Assessment of Nutritional Status of Gastroenterology Patients in Croatia

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ABSTRACT

Malnutrition is a common feature of gastroenterological diseases. In this study, nutritional status of the patients admitted to Department of Gastroenterology at University Hospital Center Zagreb was assessed. Anthropometric, dietetic, biochemical methods and method of Subjective Global Assessment (SGA) was used. The study group included 284 patients admitted to the Hospital. Malnutrition, as defined by SGA, was found in 61.1% of the patients, of whom 75% were moderately and 25% severely malnourished. Those patients classified as moderately and extremely malnourished by SGA were found to have statistically lower values of BMI, albumin, total proteins, calcium, iron, triglycerides, cholesterol, vitamin A and lymphocytes as compared to those who were adequately nourished. The prevalence of malnutrition in hospitalized patients treated at the Department of Gastroenterology is high. The use of nutritional screening with multiple measures would be important in the early identification and treatment of these patients and would help decrease this high prevalence.

Key words: anthropometry, biochemical markers, dietary assessment, hospital malnutrition, gastroenterology inpatients, nutritional status, subjective global assessment (SGA)

Introduction

Numerous diseases of different organs can lead to malnutrition or undernutrition. Malnutrition is defined as any disorder of nutritional status, including disorders resulting from a deficiency of nutritional intake, impaired nutrient metabolism, or even overnutrition.

Nutritional status of the patient plays an important role in reconvalescence or trauma recovery. Despite such findings, problem of malnutrition in hospital remains largely unrecognized.

Malnourished patients are much more prone to infections, their recovery after therapy is prolonged and they spend more time in hospitals. Malnutrition is an independent risk factor impacting on higher complications and increased mortality, length of hospital stay and costs. Due to the common aim of costs reduction, scientists defined malnutrition as one of latent causes of costs augmentation. Nevertheless, assessment of nutritional status is usually not a routine part of clinical practice.

The assessment of nutritional status integrates measurement of basic anthropometric and dietetic parameters, estimation of patient's general condition, medical history and family morbidity. Measurement of selected biochemical parameters provides a complete individuals' nutritional status.

Determination of the optimal approach to assessment of nutritional status in clinical conditions is not easy, because the non-nutritive factors influence the parameters used in nutritional status evaluation. Despite the lack of safe and unique method for assessment of nutritional status, ability to detect malnutrition in early stage is essential for providing an effective therapy and prevention of undesirable clinical outcome. Periodic nutritional status assessment is necessary for efficient evaluation of every single nutritional intervention.

The aim of this study, first of this kind in Croatia, was to assess the nutritional status and the prevalence of

malnutrition in gastroenterological patients, using the anthropometric, dietetic and biochemical methods and the method of Subjective Global Assessment.

Subjects and Methods

Subjects

The sample consists of randomly chosen gastroenterological patients from the Department of Gastroenterology, Zagreb University Hospital Center, during the time period from June 2003 until February 2004. Bed-ridden and psychiatric patients, those who were not able to communicate adequately, pregnant women and pediatric patients were excluded from the study.

The sample consisted of 284 eligible patients (170 male and 114 female) which fulfilled the inclusion criteria for assessment of nutritional status. All of the subjects volunteered to participate after detailed presentation of the aim and the methods of this study.

Methods

Different data groups were collected to assess the nutritional status by use of following four different methods;

1. Anthropometry. Using measured body weight and height it was possible to calculate the BMI (Body Mass Index) individually.
2. Dietetic assessment. Subjects were interviewed by general qualitative questionnaire to assess the food quality, lifestyle and self-evaluated the health condition and nutritional status. Because of obvious differences in dietary habits of different populations according to geographical region, as well as among members of different socio-economic categories, a questionnaire must be tailored specifically to encompass the diets of the target population.[12] The questionnaire for estimation of food-intake was created to enable a rapid assessment of nutrition quality in gastroenterological patients. The aim was to get an insight into frequency of consumption of particular groups of food. Subjects were giving answers based on their pre-hospitalization dietary habits.
3. Biochemical analyses of selected serum biochemical parameters – alkaline phosphatase, albumin, total protein level, total cholesterol level, triglycerides, potassium, sodium, chloride, calcium, phosphates, magnesium, copper, iron, vitamins A, B and D, folic acid, total lymphocyte and thrombocyte count.
4. Subjective Global Assessment (SGA). The SGA method was chosen because it's recommended by literature as a reference method for nutritional status assessment in hospitalized population. Conduction of this method was provided by educated personnel of Department of Gastroenterology. SGA was conducted according to the method terms – on 280 subjects, and having two main parts containing medical history and physical examination. Subjective impression is a base-

TABLE 1
NUTRITION HABITS

Parameter	f	rf (%)
Specific type of nutrition		
Omnivores	279	98.2
Occasional vegetarians	3	1.1
Vegetarians	2	0.7
Number of daily meals		
1 meal	14	4.9
2 meals	77	27.1
3 or more meals	193	68.0
Characteristics of typical daily breakfast		
Do not eat breakfast	45	15.9
Fast food. ready to eat meals	0	0.0
Continental type of breakfast [eggs. ham. bread. coffee/juice/milk]	48	16.9
Toast/bagel/cereals with milk and juice/coffee	191	67.2
Average number of daily consumed fruit servings		
Less than 1 serving daily	63	22.2
1 serving daily	155	54.6
2 servings daily	62	21.8
3 or more servings daily	4	1.4
Average number of daily consumed vegetable servings		
Less than 1 serving daily	90	31.7
1 serving daily	91	32.0
2 servings daily	71	25.0
3 or more servings daily	32	11.3
Average number of daily consumed milk and dairy servings		
Do not consume milk and dairy	14	4.9
Less than 1 serving daily	39	13.8
1 serving daily	117	41.3
2 servings daily	79	27.9
3 or more servings daily	34	12.1
Average number of daily consumed milk and dairy servings		
3 or more servings daily	5	1.7
2 servings daily	60	21.1
1 serving daily	153	53.9
Consume meat occasionally during the week. but not daily	66	23.3
Frequency of fish consumption		
Do not eat fish	32	11.3
1–3 times per month	69	24.3
Once a week	134	47.2
Twice a week	49	17.2
Daily fluid intake		
Less than 3 glasses a day	17	6.0
3–5 glasses a day	71	25.0
More than 5 glasses a day	196	69.0
Intake of dietary supplements		
Take supplements regularly	97	34.2
Do not take any dietary supplements	187	65.8

line for the SGA method. According to author of this method, the priority is to assess unintentional weight loss, decreased food intake, subcutaneous fat and muscle loss. All other SGA aspects were used as a confirmation of previous findings.

Statistical Methods

Collected data have been analyzed using software programs – MS Excel and Statistica 5.0. Descriptive statistical parameters were calculated for all the quantitative variables: arithmetic mean, minimum, maximum and standard deviation. Interval of population arithmetic mean was assessed at error level of 0.01. The interview answers portion as well as particular parameters' deviation were demonstrated through absolute and relative frequencies. Statistical significance of differences between patient groups' arithmetic mean was tested by univariate variance analysis (ANOVA) or t-test at an error level of 0.05.

Results and Discussion

Anthropometric and dietetic parameters

Eligible subjects who fulfilled the inclusion criteria participated in this study. Complete number of subjects was 284 and consisted of 170 men and 114 women. Mean age of the subjects was 54.6±16.8 years. Mean BMI value was 26.1±5.2. 37.2% of subjects were overweight and even 20.8% were obese. 47.2% patients have lost unintentionally more than 3 kg during last 3 months. Highest prevalence of unintentional weight loss was recorded in patients with carcinoma and inflammatory bowel diseases. Table 1.contains results of dietetic assessment and shows nutrition habits of the subjects.

Nutritional habits of the subjects are not adequate. Although number of consumed daily meals is satisfying, most of the subjects do not have sufficient daily fruit, vegetables and dairy intake (Table 1.). This survey established a significantly lower frequency of breakfast skipping than in general population.

Subjective global assessment

Slightly more than one third of complete sample was assessed as well nourished or »A« (38.9%). 46.1% of subjects were assessed as moderately malnourished or »B« and the rest (15.0%) were assessed as severely malnourished or »C«. Total percentage of subjects at risk of malnutrition was 61.1%. This percentage varied between different diagnoses, and the highest prevalence of severely malnourished patients was in the group of patients diagnosed with inflammatory bowel disease and carcinoma (Fig. 1). The prevalence of hospital malnutrition varies

TABLE 2
MEAN VALUES OF BIOCHEMICAL PARAMETERS MEASURED

Parameter	n	X±SD	Confidentiality interval		Minimum	Maximum
			–99.00%	+99.00%		
Glucose (mmol/L)	194	5.9±1.86	5.5	6.2	2.8	14.2
Urea (mmol/L)	189	5.7±4.38	4.9	6.5	1.0	37.2
Creatinine (μmol/L)	187	99.9±49.37	90.5	109.3	10.0	553.0
Urate (μmol/L)	177	290.2±111.22	268.5	312.0	47.0	624.0
Potassium (mmol/L)	198	4.2±0.52	4.1	4.3	2.6	5.8
Sodium (mmol/L)	198	139.6±4.10	138.8	140.3	121.0	150.0
Chloride (mmol/L)	164	101.6±3.84	100.9	102.4	88.0	110.0
Calcium (mmol/L)	187	2.3±0.20	2.2	2.3	1.3	3.0
Phosphorus (mmol/L)	180	1.0±0.24	1.0	1.1	0.2	2.1
Magnesium (mmol/L)	174	0.8±0.09	0.8	0.9	0.5	1.1
Copper (μmol/L)	171	19.2±5.28	18.1	20.3	9.6	40.5
arsid3943015 Iron (μmol/L)	180	13.6±9.89	11.6	15.5	2.0	53.0
Albumin (g/L)	173	37.9±6.75	36.5	39.2	20.8	55.2
Cholesterol (mmol/L)	173	4.8±2.03	4.4	5.2	1.3	19.5
Triglycerides (mmol/L)	174	1.6±1.49	1.3	1.9	0.5	16.0
Vitamin A (μmol/L)	157	438.6±257.55	384.9	492.1	7.3	1052.1
Vitamin B_{12} (pmol/L)	86	413.5±211.56	353.4	473.6	122.0	750.0
Folate (nmol/L)	110	12.9±7.26	11.1	14.8	4.0	45.0
Vitamin D (nmol/L)	130	57.9±40.83	48.6	67.3	3.0	244.0

*determined statistically significant difference for the malnutrition status at the level p<0.05
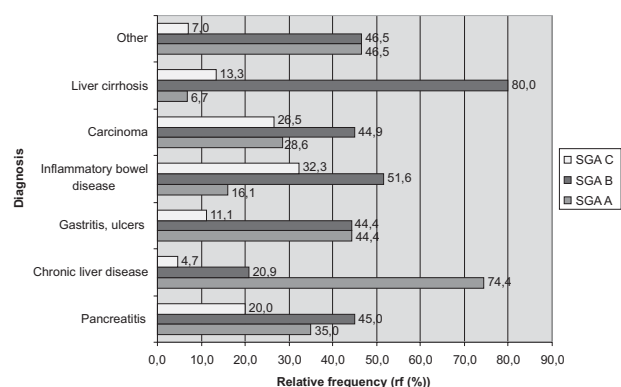
Fig. 1. Relative frequencies of SGA A. SGA B and SGA C according to diagnosis (A=well nourished. B = moderately malnourished. C = severely malnourished).

from 20–50% in different studies, according to different criteria.[13] In Europe, Naber et al. registered malnutrition in 45% of internal medicine and gastroenterological patients, and McWriter and Pennington registered it in

40%.[14] Brazilian National Survey reported 48.1% of malnourished patients at the admission to hospital[15]. Multicentric study conducted in Latin America on 9348 patients brings up the value of 50.2% of malnourished patients[16].

Biochemical parameters

Mean values of selected biochemical parameters are shown in Table 2. Serum albumin level showed a statistically significant difference between groups of well nourished, moderately malnourished and severely malnourished patients (Table 3). There was a higher tendency to hypoalbuminemia in moderately malnourished and especially severely malnourished patients. The study conducted in Turkey reports the mean value of albumin level of 35 g/L±6.0 in malnourished patients (SGA B and C)[17], and our study showed levels of 35.6 g/L±6.7 (Table 3). Decreased albumin level in malnourished patients was measured in other studies of nutritional assessment as well. Nevertheless, albumin cannot be observed as an isolated parameter of nutritional status assessment – se-

TABLE 3
RESULTS OF UNIVARIATE ANALYSIS OF VARIANCE (ANOVA) BETWEEN GROUPS RATED ACCORDING TO SGA (A=WELL NOURISHED. B=MODERATELY MALNOURISHED. C=SEVERELY MALNOURISHED)

Parameter	$\overline{X}$ A	$\overline{X}$ B	$\overline{X}$ C	F-test	p
Age (years)	51.60	58.85	49.62	8.03	0.00*
id3943015 Body weight (kg)	81.83	72.33	60.20	36.07	0.00*
BMI (kg/m²)	28.25	25.92	21.01	36.92	0.00*
Glucose (mmol/L)	5.85	6.03	5.65	0.52	0.60
Urea (mmol/L)	5.38	6.07	5.52	0.52	0.59
Creatinine (μmol/L)	97.93	107.11	84.77	2.45	0.09
Urate (μmol/L)	303.64	295.90	238.96	3.58	0.03*
Potassium (mmol/L)	4.33	4.14	4.21	3.02	0.05*
Sodium (mmol/L)	140.88	138.99	138.10	7.29	0.00*
Chloride (mmol/L)	102.37	101.07	101.15	2.25	0.11
Calcium (mmol/L)	2.36	2.24	2.21	10.15	0.00*
Phosphorus (mmol/L)	1.05	1.03	1.04	0.12	0.89
Magnesium (mmol/L)	0.85	0.82	0.82	1.59	0.21
Copper (μmol/L)	18.92	19.69	18.60	0.57	0.56
Iron (μmol/L)	15.75	12.38	11.32	3.13	0.05*
Total protein (g/L)	76.04	71.63	66.31	14.49	0.00*
Albumin (g/L)	41.27	36.87	32.43	24.04	0.00*
Cholesterol (mmol/L)	5.30	4.52	4.09	4.65	0.01*
Triglycerides (mmol/L)	1.97	1.48	1.16	3.60	0.03*
Vitamin A (μmol/L)	553.29	374.54	320.45	13.24	0.00*
Vitamin B$_{12}$ (pmol/L)	384.97	421.72	448.81	0.53	0.59
Folate (nmol/L)	14.36	11.78	12.94	1.46	0.24
Vitamin D (nmol/L)	61.09	53.62	60.14	0.49	0.62
Thrombocytes (x10⁹/L)	251.84	233.03	288.80	2.55	0.08
Lymphocytes (x10³/mm³)	2.06	1.69	1.47	8.40	0.00*

rum albumin level could easily be influenced by body fluid redistribution, sepsis, renal and hepatic diseases and postoperative condition. Also the long half-life of serum albumin makes this test insensitive to quick changes of nutritional status[,18].

The calcium level showed statistically significant difference between groups A, B and C (Table 3), and showed a decreasing tendency in moderately malnourished and especially in severely malnourished patients. The explanation for this phenomenon is given by the fact that albumin binds calcium and decreases the serum concentration of calcium[19]. Lowered serum calcium level in gastroenterological patients is described also in other surveys and literature[20].

Serum vitamin A level showed statistically significant difference between groups A, B and C, and the lowest concentrations were measured in severely malnourished patients. The imperfections of liposoluble vitamins – like vitamin A, are often found in GI diseases that include malabsorption and maldigestion. This vitamin's serum deficiency was found in population with carcinomas of GI tract, liver cirrhosis, inflammatory bowel diseases and chronic pancreatitis. Vitamin B12 and vitamin C concentrations did not differ statistically significant, according to the nutritional status.

Total lymphocyte count showed the statistically significant difference between groups A, B and C. The lowest values were measured in severely malnourished patients and the highest values in well nourished patients (Table 3). Low lymphocyte count is often being reported as one of the effects of malnutrition. On the other hand, thrombocyte count showed increasing tendency in severely malnourished patients. The explanation can be given by fact that thrombocytes are a good parameter of acute inflammation or tumor appearance, mediated by cytokine synthesis.

Conclusion

Nutritional status assessment using the BMI pointed out only 7.3% malnourished and 5.1% subjects with risk for malnutrition development. Once again it was confirmed the fact that BMI does not reflect the nutritional status in all patient groups and cannot be observed as an isolated parameter for nutritional status assessment in gastroenterological patients.

Malnutrition frequency assessed by the SGA method is insignificantly higher comparing to results of other studies, reaching 61.1% of which 46.1% of subjects were moderately malnourished, and 15% were severely malnourished.

The subjects were rated as A (well nourished), B (moderately malnourished) and C (severely malnourished) by the SGA method. Statistically significant difference between those groups was showed for BMI, albumin level, total protein level, calcium, iron, triglycerides, cholesterol, vitamin A and total lymphocyte count. These parameters' values were significantly lower in moderately and severely malnourished groups (SGA B and SGA C).

Application of different methods (anthropometric, dietetic, biochemical, SGA) enables better view into nutritional status of gastroenterological patients.

Early nutritional intervention in high-risk patients cannot be implemented and the nutritive support effectiveness cannot be evaluated if assessment of nutritional status has not been done at hospital admission. Therefore there is a large need for routine nutritional screening in hospitals and also for better recognition of patients' needs so that the prevalence of malnutrition could be diminished.

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PROCJENA NUTRITIVNOG STATUSA GASTROENTEROLOŠKIH BOLESNIKA U REPUBLICI HRVATSKOJ

S A Ž E T A K

Malnutricija je često obilježje gastrointestinalnih bolesti. Cilj istraživanja bio je, po prvi puta u nas, odrediti nutritivni status i učestalost malnutricije na populaciji gastroenteroloških bolesnika antropometrijskim, dijetetičkim, biokemijskim metodama i metodom subjektivne općenite procjene (SGA) kako bi bilo moguće odabrati adekvatnu nutritivnu potporu važnu za liječenje bolesti probavnog sustava. Ispitanici su bili 284 hospitalizirana gastroenterološka bolesnika zaprimljena na Odjel gastroenterologije Kliničkog bolničkog centra u Zagrebu, oba spola dobi od 16 do 88 godina. Prema metodi subjektivne općenite procjene 61,1% bolesnika ocijenjeno je kao neadekvatno uhranjeno, 46,1% bilo je blago pothranjeno i 15% izrazito pothranjeno. U skupinama blago i izrazito pothranjenih bolesnika izmjerene su niže statistički značajno niže vrijednosti BMI, albumina, ukupnih proteina, kalcija, željeza, triglicerida, kolesterola, vitamina A i limfocita nego u skupini adekvatno uhranjenih. Učestalost malnutricije bila je najviša u skupinama oboljelih od upalnih bolesti crijeva i malignih bolesti. Učestalost malnutricije na Odjelu gastroenterologije izrazito je visoka, a svijest stručnjaka o ovome problemu je nedovoljna, što ukazuje na neminovnu potrebu za rutinskim provođenjem procjene nutritivnog statusa u bolnicama u cilju boljeg prepoznavanja nutritivnih potreba bolesnika i smanjenja učestalosti malnutricije.