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NUTRITIONAL STATUS OF POST - STROKE PATIENTS HOSPITALIZED IN THE REHABILITATION DEPARTMENT

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Abstract

Introduction: Malnutrition is a very common phenomenon encountered in people over 60. It is an adverse phenomenon leading to many complications. Malnutrition depends on many factors including the level of depression and the functional capacity of the subjects.
Objective: The aim of this study was to assess the degree of malnutrition in stroke survivors hospitalised in the Rehabilitation Unit.
Results: Malnutrition was found in 40% of subjects, more often among men (66.7%), 60% were at risk of malnutrition. Malnutrition was more common among rural residents (55.6%) and those following a mush diet (60%). Functional impairment was defined as moderately severe in 80% of the subjects. Moderate memory impairment was present in 60% of the subjects, and a mild form was present in 25% of the subjects. A moderate form of depression was diagnosed in 40% of the subjects, a mild form in 35% of the subjects.
Conclusions:
1. Post-stroke complications associated with a decrease of functional efficiency leads to the development of malnutrition.
2. A common complication after a stroke is depression.
3. The risk of malnutrition after stroke increases with age.
4. Cognitive impairment in post-stroke patients is a contributing factor to malnutrition.

Key words: malnutrition, stroke, functional capacity, depression, memory impairment.

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Introduction

Post-stroke patients are very often malnourished due to impaired swallowing, or the absorption and metabolism of food. Risk factors for malnutrition in post-stroke patients include severity of the patient's condition, cognitive impairment, poor oral hygiene, depression, anorexia, reduced mobility and dependence on other people. The problem of malnutrition is found in between 6% and 62% of patients hospitalised for stroke. Despite the fact that malnutrition is a factor of poor prognosis in post-stroke patients, the problem is often overlooked by medical personnel. Malnutrition significantly increases the risk of complications, bedsores, infections, and plays an important role in the effectiveness of rehabilitation, morbidity and mortality, prolongs hospital stays and increases treatment costs. Appropriate post-stroke care contains assessment of nutritional status, which includes nutritional history, anthropometric examination to calculate BMI, in addition, the measurement of arm circumference and triceps fold thickness, hand grip strength and bioimpedance can be performed. Blood evaluation for albumin, pre-albumin, lymphocyte count and transferrin are recommended [1].

Scales are used to assess nutritional status:

1. Mini Nutritional Assessment (MNA) - to assess the risk of malnutrition in elderly. The MNA scale consists of four parts. The first concerns taking of anthropometric measurements, the second assesses factors that influence the onset of malnutrition. This part considers the amount of medication taken, stress in the past three months, the presence of abrasions, neurological disorders and chronic diseases. The third part concerns the nutritional history on the quantity and quality of the meals consumed during the day. The fourth part is an assessment of the patient's subjective feelings. The questions in this part concern the assessment of one's own health and nutrition. A maximum score of 30 points can be obtained, which means a very good nutritional status, 24 to 29 points means a good nutritional status, 17.5 to 23 means a risk of malnutrition, while 17 points and less means malnutrition [2].
2. Malnutrition Universal Screening Tool (MUST) - to assess the risk of malnutrition by assessing BMI, percentage weight loss and clinical status. A score of 0 indicates a low risk of malnutrition. A score of 1 indicates a patient

at risk of malnutrition. A score of 2 requires a full assessment of the patient's nutritional status and specialist consultation [3].

3. Nutritional Risk Screening 2002 (NRS 2002) - a scale used to assess the degree of malnutrition, using the patient's age and severity of illness. The total score ranges from 0 - 9. A score of 3 indicates the implementation of nutritional treatment [4].
4. Subjective Global Assessment (SGA) - medical and nutritional history is taken into account in the assessment of malnutrition. In addition, reduced adipose tissue over the triceps and chest cage, oedema over the sacrum, oedema around the ankles and ascites are assessed. Based on the collected data, the patient should be classified into one of three groups: patient with good nutritional status, moderate malnutrition and severe malnutrition [5].

Nutritional treatment of people after stroke

The diagnosis of malnutrition using these scales is an indication for the implementation of nutritional treatment in post-stroke patients. According to the recommendations of the European Society of Clinical Nutrition and Metabolism, nutritional treatment should be initiated in a patient when oral nutrition cannot be started for 7 days and when malnutrition is present [6].

Malnutrition is a condition in which there are visible changes in body composition and function due to nutrient deficiencies [7]. For post-stroke patients who are in the malnourished group, one of three treatment methods can be used: enteral, parenteral and mixed nutrition [8].

Enteral feeding maintains physiological gastrointestinal transit and allows the normal function of the intestinal villi to be influenced. Enteral nutrition can be administered by oral route using well-balanced diets, by oral route using industrial diets, by gastrointestinal tube or nutritional fistula, or by thin tube feeding (jejunostomy or nutritional fistula) [9]. The type of feeding and the method of feeding used depends on the patient's condition. In patients with difficulty swallowing food, the consistency of the diet should be adjusted. In this group of patients, it is worth considering the supply of liquid or mushy foods to prevent choking. Patients with gastrointestinal obstruction, malabsorption, shock, diarrhoea and vomiting are not recommended for enteral feeding [10].

If enteral feeding is used for less than 30 days, a nasogastric or nasogastric tube is recommended. Special liquid industrial diets can be administered by gravity infusion or using a peristaltic pump with an initial infusion of 10ml/hr. For gastric tubes, nutrition can be administered in boluses of 200 - 300 ml on average. The gastric tube should be replaced at least every 6 weeks, for continued enteral feeding a gastrostomy which is directly inserted into the stomach using surgical techniques should be considered. Feeding by gastrostomy can also be done by gravity bolus or continuous infusion [11].

Oral nutritional formulations that are used contain all or only selected nutrients and macro- and microelements. Nutritional preparations are often in liquid form, nutritional bars or cookies [12].

Parenteral nutrition should only be considered when there are contraindications to the implementation of enteral nutrition. It can be used as the sole method of nutrition or as an adjunct to partial enteral nutrition [13].

Parenteral nutrition uses all-in-one bags, which contain all the necessary nutrients. Among the methods of parenteral nutrition are: parenteral nutrition via the central route using a catheter whose tip is placed in the central vein, at the junction of the superior vena cava and the right atrium [14]. Another method is the delivery of nutrition using a cannula inserted into a peripheral vein. In patients in whom insertion of a central catheter is not possible, the supply of nutrition should be considered using an arteriovenous fistula, either used for haemodialysis or inserted for the sole purpose of feeding the patient. Feeding can be delivered using a vascular port implanted under the skin of the chest [15].

Irrespective of the method of nutrition, the calculation of caloric requirements plays a major role. Approximately 6 -7 days after the stroke, the caloric requirement is 25 - 30 kcal/kg bw/day. In the acute phase of the disease, the requirement increases and is 30 - 35 kcal/kg bw/day. The protein requirement is 1.1 - 2 g/kg bw/day. The calculation of fluid requirements (30 - 40 ml/kg/day), electrolytes and vitamins play a major role [16].

Objective of the work

The aim of this study was to assess the nutritional status of post-stroke patients hospitalised in the in the Rehabilitation Unit.

Material and methods

A total of 100 patients including 70% female, 30% male with a mean age of 68.30 years (SD=11.61) after stroke residing in the Rehabilitation Unit were included in the study. Participation in the study was voluntary and anonymous.

Almost half of the patients surveyed (N=45, 47%) were married, widows/widowers 37%, unmarried 16% of patients. Primary education was the highest level of education for 30% of patients (N=30), more than half of respondents (N=55, 55%) had secondary education, tertiary education was completed by 15% (N=15). The place of residence for 45% of patients (N=45) was the countryside, urban residents accounted for 55% of respondents (N=55). The majority of respondents (N=80, i.e. 80%) lived with their family. Twenty per cent (N=20) lived alone. Family relationships of the majority of patients (N=80, 80%) were correct, for 20% of subjects (N=20) family relationships were incorrect. Ischaemic stroke was experienced by 70% of the patients surveyed (N=80). A group of 30% (N=30) had undergone a haemorrhagic stroke. The mean time since stroke was 6.44 months (SD=13.86).

A diagnostic survey method was used in this study. The techniques included direct interviews, observation and anthropometric measurement. The research tool was an interview questionnaire and standardised tools:

1. MNA (Mini Nutritional Assessment) scale - used to assess recovery status
2. Barthel scale - used to assess basic life functions

3. Beck depression scale - used to assess well-being
4. Abbreviated Mental Test Score (AMTS) test

The Mann-Whitney test and Pearson's $\chi 2$ independence test were used in this study. The choice of non-parametric tests was preceded by checking the assumptions about the normality of the distributions of the variables (Kolmogorov-Smornov test) and the nominal nature of the variables considered. A significance level of $p<0.05$ was assumed and calculations were performed with the SPSS 20 programme.

N - number of people,
SD - standard deviation,
Me - median,
p - level of statistical significance.

Results

Paresis was the most common effect of stroke in patients (N=95, 95%). Other effects included aphasia (N=75, 75%), memory impairment (N=55, 55%), and dysphagia (N=35, 35%). Visual (N=15, 15%) and hearing (N=10, 10%) impairments were much less common in patients as a result of stroke. The results are shown in figure 1.

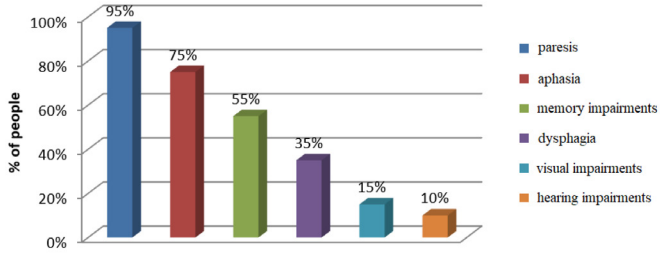

Figure 1. Effects of stroke

*results did not add up to 100% as more than one answer was indicated

The most common co-morbidities in the subjects were hypertension (N=95, 95%), heart disease (N=75, 75%) and diabetes (N=30, 30%) (figure 2).

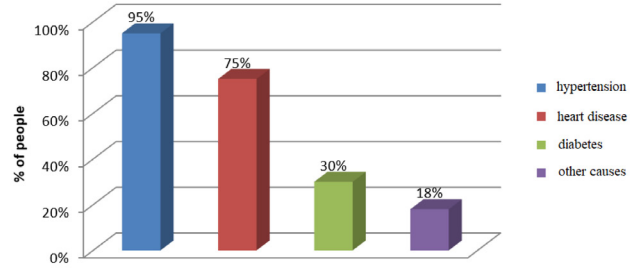

Figure 2. Co-morbidities
Source: own elaboration

*results did not add up to 100% as more than one answer was indicated

Post-stroke patients mainly took antihypertensive drugs (N=95, 95%) and anticoagulants (N=90, 90%). Cardiac drugs were taken by 70% of the respondents (N=70) and other drugs were used by 30% of the subjects (N=30) - figure 3.

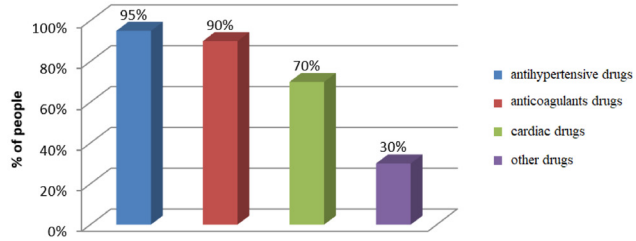

Figure 3. Medication used
Source: own elaboration

*results did not add up to 100% as more than one answer was indicated

All subjects were fed orally, mostly with a normal diet (N=75, 75%) and less frequently with a pap diet (N=25, 25%) - figure 4.

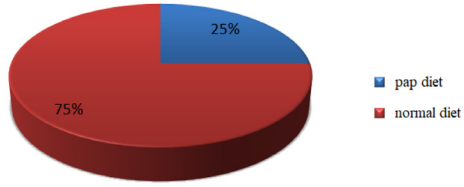

Figure 4. Diet in case of oral feeding
Source: own elaboration

The level of mental performance measured on a 0–11 point scale averaged 5.30 points. (SD=1.62) and ranged from 2 points to 8 points. Severe memory impairment was detected in 15%.

The majority of individuals (60%) had moderate memory impairment. One in four stroke patients (25%) had mild memory impairment - figure 5.

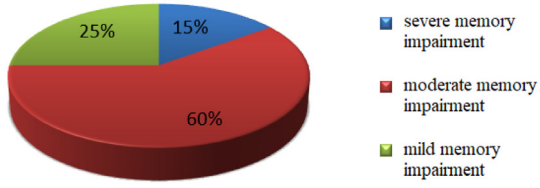

Figure 5. Level of mental performance (AMTS)
Source: own elaboration

The average level of functional ability, as measured by the Barthel scale in the range of 0-100 points was 57.70 points (SD=24.35). Scores ranged from 15 points to 91 points. In a small number of patients (N=5, 5%), the functional status was described as "very severe". Most of the post-stroke patients surveyed (N=80, 80%) were in a functional status of "moderately severe". The functional status was "light" for 15% of the subjects (N=15). The results are included in figure 6.

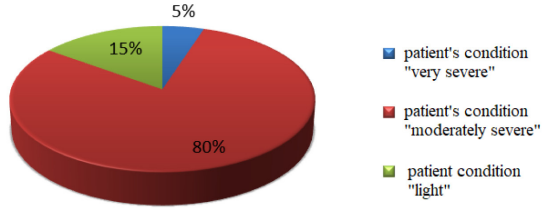

Figure 6. Functional performance level (Barthel)
Source: own elaboration

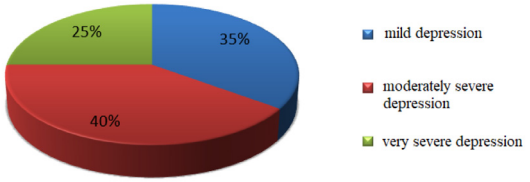

Figure 7. Level of depression (Beck)
Source: own elaboration

Post-stroke patients mainly took antihypertensive drugs (N=95, 95%) and anticoagulants (N=90, 90%). Cardiac drugs were taken by 70%

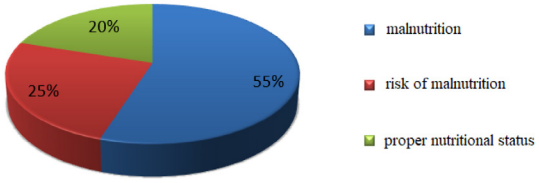

Figure 8. Screening assessment result (MNA)
Source: own elaboration

The outcome of the nutritional status of the stroke patients indicated malnutrition in 40% of the subjects. At risk of malnutrition were 60% of subjects (figure 9).

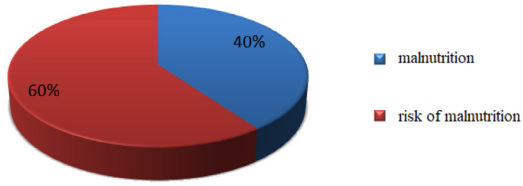

Figure 9. Final result of the patient/patient assessment (MNA)
Source: own elaboration

Factors affecting the nutritional status of patients after stroke

The study showed that the age of post-stroke patients significantly affected their nutritional status (p=0.0134). Malnutrition was found in older patients (mean age 71.13 years) and the risk of malnutrition in younger patients (mean age 66.42 years) - table 1.

Tab. 1. Nutritional status (MNA) vs. age

Age						
Final result of patient assessment	Average	SD	Me	Min.	Max.	N
Malnutrition	71.13	13.34	75.00	52	86	40
Risk of malnutrition	66.42	9.98	69.00	48	81	60
Total	68.30	11.61	71.00	48	86	100
p	0.0134					

Source: own elaboration

It was noted that those who had been malnourished for more time since stroke (mean 13.21 months) were more malnourished than those who had been malnourished for less time since stroke (mean 1.17 months). The differences indicated were statistically significant (p=0.0001) - table 2.

Tab. 2. Nutritional status (MNA) vs. time since stroke

Time since stroke (in months)						
Final result of patient assessment	Average	SD	Me	Min.	Max.	N
Malnutrition	13.21	19.04	2.00	0.75	48.75	35
Risk of malnutrition	1.17	0.40	1.00	0.75	2.00	45
Total	6.44	13.86	1.25	0.75	48.75	80
p	0.0001					

Source: own elaboration

Malnutrition was found significantly more often (p=0.0004) in men (66.7%) than in women (28.6%) - table 3.

Tab. 3. Nutritional status (MNA) and gender

			Gender		Total
			woman	man	
Final result of patient assessment	Malnutrition	N	20	20	40
		%	28.6%	66.7%	40.0%
	Risk of malnutrition	N	50	10	60
		%	71.4%	33.3%	60.0%
Total		N	70	30	100
		%	100.0%	100.0%	100.0%
$\chi2$=12.698; p=0.0004					

Source: own elaboration

Malnourished people were more often widowed (57.1%), less often unmarried people (33.3%) or married people (22.2%). The differences were statistically significant (p=0.0055) - table 4.

Tab. 4. Nutritional status (MNA) vs. marital status

			Marital status			Total
			married	widower/widow	free	
Final result of patient assessment	Malnutrition	N	10	20	5	35
		%	22.2%	57.1%	33.3%	36.8%
	Risk of malnutrition	N	35	15	10	60
		%	77.8%	42.9%	66.7%	63.2%
Total		N	45	35	15	95
		%	100.0%	100.0%	100.0%	100.0%
$\chi2$=10.412; p=0.0055						

Source: own elaboration

It was also found that undernourished people were more often those with only primary education (83.3%), less often those with tertiary education (33.3%), or secondary education (18.2%). The differences indicated were statistically significant (p<0.0001) - table 5.

Tab. 5. Nutritional status (MNA) vs. education

			Education			Total
			basic	medium	higher	
Final result of patient assessment	Malnutrition	N	25	10	5	40
		%	83.3%	18.2%	33.3%	40.0%
	Risk of malnutrition	N	5	45	10	60
		%	16.7%	81.8%	66.7%	60.0%
Total		N	30	55	15	100
		%	100.0%	100.0%	100.0%	100.0%
$\chi2$=34.659; p<0.0001						

Source: own elaboration

Malnutrition affected rural residents (55.6%) more often than urban residents (27.3%). The differences were statistically significant (p=0.0041) - table 6.

Tab. 6. Nutritional status (MNA) vs. residence

			Residence		Total
			village	city	
Final result of patient assessment	Malnutrition	N	25	15	40
		%	55.6%	27.3%	40.0%
	Risk of malnutrition	N	20	40	60
		%	44.4%	72.7%	60.0%
Total		N	45	55	100
		%	100.0%	100.0%	100.0%
χ2=8.249; p=0.0041					

Source: own elaboration

The study showed that malnutrition affected (p=0.1258) those with correct family relationships (43.8%) slightly more often than those with incorrect family relationships (25.0%) - table 7.

Tab. 7. Nutritional status (MNA) and family relationships

			Family relationships		Total
			correct	incorrect	
Final result of patient assessment	Malnutrition	N	35	5	40
		%	43.8%	25.0%	40.0%
	Risk of malnutrition	N	45	15	60
		%	56.3%	75.0%	60.0%
Total		N	80	20	100
		%	100.0%	100.0%	100.0%
χ2=2.344; p=0.1258					

Source: own elaboration

The type of stroke suffered was not found to significantly (p=0.3730) affect the nutritional status of the patients. Malnutrition was found in 33.3% of haemorrhagic stroke patients and in 42.9% of ischaemic stroke patients - table 8.

Tab. 8. Nutritional status (MNA) and history of stroke

			Past stroke		Total
			haemorrhagic	ischaemic	
Final result of patient assessment	Malnutrition	N	10	30	40
		%	33.3%	42.9%	40.0%
	Risk of malnutrition	N	20	40	60
		%	66.7%	57.1%	60.0%
Total		N	30	70	100
		%	100.0%	100.0%	100.0%
χ2=0.794; p=0.3730					

Source: own elaboration

The study found that malnutrition affected patients fed a pap diet more often (60.0%) than those fed a normal diet (33.3%). The differences were statistically significant (p=0.0184) - table 9.

Tab. 9 Nutritional status (MNA) vs. diet when fed orally

			Diet in case of oral feeding		Total
			pap diet	normal	
Final result of patient assessment	Malnutrition	N	15	25	40
		%	60.0%	33.3%	40.0%
	Risk of malnutrition	N	10	50	60
		%	40.0%	66.7%	60.0%
Total		N	25	75	100
		%	100.0%	100.0%	100.0%
χ2=5.556; p=0.0184					

Source: own elaboration

Malnutrition status was also found in subjects with severe memory impairment (66.7%), less frequently in subjects with mild memory impairment (60.0%), and to a small extent in subjects with moderate memory impairment (25.0%). The differences were statistically significant (p=0.0008) - table 10.

Tab. 10. Nutritional status (MNA) and level of mental performance

			Level of mental fitness			Total
			severe memory impairment	moderate memory impairment	mild memory impairment	
Final result of patient assessment	Malnutrition	N	10	15	15	40
		%	66.7%	25.0%	60.0%	40.0%
	Risk of malnutrition	N	5	45	10	60
		%	33.3%	75.0%	40.0%	60.0%
Total		N	15	60	25	100
		%	100.0%	100.0%	100.0%	100.0%
χ2=14.236; p=0.0008						

Source: own elaboration

Malnutrition also accompanied those in the 'moderately severe' functional status (50.0%), while it was not found in other patients (p=0.0002) - Table 11.

Tab. 11. Nutritional status (MNA) and level of functional performance

			Functional performance level			Total
			patient condition "very serious"	patient condition "moderately severe"	patient condition "light"	
Final result of patient assessment	Malnutrition	N	0	40	0	40
		%	0.0%	50.0%	0.0%	40.0%
	Risk of malnutrition	N	5	40	15	60
		%	100.0%	50.0%	100.0%	60.0%
Total		N	5	80	15	100
		%	100.0%	100.0%	100.0%	100.0%
χ2=16.667; p=0.0002						

Source: own elaboration

Patients with mild depression (57.1%) were more likely to be malnourished than those with moderate depression (50.0%). The differences were statistically significant (p<0.0001) - table 12.

Tab. 12. Nutritional status (MNA) and level of depression

			Level of depression			Total
			mild depression	moderately severe depression	very severe depression	
Final result of patient assessment	Malnutrition	N	20	20	0	40
		%	57.1%	50.0%	0.0%	40.0%
	Risk of malnutrition	N	15	20	25	60
		%	42.9%	50.0%	100.0%	60.0%
Total		N	35	40	25	100
		%	100,0%	100,0%	100.0%	100.0%
χ2=22.619; p<0.0001						

Source: own elaboration

Patients with paresis (63.2%; p=0.0050), those with aphasia (p=0.0184) were more at risk of malnutrition. However, malnutrition was more common in patients with visual impairment (100.0%; p<0.0001) and patients with hearing impairment (100.0%; p<0.0001) - table 13.

Tab. 13. Nutritional status (MNA) and effects of stroke

		Final result of patient assessment				p
		Malnutrition		Risk of malnutrition		
		N	%	N	%	
paresis	no	5	100.0%	0	0.0%	χ2=7.895; p=0.0050
	yes	35	36.8%	60	63.2%	
aphasia	no	15	60.0%	10	40.0%	χ2=5.556; p=0.0184
	yes	25	33.3%	50	66.7%	
dysphalgia	no	25	38.5%	40	61.5%	χ2=0.183; p=0.6687
	yes	15	42.9%	20	57.1%	
memory disorders	no	20	44.4%	25	55.6%	χ2=0.673; p=0.4119
	yes	20	36.4%	35	63.6%	
visual impairment	no	25	29.4%	60	70.6%	χ2=26.471; p<0.0001
	yes	15	100.0%	0	0,0%	
hearing impairment	no	30	33.3%	60	66.7%	χ2=16.667; p<0.0001
	yes	10	100.0%	0	0.0%	

The risk of malnutrition was also more common in patients with heart disease (66.7%; p=0.0184) - table 14.

		Final result of patient assessment				p
		Malnutrition		Risk of malnutrition		
		N	%	N	%	
hypertension	no	0	0.0%	5	100.0%	$\chi2$=3.509; p=0.061
	yes	40	42.1%	55	57.9%	
diabetes	no	30	42.9%	40	57.1%	$\chi2$=0.794; p=0.3730
	yes	10	33.3%	20	66.7%	
heart diseases	no	15	60.0%	10	40.0%	$\chi2$=5.556; p=0.0184
	yes	25	33.3%	50	66.7%	
other	no	35	42.7%	47	57.3%	$\chi2$=1.366; p=0.2424
	yes	5	27.8%	13	72.2%	

Source: own elaboration

Discussion

TStrokes are the most common condition in old age, leading to many complications, including swallowing disorders. In previously functioning people, strokes lead to malnutrition and the need to change the current diet. In addition, it should be emphasized that malnutrition is a common problem in the elderly. Research to date indicates that the majority of older people are malnourished or at risk of malnutrition [7].

In our own study, it was shown that prior to the stroke, most of subjects showed no food preference and consumed food by mouth, following a normal diet. Only 25% of the subjects had followed a mushy diet before their stroke. One of the complications of stroke is dysphagia, with 35% of the subjects in the study group exhibiting the problem.

The studies conducted assessed the condition of the respondents using Abbreviated Mental Test score (AMTS), the level of functional capacity measured using the Barthel scale, the level of depression measured using the Beck scale and the assessment of nutritional status using the MNA scale. The aim of the planned study is to assess the nutritional status of post-stroke patients and the factors influencing their nutrition. The results show that 60% of stroke patients have moderate memory impairment (60%). To sum up the Barthel scale, 80% of the subjects were found to be in a moderately severe condition. Moreover, 40% of the subjects according to the Beck scale had moderate depression.

Considering the MNA scale, it was shown that 55% of the respondents showed malnutrition, while 25% were at risk of malnutrition. The final nutritional status score indicated malnutrition in 40% of the respondents, while 60% were at risk of malnutrition. Similar results were obtained by Ulatowska when conducting a study in a group in a geriatric ward. In her study, she found that the majority of the subjects were undernourished, while the others were at risk of malnutrition [1]. Sokołowska, on the other hand, in her study among patients in a surgical ward, also found that 19.3% of the study subjects were malnourished or at risk of malnutrition [2]. The study by Piórecka et al. was a confirmation that people in the elderly group are eating improperly and are therefore malnourished or are in the group of people at risk of malnutrition[1] [17]. Kawalec - Kajstura indicates that the problem of malnutrition is a very common problem. In her study group, 42.86% were at risk of malnutrition, while 1.43% were malnourished [2] [18]. Błaszczyk - Bębenek et al. obtained similar results for malnourished elderly[3] [19]. The study by Kurowska et al. showed slightly different results regarding those in the group of malnourished patients. The author showed a small percentage of those in the at-risk group. According to Kurowska, malnutrition is one of the most important geriatric problems.[4] [20]. Mirczak also emphasises the importance of malnutrition as one of the problems in people over 60. According to Mirczak, this problem is more likely to affect people in long-term care facilities or nursing homes[5] [21].

Among the factors influencing nutritional status in our study, age was clearly shown to be a meaningful factor. Malnutrition was found in older patients at older ages, while a group of younger patients were at risk of malnutrition. Strugala's study obtained different results from those obtained in our work. There was no correlation between malnutrition and the age of the subjects [3]. Krzymińska - Siemaszko indicated that the problem of malnutrition concerns an increasing number of elderly people[6] [22]. Ulatowska's study showed that age is a factor predisposing people to malnutrition, and certainly increases the number of people at risk of malnutrition [1]. Mirczak emphasises that the risk of malnutrition increases with age [21].

In our study, we also found that people who had been undernourished for a longer period since their stroke were more likely to be malnourished compared with people who had a relatively recent stroke. Malnutrition was more common in men (66.7%) than in women. A study by Kawalec - Kajstura found that gender was not a factor influencing the nutritional status of older people [18]. Mirczak emphasises that malnutrition more often affects rural residents, which translates, according to the author, into less education. Similar conclusions were obtained in the author's study. Malnutrition was more common among those living in rural areas. Mirczak emphasises that women are more likely to be malnourished or at risk of malnutrition [21]. Kołłajtis-Dołowy also points out that rural residents are much more likely to suffer from malnutrition[7] [23]. Simsek points out that malnutrition is much more common among women[8] [24].

Malnutrition was significantly more common among ischaemic stroke survivors (42.9%) than haemorrhagic stroke survivors, but the differences shown were not statistically significant. Mirczak emphasises that malnutrition most commonly affects people with neurological diseases [21].

1. Piórecka B., Międzobrodzka A.: Ocena sposobu żywienia i stanu odżywienia osób starszych zamieszkałych w Krakowie. Nowiny Lekarskie 2002;71:249-254.

2. Kawalec – Kajstura E., Rajchel J., Padykuła M., Puto G. et al.: Wpływ stanu odżywienia na sprawność funkjonalna osób po 65 roku życia hospitalizowanych z przyczyn endokrynologicznych, Sztuka Leczenia 2018;2:11-20.

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5. Mirczak A.: Czynniki determinujące ryzyko niedożywienia osób starszych ze środowiska wiejskiego. Med Środow 2014; 17:68–75

6. Krzymińska Siemaszko R., Wieczorkowska Tobis K.: Ewolucja oceny niedożywienia u osób starszych przy użyciu kwestionariusza MNA, Geriatria 2012; 6: 139-143.

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8. Simsek H., Meseri R., Sahin S. et al.: Prevalence of food insecurity and malnutrition, factors related to malnutrition in the elderly. A community-based, cross-sectional study from Turkey. European Geriatric Medicine 2013: 1-5.

In our study, it was shown that subjects fed a mush diet were more likely to show malnutrition (60%) than those fed a normal diet. Mirczak's study showed that malnutrition was significantly more common in people who had poor eating habits and had previously followed an inadequate diet [21].

Malnutrition in our study was more common in those with severe memory impairment (66.7%) and less common in those with mild memory impairment (60%). According to Strugala, malnutrition is closely associated with cognitive impairment in older people [3]. Wojszel emphasises the importance of cognitive functions influencing the risk of malnutrition[9] [25].

It was shown that malnutrition in the study group was significantly more common in those with a moderate functional status and a mild form of depression (57.1%), and less common with a moderate form of depression (50.0%). In their study, Strugala showed that the lower the functional capacity of older people, the higher the risk of malnutrition in this group of subjects [3]. Oliveira et al. showed that the more dependent patients were in activities of daily life, the more likely they were to develop malnutrition[10] [26]. Confirmation of the influence of functional status on nutritional status comes from a study by Kiesswetter et al, which showed that nutritional status is dependent on the functional capacity of the individuals studied[11] [27]. Individuals with better nutritional status showed better functional efficiency and independence scores [1]. In a study by Riyadi et al. it was shown that people with low self-esteem who were at risk of depression were significantly less nourished as a consequence of reduced food intake[12] [28]. Mirczak also confirmed that the presence of depression, loneliness significantly worsens the nutritional status of older people contributing to malnutrition [22]. According to Wojszel, people showing symptoms of depression are at risk of malnutrition or have symptoms of malnutrition [25].

Our own research shows that people at risk of malnutrition are most often those with paresis and aphasia. In contrast, malnutrition was diagnosed in people with visual and hearing impairment. On the other hand, no correlation was found between dysphagia and malnutrition. A study by Wirth et al. showed a correlation between the presence of dysphagia and malnutrition status. According to the author of the study, people with swallowing problems were significantly more likely to be diagnosed with malnutrition[13] [29]. In Wojszel's study, people at risk of malnutrition are those with swallowing and chewing problems. A similar relationship was shown among heavy drug users. It was shown that the more drugs taken, the greater the risk of malnutrition, which was not confirmed in our study [25]. Similar conclusions were made by Mirczak, who concluded that too much medication taken by elderly people affects the nutritional status of geriatric patients. Mirczak believes that the medications taken affect the decreased appetite of the elderly. In addition, Mirczak believes that malnutrition is influenced by oral status, swallowing problems and mouth dryness [21]. Simsek emphasises the importance of taking many medications as a predisposing factor and having a major impact on malnutrition and the risk of developing malnutrition [24].

The above-mentioned studies show that malnutrition is not only quite common in the post-stroke group, but that the development as well as the occurrence of malnutrition is influenced by many factors. It should also be emphasised that malnutrition is a negative phenomenon, the consequences of which affect the negative functioning of older people. Therefore, it is of utmost importance, especially in functionally impaired patients, to implement appropriate nutritional treatment and to help the patient to eat a balanced diet.

Conclusions

1. Post-stroke complications associated with functional decline can lead to the development of malnutrition.
2. A common complication after a stroke is depression.
3. The risk of malnutrition after stroke increases with age.
4. Cognitive impairment in post-stroke patients is a contributing factor to malnutrition.

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