**Original Article**

Cavalcante LS, Silva HKM, Silva RP
Assessment of Muscle Strength, Nutritional Status and Quality of Life in Cancer Patients Undergoing Chemotherapy

# Assessment of Muscle Strength, Nutritional Status and Quality of Life in Cancer Patients Undergoing Chemotherapy

Avaliação da Força Muscular, Estado Nutricional e Qualidade de Vida de Pacientes Oncológicos em Quimioterapia

Evaluación de la Fuerza Muscular, el Estado Nutricional y la Calidad de Vida en Pacientes con Cáncer Sometidos a Quimioterapia

**RESUMO**

**Objetivo:** avaliar a força muscular nesses pacientes e investigar se essa condição se associa com o estado nutricional e a qualidade de vida. **Métodos:** estudo do tipo transversal, com indivíduos de ambos os sexos, diagnosticados com câncer em quimioterapia, recrutados no Hospital das Clínicas da Universidade Federal de Pernambuco. Foram coletados dados clínicos, demográficos, antropométricos, força de preensão palmar e qualidade de vida. **Resultados:** avaliados 55 pacientes com idade média de 64 anos. O índice de massa corporal médio foi de 25,6 ± 4,8 kg/m², sendo 45,5% eutróficos. Já circunferência do braço 50,9%, apresentaram desnutrição, enquanto 60% tinham circunferência da panturrilha adequada e 30,9% baixa força de preensão palmar. Foi verificado correlação direta entre a força de preensão palmar e a função física (p<0,001) e função cognitiva (p=0,01). **Conclusão:** a maioria apresentou força muscular preservada, estado nutricional comprometido e uma qualidade de vida relativamente satisfatória.

**DESCRITORES:** Câncer; Força Muscular; Qualidade de Vida; Estado nutricional.

**ABSTRACT**

**Objective:** To assess muscle strength in these patients and investigate whether this condition is associated with nutritional status and quality of life. **Methods:** A cross-sectional study involving individuals of both genders, diagnosed with cancer undergoing chemotherapy, recruited at the Hospital das Clínicas, University of Pernambuco. Clinical, demographic, anthropometric data, handgrip strength, and quality of life were collected. **Results:** 55 patients were evaluated with a mean age of 64 years. The average body mass index was 25.6 ± 4.8 kg/m², with 45.5% being eutrophic. Regarding arm circumference, 50.9% showed signs of malnutrition, while 60% had an adequate calf circumference, and 30.9% exhibited low handgrip strength. A direct correlation was found between handgrip strength and physical function (p<0.001) and cognitive function (p=0.01). **Conclusion:** Most patients showed preserved muscle strength, compromised nutritional status, and relatively satisfactory quality of life.

**DESCRIPTORS:** Cancer; Muscle Strength; Quality of Life; Nutritional Status.

**RESUMEN**

**Objetivo:** Evaluar la fuerza muscular en estos pacientes e investigar si esta condición se asocia con el estado nutricional y la calidad de vida. **Métodos:** Estudio transversal con individuos de ambos sexos, diagnosticados con cáncer en quimioterapia, reclutados en el Hospital de Clínicas de la Universidad Federal de Pernambuco. Se recolectaron datos clínicos, demográficos, antropométricos, fuerza de prensión palmar y calidad de vida. **Resultados:** Se evaluaron 55 pacientes con una edad promedio de 64 años. El índice de masa corporal promedio fue de 25.6 ± 4.8 kg/m², siendo el 45.5% eutróficos. En cuanto a la circunferencia del brazo, el 50.9% presentó desnutrición, mientras que el 60% tenía una circunferencia de pantorrilla adecuada y el 30.9% presentó baja fuerza de prensión palmar. Se encontró una correlación directa entre la fuerza de prensión palmar y la función física (p<0.001) y la función cognitiva (p=0.01). **Conclusión:** La mayoría presentó fuerza muscular preservada, estado nutricional comprometido y una calidad de vida relativamente satisfactoria.

**DESCRIPTORES:** Cáncer; Fuerza Muscular; Calidad de Vida; Estado Nutricional.

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## INTRODUCTION

Cancer is one of the main public health problems in the world and is among the three main causes of death before the age of 70. [1]

In the three-year period from 2023 to 2025, it is estimated that Brazil will present approximately 704 thousand new cases of cancer annually, with a notable emphasis on the South and Southeast regions, which account for approximately 70% of the incidence of the disease. The survey reveals that the most common type of malignant cancer in the country is non-melanoma skin cancer, representing 31.3% of the total cases, followed by female breast cancer (10.5%), prostate cancer (10.2%), colon and rectum cancer (6.5%), lung cancer (4.6%) and stomach cancer (3.1%). [1]

The type of cancer, location, stage, and treatments are determining factors that can lead to physical, psychological, and social changes and compromised nutritional status. [1]

In this context, cachexia and malnutrition stand out, which are the main nutritional disorders found in cancer patients due to the increased energy and nutrient demand promoted by the tumor. As well as the individual's response to the tumor and oncological therapies that can lead to undesirable effects such as anorexia, taste alteration, xerostomia, nausea, vomiting, mucositis, stomatitis, odynophagia, diarrhea and constipation. [2] Furthermore, studies reveal that there is an association between the loss of muscle mass and poor outcomes, such as high postoperative mortality, chemotherapy toxicity, reduced survival, higher infection rates, increased length of hospital stay and increased mortality rate. [3]

Quality of life (QoL) encompasses a broad and subjective concept associated with how individuals situate themselves in life, considering the cultural context and their values, along with their goals, expectations and concerns. Their interactions are varied and can be influenced by the physical and mental health status, level of independence, social relationships and environmental characteristics. Furthermore, measuring QoL during chemotherapy is crucial to assess the clinical and therapeutic implications of the treatment. [4]

To assess QoL, some studies use research instruments to measure the extent to which cancer can interfere with health, functional capacity, symptoms, psychosocial well-being and life satisfaction. Among them, the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30 (EORTC QLQ-C30) stands out. [4-5]

Thus, the purpose of this study was to examine the relationship between decreased muscle strength, nutritional status, and quality of life in cancer patients undergoing chemotherapy. The aim is to provide relevant information to improve nutritional intervention and symptom management, aiming at improving the overall well-being of these individuals.

## METHODS

This is a cross-sectional, analytical, quantitative study involving adults and elderly individuals aged ≥ 20 years of both sexes, undergoing exclusive chemotherapy treatment, treated at the oncology and nutrition outpatient clinic of the Hospital das Clínicas of the Federal University of Pernambuco, in 2023. It included patients diagnosed with various types of cancer at any stage of the disease who were at least in the 1st cycle of chemotherapy treatment. The following were excluded from the study: pregnant women, patients with edema and/or ascites who were unable to undergo nutritional assessment, as well as those suffering from chronic diseases such as chronic kidney disease (CKD), heart failure (HF) and liver disease.

A structured and personalized questionnaire was applied, containing questions related to age, sex, level of education, place of birth, as well as clinical information, such as type of cancer, time since diagnosis, type of treatment and

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concomitant medical conditions. In addition to measuring anthropometric measurements (weight, height, arm circumference, calf circumference, handgrip strength) were recorded.

Weight was measured using a Welmy® anthropometric platform scale with a precision scale of 100g and a capacity of up to 200kg.

To measure arm circumference (AC), the patient stood with the arm extended along the body and the palm of the hand facing the thigh, marking the point measured between the acromion and the olecranon. The patient's arm was circumscribed with an inelastic anthropometric tape (SANNY®). The results were calculated using the adequacy formula and subsequently classified with cutoff points. [6]

Calf circumference (CC) was measured at the time of the interview, using an inelastic anthropometric tape, measured with the patient sitting with their legs slightly apart and at a 90° angle, and placed on the most protuberant region of the calf. [6] The CC values for elderly people, <33 cm for women and <34 cm for men were considered as the cutoff point, according to values validated for this population and for adults <31 cm. [6-7]

In order to assess functional status and total strength, handgrip strength (HGS) was measured by isometric contraction of the hand muscles using a digital dynamometer (JAMAR®), with the individual sitting with the shoulder abducted and slightly rotated, elbow flexed at 90° and forearm and wrist in a neutral position. The measurement was repeated 3 times on the dominant arm, with 1-minute intervals, recording the highest value, using the cutoff point for the elderly as <27 kg/f for men and <16 kg/f for women. [7] The cutoff point < P10 was adopted for the analysis in adults. [8]

The body mass index (BMI) was obtained by the ratio between body weight (kg) and height (cm) squared and the cut-off points recommended by the World Health Organization (WHO, 1995) for adults and the Pan American Health Organization - PAHO (2002) for the elderly were used in the classification. [6]

To assess QoL, the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30 (EORTC QLQ-C30) instrument was applied. The questionnaire consists of 30 questions related to five functional scales (physical, functional, emotional, social and cognitive), one scale on global health status, three symptom scales (fatigue, pain and nausea/vomiting) and six additional symptom items (dyspnea, insomnia, loss of appetite, constipation, diarrhea and financial difficulties). Questionnaire scores range from 0 to 100. The scoring principle of the scales was calculated according to the EORTC QLQ-C30 Scoring Manual. [9]

The data were tabulated in EXCEL and the statistical analysis was performed using the Statistical Package for Social Sciences (SPSS), version 25.0. Continuous variables were tested for normality using the Kolmogorov-Smirnov test. Normally distributed variables were described as mean and standard deviation, and non-normally distributed variables were described as median and interquartile range. Categorical variables were described as proportions. Student's t-test and Mann-Whitney U-test were used to compare two means and/or medians, respectively. Spearman's correlation was used to assess the relationship between two quantitative variables. The Kruskal-Wallis test was used to compare three or more medians. A significance level of 5% was used to reject the null hypothesis.

The study was approved by the Ethics and Research Committee involving human beings of HC/PE, in accordance with resolution No. 466/12 of the National Health Council/ Ministry of Health, under CAEE No. 67934223.5.0000.8807. The patients signed the Free and Informed Consent Form – FICF.

## RESULTS

The sample consisted of 55 patients with various types of cancer, aged ≥ 20 years, of whom 52.7% were men. The mean age was 64 years and 41.8% had a high school education. In the sample, the main sites affected by cancer were the colon, cecum, ileum, anus and rectum (Table 1). Regarding handgrip strength (HGS), it was noted that 30.9% of the sample was classified as having low HGS while 69.1% of the participants had normal HGS (Table 1).

| Table 1. Distribution of nutritional characteristics and variables in cancer patients undergoing chemotherapy treatment (n = 55) | | |
|---|---|---|
| Variables | n | % |
| Age group | | |
| Adult | 15 | 27,3 |
| Elderly | 40 | 72,7 |
| Sex | | |
| Female | 26 | 47,3 |
| Male | 29 | 52,7 |
| Education | | |
| Illiterate | 3 | 5,5 |
| Complete Elementary school | 8 | 14,5 |
| Incomplete Elementary school | 18 | 32,7 |
| Complete High School | 23 | 41,8 |
| Incomplete High School | 2 | 3,6 |
| Complete Higher education | 1 | 1,8 |

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| Cancer location/type | | |
|---|---|---|
| Prostate | 7 | 12,7 |
| Breast | 9 | 16,4 |
| Colon, cecum, ileum, anus, and rectum | 15 | 27,3 |
| Esophagus, parotid gland, and larynx | 4 | 7,6 |
| Ovary and endometrium | 5 | 9,1 |
| Liver, Stomach and pancreas | 9 | 16,3 |
| Lung | 3 | 5,5 |
| Body Mass Index | | |
| Underweight/thinness | 11 | 20,0 |
| Eutrophy | 25 | 45,5 |
| Overweight | 9 | 16,4 |
| Obesity | 10 | 18,2 |
| Classification Arm Circumference | | |
| Malnutrition | 28 | 50,9 |
| Eutrophy | 23 | 41,8 |
| Overweight | 2 | 3,6 |
| Obesity | 2 | 3,6 |
| Calf Circumference | | |
| Inadequate | 22 | 40,0 |
| Adequate | 33 | 60,0 |
| Handgrip strength | | |
| Low strength | 17 | 30,9 |
| Adequate strength | 38 | 69,1 |

The mean body mass index (BMI) was 25.6 ± 4.8 kg/m², with 20% classified as malnourished, 45.5% as eutrophic and 34.6% as overweight. Regarding arm circumferenc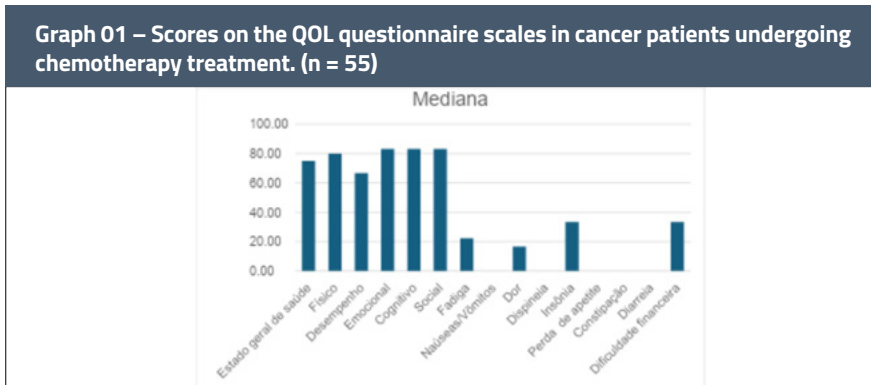e (AC), it was found that 50.9% of the participants were malnourished, while 60% of the participants maintained adequate calf circumference (CC) (Table 2).

| Table 2. Comparison between mean and/or median according to muscle strength in cancer patients undergoing chemotherapy. (n = 55) | | | |
|---|---|---|---|
| **Variables** | **FPP** | | |
| | Low strength (n = 17) | Normal strength(n = 38) | |
| | Mean ± SD | Mean ± SD | p – valorª |
| BMI (kg/m²) | 24,3 ± 5,4 | 25,6 ± 4,8 | 0,400 |
| Adequation AC (%) | 86,9 ± 14,9 | 91,7 ± 14,7 | 0,276 |
| CC (cm) | 33,4 ± 4,4 | 35,0 ± 3,9 | 0,198 |
| Functional | Mediana (IQ) | Mediana (IQ) | p - valorᵇ |
| Physical function | 73,3 (36,7 – 86,7) | 86,7 (58,3 – 100,0) | 0,101 |
| Performance function | 50,0 (16,7 – 100,0) | 66,7 (45,8 – 100,0) | 0,502 |
| Emocional function | 83,3 (33,3 – 100,0) | 83,3 (66,7 – 100,0) | 0,993 |
| Cognitive function | 66,7 (50,0 – 100,0) | 83,3 (66,7 – 100,0) | 0,057 |
| Social function | 83,3 (50,0 – 100,0) | 83,3 (62,5 – 100,0) | 0,985 |
| Symptoms | | | |
| Fatigue | 22,2 (5,5 – 55,6) | 22,2 (0,0 – 36,1) | 0,241 |
| Nausea/ vomiting | 0,0 (0,0 – 25,0) | 16,7 (0,0 – 33,3) | 0,591 |

| | | | |
|---|---|---|---|
| Pain | *16,7 (0,0 – 50,0)* | 16,7 (0,0 – 33,3) | 0,576 |
| Dyspnea | 0,0 (0,0 – 16,7) | 0,0 (0,0 – 0,0) | 0,696 |
| Insomnia | 33,3 (0,0 – 66,7) | 0,0 (0,0 – 66,7) | 0,430 |
| Loss of appetite | 33,3 (0,0 – 100,0) | 0,0 (0,0 – 41,7) | 0,345 |
| Constipation | 0,0 (0,0 – 16,6) | 0,0 (0,0 – 33,3) | 0,516 |
| Diarhea | 0,0 (0,0 – 33,3) | 0,0 (0,0 – 41,7) | 0,630 |
| Financial hardship | 33,3 (0,0 – 66,7) | 33,3 (0,0 – 100,0) | 0,254 |
| Global Health | 75,0 (50,0 – 87,5) | 70,0 (56,2 – 91,7) | 0,594 |

[a]Student's t-test;; [b]Mann-Whitney's U-test.
SD: Standard deviation; IQ: Interquartile range;
AC: Arm circumference

**Graph 01 – Scores on the QOL questionnaire scales in cancer patients undergoing chemotherapy treatment. (n = 55)**



In the domains of the functional scale, in this study, the variable that had the greatest impact on the worsening of quality of life was the performance function (66.67). The prevalent symptoms in the sample included fatigue (22.22), pain (16.67), insomnia (33.33) and financial difficulties (33.33), as illustrated in Graph 1, and were the main contributors to the decline in the final score in the quality of life of the participants in this research. Regarding the assessment of the general health status, the sample had a median of 75.5 (Graph 1).

No statistically significant differences were observed in the medians of nutritional measurements and QOL scores according to HGS (Table 2).

A direct correlation was observed between HGS and physical function (p<0.001), cognitive function (p = 0.01) and an inverse correlation between HGS and fatigue (p = 0.002) in addition to HGS and pain (p = 0.046). There was an inverse correlation between BMI and dyspnea symptoms (p = 0.0039) (Table 3).

**Table 3. Correlation between anthropometric variables and handgrip strength (HGS) with quality of life variables and their components (n = 55)**

| Componentes | BMI | | %AC | | CC | | HGS | |
|---|---|---|---|---|---|---|---|---|
| | rô | p | rô | p | rô | p | rô | p |
| Global health | 0,164 | 0,233 | 0,072 | 0,602 | 0,071 | 0,606 | 0,285 | 0,035 |
| Physical | 0,036 | 0,794 | -0,019 | 0,891 | 0,155 | 0,260 | 0,474 | <0,001 |
| Functional | 0,237 | 0,081 | 0,141 | 0,306 | 0,248 | 0,068 | 0,179 | 0,191 |
| Emotional | 0,012 | 0,932 | -0,050 | 0,718 | 0,184 | 0,182 | 0,148 | 0,285 |
| Cognitive | 0,122 | 0,376 | 0,034 | 0,804 | 0,134 | 0,330 | 0,344 | 0,010 |
| Social | 0,122 | 0,375 | 0,009 | 0,946 | 0,107 | 0,439 | 0,207 | 0,130 |
| Fatigue | 0,038 | 0,783 | 0,097 | 0,482 | -0,096 | 0,485 | -0,414 | 0,002 |
| Nausea | -0,004 | 0,977 | 0,098 | 0,476 | 0,002 | 0,990 | -0,096 | 0,486 |
| Dor | -0,229 | 0,092 | -0,169 | 0,217 | -0,253 | 0,062 | -0,270 | 0,046 |
| Dyspnea | -0,280 | 0,039 | -0,199 | 0,145 | -0,234 | 0,085 | 0,010 | 0,943 |
| Insomnia | 0,116 | 0,397 | 0,274 | 0,043 | 0,088 | 0,523 | -0,213 | 0,119 |
| Loss of appetite | -0,207 | 0,130 | -0,209 | 0,126 | -0,237 | 0,082 | -0,203 | 0,137 |
| Constipation | *-0,078* | 0,574 | 0,026 | 0,850 | -0,170 | 0,214 | 0,006 | 0,967 |
| Diarrhea | -0,102 | 0,458 | 0,046 | 0,739 | 0,079 | 0,565 | -0,097 | 0,481 |
| Financial difficulty | -0,049 | 0,722 | -0,006 | 0,965 | 0,031 | 0,821 | -0,037 | 0,787 |

Spearman correlation

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There was no association between nutritional status assessed by BMI and quality of life scores (Table 4).

| Table 5. Quality of life score and its components according to nutritional status | | | | | |
|---|---|---|---|---|---|
| Scale items | Nutritional status | | | | p |
| | Malnutrition (n=11) | Eutrophy (n=25) | Overweight (n=9) | Obesity (n=10) | |
| General health status/ Quality of life | 58,3 (41,7 – 91,7) | 75,0 (50 – 91,7) | 75,0 (66,6 – 91,7) | 70,8 (56,2 – 93,8) | 0,428 |
| Functional scale | | | | | |
| Physical | 73,3 (40,0 - 86,7) | 66,7 (53,3 – 100,0) | 86,7 (80,0 – 100,0) | 76,6 (45,0 – 95,0) | 0,406 |
| Funcional | 50,0 (16,7 - 66,7) | 66,7 (25,0 – 100,0) | 100,0 (50,0 – 100,0) | 83,3 (37,5 – 100,0) | 0,243 |
| Emotional | 83,3 (33,3- 100,0) | 83,3 (60,4 – 91,7) | 83,3 (54,1 – 100,0) | 91,6 (62,5 – 100,0) | 0,940 |
| Cognitive | 50,0 (33,3 - 100,0) | 83,3 (83,3 – 100,0) | 83,3 (58,3 – 100,0) | 66,7 (62,5 – 100,0) | 0,176 |
| Social | 83,3 (33,3 - 100,0) | 83,3 (66,7 – 100,0) | 100,0 (58,3 – 100,0) | 83,3 (50,0 – 100,0) | 0,755 |
| Symptoms scale | | | | | |
| Fatigue | 22,2 (11,1 - 44,4) | 22,2 (0,0 – 50,0) | 33,3 (0,0 – 44,4) | 16,6 (0,0 -36,1) | 0,966 |
| Nausea and vomits | 0,0(0,0 – 16,7) | 33,3 (0,0 – 50,0) | 0,0 (0,0 – 33,3) | 0,0 (0,0 – 16,7) | 0,071 |
| Pain | 33,3 (16,7 – 50,0) | 16,7 (0,0 – 50,0) | 0,0 (0,0 – 33,3) | 0,0 (0,0 – 33,3) | 0,216 |
| Dyspnea | 0,0 (0,0 - 33,3) | 0,0 (0,0 – 0,0) | 0,0 (0,0 – 16,6) | 0,0 (0,0 – 0,0) | 0,216 |
| Insomnia | *33,3 (0,0 - 66,7)* | 0,0 (0,0 – 66,7) | 33,3 (0,0 – 83,3) | 33,3 (0,0 – 100,0) | 0,769 |
| Loss of appetite | 33,3 (0,0 - 100,0) | 33,3 (0,0 – 66,7) | 0,0 (0,0 – 66,5) | 0,0 (0,0 – 8,3) | 0,119 |
| Constipation | 0,0 (0,0 - 33,3) | 0,0 (0,0 – 33,3) | 0,0 (0,0 – 0,0) | 0,0 (0,0 – 0,0) | 0,105 |
| Diarrhea | 33,3 (0,0 - 66,7) | 0,0 (0,0 – 33,3) | 0,0 (0,0 – 50,0) | 0,0 (0,0 – 41,7) | 0,687 |
| Financial difficulty | 0,0 (0,0 - 66,7) | 33,3 (0,0 – 66,7) | 66,7 (0,0 – 100,0) | 33,3 (0,0 – 66,7) | 0,715 |

Kruskall-Wallis's test

## DISCUSSION

In the present study, we found a predominance of elderly males and that the main site of cancer was intestinal cancer, as well as a recent study that observed a higher occurrence of patients with gastric neoplasia (58.82%), followed by colon (31.37%) and rectal (9.80%) cancer, which is in line with the results we found. [10]

A common situation in cancer patients is malnutrition, which significantly impairs quality of life, since it affects several aspects that make it up. In our sample, it was found that 20% presented malnutrition when assessed by BMI. A similar result was observed in a study that presented an average BMI of 24.2 kg/m², with 47.4% of the sample being eutrophic. [11]

Malnutrition was more prevalent in the present study when we analyzed arm circumference (AC) as a body composition parameter, showing that patients had a depletion of adipose reserves, resulting in compromised nutritional status. [12]

Another parameter evaluated was the HGS, which is not limited to measuring only hand strength, but also serves as an indicator of overall body strength. Hand strength is a good indicator of limb muscle strength performance, which makes it applicable to different populations. [13] In the data collected, HGS revealed strength depletion in 30.9% of the patients evaluated, while 69.1% presented HGS within the appropriate parameters.

Malnutrition was found to be more prevalent in our sample through AC, and this fact can be explained by post-chemotherapy symptoms that lead to loss of appetite, in addition to the difficulty in accessing quality food due to low income, as there is a significant association of a higher rate of malnutrition in individuals who are older, have low income, and live in rural areas. [14]

Seeking to assess the impact of cancer on health through instruments, the European Organization for Research and Treatment of Cancer Core 30 Quality of Life Questionnaire (EORTC QLQ-C30) stands out, which was used in this study. [5,9]

In the functional scale fields present in the questionnaire (EORTC QLQ-C30), when correlating the

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functional scale with HGS, the factor that had the greatest negative impact was functional performance. On the other hand, cognitive function (p = 0.057) remained more preserved in the group with normal HGS, indicating a satisfactory quality of life.

The variables of insomnia (33.3), fatigue (22.22), pain (16.67) and financial difficulty (33.3) emerged as the main contributing factors to the decline in the quality of life of the participants in this research. Insomnia was the most impacted domain in a recent study that recorded a rate of 39.22%, followed by fatigue with 26.80%, pain with 26.47% and loss of appetite with 26.14%, which is common in patients undergoing antineoplastic treatment. [10]

When evaluating quality of life in another study, researchers observed that on the symptom scale, one of the domains with the highest mean values was insomnia (43.3 ± 31.3 points), similar to another study in which the most affected domains were insomnia (41.35 ± 43.7), followed by pain (39.66 ± 40.5) and constipation (29.54 ± 43.6) and loss of appetite (29.11 ± 38.9). [15-16] Insomnia is one of the most reported symptoms in studies and is related to changes in metabolism and the inflammatory process caused by cancer itself through the release of inflammatory cytokines, which affect the circadian cycle, potentially modulating and favoring its occurrence. [17-18]

No statistically significant difference was identified in the Quality of Life (QOL) scores in relation to HGS and nutritional status by BMI. When assessing quality of life, it was found that our sample presented a median of 75.0 points, indicating a relatively satisfactory general health status and quality of life for the participants. This result is in line with a similar study, where a median of 75.0 was found. [19]

When performing Spearman's correlation between anthropometric variables and handgrip strength (HGS) with quality of life variables and their components, we found significant results between the variables dyspnea and BMI (p = 0.039), % AC and insomnia (p = 0.043), HGS and QOL (p = 0.035), HGS and physical (p < 0.01), HGS and cognitive (p = 0.010), HGS and fatigue (p = 0.002), HGS and pain (p = 0.046), positive and negative correlations were found that directly interfered in the final quality of life scores of the patients studied. A similar result was found in a previous study, corroborating our findings. [19]

When analyzing the quality of life scores and their components based on nutritional status, we observed that individuals with malnutrition had lower medians in the assessments of general health status (58.3), cognitive functioning (50.0) and general functioning (50.0).

In the analysis performed, patients presented better medians in the functional scale for physical, emotional, cognitive, social and functional function, and no association was found between nutritional status and quality of life. Divergent results were observed in a study that found lower scores for physical, functional, cognitive function and symptoms that were more prevalent in malnourished patients, demonstrating that impaired nutritional status can worsen the quality of life of patients. [19]

When analyzing 162 women who survived breast cancer, a study revealed significant values in several scales of the Quality of Life Questionnaire, among them aspects such as physical and general functioning, fatigue, nausea, pain, dyspnea, insomnia, loss of appetite, constipation, diarrhea and financial difficulties. In the comparison between underweight/ normal weight and overweight/obese women, the scores related to physical and general functioning, fatigue, pain and dyspnea indicated more unfavorable results, corroborating our findings. [20]

Given our results, we highlight the complexity of the relationship between nutrition, muscle strength and quality of life in cancer patients, emphasizing the need for integrated approaches in the care of these individuals. Among the limitations, we highlight its cross-sectional approach, which makes it impossible to establish cause-and-effect associations. Additionally, it is important to mention the limited number of participants in the study.

## CONCLUSION

Although most patients had normal HGS, a significant result was identified in cases of low HGS, which may be related to several factors, such as malnutrition, side effects of treatment, metastases and neurological conditions caused by cancer. This finding highlights the importance of assessing muscle strength in this clinical context, providing adequate guidance in therapeutic decisions.

Although the Body Mass Index (BMI) classification indicated a sample within the eutrophic range, the assessment of arm circumference (AC) revealed a significant presence of malnutrition among patients.

The correlation between handgrip strength and quality of life variables reinforces the relevance of this parameter to understand the global impact of cancer on individuals' lives. In general, most patients had preserved muscle strength, but the compromised nutritional status points to the need for integrated approaches to optimize the quality of life of these individuals.

# Original Article

Cavalcante LS, Silva HKM, Silva RP
Assessment of Muscle Strength, Nutritional Status and Quality of Life in Cancer Patients Undergoing Chemotherapy

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