BODY MASS INDEX IS A POOR PREDICTOR OF MALNUTRITION IN HOSPITALIZED PATIENTS

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ABSTRACT

OBJECTIVE
Comparison between Subjective Global Assessment and Body Mass Index to determine the nutritional status in patients admitted in an Internal Medicine Service.

METHODS
Prospective, longitudinal, observational study of a population of 152 patients, using the Subjective Global Assessment and Body Mass Index. Plasma levels of albumin, functional capacity, weight and income conditions were determined. Statistics: methods of chi -square test for univariate analysis, non-parametric tests and logistic regression were used.

RESULTS
152 patients, of which 48.70 % had malnutrition, moderate malnutrition 34.2 % (group B) and 14.5 % severe malnutrition (group C) were included. No association between Subjective Global Assessment and Body Mass Index was shown to determine nutritional status. Malnutrition was associated with age over 60 years, male sex, and diagnosis of oncologic and infectious diseases, as well as the level of functional ability.

CONCLUSIONS
Body Mass Index is not a suitable method to assess the impact of malnutrition in hospitalized patients compared with the Subjective Global Assessment.

KEY WORDS: Body Mass Index, Subjective Global Assessment, malnutrition.

NigerJMed2015: 310-314

INTRODUCTION

Malnutrition is the result of a requirement of protein, energy or both that cannot be satisfied, progressing to the appearance of functional and structural changes that are related to the duration and severity of the intake restriction. This condition, caused by the depletion of nutrients, often develops or worsens during the hospital stay. Regardless of the method used to diagnose and categorize the severity of hospital malnutrition, the high prevalence of this condition is determined largely by the same diseases that induce patient hospitalization. Besides the secondary malnutrition or " associated malnutrition diseases " (AMD) frequently starts prior to hospitalization and is often aggravated by the same causes of hospitalization, its treatments and / or several concurrent causes, some iatrogenic , related or not to the length of stay.[1] For several years there have been designed different strategies and methods for nutritionally evaluation in in-patients , thereby created to detect malnutrition and fix it.

Nevertheless malnutrition remains underestimated and poorly detected by the health team. The prevalence found in different studies is between 30% and 50%. In one of them, 75% of malnourished patients deteriorated nutritional status during hospital stay.[2-3]

Most studies were conducted in developed countries with few countries made ? ? in developing countries. In Latin nutritional evaluations recently conducted in hospitalized patients in Brazil , Chile and Argentina.[4-5-6] The Body Mass Index (BMI) assesses the relationship between weight and height. While it is considered as normal range values between 18.5 and 24.9, lower rates are indicative of malnutrition and are associated with a significant increase in mortality in different types of patients.[7] It is useful not only for the comparison with the reference values in a particular patient or

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population, but also allows a linear track in them. The aim of this paper is to demonstrate the correlation between BMI and malnutrition according to the definition of the SGA and if it is possible to use the BMI as a predictor of malnutrition in hospitalized patients.

MATERIAL AND METHODS

Patients admitted to the Internal Medicine Service of the Complejo Churruca- Visca of Buenos Aires , Argentina. The evaluation was conducted from 1º July to 1º December 2012.

The evaluation method chosen was the Subjective Global Assessment (SGA) described by Detsky et al.[8]

SGA is a combination of : A) the food intake, weight changes, type of intake and gastrointestinal symptoms , functional capacity and type of pathology ; B) physical exam where loss of subcutaneous fat , muscle wasting and edema is evaluated . Patients were classified as well nourished (A) , moderately malnourished (B) and severely Malnourished (C). When they were unable to obtain direct evidence of the patient, the closest family was interrogated to obtain these data. Patients above 16 years were included (Service admission condition). Patients who could not be weighted or were discharged during the first 24 hours were excluded.

The assessment was performed within 48 hours of admission. The average interview duration was 11 minutes. Patient's pathologies were classified into groups according to the affected systems or medical conditions; co - morbidities were not taken into account. The variables considered in addition to the SGA, included the determination of Body Mass Index (BMI), weight at admission, plasma albumin, and functional capacity during the last month. Patients were divided according to BMI less than 18 (malnutrition) and over 25 (overweight and obesity). The days of admission were divided into < 12 days and > 12 days. The age in <60 and > 60 years, separating the population in the elderly and non-elderly, according to the WHO definition (1st World Assembly on Aging , Vienna , Austria, 1982 and 2nd World Assembly on Ageing , Madrid, Spain , 2002.

Statistical analysis was performed with the SPSS 16 package (Statistical Package for Social Sciences Chicago, IL, USA). Frequencies of all variables were included. For comparison of nominal and ordinal variables the chi-square test, linear correlation, univariate analysis and logistic regression in order to determine the degree of association being collected variables (malnutrition was used as the dependent variable, BMI, weight, etc. as independent). Statistical significance was defined as $p < 0.05$.

RESULTS

152 patients were evaluated. The average age was 63.4 years with a range between 17 and 92 years. The 55% were men.

Pathologies distribution group was shown in Table I.

	Frequency	Percentage		Cumulated Percentage
NEUROLOGIC	33	21,7		21,7
INFECTIOUS	29	19,1		40,8
RESPIRATORY	27	17,8		58,6
OTHERS	20	13,2		71,7
ONCOLOGIC	19	12,5		84,2
DIABETES	13	8,6		92,8
GASTROENTEROLOGY	8	5,3		98,0
CARDIOVASCULAR	3	2,0		100,0
Total	**152**	**100,0**		

TABLE 1 DISTRIBUTION OF DISEASES IN THE POPULATION

The results obtained by applying the SGA were: 51.3 % of patients (n = 78) were well nourished (group A) , while 48.7 % (n = 74) were malnourished (B+C). Of these, 52 patients (34.2 %) had moderate malnutrition (group B), and 22 patients (14.5 %) had severe malnutrition (group C). The distribution of functional capacity and frequency conditions are observed in Table II and Figure 1 respectively.

Activity level	Nº	Percentage
Normal	53	34,87 %
Quite normal activities, but with effort	34	22,37 %
Decayed and in bed or sitting part of the day.	20	13,16 %
Capable of small activities; most of the day in bed or sitting.	12	7,89 %
Almost always in bed.	33	21,71 %
TOTAL	152	100 %

TABLE II CHANGES IN THE FUNCTIONAL CAPACITY DURING THE PAST MONTH

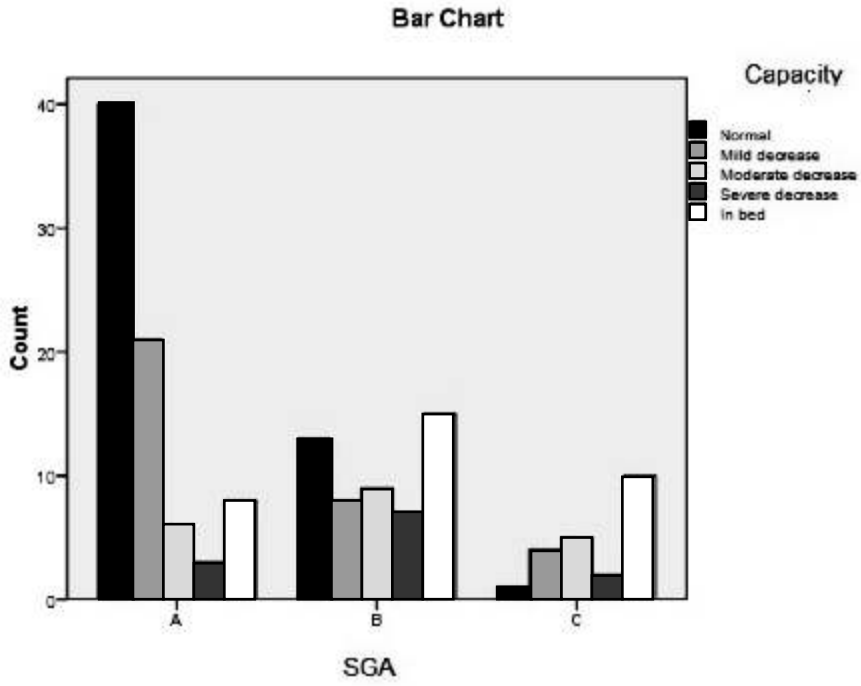

Figure 1: Relationship between SGA and functional capacity

BMI had an average of 26.75 (± 7.5), weight of 79.56 kg (± 17.2) and albumin 3.35 g/l (± 0.76) . Of the total, 15 patients had less than 18 (9.9 %) (3 patients well nourished and 12 malnourished patients), 54 between 18.1 and 24.9 (30.9 %) (20 normally nourished and 34 malnourished) and 90 over 25 (59.2 %) BMI (58 well nourished and 32 malnourished). The average stay was 13.5 days (± 5.4) , with a range between 2 and 68 days , with a value of 7.5 days for normally nourished group and 16.4 for the malnourished. (<0.05).

Malnutrition was significantly associated using the Mann- Whitney test with the level of functional ability. The same test showed association between BMI less than 18 and malnutrition according to SGA , but no association between normal BMI or BMI >25 and malnutrition (p 0.01 , 0.12 and 0.14 respectively). There was a significant association between malnutrition and low levels of plasma albumin but with a p-value of 0.58.

The same analysis showed significant correlation between malnutrition and age over 60 years and, diagnoses of infectious and oncologic disease ($p < 0.001$).

Patients older than 60 years had a higher predisposition to malnutrition. (OR = 2.10 C.I = 1.43-2.58 $p < 0.001$). Patients with cancer and infectious disease also had a higher risk of malnutrition (OR = 2.28 CI = 1.84-2.71 for cancer patients $p < 0.001$ and OR = 1.25 CI = 0.92-1.49 for infectious, $p < 0.05$).

DISCUSSION

There are many factors that contribute to malnutrition, such as socioeconomic, advanced age, the type of pathology and hospital stay.[9-10]

A previous study conducted on hospital malnutrition in this service, showed similar results to other studies conducted in developed countries and in Latin America and Argentina , with values ? ? of 37 % involvement in Chile, 48 % in Brazil and 47.35 % in Argentina .

The present study shows of 48.78 % of malnutrition a using the SGA , which is in the range described in the literature; however malnutrition is just 10 % when body mass index (BMI) is only used as a criteria. This finding supports the data described in the literature about the shortcomings that have anthropometric measurements to assess the nutritional status of patients, particularly BMI.

The use of SGA to distinguish between well-nourished and malnourished patients, without resorting to anthropometric measurements and laboratory (albumin and lymphocyte count) , with adequate certainty of outcome fidelity .[11-12-13-14]

The body mass index (BMI) is not useful to detect malnutrition as shown in this situation. Anyway, the World Health Organization still considers the BMI as a useful method to assess nutritional status. According to some authors, up to 30 % of healthy controls should be considered malnourished if tables like Jellife and Frisancho are used.[15-16] There are also screening methods developed that combine different variables, including anthropometric and biochemical variables, with low effectiveness / cost ratio, but it is not proven its usefulness in daily practice.

Among these tools there is one developed by Elmore which can detect malnourished patients who were not detected with other screening methods. The equation contains three common use parameters that are easy to handle as the total lymphocytes count, plasmatic albumin and the weight loss percentage.[17] Many recent screening tools (Screening Tool Malnutrition , Nutrition Screening Tools , Nutritional Risk Index, etc.) combine the SGA, considered the "gold standard " with anthropometric parameters (BMI, triceps skin fold measurement , etc.).[18-19-20-21-22-23]

The use of BMI as a sole criteria for malnutrition assessment, underreport the true nutritional status. Anyway, none of the combined studies has become a validated tool nutrition screening applicable to all in-patients.[24-25]

Although BMI is a poor malnutrition tool, it is still used as a marker for this condition.

CONCLUSION

Malnutrition in hospitalized patients in Argentina has a high incidence, similar to those described in other papers.[26]

It is necessary an adequate assessment of nutritional status on admission of the hospitalized patient to define and identify the population risk and start a health nutritional program.[27]

The screening methods used should be evaluated at the level of predictive validity, content validity and interobserver variation, which must have ease of application, ease of understanding and acceptability to patients and health professionals

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