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Nutritional Status of Patients with Head and Neck Cancer Undergoing Chemotherapy

Perfil nutricional de pacientes com câncer de cabeça e pescoço em tratamento quimioterápico

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ABSTRACT

Introduction: Cancer is a disease characterized by the uncontrolled growth of cells, which can form malignant tumors. Additionally, malnutrition is directly linked to increased risks of illness and death. **Objectives:** The present study aims to evaluate the nutritional status and determine the presence of malnutrition among patients with head and neck cancer undergoing chemotherapy. **Methods:** A cross-sectional study was conducted with patients of all genders who agreed to participate. Several parameters were collected to evaluate the patients' nutritional status, including weight, height, arm circumference, and triceps skinfold thickness, which were subsequently used to calculate body mass index (BMI) and arm muscle circumference. Features such as risk factors, tumor staging, and the duration of nutritional support, as recorded in electronic medical records, were also considered. **Results:** The majority of participants were male (90%), with a mean age of 59.5 years. A substantial proportion (75%) reported a history of tobacco and/or alcohol use, and most were diagnosed at advanced stages of the disease. Many patients exhibited signs of malnutrition, including weight loss exceeding 10%, often occurring without adequate monitoring or nutritional support. **Conclusion:** Early nutritional assessment is essential to reduce the risk of malnutrition and weight loss, which can lead to serious complications such as poorer prognosis and decreased treatment tolerance. Proper nutritional care can provide a significant difference in improving outcomes for these patients.

Descriptors: Neoplasms, Nutritional Status, Malnutrition.

RESUMO

Introdução: O câncer é uma doença caracterizada pelo crescimento descontrolado de células, que podem formar tumores malignos. Além disso, a desnutrição está diretamente relacionada ao aumento dos riscos de doenças e morte. **Objetivos:** Este estudo tem como objetivo identificar o estado nutricional e a presença de desnutrição em pacientes com câncer de cabeça e pescoço que estão passando por quimioterapia. **Métodos:** Foi realizado um estudo transversal com pacientes de todos os gêneros que concordaram em participar. Diversos dados foram coletados para avaliar o estado nutricional, incluindo peso, altura, circunferência do braço e dobras cutâneas do tríceps, que foram usados para calcular o índice de massa corporal (IMC) e a circunferência do músculo do braço. Além disso, características como fatores de risco, estágio do tumor e duração do suporte nutricional, conforme registradas nos prontuários eletrônicos, também foram consideradas. **Resultados:** A maioria dos participantes era do sexo masculino (90%), com idade média de 59,5 anos. Muitos tinham histórico de uso combinado de tabaco e álcool (75%) e foram diagnosticados em estágios avançados da doença. Observou-se que muitos pacientes apresentaram sinais de desnutrição, incluindo perda de peso superior a 10%, muitas vezes sem acompanhamento ou assistência nutricional adequada. **Conclusão:** A avaliação nutricional precoce é fundamental para reduzir o risco de desnutrição e perda de peso, que podem levar a complicações graves, como piora do prognóstico e menor tolerância ao tratamento. Um cuidado nutricional adequado pode fazer uma grande diferença na melhora dos resultados para esses pacientes.

Descritores: Neoplasias, Estado Nutricional, Desnutrição.

INTRODUCTION

Cancer is a disease characterized by the uncontrolled growth of cells, leading to the formation of malignant tumors that can spread to other parts of the human body[1]. On a global scale, the incidence of HNSCC is projected to increase by approximately 30% by 2030, often associated with smoking and alcohol consumption[2-3]. In most cases, it is diagnosed at a late stage due to a lack of awareness about the disease and delays in seeking medical care[4].

The treatments used for HNC—such as surgery, chemotherapy, and/or radiotherapy—cause side effects that can interfere with the patient's nutritional status, as antineoplastic agents alter the taste sensory cells, reducing sensitivity to flavors and consequently lowering nutrient intake[5-6].

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Patients undergoing treatment for head and neck cancer experience significant side effects that affect several body functions. Common effects include mucositis (mouth sores), dry mouth, alterations in taste and smell, and difficulty swallowing and speaking, which can contribute to malnutrition and/or reduced nutritional intake,[5-7]especially among the elderly[8-9]. Reduced caloric energy intake is associated with signs and symptoms related to cancer treatment, particularly chemotherapy, which makes eating an unpleasant and difficult task due to dry mouth, constipation, early satiety, nausea, vomiting, and dysphagia[10-11].

Since malnutrition in cancer patients is directly related to morbidity and mortality risk[11-12], early nutritional assessment becomes essential, as it can help detect changes that require nutritional intervention[5,10]. Therefore, this assessment should be carried out as early as possible to identify the patient's real nutritional needs, reducing the negative impact of malnutrition on quality-of-life[13], and diagnosing nutritional risks and malnutrition that may cause numerous complications in oncology patients[14]. Preserving and improving the nutritional status of cancer patients is extremely important for achieving better treatment outcomes, improved prognosis, and increased survival[9]. It is important to emphasize that nutritional intervention contributes not only to the recovery of nutritional status but also to the reduction of comorbidities throughout treatment[5].

Malnutrition in patients with head and neck cancer can negatively influence the course of treatment. When the body does not have enough energy and protein reserves, it becomes more difficult to maintain essential functions. As a result, patients may tolerate chemotherapy, radiotherapy, or surgery less effectively, which increases the chances of treatment delays and complications. In addition, malnutrition can weaken the immune system, make tissues more vulnerable to oxidative stress, and slow down the healing process, all of which can interfere with recovery[15-16]. The present study aims to identify the nutritional status and malnutrition in patients with HNC undergoing chemotherapy, as well as the timing of nutritional care.

METHODS

This cross-sectional study was conducted between June and December 2018 at a cancer care hospital located in the northwest region of São Paulo State, Brazil. The study was approved by the Institutional Research Ethics Committee under protocol number 2.713.145/2018.

Sociodemographic and clinical data, including gender, age, family history of cancer, and risk factors, as well as anthropometric parameters such as arm circumference (AC, in cm) and triceps skinfold thickness (TSF, in mm), were collected through direct interviews with participants. Arm muscle circumference (AMC) was calculated and classified according to Frisancho's standards[17] for adults and NHANES III criteria for elderly individuals.

Additional clinical and anthropometric data—such as tumor staging, usual and current weight, height, and details of nutritional care—were obtained from the patients' electronic medical records. Body Mass Index (BMI) was calculated using weight and height, and classified according to the World Health Organization (WHO) guidelines[18] for adults (<60 years) and Lipschitz criteria[19] for older adults (≥60 years). Unintentional weight loss was determined using the formula: (Usual weight–Current weight) ×100/Usual weight) and classified according to the clinical relevance of weight loss over time, as established in the literature[20]

All data were tabulated using Microsoft Office Excel®, followed by statistical analysis. Frequency comparisons were performed using the Classical Chi-square test, and P values <0.05 were considered significant. The program used was SPSS (version 23, 2014).

RESULTS

A total of 39 patients diagnosed with head and neck cancer (HNC) agreed to participate in the study, but only 20 patients met the eligibility criteria for inclusion in the study: age over 18 years, undergoing chemotherapy with exclusive oral intake, and written informed consent provided via a signed Free and Informed Consent Form (FICF).

The study population comprised individuals diagnosed with head and neck cancer (HNC) undergoing chemotherapy treatment, of whom 10% were female and 90% male, with a mean age of 59.5 years, ranging from 42 to 76 years. Regarding risk factors, 40% reported a family history of cancer, 90% were smokers or former smokers, and 85% were current or former alcohol users. Notably, 75% of patients had a history of both smoking and alcohol consumption at some point in their lives. According to tumor staging, 85% of the cases were classified as stage T3 or T4, with 25% in T3 and 60% in T4. (Table 1)

According to BMI for nutritional status, there was a higher prevalence of eutrophic adults (80%), followed by elderly individuals with malnutrition (60%), with statistical significance (p = 0.0237). Malnutrition was also identified in the anthropometric variables: arm circumference (AC) at 90%, triceps skinfold (TSF) at 75%, and mid-upper arm circumference (MUAC) at 90%, in both age groups. Mild malnutrition was more frequent in AC and MUAC: 50% in adults under 60 years and 30% in older adults (≥ 60 years) for these variables. In TSF, severe malnutrition predominated among the elderly (50%). Severe involuntary weight loss occurred in 50% of adults and 60% of elderly individuals, pointing out weight loss >10% in the respective patients (Table 2)

In this study, 35% of patients received no nutritional care. Among the 65% who did receive nutritional support, only 5% had three or more consultations during the course of treatment. It was observed that the initial nutritional consultation typically occurred five months after the first clinical appointment, and for patients who did receive follow-up care, the average interval between appointments was approximately two months (Table 3).

Table 1. Sociodemographic and clinical profile of head and neck cancer patients undergoing oncological treatment in a public hospital.

Variable	Category	n (%)
Gender	Male Female	18(90) 2 (10)
Age (years)	Minimum – Maximum Median Mean ± SD : 59.55 ± [1.00] < 60 years ≥ 60 years	42 – 76 59.50 59.55 10 10
Educational level	Illiterate Incomplete Primary Education Incomplete Secondary Education Complete Secondary Education	1 (5) 16 (80) 1 (5) 2 (10)
Job occupation	Self-employed worker (farmer, driver, painter, bricklayer, tire repairer) Salaried worker (mechanic, storekeeper, driver) Retired (accounting technician, security guard, driver)	13 (65) 4 (20) 3 (15)
Family Income	< 1 minimum wage 1 – 3 minimum wage > 3 minimum wage	5 (25) 15 (75) -
Risk factors	Tobacco use Alcohol use	18 (90) 17 (85)
	Tobacco use + Alcohol use	17 (85)
Tumor staging	T1 T2 T3 T4	1 (5) 2 (10) 5 (25) 12 (60)

SD = Standard Deviation; T = Tumor staging

Table 2. Classification of nutritional status according to BMI, arm circumference (AC), triceps skinfold thickness (TSF), arm muscle circumference (AMC), weight variation, and involuntary weight loss in patients with head and neck cancer (HNC) at a hospital in northwest São Paulo, 2018.

Variables	Total n (%)	< 60 years n (%)	≥ 60 years n (%)	p-value*
BMI				**0.0237**
Grade II thinness	1 (5%)	1 (10%)	-	
Malnutrition	6 (30%)	-	6 (60%)	
Eutrophy	11 (55%)	8 (80%)	3 (30%)	
Pre-obese	1 (5%)	1 (10%)	-	
Obesity	1 (5%)	-	1 (10%)	
AC				**0.8254**
Eutrophy	2 (10%)	1 (10%)	1 (10%)	
Mild malnutrition	8 (40%)	5 (50%)	3 (30%)	
Moderate malnutrition	5 (25%)	2 (20%)	3 (30%)	
Severe malnutrition	5 (25%)	2 (20%)	3 (30%)	
TSF				**0.6561**
Eutrophy	5 (25%)	3 (30%)	2 (20%)	
Mild malnutrition	7 (35%)	4 (40%)	3 (30%)	
Severe malnutrition	8 (40%)	3 (30%)	5 (50%)	
AMC				**0.7610**
Eutrophy	2 (10%)	1 (10%)	1 (10%)	
Mild malnutrition	8 (40%)	5 (50%)	3 (30%)	
Moderate malnutrition	6 (30%)	2 (20%)	4 (40%)	
Severe malnutrition	4 (20%)	2 (20%)	2 (20%)	
Weight loss				**0.8446**
No loss	4 (20%)	2 (20%)	2 (20%)	
Significant loss	5 (25%)	3 (30%)	2 (20%)	
Serious loss	11 (55%)	5 (50%)	6 (60%)	

* P-value referring to the Classical Chi-square Test; BMI = Body Mass Index; AC = Arm Circumference; TSF = Triceps Skinfold; AMC = Arm Muscle Circumference.

Table 3. Nutritional care and frequency of consultations in patients with head and neck cancer (HNC) at a hospital in northwest São Paulo, 2018.

Number of Nutritional Consultations	Total n (%)
No consultation	7 (35)
1 consultation	1 (5)
2 consultations	11 (55)
3 consultations	1 (5)
Time from first clinical consultation to first nutritional consultation (months)	
Mean ± SD	9.77 ± 8.87
Maximum – Minimum	29 – 2
Median	5
1st Quartile (Q1)	4.5
3rd Quartile (Q3)	13.5
Interval between nutritional consultations (months)	
Mean ± SD	2.75 ± 2.96
Maximum – Minimum	12 – 1
Median	2
1st Quartile (Q1)	1.5
3rd Quartile (Q3)	2

SD (Standard Deviation)

Further analysis of Table 2 shows that for 25% of the participants (1st quartile), the average time until the first nutritional consultation was 4.5 months—a figure very close to the median (50%), which was five months. In contrast, for 75% of the sample (3rd quartile), the time until the first nutritional consultation reached 13.5 months. Regarding the interval between follow-up nutritional appointments, 25% of patients received follow-up care approximately every 1.5 months, a duration very close to that observed for 75% of the sample (3rd quartile), where the interval between consultations was 2 months.

DISCUSSION

According to the related literature, head and neck cancer (HNC) occurs more frequently in males and typically appears between the fifth and seventh decades of life[21-23,20]. It is commonly associated with smoking and alcohol consumption habits[23-26], as well as with late-stage diagnosis[21, 26]—findings that are consistent with the present study.

In line with the recommendations from the Brazilian National Consensus on Nutrition and Oncology, several anthropometric parameters—such as BMI, arm circumference (AC), triceps skinfold thickness (TSF), arm muscle circumference (AMC), and percentage of weight loss—should be used in combination for comprehensive nutritional assessment[27]. This approach helps to identify nutritional risk using different tools, accounting for the individual limitations of each method[28]. Accordingly, the present study assessed nutritional status based on multiple anthropometric indicators, identifying malnutrition (mild, moderate, or severe) in all parameters: 90% by AC, 75% by TSF, and 90% by AMC. Furthermore, most patients aged ≥60 years presented with BMI values consistent with malnutrition. These results are consistent with Oliveira (2015)[29], who reported malnutrition in 34.5% of patients aged ≥60 years based on BMI, 41.4% by TSF, and 44.8% by AMC. Similarly, Medeiras (2016)[30]found malnutrition rates of 37.5% by BMI, 74.99% by AC, 100% by TSF, and 66.66% by AMC.

In contrast, Silva and Bernardes (2017)[31]found divergent results by using BMI as the sole nutritional assessment method, identifying 48.6% of patients as eutrophic and only 22.9% as underweight. This highlights the importance of using multiple anthropometric variables for a more accurate nutritional assessment. If only BMI were considered in the present study, 80% of patients under 60 years of age would have been classified as eutrophic, which aligns with Medeiras

(2016)[30], who reported 75% eutrophy in that same age group using BMI alone—illustrating how relying on a single parameter can yield misleading results. The malnutrition observed in this study is likely related to the advanced tumor staging at diagnosis (25% T3 and 60% T4), a pattern also reported in other studies[28-31] indicating delayed diagnosis and its impact on nutritional deficits.

Among the patients assessed, 80% experienced weight loss—25% experienced significant weight loss (<10%), and 55% experienced severe weight loss (≥10%). This likely reflects early weight loss even before initial medical evaluation and is often associated with tumor location. Silva and Bernardes (2017)[31] reported weight loss in 78.9% of HNC cases, with higher frequencies in patients with oral cavity and pharyngeal tumors (63.2%). Such weight loss compromises treatment, increases comorbidity and mortality rates, and negatively affects quality of life, as emphasized by the Brazilian National Cancer Institute (2015)[32].

Furthermore, male gender and tumor location in the digestive tract, head and neck, or male reproductive organs are strongly associated with unintentional weight loss[33]—a finding supported by the current study, where 55% of patients experienced severe unintentional weight loss, predominantly among men. This is in line with Bongiovani (2017)[34] and Wang *et al.* (2024)[35], who found that men were more frequently affected by weight loss exceeding 10% of body weight, a threshold considered indicative of severe malnutrition. Maintaining an adequate nutritional status is crucial for the successful management and treatment of cancer.

Early detection of nutritional alterations allows for timely intervention, which can help prevent increases in morbidity and mortality, reduce postoperative complications, shorten hospital stays, and lower healthcare costs[35,36]. Despite this, only 65% of the patients in this study received nutritional care, and this care typically began late—13.5 months after the first clinical consultation and probable cancer diagnosis, in 75% of the cases. This delay reinforces the notion that nutritional therapy is not routinely provided to cancer patients[32], which conflicts with the recommendations of the Brazilian National Consensus on Oncology Nutrition[33], which states that all oncology patients should receive nutritional care.

Moreover, even when nutritional care was provided, follow-up occurred only after two months, also not aligned with best practice guidelines, which recommend that nutritional screening and follow-up occur within 30 days for adult patients with nutritional risk or elderly patients without nutritional risk. For elderly individuals with nutritional risk, follow-up should occur within 15 days[33]. Therefore, this study reveals a scenario of already established malnutrition, likely due to delayed nutritional care, contradicting several studies that highlight the importance of early detection of nutritional risk to allow for appropriate nutritional therapy. Early intervention can reduce metabolic changes and lower cancer-related morbidity and mortality[31]. Evidence suggests that maintaining adequate nutritional status—even after cancer diagnosis and during treatment—can reduce hospitalization time, minimize side effects of radiotherapy and chemotherapy, and ultimately improve patients' quality of life [29-36]

CONCLUSION

Malnutrition is prevalent among the majority of patients undergoing chemotherapy for head and neck cancer, as evidenced by several nutritional parameters such as BMI, arm circumference, triceps skinfold thickness, and arm muscle circumference. Often, this condition is identified late, since nutritional care is not typically initiated immediately following the diagnosis of the disease.

It is expected that this study will foster reflection and discussion on the theme, contributing to the improvement of nutritional care protocols and the implementation of earlier nutritional assessments at the time of diagnosis. Early evaluation may help reduce the risks of malnutrition and significant weight loss, since both can lead to numerous complications in oncology patients, including poor prognosis and decreased treatment tolerance. Further research on larger sample sizes is recommended to support the development of standardized and more comprehensive nutritional protocols from the point of cancer diagnosis onward.

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