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Determining the ability of Subjective Global Assessment (SGA) to diagnosis risk of malnutrition in hospitalized patients

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ABSTRACT

Malnutrition is still one of the most common and important problems in hospitals, and caused an increased incidence of adverse events and mortality in hospitalized patients. Since there is no standard instrument as a gold standard method for diagnosis of risk of malnutrition, the aim of this study was to evaluate the ability of each of instruments provided for study on nutritional status in diagnosing patients with malnutrition and risk of malnutrition on admission. This study is a cross-sectional study, examined nutritional status of 280 patients randomly from different parts of the hospitals within 24-72 first hours of admission via Subjective global assessment (SGA) and full nutrition assessment (FNA). In this study, the sensitivity and positive and negative predictive value of SGA compared with FNA as the gold standard were calculated. The sample group consisted of 280 patients (140 females, 140 males) with an average age of 55.384 and an average BMI (22.17). In this study, the prevalence of malnutrition depends on the type of used instrument and varies between 41.4 to 49.9%. SGA has reported prevalence to 49.9 and FNA has reported prevalence to 41.1. The prevalence of malnutrition in people over age 65 are significantly higher than people under 65 years; further sensitivity, specificity, positive and negative predictive value in SGA instrument equal to 82.75, 73.17, 68.57, 85.71, respectively. According to the present study, the prevalence of malnutrition in hospitalized patients has been extensive, and laboratory and anthropometric parameters have been compared. The ability of SGA instrument has been proper in diagnosis of the patients with malnutrition and trust on malnutrition diagnosis has been relatively proper in the patients who have been diagnosed as the people with malnutrition regarding SGA test.

Keywords: SGA instrument, malnutrition, FNA, gold standard

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INTRODUCTION

Malnutrition refers to an extensive term that can be used to express any imbalance in nutrition. This imbalance includes excessive nutrition in the developed world to less nutrition in many developing countries as well as hospitals and care centers in developed countries. Here, the main emphasis has been put on less nutrition. Lack of an accepted definition that explains the pathophysiology of malnutrition and its effects causes to avoid the way for malnutrition

detection and appropriate intervention for it. Therefore, malnutrition is still one of the most common and important problems in hospitals [1-4]. Prevalence of malnutrition in hospitalized patients in hospital has been reported between 15 and 90% based on the used criteria and type of disease in several areas [5-13]. For instance, malnutrition in the hospitalized elderly with prevalence 23-60% [5] and in cancer patients with a prevalence of 15-80% [8, 9, 12] and in patients with chronic liver with prevalence of 65-90% [11] and in chronic kidney failure and hemodialysis with prevalence 16-90% [6, 7, 13, 14] have been reported. Side effects of malnutrition include decreased immune function, impaired wound healing, loss of body muscle leading to decreased heart muscle mass and decreased respiratory function, prolonging hospital stay, and reduced quality of life, increased the cost of treatment and increased mortality in hospitalized patients in the hospital [1-3, 15].

Malnutrition should be diagnosed and treated [3]. Diagnosis of patients with malnutrition or at risk of malnutrition refers to principles for malnutrition treatment [1]. Screening and comprehensive evaluation and correction of malnutrition at the earliest time cause reduced treatment cost, reduced length of stay, improved response to treatment, and most importantly improvement in functional performance and increased quality of life [8]. There are several methods for nutritional assessment of patients. At the same time there has been no standard index for the definition and diagnosis of malnutrition [16]. The most common way in this context is Subjective Global Assessment (SGA) which is a valid and reliable clinical method to assess nutrition status and determine malnutrition in patients, but this method is a semi-quantitative method [15]. SGA has been designed based on history, dietary information, gastrointestinal symptoms, functional capacity and the effects of disease on nutritional needs and physical examination and has the ability to identify patients at risk of malnutrition [17]. SGA has been mainly used due to simplicity, non-invasive, low-cost, high-speed completion, feasibility beside patient's bedside by trained professionals, its ability to identify patients at high nutritional risk [18] in various clinical locations [17].

Further, in most of the studies, the ability of the instruments in diagnosing patients with malnutrition in comparison with standard SGA was examined [10, 15, 19, 20]. But SGA has the limitations including subjective limitation, designed to highlight the characteristics against sensitivity, and not allowed for classification on mild malnutrition and required for skill so as to complete it. Another limitation is that some cases of malnutrition do not diagnose acute cases at an early stage [21]. The FNA (FULL NUTRITION ASSESSMENT) instrument examines nutritional status of patients using anthropometric and biochemical parameters [22-24]. Further, subjective global assessment (SGA) instruments have been used in different clinical centers, and used as standard instruments in most studies to determine the ability of other instruments and targeted in study on its efficiency against each of the anthropometric data and laboratory parameters [18]. yet, large body of studies have not been conducted to determine the ability of this instrument to identify patients with malnutrition with simultaneous use of anthropometric data and laboratory parameters; the purpose of this study was to determine the ability of the SGA instrument compared with FNA in detecting patients at risk of malnutrition in the hospital.

MATERIALS AND METHODS

Sample

280 patients were selected randomly from different parts of the hospital. The samples through the system of hospital admission were selected using random sampling. 280 patients at Namazi hospitalization including 140 women and 140 men among individuals at age group above 18 years old and at 24-72 first hours were assessed with nutritional status.

Nutritional Status Assessment

Full nutrition assessment (FNA)

Full nutrition assessment (FNA) includes body mass index (BMI) and information on unintentional weight loss, the triceps skin fold (TSF), mid-arm muscle circumference (MAMC), albumin, Prealbumin and total lymphocyte. These parameters are associated to malnutrition and clinical results as well as duration of hospitalization and the mortality, accepted as assessment indicators of nutritional status; definition for malnutrition in these instruments is that 3 or more than these 7 parameters be abnormal[29, 30].

SGA

Classification of malnutrition by SGA based on the use of information includes weight loss, changes in dietary intake, gastrointestinal symptoms (such as diarrhea, nausea, loss of appetite), physical activity and physical examination parameters such as loss of subcutaneous fat, loss of the body's muscle mass and presence of ascites, edema, dehydration. In general, patients were divided into three groups based on their nutritional status. Patients with good nutritional status, patients with moderate malnutrition status and patients with severe malnutrition were classified in Group A, Group B and group C [25]. Definition for malnutrition in these instruments refers to the patients in group B or C.

In following, a screening instrument in terms of validity was examined in form of sensitivity and specificity, positive and negative predictive values. Dietitian has diagnosed nutritional status of patients with a percent of individuals.

Procedure

Informed consent was obtained from patients after giving explanation on goals of research. In beginning, each patient was examined by nutritionist. Two instruments Subjective global assessment (SGA) and Full nutrition assessment (FNA) were used to evaluate the nutritional status of hospitalized patients. Power calculations show that the sample size to examine difference in body mass index (BMI) and other variables in the SGA and FNA are suitable for the diagnosis of malnutrition among patients (Power> 0.95, P <0.05). Height and weight of each patient were measured, and their BMI was calculated based on the formula. Unintentional weight loss due to the weight difference between the past and the patient's weight during the study period were recorded. Mid-arm muscle circumference (MAMC) was measured and recorded by tape measure and also Triceps skinfold (TSF) was measured by means of skin fold calipers [49]. For mid-arm muscle circumference (MAMC), measurements MAC and TSF were used to calculate. To calculate anthropometric Percentiles, The National Health and Nutrition Examination Survey (NHANES) were used. The albumin was measured by color measurement tests and Prealbumin was measured using nephelometry method.

Statistical analysis

Statistical analysis was made using software SPSS. The patients with scores lower than the reference values for various nutritional indices and parameters were diagnosed. Sensitivity, specificity, positive and negative predictive value of SGA instruments compared to FNA instruments were calculated. Distribution of various variables in the study was examined via Kolmogorov–Smirnov test. To examine difference between normal group and group with severe malnutrition, t-test was used. The relationship between SGA and FNA was evaluated via linear correlation.

RESULTS

With regard to table 1, the sample group consists of 140 males and 140 females that average age of sample group is 55.384 of which 32.85% are people above 65 years old and 67.14% are people under 65 years old. Average weight of individuals is 63.22 with standard deviation (11.34) and average BMI is 23.17 with standard deviation (4.164). With regard to table 2, with regard to SGA instruments, 50.1% of patients lacked malnutrition and 49.9% of patients suffered from malnutrition. With regard to FNA, 58.6% of patients have been diagnosed healthy and 41.4% of patients have been diagnosed with malnutrition.

Table 1: Characteristics of individuals in sample group

Variable		Frequency	Frequency percent
Age	people above 65 years old	92	32.85
	people under 65 years old	188	67.14
Gender	Male	140	50
	Female	140	50
	Weight	63.22*	11.34**
	BMI	22.17*	4.164**

*average, ** standard deviation

Table 2. Frequency and prevalence of malnutrition in terms of various instruments

SGA	Without malnutrition	141	50.1
	moderate malnutrition + severe malnutrition	139	49.9
FNA	Without malnutrition	164	58.6
	With malnutrition	116	41.4

Table 3. Frequency and prevalence of malnutrition based on various instruments in terms of age

	Age	Under 65 years old	Above 65 years old	P.VALUE
SGA	Without malnutrition	105	33	
		55.9%	36.7	0.002
	With malnutrition	83	57	0.003
		44.1%	63.3	
FNA	Without malnutrition	111	51	0.07
		59%	56.7	
	With malnutrition	77	39	0.795
		41%	43.3	

Table 4. Frequency and prevalence of malnutrition based on various instruments in terms of gender

Instrument	Nutritional status	Gender		P.VALUE
		Male	Female	
SGA	Without malnutrition	74	64	0.4
		47.1%	52.9%	
	With malnutrition	83	57	0.397
		52.9%	47.1%	
FNA	Without malnutrition	78	84	0.001
		49.7%	69.4%	
	With malnutrition	79	37	0.001
		50.3%	30.6%	

Table 5. sensitivity, specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV), Kappa correlation coefficient SGA compared to FNA

	Sensitivity	Specificity	Positive Predictive Value (PPV)	Negative Predictive Value (NPV)	Kappa correlation coefficient
SGA	82.75	73.17	68.57	85.71	65/. 001/. P<

Table 3 displays that prevalence of malnutrition in people above 65-year-old in SGA instrument has been higher than prevalence of malnutrition in people under 65 years old in FNA instruments. This difference in SGA instruments (P=.017) has been significant statistically, but it has not been significant in FNA instruments (P=.715).

With regard to table 4, prevalence of malnutrition based on both SGA and FNA instruments in men is greater than women, which has not been significant in SGA instruments statistically(p=0.0397), and this difference has been significant at FNA instruments(P=0.001).

With regard to table 5, the extent of correlation between SGA instruments and FNA instruments is 65%, which had proper correlation with FNA instruments. Sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) in SGA instruments compared to FNA instruments equals to 82.75, 73.17, 68.57 and 85.71, respectively.

DISCUSSION AND CONCLUSION

Malnutrition is a major health problem at hospitals which raise increased side effects and mortality in patients hospitalized in hospital. In the present research, prevalence of malnutrition dependent on type of used instruments has been reported between 41.4%-49.9%, i.e. malnutrition is common among the hospitalized patients at the early admission. It is obvious that early malnutrition diagnosis for nutritional supports on attention to provide treatment for the patients with malnutrition can be effective in treatment process of disease and reduction of treatment costs. Results from the present research have been consistent with the results from an epidemiological study in Europe, in which prevalence of malnutrition has been reported between 20%-30%. in a study in Asia, prevalence of malnutrition has been reported

between -39%-27%; in a study in south of America, prevalence of malnutrition has been reported between 37%-45%; in a study in Australia, prevalence of malnutrition has been reported between 23%-42%; with regard to results from these studies, it can say that malnutrition is a common problem among hospitalized patients [26]. In the present research, prevalence of malnutrition among people above 65 years old regarding SGA instruments is greater than other age groups, but this difference has not been significant regarding FNA instruments. Results from this study have been consistent with the results from studies by Imberdrof *et al* [27], Pirilich *et al* [28] and Fakhar *et al* [29]. Results from the present research indicated that the elderly have had improper nutritional status than other age groups, caused by physiological, economic and social parameters that include dementia, gas platter, dysphagia, diarrhea, depression, diseases, chew disorders and dysfunction [5]. Results from the present study have indicated that prevalence of malnutrition has been also high in other age groups, thus other age groups are not also safe from malnutrition. In the present study regarding various instruments for study on nutritional status in patients, prevalence of malnutrition in men has been higher than women, found with significant difference in FNA instruments. Discussion on this finding reveals that men less likely than women seek health and care services, and then less likely get to preventive practices and less likely consider changes in body weight and food intake reduction. Thus, the assumption is that when men are hospitalized in hospital, the malnutrition chance ratio might be higher in them than women. In study by Bank *et al*. [30], it has been indicated that malnutrition chance ratio in men has been higher than women, but no significant difference has existed between two genders; in study by Pirlich and colleagues, percent of malnutrition in women has been significantly higher [28]. Since malnutrition among hospitalized patients is common at early admission and malnutrition causes side effects for patients, the earliest awareness from this problem using malnutrition diagnosis instrument with the least error and highest accuracy is of great importance. In this study, accuracy in diagnosis by SGA instruments in diagnosing patients with malnutrition or patients subjected to malnutrition has been examined. With regard to this study, sensitivity and specificity of SGA compared to FNA were obtained equal to 82.75% and 73.17%, respectively. Thus, a small number of patients with malnutrition are released without a diagnosis and as a result the consequences from malnutrition and waste of human resources are minimized, but ability of these instruments in diagnosing the patients with malnutrition and at risk of nutrition risk has been higher than their ability in diagnosing the patients without malnutrition. Results from this study are consistent with other studies. In study by Deveto *et al* [31], sensitivity and specificity of these instruments among the patients hospitalized in hospital were compared with sensitivity and specificity of detailed nutritional assessment as gold standard method, reported 76.5% and 83.7% which displayed a proper sensitivity and specificity; this has been consistent with results from this study, but its specificity than sensitivity has been higher despite the present study. Thus, in this study despite proper ability of SGA in proper diagnosis of patients with malnutrition or the patients subjected to nutritional risk and diagnosis of patients without health, ability of these instruments in diagnosis of healthy patients than their ability in diagnosis of patients with malnutrition and at risk of malnutrition has been higher. In another study by Thoresen *et al* [4] with study on status of patients hospitalized in oncology sector via SGA and FNA, sensitivity and specificity of SGA have been reported 96% and 83%, found with proper sensitivity and specificity. But, in comparison with the present research, ability of SGA has been higher in diagnosis of patients with malnutrition and at risk of malnutrition and healthy individuals. In study by Pablo *et al*. [32], sensitivity and specificity of SGA instruments have been compared with combined method, reported sensitivity and specificity a 100% and 59%. According to the present research, SGA has a proper ability in diagnosis of patients with malnutrition and at risk of nutrition, but it has had higher ability compared to the present research. But, despite results from the present research, ability of SGA has been lower in diagnosis of healthy patients. Since sensitivity and specificity of SGA have been reported different in various studies, it has been displayed in various studies that ability of SGA has been proper in diagnosis of health individuals and individuals with malnutrition and at risk of malnutrition. This difference in sensitivity and specificity is due to various populations under study, various clinical sectors under study and different gold standards compared with it. One of the limitations in

sensitivity and specificity is their disability in determining whether the patients specified with result of examination has malnutrition or health. In doing so, positive and negative predictive value has been obtained for that instrument which is other criterion to study accuracy in diagnosis of instruments. In the present research, positive predictive value and negative predictive value of SGA have been reported 68.57% and 85.71%.

Thus, if a person is diagnosed with malnutrition or at risk of malnutrition based on SGA, he will be subjected to malnutrition or at risk of malnutrition with probability of 68.57%; if a person is diagnosed healthy and at risk of malnutrition based on SGA, he will be healthy with probability of 85.71%. Positive predictive value of SGA in the present research than research by Pablo *et al*. [32] and research by Poulia *et al*. [33] is lower; further positive predictive value of SGA in the present research than research by jeejeebhoy *et al* [34] is higher. Negative predictive value of SGA in the present research than research by Pablo *et al* [32] is lower and it is higher than research by Poulia *et al* [33] and jeejeebhoy *et al* [34]. Since predictive value is under influence of prevalence of disease in the population under study and the results from predictive value should not be generalized to population with various prevalence from the population in various studies, the difference in predictive value of SGA is due to difference in prevalence of malnutrition in populations under study and various gold standards used in various studies.

CONCLUSION

with regard to the present research, prevalence of malnutrition in patients hospitalized in hospital has been extensive; despite limitations on SGA instruments including its subjective facet and design based on highlighting features against sensitivity, some cases do not diagnose malnutrition acute and at early stages[21], in this study which the anthropometric data and laboratory parameters were compared, the ability of SGA in diagnosis of patients with malnutrition has been proper and trust on diagnosis of patients with malnutrition regarding SGA test has been relatively proper.

Conflict of interest:
None

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