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Original/*Valoración nutricional*

Nutritional assessment in surgical oncology patients: a comparative analysis between methods

Carla de Magalhães Cunha[1], Ethiane de Jesus Sampaio[3], Maria Lúcia Varjão[4], Clarissa Simon Factum[5], Lilian Barbosa Ramos[2] and Jairza Maria Barreto-Medeiros[2].

[1]Master's Degree of Food Nutrition and Health, School of Nutrition, Federal University of Bahia. [2]Clinical Nutrition Department, School of Nutrition, Federal University of Bahia. [3]Department of Nutrition and Dietetics, Professor Edgard Santos University Hospital, Bahia. [4]Department of Nutrition and Dietetics, Aristides Maltez Hospital, Bahia. [5]Graduate in School of Nutrition, Federal University of Bahia. Brazil.

Abstract

Background and aims: The malnutrition found in oncology patients is the main responsible for the increase in morbimortality and worsening of their quality of life. Currently, the assessment of malnutrition is performed by subjective and objective methods, or the combination of them. Although these methods are routinely applied and their association is very common in clinical practice, there are few studies on the agreement between them. Thereby, this study aims to compare different methods for nutritional status assessment in surgical oncology patients.

Methods: 173 oncology patients, admitted for surgery, were submitted to an anthropometric evaluation and answered a SGA, PG-SGA and NRS-2002. Kappa test was used to evaluated the level of concordance between the methods.

Results: Poor concordance were observed between BMI and NRS-2002 (K=0,286), SGA (K=0,372) and PG-SGA (K=0,173). Among the subjective methods, the best results were found for SGA and PG-SGA (K=0,690), and the lowest between NRS-2002 and both others (SGA: K=0,345; PG-SGA: K=0,322).

Conclusions: The poor concordance found between objective and subjective methods reinforces the importance of associating indicators in the nutritional assessment of this population Despite of the poor concordance found between the nutritional status assessment methods investigated in this study, patients who had greater depletion of body stores were also diagnosed with a higher degree of malnutrition by subjective methods.

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Key words: *Nutritional status. Oncology. Subjective assessment. Anthropometry. Concordance.*

VALORACIÓN NUTRICIONAL EN PACIENTES ONCOLÓGICOS QUIRÚRGICOS: UN ANÁLISIS COMPARATIVO ENTRE MÉTODOS

Resumen

Introducción y objetivos: La desnutrición en el paciente oncológico es responsable por el aumento de la morbilidady la mortalidady produce una disminución de su calidad de vida. En la actualidad, la identificación de la desnutrición se lleva a cabo por medio de métodos subjetivos y objetivos o por la unión de ambos. A pesar de la asociación de estos métodos como examen de rutina en la práctica clínica, son muy pocos los trabajos que evalúan la concordancia entre ellos. De ese modo, el objetivo de este estudio fue comparar diferentes métodos para evaluar el estado nutricional de los pacientes oncológicos quirúrgicos.

Métodos: Se analizaron 173 pacientes oncológicos, ingresados para cirugía, se sometieron a una evaluación antropométrica y respondieron a SGA, PG-SGA y NRS-2002. Se utilizó el test Kappa para evaluar el nível de concordancia entre los métodos.

Resultados: Baja concordancia entre el IMC con el NRS-2002 (K=0,286), ASG(K=0,372) y ASG-PPP (K=0,173) fue identificado. Entre los métodos subjetivos, los resultados fueron mejores com ASG y ASG-PPP (K=0,690) y menor entre el NRS-2002 y los otros (ASG: K=0,345; ASG-PPP: K=0,322).

Conclusión: Los resultados demostraron baja concordancia entre los métodos objetivos y subjetivos, lo que refuerza La importancia de la asociación de los indicadores en la evaluación nutricional de esta población. Aunque se ha encontrado baja concordancia entre los métodos de evaluación nutricional empleados en este estudio, los pacientes que presentaron una mayor reducción de las reservas corporales, fueron diagnosticados con un mayor grado de mal nutrición por los métodos subjetivos.

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Palabras clave: *Estado nutricional. Oncología. Valoración subjectiva. Antropometría. Concordancia.*

Correspondence: Carla de Magalhães Cunha
Av. Araújo Pinho, n. 32, Canela.
CEP: 40110-150, Salvador-Bahia, Brazil.
E-mail: carlamagalhaesc@gmail.com

Abbreviations

SGA: Subjective Global Assessment.
PG-SGA: Patient Generated Subjective Global Assessment.
NRS-2002: Nutritional Risk Index-2002.
BMI: Body Mass Index.
TST: Triceps Skinfold Thickness.
AC: Mid-Arm Circumference.
%AdeqTST: Adequacy Percent of Triceps Skinfold Thickness.
AMC: Mid-Arm Muscle Circumference.
AMAc: Corrected Arm Muscle Area.
MM: Muscle Mass.

Introduction

The malnutrition commonly found in oncology patients is responsible for the decrease in treatment tolerance, enhancement of morbimortality in the postoperative period, as well as worsening of quality of life[1, 2]. Half of the patients lose at least 5% of the body weight they had prior to disease diagnosis, and such weight loss is even more severe in patients who are at an advanced disease stage[3]. Studies report that approximately 20% of these patients die as a result of malnourishment rather than from causes associated with the disease, besides, the change in body composition negatively affect the response to anticancer therapy[4, 5, 6]. Therefore, early identification of malnourished patients, or at risk of malnourishment, is substantial to minimize or prevent undesirable outcomes throughout clinical course[7, 8].

Providing of the diagnosis of malnutrition or risk of malnutrition depends on the parameters used in the nutritional assessment which are influenced by the metabolic disorders presented by cancer and other factors that are independent of nutritional status[4, 9]. Several methods with different sensitivities, specificities and costs can be employed in clinical practice. However, there is still no method that is considered "gold standard", and those used in clinical practice have various limitations, ranging from those which are intrinsic to the patient's disease, until the infrastructure of nutrition services for the execution of routine assessment[2].

The most used methods for the nutritional evaluation of these patients are the anthropometry and the subjective methods. Among the most common limitations of the anthropometric methods, we highlight the alterations in the hydration status and the presence of tumor mass of great volume that interfere with the weight[5, 10]; influence of the metabolic abnormalities on the body stores; limitations in mobility of the patients which hinder frequent monitoring of anthropometric measures[4]; and others. On the other hand, the subjective methods, given that they rely on the information provided by the patients, also have limitations when the patients are not able to provide the information re-

quested, or when they can't because of impaired level of consciousness[1]. The loss or the poor credibility of such information often reflects on the impossibility of defining the patient's diagnosis.

Considering that both subjective and objective methods are extensively applied in nutritional assessment of patients, the combination of them is fairly common in clinical practice, and given lack of studies on the agreement between them, the present study aimed to evaluate the agreement between anthropometry and subjective assessments of nutritional status in surgical oncology patients.

Methods

This is a cross-sectional study, conducted at the Aristides Maltez Hospital, a referral hospital for oncologic treatment in the city of Salvador, Bahia. A sample of a hundred and seventy three patients admitted with cancer diagnosis and surgical indication were evaluated. This research was approved by the institution's Ethics and Research Comittee and registered under the number 284/10, respecting the criteria set by the Helsinki Conference and the Resolution n.466/12 of the Brazilian National Health Council.

Population

The study included patients aged 18 years or older, of both sexes, admitted to the hospital to undergo oncologic surgery, and who were able to go through anthropometric assessment of nutritional status and answer properly the questionnaires.

The sample was selected by convenience and the patients were invited to enroll in the study by one of the researchers. Everyone who agreed to participate signed a free and informed consent form.

Anthropometry

We measured Triceps Skinfold Thickness (TSF) with Lange⑨ skinfold caliper, and Mid-Arm Circumference (AC) using an inelastic tape, and both measurements composed the indexes of body composition evaluation. To assess the adipose tissue stores we applied the Adequacy Percent of Triceps Skinfold Thickness (%AdeqTST), using the cutoff points from 90 to 110% of adequacy in relation to P50, established by Blackburn and Thornton (1979)[11].

To evaluate muscle mass stores, we used the Mid-Arm Muscle Circumference (AMC) formula for the elderly, applying the cutoff points established by NHANES III (1991), and for the adults we used the Corrected Arm Muscle Area (AMAc) formula, adopting the cutoff points of Frisancho (1990)[12, 13]. Trained researchers performed the measurements twice, and a third

one was taken if there was a deviation > + or-1 mm between the first two. The means of the measurements were registered in the research protocol[12].

The height and weight data were collected from medical records derived from the admission screening conducted by nursing staff and were used to calculate the Body Mass Index (BMI). The results for BMI were interpreted in accordance with the WHO (1997) criteria for adults and Lipschitz (1994) criteria for the elderly[12].

Subjective Assessment

In the subjective evaluation and nutritional screening the patients answered within the first 48 hours after admission the Nutritional Risk Screening-2002 (NRS-2002), the Subjective Global Assessment (SGA) and the Patient Generated Subjective Global Assessment (PG-SGA). For the SGAs, we used the results A: Well-nourished; B: Mildly/Moderately Malnourished; C: Severely Malnourished, and for the NRS-2002 we used nutritional risk and lack of nutritional risk[14, 15, 16]. The data regarding surgery and tumor location, which were necessary to complete the PG-SGA, were obtained from the patient's medical records.

Statistical Analysis

To characterize the sample, descriptive analyses that included mean and standard deviation for continuous variables and frequencies for categorical variables were performed. For statistical inferences, we applied Pearson Chi-square Test to dichotomous categorical variables, Chi-square of Linear Tendency to polytomous categorical variables and ANOVA to polytomous linear variables.

Agreement between the two tools of nutritional assessment was tested by the Kappa Index of Agreement. The results were interpreted as follows: <0 lack of agreement; 0 to 0.19, poor agreement; 0.20 to 0.39, fair agreement; 0.40 to 0.59, moderate agreement; 0.60 to 0.79, substantial agreement; and 0.80 to 1.00, nearly perfect agreement[17].

For the Kappa and Chi-square tests, we performed dichotomization of the results of SGAs, so that the ratings B and C were grouped as subjective diagnosis of nutritional deficit. The analyses were performed considering the age range of the population, due to anthropometric differences inherent to adults and the elderly. The data collected were tabulated and analyzed in the statistical software SPSS 11.0.

Results

Of the 173 patients who participated in the study, 92 were elderly, with a mean age of 69.9 (±7.4) years, and 81 were adults, with a mean age of 46.1 (±8.8)

Table I
Distribution of surgeries performed on 173 surgical patients with cancer, by type of specialty. Salvador, Bahia, 2010

Specialty	n	%
Urology	60	35%
General Cir. (Soft Tissues)	45	26%
Mastology	29	17%
Head and Neck	15	9%
Gynecology	12	7%
Gastroenterology	5	3%
Coloproctology	3	2%
Neurology	2	1%
Thoracic Surgery	2	1%
Total	173	100%

Table II
Anthropometric and Subjective Assessment of Nutritional Status of 173 surgical patients with cancer. Salvador-Bahia, 2010

	Adults	Elderly	p
BMI			
Deficit	3	23	
Adequate	30	38	0,000[a]
Excess	47	28	
MUSCLE MASS			
Deficit	28	82	
Adequate	53	10	0,000[b]
ADIPOSE TISSUE			
Deficit	29	56	
Adequate	13	9	0,008[a]
Excess	33	27	
SGA (Detsky, 1987)			
Nutritional Deficit	14	30	
Well Nourished	67	62	0,021[a]
PG-SGA (Ottery, 1994)			
Nutritional Deficit	17	25	
Well Nourished	64	66	0,323[a]
NRS-2002			
Nutritional Risk	3	10	
Lack of nutritional risk	78	82	0,074[b]

[a]Chi-square of Linear Tendency b Pearson Chi-square Test
BMI: Body Mass Index; SGA: Subjective Global Assessment; PG-SGA: Patient Generated Subjective Global Assessment; NRS-2002: Nutritional Risk Index-2002

years. Among seniors 72.8% were males and 64.2% of the adults were females. Most of the patients were hospitalized to undergo urologic procedures, especially prostatectomy (26% of total surgeries conducted during this study).

Table II displays the anthropometric and subjective nutritional evaluation of study participants. For all indicators of nutritional status, we found a higher prevalence of deficit among the elderly. Statistically significant difference between groups was not found only for PG-SGA and NRS-2002.

When assessing the agreement between subjective methods and anthropometry, we observed a poor agreement between them, even when the sample was stratified by age (Table III).

Furthermore, patients rated at higher degrees of malnutrition by subjective evaluations also showed statistically significant greater impairment of nutritional parameters assessed by anthropometry (Table IV).

Discussion

Nutritional assessment is the first step to define the nutritional plan during the patient's admission. Currently this screening is performed by simple subjective methods to identify which nutritional changes, inherent to the illness process, the patient features[18]. Along with subjective methods, anthropometric assessment of body stores is also of great utility to identify how

Table III
Agreement between methods of nutritional status assessment of surgical patients with cancer. Salvador-Bahia, 2010

	SGA				
	BMI	*AMC/AMAc*	*%AdeqTST*	*PG-SGA*	*NRS*
Adults	0,185	0,257	0,181	0,721	0,311
Elderly	0,406	-0,025	0,272	0,662	0,343
Total	0,372	0,143	0,265	0,690	0,345
	PG-SGA				
	BMI	*AMC/AMAc*	*%AdeqTST*	*SGA*	*NRS*
Adults	0,146	0,188	0,054	0,721	0,253
Elderly	0,162	0,024	0,116	0,662	0,356
Total	0,173	0,110	0,106	0,690	0,322
	NRS-2002				
	BMI	*AMC/AMAc*	*%AdeqTST*	*SGA*	*PG-SGA*
Adults	0,307	0,136	0,062	0,311	0,253
Elderly	0,245	0,029	0,071	0,343	0,356
Total	0,286	0,089	0,085	0,345	0,322

* Kappa Test
SGA: Subjective Global Assessment; PG-SGA: Patient Generated Subjective Global Assessment; NRS-2002: Nutritional Risk Index-2002; BMI: Body Mass Index; %AdeqTST: Adequacy Percent of Triceps Skinfold Thickness; AMC: Mid-Arm Muscle Circumference; AMAc: Corrected Arm Muscle Area.

Table IV
Mean and standard deviation of anthropometric measures according to the classifications obtained in subjective assessments of surgical patients with cancer. Salvador-Bahia, 2010

	SGA				PG-SGA			
	A	*B*	*C*	*p**	*A*	*B*	*C*	*p**
%Weight Loss	0,9 ± 2,1	4,1 ± 4,6	15,3 ± 0,9	0,000	1,2 ± 2,6	3,6 ± 4,3	7,7 ± 7,2	0,000
BMI	26,2 ± 3,8	22,8 ±3,7	18,3 ± 2,2	0,000	25,3 ± 3,9	24,7 ± 4,4	19,5 ± 1,9	0,007
TST	18,6 ± 9,5	12,9 ±7,4	4,5 ± 0,7	0,000	17,4 ± 9,2	17,3 ± 10,4	8,6 ± 4,3	0,124
AC	31,5 ± 22,1	26,6 ± 3,6	20,3 ± 2,1	0,279	31,1 ± 22,1	28,4 ± 3,9	22,2 ± 2,0	0,000

* ANOVA
SGA: Subjective Global Assessment; PG-SGA: Patient Generated Subjective Global Assessment; NRS-2002: Nutritional Risk Index-2002; BMI: Body Mass Index; TST: Triceps Skinfold Thickness; AC: Mid-Arm Circumference.

much these alterations influenced the nutritional status of the patient, and is also useful for nutritional monitoring over time[3]. The evidence that this intervention is able to prevent complications of malnutrition, improve quality of life and increase response and tolerance to anticancer treatment, highlights the need for a nutritional assessment that detects malnutrition and enables early initiation of an effective treatment[19].

In this study, the prevalence of malnutrition by different parameters is below the average found in the literature, which varies from 30 to 77%[19, 20, 21, 5, 2, 22]. The occurrence of malnutrition in this population is influenced by tumor location, disease stage and the anticancer treatment employed[23]. The lower percentage of patients with nutritional deficit found in the present study might be related to the influence of different methods of nutritional status assessment and the exclusive participation of surgical patients, who often are newly diagnosed and have not yet undergone other treatments.

There was a lower occurrence of malnutrition by BMI screening when compared to subjective methods. The BMI reflects only the current nutritional status, which is not the best method to diagnose malnutrition in oncology patients. The monitoring of weight change over time is more suitable to evaluate the decline in nutritional status of such patients[3, 17]. Another limitation is that BMI reflects only the total body weight, thus it doesn't take into account the body composition, which might be inadequate since patients with adequate BMI or overweight or obese may feature inadequacies in their body composition and even be malnourished, thereby interfering on treatment responsiveness and cancer prognosis[24, 6].

The deficit of muscle mass (MM) is a common finding in cancer patients due to increased protein catabolism inherent to the disease. Studies that evaluate body composition of these patients usually find a great prevalence of MM deficit up to 47%[19, 14]. In this study the prevalence of low MM was 63.5%, and among the elderly this finding was 89.2%, reinforcing the idea that in these patients, who already feature physiological decline of MM, the intervention must be greater in order to mitigate an even more intense decline in muscle body stores in this age group[26].

The combination of methods is very common in clinical practice, but only a few published studies have evaluated the agreement between them. When the degree of agreement between subjective evaluations was analyzed, we observed a good correlation between SGA and PG-SGA (K = 0.69), but the same did not happen with the NRS-2002. The latter had mild agreement with SGA and PG-SGA (K = 0.345 and K = 0.322), contradicting the findings of Ryu and Kim (2010), Raslan et al. (2010), Velasco et al, (2011) and Almeida et al (2012), who found a greater agreement (K = 0.68, K = 0.56, K = 0.62 and K = 0.853) between SGA and NRS. Possibly the poor agreement found could be justified by the diversity of patients partici-

pating in these studies, as well as the fact that the patients in the present study showed heterogeneity of tumor location sites, since the first authors included only patients with gastric cancer and the last three included patients hospitalized for other causes, not exclusively oncology conditions[5, 20, 18, 24].

Among possible sources of discrepancy between the findings, we emphasize the variety of methods to assess nutritional status, subjectivity in choosing the final diagnosis, and practical skills in anthropometric techniques.

When we tested the agreement between subjective methods and anthropometry, the values did not surpass fair agreement. This result was also found in another study that observed poor agreement between SGA and BMI (K = 0.068) and NRS-2002 and BMI (0.052)[24]. Only one study reported good agreement between the nutritional diagnosis provided by anthropometry and SGA performed by nutritionists (K = 0.78), but the authors did not disclose the criteria applied to establish the anthropometric diagnosis used for comparison[19]. The lack of studies precludes a better comparison between these findings and the ones found in the literature, especially regarding body composition assessment.

Despite the poor correlation between subjective and anthropometry methods, we observed that patients who had a more severe impairment of muscle and adipose tissue reserves, as well as greater weight loss, were subjectively classified as the most malnourished. This demonstrates the relevance of using more than one method to obtain the nutritional diagnosis, turning it more complete by including subjective and objective items of evaluation.

Such combination becomes even more important when working with oncology patients who exhibit different clinical signs and symptoms, fluctuations in food intake, adverse reactions to the treatments and changes in nutritional status. It is important to point out that the selection of the method to be employed should be guided by the profile of the population assisted, the feasibility of inserting these methods into nutritional routine and the possibility of monitoring these patients periodically, thereby ensuring proper nutritional intervention and minimization of undesirable effects inherent to the disease process.

Importantly, the nutritional monitoring must occur on a regular basis to assure the effectiveness of nutritional intervention and to identify if the patient is not presenting further decline in nutritional status. This practice leads to benefits for the patient and enhances the immune and anticancer therapy responses, resulting in a higher survival rate, improvement in quality of life as well as reduction in health care costs[3].

Conclusion

Anthropometry and subjective evaluations are important tools to guide the development of nutritional

intervention and contribute to a more favorable clinical outcome in cancer patients.

Despite the poor agreement between subjective assessments and anthropometry, patients classified in more severe stages of malnutrition by subjective assessment showed proportionately greater impairment of body reserves by anthropometry. Such finding justifies that subjective methods are able to properly rank patients according to their body composition, even if the statistical test employed did not reveal agreement between the methods.

Given these results, it is worth noting the importance of applying more than one method of nutritional assessment, complementarily. The combination of methods allows better monitoring and nutritional diagnosis, than the singly use of one tool.

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