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Evaluation of Malnutrition Risk with Malnutrition Universal Screening Tool (MUST) in Inflammatory Bowel Disease Patients

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ABSTRACT

Objectives: Malnutrition can lead to morbidity and mortalityin Inflammatory bowel diseases (IBD). Malnutrition screening tool (MUST) is a simple and easy-to-apply screening questionnaire developed for outpatiets. In this study, we aimed to evaluate the frequency of malnutrition risk with MUST in IBD patients.

Method: Between 01 April 2016 and 01 April 2017, patients diagnosed with IBD in outpatient and inpatient clinics of Gastroenterology were screened for malnutrition risk with MUST. Patients with a MUST score of ≥ 2 were concluded as high-risk for malnutrition.

Results: A total of 216 IBD patients enrolled in this study. The study included a total of 177 (81.9%) patients from outpatient polyclinic and 39 (18.1%) from inpatient clinic. Risk of malnutrition was identified in 24.1% of patients according to MUST. Number of hospitalized patients with malnutrition rsik was significantly higher than the outpatient ones (71.7% vs. 13.5%, $p < 0.001$). The frequency of high malnutrition risk was 21.7% in ulcerative colitis (UC) patients and 29.68% in Crohn's disease (CD) patients. The economic status of patients with malnutrition was significantly lower ($p = 0.010$) and the history of surgery was significantly higher in patients with CD ($p = 0.002$).

Conclusion: A quarters of IBD patients had a high risk of malnutrition in our study. The risk of hospitalized patients was much higher. Care should be taken with low economic status for all patients and in CD patients with a surgical history for malnutrition risk.

Keywords: Inflammatory bowel disease, Malnutrition, Nutritional assessment

Inflammatory bowel diseases (IBD) are a group of chronic and recurrent diseases consisting of ulcerative colitis (UC) and Crohn's disease (CD) in which genetic predispositions, environmental factors and various host factors play a role in the etiology. Increased inflammation, especially in the active stages of the disease, can cause serious damage to the intestinal mucosa and loss of physiological functions of the intestine.[1] Malnutrition is a clinical condition that occurs with the destruction of endogenous energy sources when food consumption cannot compensate the metabolic rate. Inadequate food intake or absorption, increased loss, decreased anabolism and protein synthesis, increased calorie requirement and medications are effective factors in the development of malnutrition.[2]

IBD patients are at risk of malnutrition due to the nature of the disease, the drugs used, and some dietary restrictions. Proinflammatory cytokines such as interleukin 1 (IL-1) and tumor necrosis factor-alpha (TNF-alpha), which play a role in the pathogenesis of the disease, and medications such as metronidazole,

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5-aminosalicylic acid (5 ASA) and sulfasalazine used in the treatment can cause nausea, vomiting and dyspepsia in these patients, and may reduce oral intake. Nutrient absorption may be impaired in patients with surgical bowel resections, bacterial overgrowth, and extensive mucosal involvement.[3] Protein-energy malnutrition in IBD patients has been reported in a wide range of 20-85% in studies.[4,5] The nutritional status of the patients is one of the most important factors affecting the recovery of all diseases in general, including IBD. The quality of life of patients with malnutrition deteriorates, complications related to the disease may increase, and the duration and cost of treatments may increase.[2,6] For these reasons, nutritional evaluation, daily calorie intake and energy expenditure should be evaluated in terms of malnutrition risk in the follow-up of IBD patients. Screening methods such as Subjective Global Assessment (SGA), Malnutrition Universal Screening Tool (MUST), Mini Nutritional Assessment (MNA) and Nutritional Risk Screening 2002 (NRS 2002) can be used in nutritional screening. MUST is a malnutrition screening questionnaire that can be easily calculated and has consistent results compared to other methods. It includes 3 independent components to determine the overall risk for malnutrition; current weight status measured by body mass index (BMI), unintentional weight loss, and acute disease effect resulting in no nutritional intake for 5 days (Table 1).[7, 8]

In this study, we screened the prevalence of malnutrition in IBD patients with MUST method and tried to evaluate the parameters that may be associated with malnutrition. To our knowledge, this is the first study in our country to screen for malnutrition risk in IBD patients using the MUST method.

METHODS

The study included 216 consecutive IBD patients who applied to Antalya Training and Research Hospital Gastroenterology Outpatient and Inpatient Clinics between 01 April 2016 and 01 April 2017. Patients with more than one admission were included in the study only at their first admission. Patients under the age of 18 years old were not included in the study. All resection operations of the patients regarding the small intestine and colon were recorded as surgical history.

The malnutrition risk of the patients was screened by the MUST by a doctor and a trained dietitian. Patients with inconsistent scores were re-evaluated by a third doctor and 2 equal results were considered final score. Patients with a score of 0-1 were classified as normal and those with a score of ≥2 were classified at risk of malnutrition8.

The study protocol was conducted in accordance with the ethical principles stated in the Declaration of Helsinki and was approved by the Antalya Training and Research Hospital Research Ethics Committee (Reference no;76/4).

Statistical analysis

Statistical analysis was made using Statistical Package for the Social Sciences (SPSS) for Windows, version 23.0 (IBM Corp., Armonk, NY, USA). Fisher's exact test and Pearson's chi-square analysis were performed for categorical variables. In the normality test, the Shapiro-Wilks test was used when the sample size in the group was less than 50, and the Kolmogorov-Smirnov test was used when it was large. The differences between the two groups were evaluated with Student's t-test for normally distributed data or the Mann–Whitney U test for non-

Table 1. Parameters of malnutrition universal screening tool (MUST)

Parameters Score		
1- BMI (kg/m2)		
	> 20	0
	18.5-20	1
	< 18.5	2
2- Unplanned weight loss in the past 3-6 months (%)		
	< 5	0
	5-10	1
	> 10	2
3- If patient is acutely ill, and there has been or is likely to be no nutritional intake for >5 days		

normally distributed data. Data are expressed as n (%), the mean ± standard deviation (SD), or median (min–max), as appropriate. $p < 0.05$ were considered statistically significant.

RESULTS

The mean age of the 216 patients included in the study was 43.1 ± 13.6 years, and 101 (46.8%) of the patients were female and 115 (53.2%) were male. Of the patients, 64 (29.6%) were diagnosed with CD, and 152 (70.4%) with UC. Mean disease duration of all patients was 5.9 ± 5.8 years. Apart from IBD, 22 (10.2%) patients had diabetes mellitus (DM), 31 (14.4%) hypertension (HT), 32 (14.9%) rheumatic diseases, and 21 (9.7%) cardiovascular diseases. Of the patients, 177 (81.9%) were outpatients and 39 (18.1%) were inpatients. Fifty-two (24.1%) of the patients were at high risk of malnutrition (MUST score; ≥ 2) (Table 2).

Patients with a MUST score ≥ 2 did not differ by gender, disease type and duration, surgical history, education, smoking status and residential area compared with patients with a MUST score of < 2. Median age of patients with a MUST score ≥ 2 was significantly lower than the group with a MUST score < 2 [33.5(18-79) years vs. 45(19-81) years, p < 0.001]. Of the patients with a MUST score < 2, 153 (93.3%) were admitted as outpatients and 11 (6.7%) were inpatients. Of those with a MUST score of ≥ 2, 24 (46.2%) were admitted as outpatients and 28 (53.8%) were receiving inpatient treatment ($p < 0.001$). The group with a MUST score ≥ 2 had significantly lower BMI [26(18.4-39.1)kg/m2 vs. 19.1(15.1-34) kg/m^2, $p < 0.001$]. When the monthly incomes of the patients were compared, it was seen that the number of patients with an income below 1000 Turkish lira (TL) was higher in the high risk group, and those with 3000 TL and above in the low-intermediate risk group, and this was statistically significant ($p = 0.010$) (Table 3).

When the patients with UC and CD with a high risk of malnutrition were compared, no statistically significant difference was found between the 2 groups in terms of gender, age, duration of disease, MUST score, smoking status and residential area. In this comparison, only the patients with CD had more surgical operations than those with UC, and the difference was statistically significant [1(3) vs. 7(36.8), $p = 0.002$] (Table 4).

Table 2. Demographic characteristics of patients, comorbidities, characteristics of IBD and MUST score.

	n = 216
Sex, n (%)	
Female	101(46.8)
Male	115(53.2)
Age(years), mean ± sd	43.1 ± 13.6
Disease type, n(%)	
Ulcerative colitis	152(70.4)
Crohn's disease	64(29.6)
Disease duration (years), mean ± sd	5.9 ± 5.8
Comorbidities, n(%)	
Diabetes mellitus	22(10.2)
Hypertension	31(14.4)
Rheumatic diseases	32(14.9)
Cardiovascular diseases	21(9.7)
Patient status, n(%)	
Outpatients	177(81.9)
Inpatients	39(18.1)
MUST score, n(%)	
< 2	164(75.9)
≥ 2	52(24.1)

IBD: inflammatory bowel disease, MUST: malnutrition universal screening tool

Table 3. Comparison of patients with high malnutrition risk and low-intermediate risk according to MUST score.

	MUST		*p*
	< 2 n: 164	≥ 2 n: 52	
Sex, n (%)			
Female	75(45.7)	26(50)	0.591
Male	89(54.3)	26(50)	
Age, median (min-max)	45(19-81)	33.5(18-79)	**< 0.001**
Disease type, n(%)			
Ulcerative colitis	119(72.6)	33(63,5)	0.211
Crohn's disease	45(27.4)	19(36.5)	
Disease duration, median (min-max)	5(0-38)	4(0-20)	0.519
Patient status, n(%)			
Outpatients	153(93.3)	24(46.2)	**< 0.001**
Inpatients	11(6.7)	28(53.8)	
BMI (kg/m^2), median (min-max)	26(18.4-39.1)	19.1(15.1-34)	**< 0.001**
Sugical history, n (%)	12(7.3)	8(15.4)	0.099
Education, n (%)			
Illiterate	3(1.8)	1(1.9)	0.301
Literate	6(3.7)	1(1.9)	
Primary school	63(38.4)	17(32.7)	
Middle School	19(11.6)	4(7.7)	
High school	56(34.1)	17(32.7)	
University	17(10.4)	12(23.1)	
Monthly income (TL), n(%)			
< 1000 TL	22(13.4)[a]	15(28.8)[b]	**0.010**
1000-2000 TL	77(47)[a]	20(38.5)[a]	
2000-3000 TL	43(26.2)[a]	16(30.8)[a]	
> 3000 TL	22(13.4)[a]	1(1.9)[b]	
Smoking status, n(%)			
Non-smoking	129(78.7)	40(76.9)	0.792
Smoking	35(21.3)	12(23.1)	
Residental area, n(%)			
Urban	133(81.1)	40(76.9)	0.511
Rural	31(18.9)	12(23.1)	

MUST: malnutrition universal screening tool TL: Turkish lira

DISCUSSION

The MUST is a simple and easily applicable malnutrition screening test recommended by European Society for Clinical Nutrition and Metabolism (ESPEN).[9] It is generally a practical method and mostly recommended in the screening of outpatients due to its 3rd item (presence of no food intake for the next 5 days due to acute illness puts the patient directly in the high-risk group with 2 points).[8] MUST has also been validated in various medical fields including medical, surgical, and oncologic patients.[8, 10, 11] In addition, there are publications stating that it can be valid in IBD patients as well.[12, 13] In our study, a high risk of malnutrition was detected in 24.1% of all IBD patients using the MUST method. MUST was used in 173 IBD patients for malnutrition screening in 2017 and a high risk of malnutrition was found in 21.4% of patients at a rate similar to ours.[14] However, in the literature, the prevalence of malnutrition in IBD patients has been reported in a wide range of 20-85% in studies conducted with different methods.[3] The reporting of such different rates is attributed to the heterogeneous nature of the disease and the influence

Table 4. Comparison of Ulcerative colitis and Crohn's disease patients with high malnutrition risk.

	Ulcerative colitis n = 33	Crohn's disease n = 19	*p*
Sex, n (%)			
Female	18(54.5)	8(42.1)	0.388
Male	15(45.5)	11(57.9)	
Age, median(min-max)	33(18-79)	35(20-69)	0.414
Disease duration, median(min-max)	4(0-16)	4(0-20)	0.511
MUST score, median(min-max)	4(2-6)	4(2-6)	0.298
Surgical history, n (%)	1(3)	7(36.8)	**0.002**
Smoking status, n (%)			
Non-smoking	24(72.7)	16(84.2)	0.499
Smoking	9(27.3)	3(15.8)	
Residental area, n (%)			
Urban	27(81.8)	13(68.4)	0.317
Rural	6(18.2)	6(31.6)	

MUST: malnutrition universal screening tool

of environmental factors.

In our study, 46.2% of the patients with malnutrition were outpatients and 53.8% were inpatients. In addition, a high risk of malnutrition was detected in 71.7% of the hospitalized patients with MUST. In a study by Azusa Takaoka *et al.*[15], consisting of 40 patients with active and hospitalized IBD, the risk of malnutrition was found to be 68.9% in patients with CD and 61.1% in patients with UC using the MUST method. Malnutrition in active IBD patients hospitalized in the clinics is an expected finding due to 3rd item of MUST as mentioned above, compatible with our study. There are studies reporting that nutritional status can be adversely affected in IBD at any time of the disease, even at the time of diagnosis.[16] Although a positive relationship was expected between disease duration and malnutrition, there was no difference in disease duration between the risky and non-risk groups in our study. In two studies conducted in 2008 and 2017, a relationship between disease duration and malnutrition was not found, which is consistent with ours.[14, 16] So, IBD patients, both inpatients and outpatients, should be evaluated in terms of malnutrition risk at each visit, starting from the time of diagnosis.

Apart from the main disease, there are many factors that can affect the development of malnutrition; such as low socioeconomic status, co-morbidities, old age, inability to access health services and food due to living in rural areas.[17] In our study, there was no difference in the risk of malnutrition in terms of education, smoking status and residential area, which are the parameters we evaluated. However, the economic status was lower in the high-risk group. Although surgical bowel resections may also cause malnutrition, no difference was found between the high-risk and low-risk groups in terms of surgical histories in our study. However, when we compared patients with high risk of malnutrition with CD and UC, surgery history was more common in patients with CD.

In addition to screening tests, some biochemical tests and anthropometric measurements can be used to determine the nutritional status. The lack of anthropometric measurements and laboratory parameters, and the inability to examine the relationship between malnutrition and disease activity can be considered as limitations of our study.

CONCLUSION

In our study, we found a high risk of malnutrition in about a quarter of IBD patients with the MUST method. The risk of malnutrition was high in both CD and UC patients, especially inpatients. Care should be taken in terms of the risk of malnutrition in IBD patients with low economic status and in CD patients with a surgical history. Considering the effect of malnutrition on the prognosis of the disease, IBD patients should be evaluated in terms of malnutrition risk both during their routine outpatient clinic follow-

ups and hospitalizations and necessary precautions should be taken.

Authors' Contribution

Study Conception: SU,; Study Design: SÇ,; Supervision: AHÇ,; Materials: SÇ,; Data Collection and/or Processing: SÇ,; Statistical Analysis and/or Data Interpretation: SU, AHÇ,; Literature Review: SU,; Manuscript Preparation: SÇ and Critical Review: AHÇ.

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