

Prevalence nutritional disorders among patients hospitalised for stroke and discopathy in the neurology department

Występowanie zaburzeń odżywiania wśród pacjentów hospitalizowanych z powodu udaru i dyskopatii na oddziale neurologicznym

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Słowa kluczowe: ocena niedożywienia, pacjenci, oddział neurologii.

Abstract

Introduction: Nutritional disorders pose a huge health problem worldwide. In Poland, symptoms of malnutrition are found on admission to hospital in approximately 30% of patients. Among neurological disorders that predispose to malnutrition, brain injuries are the most frequent. The disease leads to difficulties with self-care, disorientation, reduced intellectual capacity, and dysphagia. Acute spinal pain syndromes affect weight loss because of persistent severe pain, and frequent dizziness and headaches accompanying cervical discopathy.

Aim of the research: To assess the degree of malnutrition in patients with stroke and discopathy hospitalised in the neurology ward.

Material and methods: The study group consisted of 141 patients, including 90 with stroke and 51 with discopathy, hospitalised in the neurology ward. Research material was collected based on medical records and a proprietary questionnaire. Body mass index (BMI) was calculated and assessed for each patient on admission and after hospitalisation.

Results and conclusions: The study sample consisted of a similar group of women (49%) and men (51%) aged from 30 to over 70 years. Ischaemic stroke was diagnosed more often in women (66.2%), whereas discopathy was more common in men (43.4%). The differences in BMI present on admission and after hospitalisation in men and women indicated a falling tendency. A slightly greater drop in BMI was found in women after hospital stay (from 24.1 to 23.3 kg/m²). The lowest BMI on admission was observed in students and pensioners. Long-term hospitalisation significantly affected weight reduction – the longer the patients were hospitalised, the lower their BMI was. Preliminary assessment of the nutrition status on admission to a hospital ward and customising individual diets may help reduce the effects of malnutrition.

Streszczenie

Wprowadzenie: W Polsce objawy niedożywienia przy przyjęciu do szpitala stwierdza się u ok. 30% chorych. Spośród schorzeń neurologicznych do niedożywienia predysponują najczęściej urazy mózgu. Choroba powoduje trudności związane z samoobsługą, zaburzenia orientacji, ograniczenie sprawności intelektualnej, zaburzenia połykania i dysfagię. Ostre zespoły bólowe kręgosłupa wpływają na redukcję masy ciała ze względu na silne bóle oraz zawroty i bóle głowy występujące przy dyskopatii szyjnej.

Cel pracy: Wstępna ocena stopnia niedożywienia u pacjentów z udarem mózgu i dyskopatią hospitalizowanych na oddziale neurologii.

Materiał i metody: Badaniem objęto grupę 141 pacjentów, w tym 90 osób z udarem mózgu i 51 osób z dyskopatią, hospitalizowanych na oddziale neurologii. Do zebrania materiału badawczego wykorzystano dokumentację medyczną i kwestionariusz ankiety. U każdego pacjenta dokonano pomiaru i oceny wskaźnika masy ciała (BMI) przy przyjęciu oraz po zakończonej hospitalizacji.

Wyniki i wnioski: W badaniach wzięła udział podobna grupa kobiet (49%) i mężczyzn (51%) w wieku od 30 do ponad 70 lat. Udar niedokrwienny częściej rozpoznano u kobiet (66,2%), a dyskopatię u mężczyzn (43,4%). Stwierdzono różnice w BMI przy przyjęciu i po zakończonej hospitalizacji zarówno u kobiet, jak i mężczyzn, wykazując tendencję spadkową. U kobiet zaobserwowano nieco wyższą tendencję spadkową BMI po wypisie: z 24,1 kg/m² do 23,3 kg/m². W grupie badanej najmniejsze BMI przy przyjęciu stwierdzono u studentów, rencistów i emerytów. Długi czas pobytu w szpitalu był istotny w redukcji masy ciała. Im dłużej pacjenci byli hospitalizowani, tym mniejszy był ich BMI.

Introduction

Nutritional disorders pose a huge health problem worldwide. Malnutrition is an indirect cause of many diseases and requires a long exhausting treatment that is not always effective. This increases the number of complications, mortality, and costs of treatment [1, 2]. In Poland, the symptoms of malnutrition on admission to hospital are found in about 30% of patients [3]. Eating disorders in neurological patients are characterised by an excess or deficiency of nutrients, often as a result of absorption and nutrition disorders. They may relate to progressive, acute and chronic degenerative diseases, impair food intake, swallowing, and mastication [4].

Among neurological disorders predisposing to malnutrition, brain injuries are the most frequent. The disease causes difficulties with self-care, disorientation, reduced intellectual capacity, as well as persistent swallowing disorders and dysphagia. Symptoms of dysphagia occur in 40–60% of patients with stroke, especially with bulbar and pseudobulbar palsy [5]. In addition, cognitive deficits after stroke are often accompanied by various kinds of emotional disorders. Depression worsens the prognosis, exacerbating the disorder. Natural nutrition may be difficult or impossible, which largely affects the development of malnutrition [4, 6, 7].

Literature provides poor data on nutritional status in patients with discopathy. However, acute spinal pain syndromes also have a huge impact on patients' weight loss due to persistent severe pain, as well as dizziness and headaches together with nausea and vomiting, which frequently accompany cervical discopathy and impair food intake. Moreover, treatment of underlying diseases and diet customising have to be considered [6].

Assessment of nutritional status has to take into consideration data relating to the general health of the patient, the course of treatment, and social conditions, collected by means of interviews, questionnaires, physical examination, anthropometric measurements, and biochemical analyses [8]. Anthropometric measurements, designed to detect anatomical abnormalities caused by malnutrition as a result of negative energy balance, exhibit changes in body fat and the occurrence of oedema. Weight, height, arm circumference, thickness of skin folds on the triceps muscle, and fat tissue content are used to calculate body mass index and the percentage of body fat [9]. The diagnostic procedure allows assessment of the degree and type of malnutrition, and choice of appropriate form of therapy [10, 11].

Aim of the research

The aim of the study was to assess the degree of malnutrition in patients with stroke and discopathy, hospitalised in the neurology department.

Material and methods

The study group consisted of 141 patients, including 90 patients with stroke and 51 with discopathy, hospitalised in the J. Sniadecki Provincial Hospital in Białystok. The study was conducted from November 2012 to May 2013 and was approved by the Bioethics Committee of the Medical University of Białystok.

Medical records and a proprietary questionnaire were used to collect research material. The first part of the questions of the survey referred to gender, age, weight, height, education, occupational status, and place of residence. The rest of the questions of the survey were related to diagnosis, comorbidities, type of nutrition during hospitalisation, patient's capacity for self-care, and time of hospitalisation. The study involved patients treated for at least 7 days. Before recruitment to the study, respondents were informed about the anonymous nature of participation. Body mass index (BMI) was calculated and assessed for each patient on admission and after hospitalisation. The analysis of medical records focused on current and coexisting diseases as well as dietary habits.

Body mass index was calculated on the basis of the generally accepted formula, assuming the BMI standard to range from 18.5 to 24.9 kg/m²: BMI = body weight (kg)/height² (m)².

Statistical analysis

Statistical analysis was performed using the non-parametric Pearson chi-square (χ^2) test of independence. The result of the statistical test is test probability (p -value), where low values indicate statistical significance. The p -value was considered statistically significant for $p < 0.05$, and highly significant for $p < 0.01$. To calculate this value the Mann-Whitney test was used, and to calculate the correlation coefficient the Spearman nonparametric test was applied.

Results

The study sample consisted of a similar group of women (49%) and men (51%) aged from 30 to over 70 years. Ischaemic stroke was diagnosed more often in women (66.2%) and discopathy more in men

(43.4%). A statistically significant difference was found between the patients' age and diagnosis ($p < 0.001$). The highest percentage rate of stroke was noted in patients over 70 years of age. Discopathy was most common in patients aged 56–60 years (60%).

In the group of pensioners, the incidence of ischaemic (75.3%) and haemorrhagic stroke (7.1%) was significantly more frequent than in other occupational groups. Among patients working physically (66.7%) and mentally (72.2%), an analogous correlation was found for discopathy problems (Table 1).

The type of disease was shown to affect nutrition significantly. Patients with discopathy received meals only by mouth. Among the patients studied, 17% required enteral nutrition and these were patients with stroke (Table 2).

The scope of self-care among neurological patients depends on the type of diagnosis. The vast majority of patients with discopathy (63.3%) were self-reliant. Patients after ischaemic (87.9%) and haemorrhagic (17.2%) stroke needed a varied degree of help from others, which was statistically significant (Table 3).

Differences in BMI were shown on admission and after hospitalisation in both men and women, and a downward trend was indicated. A slightly greater drop in BMI was found in women after hospital stay (from 24.1 to 23.3 kg/m²). There was no relationship between BMI and place of residence (Table 4).

On admission, the highest BMI (40.0 kg/m²) was displayed by patients with discopathy, and the lowest (16.2 kg/m²) by patients with ischaemic stroke. A falling tendency in BMI was observed during hospitali-

Table 1. Professional status and the prevalence of neurological diseases

Variable		Diagnosis			Total	Value of <i>p</i>	
		Ischaemic stroke	Discopathy	Haemorrhagic stroke			
Professional status	Student	<i>n</i>	1	1	0	0.001	
		%	50.0	50.0	0.0		
	Physical work	<i>n</i>	9	20	1		30
		%	30.0	66.7	3.3		100.0
	Mental work	<i>n</i>	4	13	1		18
		%	22.2	72.2	5.6		100.0
	Retired/pensioner	<i>n</i>	64	15	6		85
		%	75.3	17.6	7.1		100.0
	Unemployed	<i>n</i>	4	2	0		6
		%	66.7	33.3	0.0		100.0
	Total	<i>n</i>	82	51	8		141
		%	58.2	36.2	5.7		100.0

Table 2. Assessment of nutrition mode in neurological diseases

Variable		Diagnosis			Total	Value of <i>p</i>	
		Ischemic stroke	Discopathy	Haemorrhagic stroke			
Nutrition mode	Oral	<i>n</i>	62	51	4	0.001	
		%	53.0	43.6	3.4		
	Feeding tube	<i>n</i>	20	0	4		24
		%	83	0.0	16.6		100.0
Total	<i>n</i>	82	51	8	141		
	%	58.2	36.2	5.7	100.0		

Table 3. The range of self-care in neurological patients

Variable		Diagnosis			Total	Value of <i>p</i>	
		Ischemic stroke	Discopathy	Haemorrhagic stroke			
Self-care	Independent	<i>n</i>	29	50	0	0.001	
		%	36.7	63.3	0.0		
	Requires help	<i>n</i>	29	1	3		33
		%	87.9	3.0	9.1		100.0
	Lying	<i>n</i>	24	0	5		29
		%	82.8	0.0	17.2		100.0
Total	<i>n</i>	82	51	8	141		
	%	58.2	36.2	5.7	100.0		

Table 4. The level of BMI on admission and discharge from hospital, depending on gender

Variable		BMI on admission	BMI at discharge	Change in BMI
Female	<i>n</i>	65	65	65
	Mean	24.104	23.347	-0.7569
	Standard deviation	4.5940	4.5932	1.06771
	Minimum	16.2	16.3	-3.80
	Median	23.300	23.300	-0.8000
	Maximum	37.7	37.3	1.20
Male	<i>n</i>	76	76	76
	Mean	25.778	25.250	-0.5274
	Standard deviation	4.5914	4.7332	0.95948
	Minimum	16.5	17.1	-4.10
	Median	25.900	25.410	-0.5400
	Maximum	40.0	40.0	1.40
Value of <i>p</i> (Mann-Whitney test)		0.012	0.007	0.116

sation in all the diseases studied. The greatest falling tendency was found in haemorrhagic stroke patients (-1.17) (Table 5).

Patients with neurological disorders frequently followed a specific dietary treatment. Those who did not follow any high protein diet exhibited greater weight loss on discharge from hospital (Table 6).

Data in Table 7 indicate the existence of statistically significant correlation between age and BMI in both groups of patients with stroke ($p < 0.05$). In the group of patients with ischaemic stroke a negative correlation in the measurement of BMI at discharge was seen ($p < 0.05$), which was not observed on admission to the hospital. This may suggest that older

patients after ischaemic stroke are more likely to have malnutrition while in hospital. In the case of patients with haemorrhagic stroke force depending statistically significant in age decreased at discharge.

Age was found to have no effect on the level of BMI; however, a long hospitalisation significantly influenced weight reduction. The longer the patients were hospitalised, their BMI was lower (Table 7).

Discussion

Malnutrition currently affects 35–55% of the population of highly developed countries, including 20% who require immediate, intensive nutritional treatment. In Poland, the number of patients with

Table 5. BMI on admission and at discharge from hospital, depending on the diagnosis

Variable		BMI on admission	BMI at discharge	Change in BMI
Ischaemic stroke	<i>n</i>	82	82	82
	Mean	24.142	23.397	-0.7452
	Standard deviation	4.5780	4.5920	1.14733
	Minimum	16.2	16.3	-4.10
	Median	23.500	23.450	-0.7000
	Maximum	37.7	37.3	1.40
Discopathy	<i>n</i>	51	51	51
	Mean	26.619	26.251	-0.3680
	Standard deviation	4.5378	4.6471	0.65464
	Minimum	18.4	17.2	-1.60
	Median	26.000	26.450	-0.4000
	Maximum	40.0	40.0	1.30
Haemorrhagic stroke	<i>n</i>	8	8	8
	Mean	23.575	22.400	-1.1750
	Standard deviation	3.6327	3.3886	1.12345
	Minimum	19.2	18.4	-2.70
	Median	22.600	21.850	-1.0000
	Maximum	30.4	27.7	0.80
Value of <i>p</i> (Mann-Whitney test)		0.005	0.001	0.047

Table 6. The effect of high protein diet on BMI

Variable		BMI on admission	BMI at discharge	Change in BMI
Not applied	<i>n</i>	88	88	88
	Mean	24.599	23.855	-0.7441
	Standard deviation	4.8949	5.0487	0.96559
	Minimum	16.2	16.3	-3.80
	Median	24.250	23.700	-0.8000
	Maximum	40.0	40.0	1.30
Applied	<i>n</i>	53	53	53
	Mean	25.682	25.233	-0.4491
	Standard deviation	4.1753	4.1065	1.07289
	Minimum	16.5	17.7	-4.10
	Median	25.900	25.800	0.0000
	Maximum	33.6	33.6	1.40
Value of <i>p</i> (Mann-Whitney test)		0.100	0.030	0.015

nutrition disorders is increasing. The problem relates primarily to chronically ill patients and is caused by deficiency of nutrients. Weight loss is a direct symp-

tom. Malnutrition leads to reduced immunity and apathy, and contributes to general weakness of the body, which prolongs hospitalisation and increases

Table 7. Nonparametric Spearman's correlations of BMI with age and hospitalisation time

Diagnosis			BMI on admission	BMI at discharge	Change in BMI
Ischaemic stroke	Age	<i>r</i>	-0.18	-0.24	-0.27
		<i>p</i>	0.113	0.028	0.013
	Hospitalisation	<i>r</i>	-0.20	-0.30	-0.48
		<i>p</i>	0.069	0.006	0.001
Discopathy	Age	<i>r</i>	0.00	-0.04	-0.25
		<i>p</i>	0.984	0.806	0.076
	Hospitalisation	<i>r</i>	-0.12	-0.16	-0.42
		<i>p</i>	0.394	0.270	0.002
Haemorrhagic stroke	Age	<i>r</i>	-0.85	-0.73	0.37
		<i>p</i>	0.008	0.041	0.369
	Hospitalisation	<i>r</i>	-0.08	-0.20	-0.70
		<i>p</i>	0.854	0.629	0.055

Nonparametric Spearman's correlations.

financial expenditure [5, 12, 13]. Patients with stroke and severe chronic back pain often have no appetite, display low mood because of their health situation, and limited mobility. Rigidly fixed meal times are another difficulty, as they prevent patients from eating when they feel hungry [2].

It has been estimated that at the time of admission to hospital, 20–50% of all patients are malnourished. The percentage of patients whose nutritional status deteriorates during the hospital stay varies between 30% and 90%, whereas hospitalisation of undernourished patients is longer by 40–70% compared to those with normal BMI [1, 12]. A detailed assessment of the degree of malnutrition requires a number of anthropometric and biochemical examinations [13].

A multicentre study was carried out in Poland in the years 1999–2000, using BMI, arm circumference, peripheral blood erythrocyte/leukocyte/lymphocyte counts, serum haemoglobin, and albumin levels [14]. Over 3000 patients from medical treatment wards, including neurology, were recruited to the study. The results showed a correlation between the length of hospitalisation and the decrease in body weight, BMI, and arm circumference. Body weight reduction by 2% was observed in more than half of the patients. There was an evident decrease in haemoglobin, average albumin level, and lymphocyte count.

The present study used simple methods to assess medical documentation, and a questionnaire and anthropometric measurements in order to examine malnutrition. They were sufficient to confirm a falling tendency in BMI during hospitalisation in all the diseases studied. The greatest downward trend was found in haemorrhagic stroke patients (-1.17). Pensioners were

a specific group, where weight deficiency was already higher at the time of admission to the neurology ward. The range of self-care and application of an individual diet was found to affect the degree of malnutrition.

Hafsteinsdottir *et al.* [15] conducted a study in a group of 73 patients after stroke, hospitalised in a university hospital in the Netherlands. The results showed that the risk and the incidence of malnutrition increased dramatically during the first 10 days in hospital. On admission, 5% of patients were undernourished, 14% were at risk of malnutrition, and 81% had normal BMI. On discharge from hospital, 26% of patients suffered from malnutrition, 39% were at risk of malnutrition, and 35% had normal body weight.

Malnutrition in Sweden was examined by Westergren *et al.* [16] in 2000 patients from nine hospitals. The researchers found reduced body weight and dietary abnormalities in 22–34% of the patients, noting the greatest weight loss in large hospitals. Similar results have been reported from Germany [17], Denmark [18], and Spain [19].

Potentially deteriorating nutritional status in the group of patients may be affected by other factors that were not studied, such as: lifestyle, physical activity, drugs, the primary prevention of cardiovascular disease, and pain. They need to be adaptable and to improve nursing and medical care, regardless of dietary treatment. An important role in reducing these factors should be played by patient education.

Conclusions

After hospitalisation, a decrease in BMI was observed in all patients regardless of diagnosis. The

greatest falling tendency was noted in haemorrhagic stroke patients. The data suggest the need for preventive action to be taken in patients with neurological diseases diagnosed with malnutrition. Preliminary assessment of nutrition on admission to hospital and establishing a customised diet may help reduce the effects of malnutrition.

Conflict of interest

The authors declare no conflict of interest.

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