Revista Brasileira de Oncologia Clínica

Artigo Original

Association between nutritional subjective global assessment and manual dynamometry in cancer patients of a chemotherapy service in Southern Brazil

Associação entre a avaliação subjetiva global e a dinamometria manual em pacientes oncológicos de um serviço de quimioterapia do Sul do Brasil

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↗ Keywords

Cancer, nutritional status, Subjective Nutritional Assessment, handgrip strength

■ Summary

Objectives: This article aims to verify whether there is an association between Subjective Global Assessment and handgrip strength in cancer patients treated at a Chemotherapy service of Pelotas-RS. **Methodology:** Cross-sectional study, cradling a randomized, controlled, blind, conducted in the Department of Chemotherapy of Academic Hospital of the Federal University of Pelotas, between June 2008 and May 2010, among patients with cancer gastrointestinal tract and lungs. Nutritional status was assessed by Subjective Global Assessment and the handgrip strength was measured by dynamometry. **Results:** We evaluated 77 patients, 57.1% were male, with 74% of the sample presenting gastrointestinal cancers. Among the severely malnourished patients, those with tumors of the gastrointestinal tract were handgrip strength significantly lower than those with lung cancers (p = 0.03). There was not found statistically significant relationship between hand grip strength and classification of Subjective Global Assessment in the overall sample. However, the mean handgrip strength tended to decrease with worsening nutritional status in both cancer sites. **Conclusion:** Although there was no association between the Subjective Global Assessment and hand grip strength, there was a tendency to decreased grip strength according to the worsening nutritional status, suggesting the impact of malnutrition on muscle function of patients.

↗ Enviado: 24/07/2014 | Aprovado: 26/05/2015

↗ Palavras-chave
Câncer, estado nutricional, avaliação subjetiva global, dinamometria, força de preensão manual

■ Resumo

Objetivos: Este artigo teve por objetivo verificar se existe uma associação entre a Avaliação Subjetiva Global e força de preensão manual em pacientes com câncer tratados pelo serviço de quimioterapia na cidade de Pelotas-RS, Brasil. **Metodologia:** Estudo transversal aninhado em um ensaio clínico randomizado, controlado e cego de Quimioterapia do Hospital de Ensino Serviço da Universidade Federal de Pelotas-RS, Brasil, entre junho de 2008 e maio de 2010, com pacientes com câncer trato gastrointestinal e do pulmão. O estado nutricional foi avaliado através da Avaliação Subjetiva Global e força de preensão da mão por meio de dinamometria. **Resultados:** Foram avaliados 77 pacientes, sendo 57,1% do sexo masculino, com 74% da amostra apresentando câncer do trato gastrointestinal. Entre os pacientes com desnutrição grave, aqueles com tumores gastrointestinais possuíam força de aperto de mão, mais baixos (*p* 0,03). Não houve associação significativa entre a classificação manual de dinamometria de Avaliação Subjetiva Global no total da amostra. No entanto, a força de preensão da mão mostrou uma tendência a diminuir com o estado nutricional em ambos os locais de câncer. **Conclusões:** Embora não tivesse nenhuma associação entre a Avaliação Subjetiva Global e dinamometria houve uma tendência à diminuição da força de preensão da mão de acordo com a deterioração do estado nutricional, sugerindo o impacto da desnutrição na função muscular dos doentes avaliados.

■ Introduction

Cancer is a disease characterized by the abnormal growth of cells, which can grow in an exacerbated way in a short time and spread in anywhere in the body, invading tissues and organs. Currently ranks as the second leading cause of deaths worldwide, about 12% of all deaths, second only to cardiovascular diseases[1]. According to the National Cancer Institute (NCI), the World Health Organization states, in 2008, around twelve million new cases of câncer[2], and National Cancer Institute (INCA) estimates for Brazil, for the biennium 2012/2013, the incidence of 518,510 new cases[3].

Among the biggest problems faced by cancer patients, malnutrition is considered the most common, being found in 40-80% of cancer patients during the course of the disease[4]. This injury affects around 15-20% of patients at diagnosis and up to 80-90% of patients with advanced stage[5]. The prevalence of malnutrition varies according to the kind of tumor, stage of disease and treatment. The deficit of nutritional status is closely related to decreased response to treatment and quality of life, and bringing a higher risk of postoperative complications, increased morbidity and mortality, length of stay and hospital costs. Its importance lies in the fact that 20% of deaths occur in cancer patients due to complications resulting from malnutrition, not the disease itself [5].

Approximately two thirds of cancer patients at advanced stages of the disease suffer from anorexia, which leads to significant weight loss and progressive cachexia, an important factor that contributes to death. Knowledge of the mechanisms underlying the effects of caquexia on the patient may play a role in identifying treatment measures targetted to muscle wasting and to maintain body strength[5].

Malnutrition in cancer patients is frequently reported in the literature and found in almost 75% of the patients at diagnosis. It is also significantly associated with increased morbidity and mortality, reduced response and tolerance to treatment, higher costs, diminished chances of survival and worse Quality Of Life. Malnutrition is caused by several factors and may vary according to the type of tumor, its stage and treatment used[6]. To improve the quality of life of the patient, nutritional therapy should be initiated immediately after the diagnosis of malnutrition or nutritional risk, thus reducing the length of stay and hospitalar cost[7]. When started early, the nutritional therapy may further reduce morbidity and enable the patient completes the course of the treatment oncológico[7].

The Patient-Generated Subjective Global Assessment (PG-SGA) developed by Ottery, validated in 1996, as an adaptation of the Subjective Global Assessment proposed by Detsky[8], is used exclusively to assess the nutritional status of cancer patients. In 2010, Gonzalez et al translated and validated the Brazilian version of PG-SGA[9]. The questionnaire consists of

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two parts with questions designed to investigate the nutritional status, gastrointestinal symptoms and functional capacity. With the numerical results (score) is possible, beyond categorization, set the strategy most appropriate to nutritional intervention[10].

It is known that the nutritional losses are associated with a low strength, that this parameter appears to undergo early changes, occurring before the measurable changes in composition corporal[11]. The impact of tumor and / or treatment results in loss of muscle mass affecting its functionality[11]. A dynamometer is a test that aims to estimate the function of skeletal muscle, thus, valid in the evaluation of nutritional status in cancer patients[7].

Hand grip strength is a nutritional assessment technique sensitive to changes in nutritional status in the short term, being a noninvasive, inexpensive, easy to apply, quick and the weighing of patient - not always possible - is unnecessary[11]. Therefore, the objective of this study was to determine whether there is an association between methods PG-SGA, already established for use in cancer, and hand grip strength in patients with cancer treated at the Chemotherapy Service of Academic Hospital of Federal University of Pelotas (UFPEL), Rio Grande do Sul, Brazil.

■ Materials and Methods

Cross-sectional study, cradling a randomized, controlled, blind, conducted in the Department of Chemotherapy of Academic Hospital UFPEL, between June 2008 and May 2010, entitled "Nutritional Intervention in Cancer Patients: Effects on Body Composition and Quality Life.

Patients older than 18 years, patients with cancer of the gastrointestinal tract and lung, beginning chemotherapy for the first time, were considered eligible. The oncology patients referred for chemotherapy at the Academic Hospital UFPEL, whom met the inclusion criteria were invited to participate in the study during the first medical consultation, if met the other eligibility criteria evaluated by the oncologist. After agreement about the participation and completion of informed consent, patients were referred for consultation with a nutritionist. At this point, it was performed the evaluation of the patient, according to standardized questionnaires addressing demographic and socioeconomic aspects. Also, it was performed the Patient-Generated Subjective Global (SGA), according to Detsky[8], which was adapted and translated and validated in Brazil by Gonzalez et al[9].

During the consultation, hand grip strength was also performed, test that aims to estimate the functional state of the skeletal muscle, using JAMAR® dynamometer. Three measures were obtained for each hand (dominant and nondominant), with one-minute intervals between each measurement, using the largest measurement obtained from each hand. This study was approved by the Research Ethics Committee responsible for the hospital involved in the study, according to letter No. 066/06 of 30 July 2006. Data were processed with double entry and consistency checking through software EpiInfo 6.04d®. The analysis were performed using Stata 9.1®.

■ Results

The study included 77 patients referred for cancer chemotherapy in the Academic Hospital of the Federal University of Pelotas (UFPel), 57.1% were male. Mean age was 64.4 ± 11.6 years. Predominated married individuals or with a partner (58.4%), with white skin 85.7%. The majority of the sample presented gastrointestinal cancer (74%). Of those, 22% had cancer of the esophagus or stomach, 46.7% of colon and rectal cancer and 5.2% pancreatic cancer or gallbladder. Only 26% presented lung tumors. Thirty-five percent of the patients had disease on stage III, 27% stage IV and 23% on stage II. As to the character of chemotherapy treatment, 52% was performed by palliative way, 30% pre / neo adjuvant, 16% adjuvant and 1% performed curative treatment. The analysis of the nutritional status of patients, according to PG-SGA, showed that 66.2% had moderate malnutrition or risk of malnutrition and 20.8% severe malnutrition. When the nutritional status was assessed according to Body Mass Index (BMI), it was found only 7.8% underweight, with a general mean BMI of 23.3 ± 3.8 kg/m^2.

In Table 1 it can be observed the classification of nutritional status, according to ASG, by cancer type. The PG-SGA consists of boxes containing questions designed to evaluate different parameters and criteria that compose the assessment of nutritional status and overall cancer patient. In the physical examination of the PG-SGA, 40.8% of patients had moderate loss, taking into account this criterion, weight loss of adipose tissue and muscle mass. About the symptoms boxes, the score of the sample reached a median of 6 (IQR 2, 9) points, from minimum of zero and maximum of 16 points. There was a predominance of right-handed individuals, representing 88.2% of the sample. For analysis purposes, it was used the values of the left hand grip strength, to enable comparison with existing studies in the literature. Regarding the left dynamometry of the general population, the handgrip strength reached an average of 24.5 ± 9.4 kgf, the minimum was 8kgf and the maximum was 51kgf. Observing by gender, women had a mean of 18.7 ± 6.2 kgf, ranging from 8 to 32kgf while men reached an average of 29.1 ± 9.0 kgf, ranging from 10 to 51kgf. Table 2 shows comparison

dynamometry left by genre according to the type of tumor. There was no statistically significant relationship between hand grip strength and classification of PG-SGA in the general sample. It can be observed, however, a tendency to decrease the handgrip strength according to the worsening in nutritional status, as noted in Table 3.

Table 1. Classification of nutritional status (SGA) according to tumor site

Tumor location / Nutritional Status	TGI [I] n = 57	Lung n = 20
SGA "A"	10.5%	20.0%
PG-SGA "B"	70.2%	55.0%
PG-SGA "C"	19.3%	25.0%

[I] TGI: gastrointestinal tract
p = 0.37 (Fischer´s exact test)

Table 2. Comparison of the handgrip strength according to tumor site

Tumor location / Gender	TGI [I] Mean (DP) Kgf	Lung Mean (DP) Kgf	p value[II]
Male	29.4 (±9.6)	28.2 (±7.3)	0.7
Female	18.3 (±6.4)	19.9 (±5.6)	0.5

[I] TGI: gastrointestinal tract
[II] Test t

Table 3. Handgrip strength according to nutritional status (PG-SGA) in patients with lung and gastrointestinal cancer

Handgrip Strength / Nutricional status	Mean (DP) (Kgf)	Mín. – Máx. (Kgf)
ASG "A"	29.3 (10.1)	18 – 47
ASG "B"	24.9 (9.4)	8 – 51
ASG "C"	20.5 (7.8)	10 – 32

p = 0.24 (Anova test)

There was also no statistical association between PPP and ASG-hand grip strength when the sample is stratified by tumor type. However, the average handgrip strength tended to decrease with worsening nutritional status in both cancer sites, as shown in Table 4. To appraise the association between the scores of the boxes that compose the PGPG-SGA (symptoms boxes, physical examination, metabolic demand, function and activity) and the handgrip strength was used Pearson correlation to the boxes whose score results in a continuous variable (symptoms and physical examination) and Anova test for the activity boxes and function and metabolic demand, whose scores are categorical.The boxes subjected to Pearson correlation resulted in weak negative correlation (r = -0.22 for the symptoms box and r = -0.31 box for physical examination, explaining only between 4.7% (R2 box Symptoms = 0.0468) and 9.3% (box Physical Examination R2 = 0.0933) of the variation of the dominant hand grip dynamometry. The boxes of Metabolic Demand and Activity and Function were not significant to determining the handgrip strength in this sample of cancer patients (p = 0.30 and p = 0.06 respectively).

Table 4. Comparison between handgrip strength and nutritional status (PG-SGA) according to tumor site

Dynamometry / Nutritional status	TGI [I] Mean (DP)	Lung [II] Mean (DP)	p value [III]
PG-SGA "A"	30.6 (10.8) Kgf	27.2 (10.1) Kgf	0.63
PG-SGA "B"	25.4 (9.6) Kgf	20.6 (10.4) Kgf	0.41
PG-SGA "C"	17.7 (7.6) Kgf	26.6 (3.9) Kgf	0.03

[I] p = 0.33 (Anova test for the means of grip strength between categories of nutritional status in patients with GI – gastrointestinal - cancer)
[II] p = 0.14 (Anova test for the means of grip strength between categories of nutritional status in patients with lung cancer)
[III] Test t (for means of grip strength according to nutritional status [intra PG-SGA categories] according to tumor location)

■ Discussion

The TGI cancer accounted for 74% of the sample, standing up to lung cancer. This result is similar to previous studies that found a high prevalence of cancers that affect the GI tract. Hortegal et al[11], in a survey conducted in cancer patients found sample comprised 36.7% of GI cancer, followed by lung cancer, which accounted for 26.7%. The rest of sample was composed of various other malignancies.

According toWaitzberg [12], cancers of the digestive tract by directly assaulting the bodies responsible for nutrition, are often associated with the incidence of cachexia. The present study, however, found a higher prevalence of severe malnutrition in individuals with lung cancer. The tumor TGI was more frequently associated with moderate malnutrition or suspected. Abrunhosa[13] observed that the group of patients with lung cancer had the highest prevalence of stunting (26.7%) and the lowest muscle strength in males than patients affected by other types of cancer. Xará[14] observed, 55.6% of moderate / suspected among patients

with carcinoma in the stomach, and among cases of carcinoma in the mouth, lips or tongue, 50% were in severe malnutrition. According to PG-SGA, the majority of the sample was classified as moderate or suspected malnutrition (66.2%) followed by severe malnutrition (20.8%). Abrunhosa [18] found similar results, being 72.3% of patients were classified as moderate or suspected malnutrition and 17.8% as severely malnourished. Duval et al[15], reported 80% prevalence of malnutrition or risk of malnutrition, which was also identified according to BMI classification, where found a high prevalence of malnourished individuals. In a study of Borges et al [16], unlike the studies cited above, 70.7% the sample was well nourished and only 4.2% had severe malnutrition. However, his sample was composed predominantly of female patients diagnosed with breast or gynecological cancer, which justifies the high prevalence of patients well nourished since the incidence of malnutrition is reduced in these tumor types. In this study, according to BMI, 59.7% of patients were classified as normal, 29.9% as overweight and only 7.8% underweight. Patients with lung cancer had a higher prevalence of underweight at the time of data collection. According to Bauer et al[17], malnourished cancer patients may present with normal BMI or within the average overweight or obese, with body fat masking the loss of lean body mass.

The strength of handgrip among males was 29.1 ± 9.4 kgf and females 18.7 ± 6.2 kgf. Among severely malnourished patients studied, those with lung tumor had lower muscle strength than those with tumors of TGI. There was no statistically significant when compared methods of PG-SGA and dynamometry, but there was a trend to reduced grip strength according to the worsening nutritional status, a result which is similar to previous studies. Contrary to expectation, given this trend, patients classified as moderately malnourished or suspected, were distributed almost equally among the three tertiles of muscle strength.

Considering the results found in this study is a clear need for the assessment and monitoring of nutritional status in cancer patients, as malnutrition occurred frequently in those referred for chemotherapy. Although in this study there was no significant association between the methods of PG-SGA and hand grip strength, there was a tendency for decreased muscle strength with worsening nutritional status. Therefore, it is evident the importance of knowing the patient nutritional status and his functional capacity, more research is needed with larger samples to assess this relationship, since both may be associated and impact the evolution of the treatment of disease and quality of life of these patients.

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