

Evaluation of Nutritional Risk in Hospitalized Oncohematologic Patients

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Avaliação do Risco Nutricional em Pacientes Onco-Hematológicos Hospitalizados

Evaluación del Riesgo Nutricional en Pacientes Onco-Hematológicos Hospitalizados

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Abstract

Introduction: Early diagnosis of nutritional risk may improve the prognosis of oncohaematological patients. **Objective:** To describe the nutritional status and to evaluate the nutritional risk factors in oncohaematological patients of a tertiary university hospital in Fortaleza, Ceará. **Method:** This cross-sectional study included 127 patients hospitalized. Clinical and demographic diagnostic data were selected through chart analysis. The nutritional status was elaborated by body mass index (BMI), arm circumference (AC) and by the application of the nutritional risk screening (NRS-2002). **Results:** Due to the different parameters, there were differences in nutritional status. The majority of the presentation criteria were NRS-2002 70.1% (n=89), followed by the AC 33.9% (n=43) and the BMI 8.7% (n=11). There was a significant positive correlation between BMI and age [r=0.313, p<0.001] and AC [r=0.846, p<0.001]. There was a significant association between NRS-2002≥3 and BMI<18.5 kg/m² (p=0.023); NRS-2002≥3 and AC classified as malnutrition (p=0.001); BMI<18.5 kg/m² and AC classified as malnutrition; and reside in urban areas and present adequate AC (p=0.023). **Conclusion:** This study revealed a high prevalence of nutritional risk, as well as a significant association between nutritional risk and low BMI, AC and to reside in rural areas. Thus, there is a need to use a combination of indicators to diagnose the nutritional status of these patients in a more precise and early manner.

Key words: Nutritional Status; Malnutrition; Medical Oncology; Hematology.

Resumo

Introdução: O diagnóstico precoce do risco nutricional pode melhorar o prognóstico dos pacientes onco-hematológicos. **Objetivo:** Descrever o estado nutricional nos pacientes onco-hematológicos e avaliar os fatores associados ao risco nutricional nos pacientes onco-hematológicos de um hospital universitário terciário de Fortaleza - Ceará. **Método:** Estudo transversal que incluiu 127 pacientes adultos internados. Os dados de diagnóstico clínico e demográficos foram coletados por meio da análise de prontuários. O estado nutricional foi avaliado pelo índice de massa corporal (IMC), circunferência braquial (CB) e pela aplicação da ferramenta de triagem de risco nutricional - NRS-2002. **Resultados:** Pelos diferentes parâmetros, houve divergências no estado nutricional. A maioria da amostra apresentava risco nutricional de acordo com a avaliação da NRS-2002 (70,1%; n=89), seguida pela CB (33,9%; n=43) e pelo IMC (8,7%; n=11). Houve correlação positiva significativa entre IMC e idade [r=0,313, p<0,001] e CB [r=0,846, p<0,001], e associação significativa entre NRS-2002≥3 e IMC<18,5 kg/m² (p=0,023); NRS-2002 ≥3 e CB classificada como desnutrição (p=0,001); IMC<18,5kg/m² e CB classificada como desnutrição; e residir em zona urbana e apresentar CB adequada (p=0,023). **Conclusão:** Este estudo revelou alta prevalência de risco nutricional, bem como uma associação significativa entre risco nutricional e baixos valores de IMC e CB, e residir em zona rural. Assim, há a necessidade de utilizar uma combinação de indicadores, a fim de diagnosticar, de forma mais precisa e precoce, o estado nutricional desses pacientes.

Palavras-chave: Estado Nutricional; Desnutrição; Oncologia; Hematologia.

Resumen

Introducción: El diagnóstico precoz del riesgo nutricional puede mejorar el pronóstico de los pacientes onco-hematológicos. **Objetivo:** Describir el estado nutricional en los pacientes onco-hematológicos y evaluar los factores asociados al riesgo nutricional en los pacientes onco-hematológicos de un Hospital Universitario Terciario de Fortaleza - Ceará. **Método:** Estudio transversal que incluyó a 127 pacientes adultos internados. Los datos de diagnóstico clínico y demográfico fueron recolectados a través de análisis de prontuarios. El estado nutricional fue evaluado por el índice de masa corporal (IMC), circunferencia braquial (CB) y por la aplicación de la herramienta de clasificación de riesgo nutricional - NRS-2002. **Resultados:** Diferentes parámetros, hubo divergencias en el estado nutricional. La mayoría de la muestra presentaba riesgo nutricional de acuerdo con la evaluación de la NRS-2002 70,1% (n=89), seguida por la CB 33,9% (n=43) y por IMC 8,7% (n=11). Se observó una correlación positiva significativa entre el IMC y la edad [r=0,313, p<0,001] y CB [r=0,846, p<0,001]. Se observó una asociación significativa NRS-2002≥3, e IMC<18,5 kg/m² (p=0,023) y CB desnutrida (p=0,001). Hubo asociación significativa entre IMC<18,5kg/m² y CB desnutrida (p=0,001), y entre residir en zona urbana y presentar CB adecuado (p=0,023). **Conclusión:** Alta prevalencia de riesgo nutricional, así como una asociación significativa entre riesgo nutricional y bajos valores de IMC y CB, y residir en zonas rurales. Hay la necesidad de utilizar una combinación de indicadores para diagnosticar de forma más precisa y precoz el estado nutricional de estos pacientes.

Palabras clave: Estado Nutricional; Desnutrición; Oncología Médica; Hematología.

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INTRODUCTION

Malnutrition is a common problem and one of the main causes of mortality in oncologic patients, to which is associated the severity of the disease and adverse effects of the treatment that directly impact the nutritional status of the individual¹.

It is estimated that the prevalence of malnutrition in hospitalized patients in Brazil varies between 40% and 60%; and for oncologic patients, from 31% to 39%². The multicenter PREDyCES[®] study with 1,707 hospitalized patients in several public hospitals in Spain, found a risk of 23% of malnutrition at the admission according to the *Nutritional Risk Screening* (NRS-2002). In the oncohematologic subgroup, this prevalence escalated to 36.8%³.

The nutritional involvement in oncohematology is a risk factor for infectious complications and longer hospitalization. In addition to this, the inadequate nutritional status in this group of patients is a negative impacting factor on the tolerance and response to antineoplastic treatment and on mortality⁴.

On the other hand, a good nutrition can be adjuvant to the most different therapies and promote better quality of life. Therefore, it is essential to early identify individuals in risk of malnutrition through methods of nutritional screening systematically in all patients hospitalized, referring them to a thorough nutritional evaluation and indicating those who can benefit from nutritional therapy⁵.

Among the existing screening tools, the *European Society for Parenteral and Enteral Nutrition* (Espen) recommends the use of NRS-2002, which was proposed and validated by Kondrup⁶, for adult hospitalized patients and whose objective is to detect early nutritional risk. In addition, NRS-2002 has been deemed proper to identify the nutritional status of hospitalized individuals due to clinical or surgical reasons when compared to other methods, further to including the diagnostic of hematologic cancer as a malnutrition risk factor⁷.

Because there are few studies that evaluate the nutritional status of hematologic cancer patients, the major goal of this study was to describe the nutritional status and evaluate nutritional status associated and correlated factors in oncohematologic patients in a tertiary hospital in Fortaleza - Ceará.

METHOD

It is a cross-sectional analytical study. The sample consists of individuals of both genders hospitalized in a hematologic clinic in a Fortaleza health public network

university hospital from February to December 2017. It were enrolled all the patients admitted to the clinic above 18 years old with oncohematologic diseases.

Clinical diagnosis and demographics were drawn from the charts. At the admission, it were collected the anthropometric data.

The nutritional status was determined from the Body Mass Index (BMI) [weight in kg divided per height in meters squared (m)], calculated at screening according to the *World Health Organization* (WHO)⁸. The individuals were classified in two categories: low weight (BMI < 18.5 kg/m²) and adequate weight (BMI ≥ 18.5 kg/m²).

To evaluate the appropriateness of the arm circumference (AC), it were adopted the cut offs values proposed by Frisancho, which consider age and gender of each patient⁹.

NRS-2002 is the screening nutritional risk tool used and validated by Kondrup⁶ and certified by Espen, which recommends its use in hospitalized patients. It is a tool divided in two phases: the initial comprehends four questions about BMI, unwanted weight loss in the last quarter, reduction of food intake in the last week and severe disease; and the final phase that classifies the responses of the initial screening, considering the percent of the weight lost and timing, BMI, acceptance of the diet and grade of the disease severity. For each item of the final phase, it is assigned a score. Ultimately, the patients can be classified as: no nutritional risk (score < 3) or with nutritional risk (score ≥ 3)⁶.

The statistical analyzes were performed with the *Software Statistical Package for the Social Sciences* (SPSS[®]), version 19.0. The numeric variables were presented in means and standard deviation and the categorical variables, in simple frequencies. The test Kolmogorov-Smirnov evaluated the normality of the numeric variables. The qualitative variables, by the chi-square test (χ^2) or Fisher exact test and calculated the prevalence ration (PR) and the confidence intervals (CI). The continuous variables were submitted to the analysis of Correlation of Spearman. The level of significance adopted for all tests was 5%.

The Institutional Review Board of "*Hospital Universitário Walter Cantídio*" approved the study, approval report number 1.287.607 and in compliance with Resolution 466/12 of "Conselho Nacional de Saúde" (Health National Council). The participants who accepted to participate of the research signed the Informed Consent Form (ICF)¹⁰.

RESULTS

From February to December 2017, it were evaluated 127 hospitalized patients at the hematology ward for chemotherapy treatment. The mean age encountered was

58.4 ± 13.9 years, mean BMI of 26.2 kg/m² ± 5.5 kg/m² and mean AC of 29.2 cm ± 4.87 cm.

Males were the majority of the sample (52.0%, n = 66) living in the rural area (60.6%, n=77). According to the NRS-2002 score, 70.1% (n = 89) had nutritional risk. Only 8.7% (n = 11) of the patients presented BMI scored as malnutrition and when malnutrition was evaluated through AC, the value was lower, 33.9% (n = 43). The most prevalent diagnosis was acute leukemia (myeloid or lymphoid) (45.7%, n = 58), followed by lymphoma (Hodgkin and non-Hodgkin) (33.8%, n = 43) and multiple myeloma (20.5%, n = 26) (Table 1).

There was a positive significant correlation between BMI and age [r = 0.313, p < 0.001] and between age and AC [r = 0.846, p = 0.001]; there was no significant association between age and AC [r = 0.088, p = 0.323], there was significant association between the presence of nutritional risk, NRS-2002 ≥ 3, and BMI < 18.5 kg/m² (p = 0.023). Additionally, patients with BMI < 18.5 kg/m² had more chance of presenting nutritional risk according to NRS-2002 (RP = 1.487; IC = 1.310 – 1.689) (Table 2); there was significant association between the presence of nutritional risk, NRS-2002 ≥ 3 and AC malnourished (p = 0.001). Patients with proper AC had less chance of

presenting nutritional risk per NRS-2002 (PR = 0.065; CI = 0.015 – 0.287) (Table 2); significant association was found between BMI < 18.5 kg/m² and AC malnourished (p = 0,001). Individuals with BMI < 18.5 kg/m² had more chance of presenting AC malnourished (RP = 3.265; CI = 2.699 - 4.868) (Table 2); there was significant association between living in urban area and proper AC (p = 0.023). Individuals living in urban area had, as protection, more chance of presenting proper AC (RP = 0.397; CI = 0.177 - 0.890) (Table 2).

DISCUSSION

This study had the objective of evaluate the risk and the nutritional status at the hospital admission of oncohematologic patients and their associated indicators. The main results were the high prevalence of risk according to NRS-2002 and malnutrition per AC.

Malnutrition, mainly caloric-protein is a common problem in patients with cancer, it can be provoked either by the metabolic demand of the disease or as a result of the treatment and it is an important cause of morbidity and mortality. The presence and the level of malnutrition are contingent upon the type of tumor, staging of the disease and type of antineoplastic treatment administered¹.

Few studies evaluated malnutrition in adult hematologic cancer patients in Brazil¹¹⁻¹⁵. In this study, 70% of the patients were under nutritional risk according to NRS-2002, 66% presented malnutrition evaluated by AC and only 8.7% with malnutrition per BMI. These data corroborate the findings of another Brazilian university hospital where many adult patients presented moderate or severe nutritional risk evaluated by NRS-2002, in the beginning of chemotherapy (79.6%) and radiotherapy (64.1%). In addition to this, patients kept this nutritional risk until the end of the treatment¹⁶.

A study with similar sample conducted with hospitalized hematologic patients encountered high prevalence of malnutrition (50.4%), as well as a positive association between malnutrition and mortality of these patients¹⁷. Another study that evaluated oncohematologic patients found a prevalence of 60.5% of some degree of malnutrition at the admission. Furthermore, malnourished patients had a higher rate of readmissions, which shows the relevance of the screening and nutritional evaluation of patients with cancer in order to grant early nutritional intervention¹⁸.

Corroborating these findings, a study conducted in Spain also utilized NRS-2002 as a method of nutritional screening and verified that nearly half of the patients admitted to oncology and hematology were at malnutrition risk at the admission, which shows that

Table 1. Clinical-demographic characteristics of the patients in chemotherapeutic treatment at a Tertiary University Hospital, Fortaleza, CE, Brazil, 2017

Variables	n	%
Gender		
Male	66	52.0
Female	61	48.0
Age (years)		
18-60	97	76.4
≥60	30	23.6
Location		
Urban	50	39.4
Rural	77	60.6
Diagnosis		
Acute leukemia (myeloid and lymphoid)	58	45.7
Lymphoma (Hodgkin and non-Hodgkin)	43	33.8
Multiple myeloma	26	20.5
NRS-2002		
<3	38	29.9
≥3	89	70.1
BMI (kg/m²)		
<18,5	11	8.7
≥18,5	116	91.3
AC		
Mal nourished	43	33.9
Proper	84	66.1

Captions: NRS-2002: *Nutritional risk screening* 2002; BMI: body mass index; AC: arm circumference.

Table 2. Association of the nutritional status and clinical-demographic characteristics of the oncohematological patients of the Hematology Department of a Tertiary University Hospital in, Fortaleza, CE, Brazil, 2017

Characteristics	NRS (n/%)		P	Prevalence Ratio			BMI (n/%)		P	Prevalence Ratio			CB (n/%)		P	Prevalence Ratio		
	<3 n=38 (29.9)	>3 n=89 (70.1)		CI			<18,5	>18,5		CI			Mal nourished	Proper		CI		
	PR**	Lower		Higher	PR**	Lower	Higher	PR**		Lower	Higher	PR**	Lower	Higher				
Age (years)																		
18-60	31 (31.3)	68 (68.7)	0.520*	-	-	-	9 (9.1)	90 (90.9)	0.746†	-	-	-	30 (30.3)	69 (69.7)	0.111*	-	-	-
≥60	7 (25.0)	21 (75.0)		-	-	-	2 (7.1)	26 (92.9)		-	-	-	13 (46.4)	15 (53.6)		-	-	-
Gender																		
Female	20 (32.8)	41 (67.2)	0.498*	-	-	-	3 (4.9)	58 (95.1)	0.149†	-	-	-	17 (27.9)	44 (72.1)	0.170*	-	-	-
Male	18 (27.3)	48 (72.7)		-	-	-	8 (12.1)	58 (87.9)		-	-	-	26 (39.4)	40 (60.6)		-	-	-
Origin																		
Urban	16 (32.0)	34 (68.0)	0.680*	-	-	-	4 (8.0)	46 (92.0)	0.831†	-	-	-	11 (22.0)	39 (78.0)	0.023*	0.397*	0.177	0.890
Rural	22 (28.6)	55 (71.4)		-	-	-	7 (9.1)	70 (90.9)		-	-	-	32 (41.6)	45 (58.4)		-	-	-
Diagnosis																		
Leukemia/SMD	15 (25.9)	43 (74.1)	0.231*	-	-	-	5 (8.6)	53 (91.4)	0.974†	-	-	-	22 (27.9)	36 (62.1)	0.572*	-	-	-
Lymphoma	17 (39.5)	26 (60.5)		-	-	-	4 (9.3)	39 (90.7)		-	-	-	12 (27.9)	31 (72.1)		-	-	-
Multiple myeloma	6 (23.1)	20 (76.9)		-	-	-	2 (7.7)	24 (92.3)		-	-	-	9 (34.6)	17 (65.4)		-	-	-
NRS-2002																		
No risk (<3)	-	-	-	-	-	-	0 (0.0)	38 (100.0)	0.023†	1,487*	1,310	1,689	2 (5.3)	36 (94.7)	0.001†	0.065*	0.015	0.287
With risk (≥3)	-	-	-	-	-	-	11 (12.4)	78 (87.6)		-	-	-	-	-		-	-	-
BMI (kg/m²)																		
<18.5	0 (0.0)	11 (100.0)	0.023†	1.487*	1.310	1.689	-	-	-	-	-	-	11 (100.0)	0 (0.0)	0.001†	3.625*	2.699	4.868
≥18.5	38 (32.8)	78 (67.2)		-	-	-	-	-	-	-	-	-	32 (27.6)	84 (72.4)		-	-	-
AC (cm)																		
Mal nourished	2 (4.7)	41 (95.3)	0.001†	0.065*	0.015	0.287	11 (25.6)	32 (74.4)	0.001†	3.625*	2.699	4.868	-	-	-	-	-	-
Proper	36 (42.9)	48 (57.1)		0 (0.0)	84 (100.0)	-	-	-		-	-	-	-	-	-	-	-	-

Captions: BMI: body mass index; AC: arm circumference; NRS-2002: *Nutritional risk screening 2002*; * χ^2 ; † tFisher exact test; ** PR: prevalence ratio; CI 95%: confidence interval.

the risk of malnutrition is prevalent for the patients with solid tumors and hematologic neoplasms. Additionally, there is a great tendency of worsening of the nutritional status in patients hospitalized with hematologic neoplasms where the prevalence of nutritional risk can be of 36.8% at admission and 51.6% at hospital discharge¹⁹.

When AC is analyzed, the present study observed that the majority of the patients presented high prevalence of malnutrition (66%), as opposed to the evaluation according to BMI, which showed more overweight. Souza et al. found similar values (62%) of malnutrition by AC and low values by BMI. These results suggest that, regardless of eutrophic BMI, a good part of the patients

had some level of mal nutrition measured by the AC²⁰.

Previously, the identification of the nutritional risk in cancer patients included only BMI and history of weight loss. However, a body weight-based approach alone became increasingly ineffective because of the global obesity epidemics and of the new understanding of metabolic alterations that occur before any measurable change in the body weight. Today, anorexia and alteration of the appetites are acknowledged as early indicators of malnutrition risk and may occur regardless of the initial weight of the patient¹.

With this, the nutritional screening through NRS-2002 has some advantages because it is easy to apply and

includes useful aspects to identify the risk of malnutrition, as low cost, reduction of food intake and severity of the disease, which grants a wider margin of the nutritional status of the patient.

Differently, BMI is the most used anthropometric indicator of nutritional evaluation and follow up because of its simplicity, low cost and high accuracy. Regardless of limitations in the evaluation of body composition, because it does not differentiate lean and fat mass or relative proportions that vary in individuals and age, gender and race/ethnicity. In addition, is less reliable when applied in elderly because of height reduction, loss of muscular mass and increase of fat mass that occur with ageing and particularly in post-menopause women. Thus, BMI shows a positive correlation with estimates of adipose tissue in younger individuals and a negative correlation with muscular tissue in elderly individuals²¹.

One study that evaluated the nutritional status of adults with severe myeloid leukemia concluded that BMI isolated is an insufficient parameter because it can under or overestimate mal nutrition. Overall, these patients present corticosteroid-induced edema, which may mask malnutrition because of weight gain resulting from liquid retention; or weight may also be changed by hyper-hydration to prevent the syndrome of tumoral lysis and can be a source of underestimation of weight loss. Nonetheless, the frequent use of diuretics may lead to an overestimation of weight loss⁴.

A recent review reported a significant association of higher mal nutrition rate amongst older individuals, lower income and living in rural areas²². These data reinforce the findings of this study where it was observed high prevalence of mal nutrition in patients living in rural area. This can be explained by the limited access to urban and political development, resulting in social inequities, more unemployment and less income and ultimately, poor access to good food²².

This study contributes to disseminate the importance of the nutritional status in oncohematologic patients, since studies with this population are scarce. Furthermore, it was identified the association of some indicators with mal nutrition and nutritional risk, which, used conjointly, are seen as parameters quite useful in clinical practice to help a more sensitive and early identification of the nutritional status and eventually leading to an early intervention.

CONCLUSION

As a conclusion, this study shows that the nutritional risk is a prevalent condition in hospitalized oncohematologic patients and nutritional risk is associated to low BMI and low measures of AC. Patients living in rural area were

importantly associated to malnutrition according to one of the parameters evaluated. Therefore, it is essential that malnutrition is investigated and evaluated with support of different variables for more sensitive identification of risk and nutritional status.

CONTRIBUTIONS

Brena Custódio Rodrigues contributed to the conception and planning of the study, data gathering, analysis and interpretation, wording and final approval of the published version. Andressa Eslayne Caldas Sales contributed to the conception and planning of the study, data analysis and interpretation, critical review and final approval of the version published. Bruna Custódio Rodrigues contributed for the conception and planning of the study, data gathering, critical review and final approval of the published version. Priscila da Silva Mendonça contributed to the planning of the study, data gathering, critical review and final approval of the published version. Ana Filomena Camacho Santos Daltro contributed to the planning of the study, data analysis and interpretation, critical review and final approval of the published version.

DECLARATION OF CONFLICT OF INTERESTS

There are no conflict of interests to declare.

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