malaysia where every third person is diagnosed as severely malnourished [23], while Abd Aziz et al. [24] found that every second person is malnourished in that country. Koczy et al. [25] suggested that the phenomenon of malnutrition occurs in 16% of elderly residing in 24-hour care centres, and 58% of residents are at risk of malnutrition. In institutionalized older adults, malnutrition was diagnosed in 26.2% of the respondents [26]. Bartosiak et al. [27] shows that more frequent hospitalization (more than 5 times a year) is associated with a higher percentage of malnourished patients – 35.71% of patients. Malnutrition among the elderly is associated with a longer hospitalization period, as indicated by the studies conducted by O'Shea et al. [28], while the study of Australians shows that diagnosed malnutrition results in prolonged hospital stays in order to implement appropriate treatment [29]. In Asia, malnutrition is found in up to 78% of hospitalized patients [30].

In our study of the body composition analysis, the average body fat content among the surveyed women

was 37.37%, and for the surveyed men 28.89%, which indicates overweight. According to the study by Adamska et al. [31] on the differences in eating habits and preferences of adults depending on age, the percentage of adipose tissue in the studied group of men indicated overweight; their adipose tissue ranged within 27%, and for women 35%, which was indicated by the correct range of the norm. Abdominal obesity was present in 41% of Spanish respondents, which was associated with an increased content of adipose tissue [32]. Several scientific publications also showed numerous abnormalities in the percentage of adipose tissue in the group of men and women [33,34,35]. Kim et al. [10] suggested that the increased level of adipose tissue in the elderly in Korea is associated with a decrease in muscle mass, which affects the development of sarcopenia. Korean researchers conducted a study assessing body composition and observed how a properly balanced diet positively affects the slower process of muscle mass loss.

Elderly persons are the highest risk for developing malnutrition and dehydration. Water content decreases with age. Based on the results of the body composition analysis obtained with the Tanita analyser, the water content in the body should be between 45–60% for women and 50–65% for men. In our study, the mean body water content for women was 44.17% and for men 49.55, which indicates an abnormal water content in the body. The mean body water content among Japanese respondents was 53.1% [36], while in the Jasiński et al. [37] study, the mean body water content in non--exercising women over 50 was 47.5%. Water imbalance and under-nutrition are preventable disorders and the early identification of such conditions

may improve seniors' quality of life, and reduce disease burden [12]. The assessment of malnutrition and hydration status by the SGA questionnaire and the Tanita BI system is relatively quick, easy and are non--invasive methods [38,39,40,41,42,43].

CONCLUSIONS

The assessment of the nutritional status of elderly hospitalized in the Department of Internal Diseases showed abnormalities in terms of malnutrition. The study used a subjective global assessment of nutritional status, which is one of the screening tests recommended by the European Society for Parenteral and Enteral Nutrition (ESPEN) and is a commonly used tool.

The assessment of nutritional status is an important element in determining the risk of malnutrition due to the health consequences for the elderly. Early diagnosis can improve treatment outcomes for comorbid conditions. The priority is to develop a uniform, interdisciplinary strategy for the assessment of nutritional status in elderly people. It should be remembered that the method of nutritional assessment used is of less significance than the actual detection of malnutrition and further implementation of nutritional management.

As the highest undernourishment was found in patients with COPD and urinary tract infections and malnutrition was found in the highest ratio in patients with cardiovascular diseases, we suggest controlling the nutritional status with an easy tool like SGA or BI in such diseased persons even in urgent

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