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Detection of malnutrition in hospitalized cases scheduled for elective surgery

Elektif cerrahi planlanan hospitalize hastalarda malnütrisyon tespiti

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SUMMARY

Malnourished patients have longer hospital stays, more drug usage, poorer functional capacity and higher morbidity and mortality rates compared to well-nourished patients. To prevent malnutrition in hospitalized patients, physicians should be aware of the fact that every hospitalized patient may be at risk or malnutrition and thus require an early diagnosis and treatment. Many indices and scoring systems have been developed to predict malnutrition, but there is still no consensus on which method reflects the malnutrition status the best. 500 adult patients composed of 242 males and 258 females hospitalized at 11 different departments of Cumhuriyet University, Faculty of Medicine were included in our study. In each patient, a detailed history was taken, laboratory measurement were performed (albumin, pre-albumin, CRP, creatinine) and Subjective Global Assessment (SGA) and bioelectrical impedance analysis (BIA) were carried out during admission to the hospital. Nutritional status and mentioned parameters were compared and the effect of nutritional status on the length of hospital stay was studied. The rate of malnutrition was found as 7.8% (39 cases). The mean age was higher in patients with malnutrition when compared to well-nourished ones. Similarly, the length of hospital stay and postoperative hospital stay were longer in patients with malnutrition. Albumin and pre-albumin levels were significantly lower and CRP was higher in patients with malnutrition. Creatinine levels did not show any significant difference. Body weight, body fat content and BMI values were higher and total body fluid in percentage of body weight were lower in patients with malnutrition.

Keywords: Malnutrition, subjective global assessment, bioelectrical impedance analysis, hospital stay

ÖZET

Malnütrisyonlu olgular malnütrisyonu olmayanlara göre daha uzun süre hastanede kalış, daha fazla ilaç kullanımı, daha kötü fonksiyonel kapasite ile daha yüksek mortalite ve morbidite oranına sahiptir. Malnütrisyonu önlemeye yardım etmek için hastaneye yatırılan her olgunun öncelikle risk altında olduğu fark edilmeli, erken teşhis ve tedavi yapılmalıdır Malnütrisyonun saptanmasında çeşitli yöntemler kullanılmakla birlikte hangi yöntemin nütrisyonel durumu en iyi yansıttığı üzerinde fikir birliğine varılamamıştır. Çalışmamızda Cumhuriyet Üniversitesi Tıp Fakültesi Hastanesi'nde yatan 11 anabilim dalından toplam 242 erkek, 258 kadın 500 erişkin hasta alındı. Her hastanın yatışında anamnezi alındı, laboratuar değerleri(albümin, prealbümin, CRP, kreatinin), Subjektif Global Değerlendirme (SGA) ve BİA (Biyoelektrik empedans analiz) ölçümleri yapıldı. Hastaların nütrisyonel durumları ile kaydedilen parametrelerin karşılaştırması yapıldı ve bunların yatış süresine etkisi araştırıldı. Malnütrisyon oranı %7,8 (39 olgu) saptandı. Malnütrisyonlu hastaların yaş ortalaması iyi beslenenlere göre daha yüksek bulunmuştur. Malnütrisyonlu hastaların, iyi beslenen gruplara göre hastanede kalış süreleri ve postoperatif kalış süreleri daha uzundu. Malnütrisyonu olan hastaların anlamlı olarak albümin ve prealbüminin daha düşük

olduğu, CRP'nin yüksek olduğu saptandı. Kreatinin değerleri arasında anlamlı farklılık bulunamamıştır. İyi beslenmiş hastaların malnütrisyonu olan hastalara göre, vücut ağırlığının, vücut yağ miktarının ve BMİ daha fazla, total vücut sıvısının % olarak değerlendirildiğinde daha az olduğu görülmüştür.

Anahtar sözcükler: Malnütrisyon, subjektif global değerlendirme, biyoelektrik empedans analizi, yatış süresi

INTRODUCTION

Balanced and sufficient consumption of nutriments is the cardinal rule of a healthy life. Adequate nutrition plays an important role in hospitalized patients. During an illness, the organism becomes more vulnerable to nutritional deficiency, which leads to health problems and increased morbidity and mortality rates due to weak body resistance[1].

Malnutrition has been found to be associated with prolonged hospitalization, increased frequency in hospital readmission, increased incidence and severity of infections, poor wound healing, gait disorders, and fall and fractures[2.]

20% to 50% of hospitalized patients have nutritional disorder[1]. It is of great importance to detect malnutrition, which is a frequently encountered condition causing undesired results, and plan its treatment at an early stage. Detecting malnutrition at an early stage requires taking a detailed history and physical examination. SGA is an easy, rapid and cost-efficient method for identifying patients having malnutrition or those at risk for malnutrition. Today, it is used to assess nutritional status in many chronic patients[3]. Bioelectrical impedance analysis (BIA) is a fast and easy method helping to calculate the amounts of body fat, lean body mass and body water and working based on the principle of applying electric current through electrodes placed at wrist and ankle to measure impedances of tissues[4]. Laboratory data are also used to assess nutritional status.

The aim of the present study was to assess effects of malnutrition on the length of hospital stay and provide adequate nutrition supplementation by determining cases at high risk for malnutrition.

MATERIAL AND METHODS

The present study was conducted between November 2011 and January 2012 after taking approval from the ethical committee of the faculty and the patients. During the study period, three anaesthesia residents worked, each for a one month period. Anaesthesia residents to work at the anaesthesia polyclinic were given a three hours training on SGA by a specialist physician trained and experienced on Subjective Global Assessment (SGA).

500 ASA I-III adult cases hospitalized at orthopaedics and traumatology, cardiovascular, urology, plastic, reconstructive and aesthetic surgery, obstetrics and gynaecology, neurochirurgie, general surgery, ophthalmology, thoracic surgery, pain and ENT departments and scheduled for elective surgery were included in the present study. Those younger than 18 years old, those having cooperation problems, pregnant women, lactating mothers, those having a psychiatric disorder and those hospitalized for day surgery were excluded from the study.

Once the pre-anaesthetic evaluation was completed, all the patients were administered the Nutritional Status Evaluation Form for Hospitalized Patients at the Anaesthesia and Reanimation Clinic by the same physician. Consent approval forms were taken by another anaesthesia physician. The said evaluation form consisted of four sections.

First section: Name-surname, file no, department, diagnosis, hospitalization day, length of hospital stay. **Second section:** laboratory analysis for albumin, prealbumin, CRP, creatinine. **Third section:** assessment of body compositions of the patients using bioelectrical impedance analysis (BIA). Patients having a pacemaker or any implants, pregnant women, those having severe edema (≥3+) or severe electrolyte disorder were excluded from the study as such conditions could cause wrong measurements. **Fourth section:** SGA was performed and below determinations were made along with other findings regarding the history of the patients: **A:**

Well-nourished in case of 5% weight loss or appetite improvement and weight gain despite more than 5% weight loss. **B:** Suspected or moderate malnutrition in case of 5% weight loss without any recent improvement, decrease in food intake and mild loss of subcutaneous tissue loss.

C: Severe malnutrition in case of more than 10% weight loss, loss of subcutaneous tissue loss and muscle loss along with frequent edema

Nutritional status of the patients during admission was established by SGA, anthropometric tests and BIA. Results obtained by SGA, anthropometry and BIA were compared among themselves and with the laboratory data, and their effects on hospitalization (postoperative hospitalization day and length of hospital stay) were tried to be established.

In our study, nutrition supplementations, enrolment to surgery, postponement decisions, developing complications and discharge status of those having malnutrition were not evaluated.

Statistical analysis

Data obtained in our study were uploaded into SPSS (ver:14.0) program and analysed using Chi-Square Test, Kruskal-Wallis Test, Pearson correlation coefficient and Tukey Test. Data are expresses as arithmetic mean and standard deviation in the tables while the significance level is 0.05.

RESULTS

500 hospitalized individuals scheduled for elective surgery were included in the present study. Of all the patients, 242 (48.4%) were male while 258 (51.6%) were female. SGA revealed that there was no significant difference in terms of gender.

When the ages of the patients were studied, the minimum age was found to be 18 years while maximum age was found to be 84 years. Age distribution was 45.56 ± 15.42 years. SGA revealed a significant difference in terms of age while there was no significant difference regarding the metabolism ages. When compared to well-nourished patients, mean age was higher in patients with malnutrition (Table 1).

Out of 500 patients included in the study, 39 (7.8%) had malnutrition (SGA-B and SGA-C) while 4 patients had severe malnutrition. 18% (91) of the patients had cancer. 23% (21) of these cancer patients had mild-moderate and severe malnutrition while 4 of the patients in SGA-C group had cancer.

When SGA was evaluated based on departments, the difference was found to be insignificant. In all the departments, SGA-A group was the dominant one. The highest ratios of SGA-B group were observed in the General Surgery, Obstetrics and Gynaecology, Urology and BSC departments while the highest ratios of SGA-C group were observed in the General Surgery, Obstetrics and Gynaecology, Pain and ENT departments.

Length of hospital stay and postoperative hospital were longer in patients with malnutrition when compared to well-nourished groups. Although there was no significant difference between SGA-B and SGA-C groups, duration of hospitalization and postoperative hospitalization stay increased with increasing degree of malnutrition (Table 2).

When nutritional status of the patients and laboratory data were compared, it was found that albumin and pre-albumin values were significantly low and CRP values were significantly high in patients with malnutrition. There was no difference in terms of creatinine values.

When the parameters affecting the length of hospital stay were evaluated by stepwise method after taking the length of hospital stay as a dependent variable, no significant difference was found between albumin values and the length of hospital stay. Length of hospital stay increased significantly by a decrease in albumin value.

Statistically significant results were found when the malnutrition status of the patients were compared using BIA. Body weight, body fat mass and BMI were higher and total body fluid was lower in percentages in well-nourished patients when compared to those with malnutrition.

Table 1: Departmental distribution of the individuals included in the study.

Department	Number	Percentage (%)
General surgery	94	18.8
Orthopaedics and traumatology	57	11.4
Urology	68	13.6
ENT	75	15.0
BSC	33	6.6
Pain	53	10.6
Cardiovascular surgery	16	3.2
Ophthalmology	9	1.8
Thoracic surgery	6	1.2
Plastic surgery	24	4.8
Obstetrics and gynaecology	65	13.0
Total	**500**	**100.0**

Table 2. Distribution of length of hospital stay and laboratory data in SGA groups.

		Number	Average	Standard deviation	Result
Postoperative stay days	A	461	3.3601	3.44529	KW=43.79
	B	35	12.7429	14.39637	P=0.001*
	C	4	18.75	12.28481	
Length of hospital stay	A	461	7.9566	7.47389	KW=38.45
	B	35	22.0857	19.02996	P=0.001*
	C	4	27	16.02082	
Albumin	A	461	4.1452	1.78559	KW=75.61
	B	35	2.84	0.68522	P=0.001*
	C	4	2.25	0.26458	
Pre-albumin	A	461	79.8959	52.82963	KW=26.82
	B	35	58.0571	105.5846	P=0.001
	C	4	22.175	30.61877	
CRP	A	461	10.6949	20.96488	KW=24.15
	B	35	42.86	68.44226	P=0.001
	C	4	70.4825	58.99332	
Creatinine	A	461	0.8306	0.35653	KW=1.79
	B	35	0.7491	0.20878	P=0.409
	C	4	0.775	0.09574	
Metabolism age	A	461	46.8486	17.1592	KW=5.086
	B	35	52.9426	16.27691	P=0.079
	C	4	55.75	12.5	
Age	A	461	44.9046	15.2941	KW=10.716
	B	35	53.4	15.46191	P=0.005
	C	4	53	11.16542	

***p<0.05 significant**

DISCUSSION

There is still no clear consensus on different methods used to evaluate nutritional status[2]. History of weight loss is the most important part of nutrition screening and evaluation. Involuntary weight loss is an important indicator and should be definitely investigated[5].

Anthropometric measurements alone are not sufficient to assess nutritional status as reference values vary depending on age gender and race. Moreover, conditions that are not related with malnutrition such as increased muscle mass by exercise, muscle atrophy independent of protein-energy malnutrition in bed-bound patients and increased interstitial fluid in intensive care patients may have an affect too. For this reason, we used SGA as it is the only assessment method taking both the clinical history and physical examination into account and showing a high correlation with other assessment methods[6, 7]. (well nourished: SGA-A, moderately/suspected of being malnourished: SGA B and severely

malnourished: SGA-C).
SGA revealed a significant difference in terms of duration of hospitalization. While SGA-A=7.95 ± 7.47; SGA-B=22.08 ± 19.02 and SGA-C=27 ± 16.02, duration of malnutrition was much shorter in the well-nourished group when compared to malnutrition group. Similarly, there was a significant difference in terms of postoperative hospitalisation stay. Although SGA did not reveal a significant difference between SGA-B and SGA-C groups, length of hospital stay and postoperative hospitalization stay increased with increasing degree of malnutrition.

In a study conducted in 2010 on 1545 adult patients having malignancy, Pressoir et al.[8] compared nutritional status to the length of hospital stay and mortality. The frequency of malnutrition was found as 30.9%. The length of hospital stay was 19.3 ± 19.4 in the malnutrition group and 13.3 ± 19 in other groups ($p<0.0001$). Mortality was found to be higher in those having severe malnutrition.

In terms of body weight, SGA revealed significant difference. In our study, majority of those in SGA-A group had body weights equal to or higher than the ideal body weight while those in SGA-B and SGA-C groups had body weights lower than the ideal body weight. In SGA-B group, 20% of the patients had a normal body weight while 8.6% had a high body weight. As expected, all those in SGA-B group composed of severe malnutrition cases had a body weight lower than the ideal body weight.

SGA showed that there was a significant difference in terms of BMI too. The ratio of those having normal or high BMI was higher in SGA-A group while those in SGA-B (71%) and SGA-C (100%) had low BMI.
As expressed clearly in our study, body weight and BMI could be misleading in assessing the nutritional status. In overweight people, BMI and weight can be within normal limits despite more than 10% loss in a short time[9, 10]. For this reason, we believe that a thorough examination is essential.

In a study conducted by Utuklerli et al[2], most of the patients were found normal based on BMI. However, finding a malnutrition ratio of 11.8% was thought to be a suspicious result when the surgical diseases and the associated stress were taken into account. For this reason, supporting the results with other parameters would yield more reliable results. Weight can be misleading in some conditions such as edema, acid and malignant tumors[11, 12].

Correlated with malnutrition, body fat percentages were found to be normal or high in most of the patients in the SGA-A group and low in the SGA-B (57.1%) and SGA-C (100%) groups. The ratio of those having normal or low body fluids was higher in the SGA-A group while the ratio of those having a normal fluid and high body fluids were respectively 62.9% and 31.4% in the SGA-B group and 25% and 50% in the SGA-C group.

Studies on different study populations have shown that both body fat and fat-free mass are decreased in patients with malnutrition[13].

Malnutrition patients had more total body fluids with higher 3-space fluids in percentage.This shows a higher fluid load in patient having malnutrition, which is a finding correlated with previous studies on hemodialysis patients[14]. There are also studies advocating that excess body water (edema, over hydration, etc.) may mask malnutrition and methods such as BIA or DEXA may yield wrong result[15].

When Kuyumcu et al.[16] evaluated the correlation between MNA and BIA parameters in geriatric patients, they found that there was a statistically significantly positive poor correlation in terms of body fat, free fat mass index and waist/hip ratio and negative poor correlation in terms of extracellular, intracellular and total body water between MNA and BIA.

We believe that having limited number of patients in some groups had an effect on statistically insignificant results. We believe that more comprehensive studies on larger patient populations are needed while our study would shed a light on future studies.

SGA is a multi-parameter index used in

assessing nutrition as reliable as other methods. Although there are many assessment scales, each method has its own advantages and disadvantages. Despite conducting many studies, no perfect malnutrition assessment method yielding fully accurate results has been developed yet. For this reason, we need to support the methods we use with fast and cost-effective methods such as laboratory parameters and BIA.

It was seen that length of hospital stay duration had an effect on malnutrition rates in patients hospitalized at surgery clinics. Thus, surgical cases are recommended to be evaluated in terms of nutrition by nutrition-trained physicians and have an adequate nutrition supplementation in case of high risk of malnutrition (SGA A and SGA C).

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