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Prevalence of malnutrition and factors associated with the nutritional status of oncological patients

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ABSTRACT

Objective: The study aim was to identify the nutritional status and factors associated with possible nutritional changes of cancer patients undergoing antineoplastic treatment.

Methodology: A cross-sectional study with cancer patients on chemotherapy treatment, of both sexes, aged 18 years or older, admitted between November 2016 and June 2017 at a university hospital in Rio Grande do Sul, Brazil. Data were collected from nutritional evaluation using the Patient Generated Subjective Global Assessment (PG-SGA), biochemical exams and patient records. Data analysis was performed using descriptive statistics, and correlation and association tests were conducted, depending on the nature of each variable, considering a 95% confidence interval, and a P-value of 0.05 was considered statistically significant.

Results: Sixty patients were evaluated, most of them were female (58.3%), adult individuals (51.7%), suffering from colon and rectal cancer (45%) and were enrolled in the first cycles of chemotherapy treatment (68%) with associated comorbidities (77%). The PG-SGA showed a prevalence of malnutrition (77%) in the sample, severe weight loss (40%), and a reduction in food consumption (41.7%) with gastrointestinal symptoms (75%), and changes on functional capacity (78%), concluding the need for critical nutritional intervention (70%). Biochemical parameters showed some reduction of serum albumin (56%) and total lymphocyte count (76%).

Conclusion: Based on the results, it is important to well evaluate nutritional status and carry out a good nutritional intervention at the beginning and in the course of the treatment, allowing the recovery and maintenance of patient's nutritional status, contributing positively to the clinical outcome of these patients.

KEY WORDS

Nutrition assessment, neoplasms, food consumption, nutritional status.

INTRODUCTION

Cancer currently occupies a relevant space in the global epidemiology scenario. The World Health Organization (WHO)[1] projects that, by 2035, there will be 24 million new cases of cancer and 14.5 million deaths from this disease each year. Regarding mortality, the situation is even worst considering that 8 million deaths are expected, 70% of them in developing countries[2,3]. In Brazil, the projection of the National Institute of Cancer José Alencar Gomes da Silva (INCA), indicates the incidence of 1.2 million new cases between 2018-2019[4].

Characterized as a chronic, non-communicable disease (CNCD), cancer is due to changes in the genetic code, and originates from the interaction between several endogenous and exogenous factors[1]. The progress of cancer treatments leads to higher rates of cure and better outcomes. Added to this, early diagnosis and treatment corroborate to raise patients' expectation and quality of life[5].

In this perspective, nutritional support is fundamental, since malnutrition is considered the secondary most common diagnosis found in cancer patients. Such nutritional threats can be caused by a multi-causal process, related mainly to the

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metabolic changes due to the cancerous cells, to the severe adverse effects of cancer treatments, recurrent infections, as well as to economic and social conditions[6].

There is no gold standard indicator that alone permits nutritional assessment. Otherwise, different methods must be combined in order to increase the specificity and sensitivity of this evaluation. Among the methods, clinical, physical, dietary, social, anthropometric, biochemical and subjective indicators can be used[7]. Patient Generated Subjective Global Assessment (PG-SGA) is considered to be an effective method of screening and nutritional assessment indicated for cancer patients[8,9].

Considering these specificities, we recognize the importance of nutritional status assessment of cancer patients, so that appropriate nutritional therapy can be established and the harmful effects of the disease can be minimized[10,11]. Then, the aim of this research was to identify the nutritional status and factors associated with possible nutritional changes of cancer patients undergoing treatment.

METHODS

We conducted a cross-sectional study in a cancer unit of a tertiary, general and public university hospital located in Rio Grande do Sul, Brazil, from November 2016 to June 2017.

The population was based on previous data, and then the sample size calculation was performed, assuming 95% confidence interval and 5% error rate. The study included individuals of both sexes, aged 18 years or older, with confirmed diagnosis of cancer, hospitalized at the research site for chemotherapy treatment associated or not to radiation therapy. We also selected patients in good physical and mental conditions to complete the data collection instrument.

Data was gathered through individual interviews. We retrieved personal data (age and sex), lifestyle data (smoking and ethnicity), clinical data (diagnosis, neoplasia grade, chemotherapy protocol, other illnesses) and biochemical data from physical and electronic records. Nutritional status was determined through anthropometric, biochemical and PG-SGA data.

We carried out the anthropometric evaluation according to the recommendations[12,13]. The current body weight and height were measured by a calibrated anthropometric digital scale, brand Balmak®, model BK-50FA. The Body Mass Index (BMI) was determined using individuals' body weight (kg), divided by their height (m) squared (kg / m²). Then, adults' nutritional status was defined according to the World Health Organization[14]: low weight: <18.5 kg/m²; normal weight: 18.5 - 24.9 kg/m²; overweight: 25 - 29.9 kg/m² and obesity: ≥ 30 kg/m². For the elderly, the cut-off points recommended by the Pan American Health Organization[15] were used: low weight: < 23 kg/m²; eutrophy: 23 - ≤ 28kg/m²; overweight: >28 - <30 kg/m² and Obesity: ≥ 30 kg/m².

Weight loss was defined using the following equation [(usual body weight – current body weight) / usual body weight × 100]. Patients who presented body weight loss of up to 5% in one month or 7.5% in three months or 10% in six months presented a significant body weight loss. Body weight loss greater than 5% in one month or greater than 7.5% in three months or greater than 10% in six months was considered severe body weight loss[16].

To assess patients, we used a PG-SGA questionnaire translated and validated for the Brazilian population[9]. The first part of this questionnaire consists of questions about body weight changes, symptoms of nutritional status (nausea, vomiting, decreased appetite, constipation and diarrhea), changes in food intake and functional capacity. SGA was completed by the patient. When the interviewee was illiterate or found it difficult to complete the form, the researcher helped filling out the form. The second part addresses aspects of the clinical history of the disease, metabolic demand and stress and physical examination. A dietitian experienced in performing SGA assessed all patients' data. Each patient was classified as well-nourished (SGA A), moderately malnourished (SGA B) or severely malnourished (SGA C). In addition, a total PG-SGA score was calculated to provide a guideline to the level of nutrition intervention required, from 0-1 point: there is no need for nutritional intervention, 2-3 points: patient and family education, from 4-8 points: requires nutritional intervention and up to 9 points: need for urgent nutritional intervention.

Biochemical parameters were collected from the electronic medical record. The total number of lymphocytes per cubic milliliter (TLC) was calculated using the following formula: TLC= (Lymphocyte % X White Blood Cells) / 100. The cutoff points used for the classification of nutritional status (immunological depletion) according to TLC were:> 2000 cells/m³ (normal), 1200 to 2000 cells/m³ (light depletion), 800 to 1199 cells / m³ (moderate depletion) and <800 cells/m³ (severe depletion). We also used albumin parameters to classify nutritional status. The following cutoff points were used: > 3.5 g/dL (nourished); 3.0 to 3.5 g/dl (mild malnutrition); 2.4 to 2.9 g/dl (moderate malnutrition) and < 2.4 g/dl (severe malnutrition)[17].

Data analysis was performed using descriptive statistics (frequency, mean and standard deviation), using Microsoft Excel® Software, version 2016. For the statistical tests, program R, version Ri 386.3.3.0 Ink was used. For the assessment of normality, Shapiro-Wilk test was conducted, considering a significance level of 5%. Finally, correlation and association tests were conducted (with a 95% confidence interval, p <0.05), depending on each type of variables.

This study was carried out after being approved by the Ethics Committee in Research with Human Beings of the Federal University of Santa Maria under the statement nº 1.812.236 and Presentation Certificate for Ethics Appre-

ciation nº 61039316.1.0000.5346. Data collection occurred after obtaining each research participant's Informed Consent Form (ICF).

RESULTS

A sample of 60 patients agreed to participate in the study: 58.3% (n = 35) were female and 41.7% (n = 25) were male. The average age was 78 ± 12.4 years old. 48.3% (n = 29) of the patients were elderly and 51.7% (n = 31) were adults. Medical history features of researched patients are presented in Table 1.

At the time of this research, 68% (n = 41) of the sample were in the first three cycles of chemotherapy. Cancer patients in this sample had different comorbid conditions, the most prevalent were the following: 43.5% (n = 20) of the patients had arterial hypertension (HA), 17.4% (n = 8) cardiovascular diseases (CVD), 11% (n = 5) diabetes mellitus and 8.7% (n = 4) chronic obstructive pulmonary disease (COPD). It should be noted that 59% (n = 27) had two or more comorbid conditions associated with cancer.

We classified the nutritional status of the sample by anthropometric parameters and PG-SGA. These results and the need for nutritional intervention are presented in Table 2. Weight loss was identified in 70% (n = 42) of the sample and 27% (n = 12) of the patients presented weight gain. The Chi-square test did not indicate association between the percentage of weight loss with tumour location (p-value = 0.098), gender (p-value = 0,116) and adult or elderly individuals (p-value = 0.535).

We also analyzed the nutritional status, based on biochemical parameters, presented in Table 3. Spearman's correlation was significant (p-value: 0.016), but regular and inverse (rho = - 0.309) between BMI and serum albumin. This result indicates that the higher body mass index is, the lower is the albumin depletion. Albumin classification was also significantly associated with the diagnosis of PG-SGA (p-value = 0.009). However, when the same test was applied for the classification of the TLC variable, there was no significant association for both BMI (p-value = 0.804) and the PG-SGA classification (p-value = 0.4763).

Food intake and symptoms related to changes in dietary intake of patients are described in Table 4. It is worth mentioning that 75% (n = 45) of the sample reported gastrointestinal and / or general symptoms in the last two weeks, of which 71% (n = 32) reported two or more simultaneous symptoms.

Regarding functional capacity, the results showed that only 21.7% (n = 13) of the patients maintained their normal capacity, with no limitations. Moderate functional activity was reported by 30% (n = 18) of the sample, 16.7% (n = 10) did not feel willing to perform many activities, 21.7% (n = 13) had capacity reduction and spent most of the day lying down or sit-

Table 1. Medical history features of cancer patients under treatment (n=60) in a university hospital. Rio Grande do Sul (RS), Brazil (2017).

Variables	Total (N=60)	
	N	%
Tumour location		
Colorectal	27	45.0
Head and Neck	13	22.0
Stomach	7	12.0
Hematologic	5	8.0
Female Reproductive System	3	5.0
Male Reproductive System	2	3.0
Mediastinum	1	2.0
Male Breast	1	2.0
Cancer of unknown primary	1	2.0
Stage		
I	-	-
II	1	2.0
III	6	10.0
IV	26	43.0
Unknown	27	45.0
Metastasis		
Yes	25	42.0
No	35	58.3
Cancer treatment		
Chemotherapy	56	93.3
Chemotherapy and radiation	4	6.7
Comorbid conditions		
Yes	46	77.0
No	14	23.0
Current smoker and ex-smoker		
Yes	28	47.0
No	32	53.0
Current drinker and ex-drinker		
Yes	14	23.0
No	46	77.0

Table 2. Nutritional status classification by BMI, PG-SGA, weight loss percentage and need of nutritional intervention of cancer patients under treatment (n=60) in a university hospital. Rio Grande do Sul (RS), Brazil (2017).

Parameters	Nutritional status classification	Adult (N=31)		Elderly (N=29)		Total (N=60)	
		N	%	N	%	N	%
BMI	Underweight	6	19.3	8	27.6	14	23.3
	Normal weight	13	42.0	12	41.4	25	41.7
	Overweight	10	32.0	3	10.3	13	21.7
	Obesity	2	6.4	6	20.7	8	13.3
PG-SGA	SGA A – wellnourished	10	32.2	4	13.8	14	23.3
	SGA B – moderately or suspected of being malnourished	15	48.4	19	65.5	34	56.7
	SGA C – severely malnourished	6	19.3	6	20.7	12	20.0
Percentage weight loss	None	2	6.4	-	-	2	3.33
	Not classified	9	29.0	6	20.7	15	25.0
	Significant body weight loss	3	9.7	2	6.9	5	8.3
	Severe body weight loss	11	35.5	11	37.9	22	36.7
Score PG-SGA	No need for nutritional intervention	1	3.22	-	-	1	1.7
	Patient and family education	3	6.4	1	3.4	4	6.7
	Requires nutritional intervention	8	25.8	5	17.2	13	21.7
	Need for urgent nutritional intervention	19	61.3	23	79.3	42	70.0

BMI: Body Mass Index; PG-SGA: Patient-Generated Subjective Global Assessment.

Table 3. Nutritional status according to biochemical parameters of cancer patients under treatment (n=60) in a university hospital. Rio Grande do Sul (RS), Brazil (2017).

Variables	Total (N=60)	
	N	%
Serum albumin		
Nourished	26	43,0
Mild malnutrition	20	33,0
Moderate malnutrition	11	18,0
Severe malnutrition	3	5,0
TLC		
Normal	16	21,7
Mild depletion	23	38,0
Moderate depletion	11	18,0
Severe depletion	10	17,0

TLC: Total Lymphocyte Count.

ting and 10% (n = 6) indicated that they spent most of their time in bed. The Qui² test identified a significant association of functional capacity with tumour location (p-value = 0.007) and gender (p-value = 0.012), however, there was no association of this indicator with the nutritional status and age.

DISCUSSION

We found in this study a prevalence of malnutrition in the sample, severe weight loss and reduction in some biochemical parameters. A large part of the participants reported reduction in food consumption associated with gastrointestinal symptoms, as well as altered functional capacity, resulting in aggressive nutritional intervention. The presence of malignant diseases, such as neoplasias, can significantly compromise the general and nutritional status of patients, through multiple pathways related to the mechanisms linked to the disease course or to the therapy itself[18].

The present study showed a prevalence of adult and female patients. A survey of fifty cancer patients undergoing antineoplastic treatment, hospitalized in Minas Gerais, Brazil, showed that 70% of the sample was composed of adults, but 62% of the patients were men[19]. Some authors highlight that

the increasing of age is considered one of the most relevant risk factors for the appearance of cancer, however, it is worth mentioning that they can occur in different age group[20].

In southern Brazil, studies forecast that the most prevalent tumor type of cancer will be of colon and rectum, between female patients. It will be the third most common for the male subjects, between 2018 - 2019[4]. This prediction seems to confirm the results of this research. According to these findings, a cross-sectional retrospective study of 70 elderly cancer patients in Passo Fundo, Brazil, showed that colorectal cancer was the most frequent (70%) among participants[21]. It is also worth noting that among the patients with clinical tumor staging, the majority of the sample was in the more advanced stages of the disease.

In this study, more than 70% of the patients had comorbidities associated with cancer, specially hypertension and cardiovascular diseases. There is support in the literature, that this co-prevalence is commonly found in cancer patients and can be explained by sharing similar risk factors, such as overweight, sedentary lifestyle, smoking, alcoholism, and bad eating habits. However, it is important to note that chemotherapy can cause changes in the individual's blood pressure and can have a great impact in the occurrence of hypertension in this public[22,23].

According to the Brazilian Inquiry on Oncological Nutrition, the nutritional status established through PG-SGA showed a high frequency of malnutrition and weight loss in patients affected by gastrointestinal cancer[24]. These data are similar to the findings of this study, in which about 77% of the patients presented underweight and 40% severe weight loss, according to PG-SGA. However, assessment of the nutritional status through BMI highlighted the prevalence of normal weight and overweight in the patients. Nevertheless studies emphasize that BMI is a parameter that should not be used alone for the diagnosis of malnutrition, since it presents several limitations[25].

Previous studies indicate that reduced levels of albumin and TLC correlate with malnutrition and mainly to worse clinical outcomes[26]. In the present study, this relationship between malnutrition and these biochemical parameters was confirmed only for nutritional diagnosis through serum albumin.

In Iran, a study with 300 cancer patients showed that 41.7% of the sample had a decrease in food consumption, and the most prevalent factors associated with this reduction were hyporexia (41.3%), and nausea (39%)[27]. In our study we found similar results. The presence of gastrointestinal symptoms in individuals suffering from cancer is mainly associated with chemotherapy. It is due to the fact that anticancer drugs do not attack only the tumor cells, but also the cells of rapid rate of proliferation, such as those of the gastrointestinal mucosa[28].

There is support in the literature that patients affected by cancer, undergoing chemotherapy and malnourished tend to reduce functional capacity[29]. Results from this study also provided some information about the large proportion of patients with disability to perform their daily activities. In a study conducted in Pernambuco, Brazil, with 30 cancer patients undergoing chemotherapy, 70% of the patients reported altered functional capacity according to PG-SGA[30]. In our study the results were similar.

Although these data have a number of strengths, they also have limitations. One of them is due to the fact that patients with several different cancer types were compared. We can also consider that our study investigated a small sample. Nevertheless, these limitations cannot make the discussion of the results unfeasible.

CONCLUSION

Overall, this analysis adds to the existing cancer literature that patients present variable degrees of malnutrition and weight loss, besides the presence of gastrointestinal symptoms and reduction in food consumption. Then, aggressive nutritional intervention is indicated for a large part of cancer patients.

These data clearly support the need for early and adequate evaluation, diagnosis and nutritional intervention in all phases of the treatment. These actions will lead to the recovery and maintenance of the patients' nutritional status, since important nutritional adjustments can influence directly their clinical outcome.

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