Correlation between Sarcopenia Risk and Food Intake in Older Hospitalized Unselected Cancer Patients

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Abstract: Objectives: Recently, the SARC-F (Strength, Assistance for walking, Rise from a chair, Climb stairs, and Falls) questionnaire was developed to screen for the risk of sarcopenia in older patients. However, no study has investigated whether SARC-F is linked to food intake. This study aimed to evaluate the relationship between SARC-F and food intake in older hospitalized unselected cancer patients. Methods: A cross-sectional study included 53 older hospitalized unselected cancer patients. The SARC-F score was used to identify muscle function loss (SARC-F ≥ 4) or sarcopenia risk [SARC-F + calf circumference (CC) ≥ 11]. Pearson’s correlation was used to assess the relationship between SARC-F and food intake. Results: We found that 51% of patients presented with SARC-F ≥ 4 and 56.6% with SARC-F + CC ≥ 11. Although these patients had a lower calorie intake (22.4 ± 11.9 kcal/kg/day), they had an adequate distribution of macronutrients. We found a negative correlation between the SARC-F score and the calorie and macronutrient intake. However, SARC-F + CC was not correlated with calories and carbohydrates, only with lipid and protein intake. Conclusions: Approximately half of unselected cancer patients presented with muscle function loss (SARC-F ≥ 4) or sarcopenia risk (SARC-F + CC ≥ 11). In addition, we showed an inverse weak correlation between SARC-F and food intake, but not between SARC-F + CC and calories and carbohydrates, suggesting that the SARC-F questionnaire may be used with caution to screen for muscle function loss and correlation with food consumption.

Keywords: sarcopenia; muscle function; food; cancer; hospitalized

1. Introduction

The European Working Group on Sarcopenia in Older People (EWGSOP) endorses the use of the SARC-F (Strength, Assistance with walking, Rise from a chair, Climb stairs, and Falls) questionnaire as a strategy to screen for the risk of sarcopenia [1]. This questionnaire has been studied in older Brazilian cancer patients [2–4]. Considering that SARC-F is a cheap and easy-to-use method for assessing the risk of sarcopenia [1] and that hospitalization and oncological treatments lead to muscle wasting, our hypothesis is that during hospitalization of cancer patients SARC-F is correlated with food intake. A recent study found that high SARC-F values predict lower survival in patients with cancer on palliative care [5]. Additionally, a previous study by our group found that a high SARC-F score in cancer patients is linked to alteration of hydration status in the gastrointestinal and accessory organs of digestion [6]. However, no study has investigated this relationship. For clinical applicability during hospitalization, we emphasized daily routine use of the SARC-F questionnaire since early nutritional education interventions could help to attenuate the development of sarcopenia. Thus, this study sought to assess the relationship between SARC-F scores and food intake in older hospitalized cancer patients.

2. Materials and Methods

A cross-sectional study included 53 (22 M/31 F) hospitalized older (68.0 ± 6.1 years) patients with a body mass index (BMI) of 23.4 ± 6.2 kg/m². The convenience sample
was composed of those patients with unselected cancer who signed the informed consent (HC-Federal University of Goias 3.981.055). All evaluations were performed in the first 48 h of hospitalization with the patients on bedrest. Food intake and oral nutrition supplements were recorded using a single 24-h dietary food recall and calories and macronutrients were quantified using DietPro software (Soluçôes em Nutrição, Viçosa, Brazil). Quantification of the calorie and macronutrient intake was obtained using the US Department of Agriculture Food Database.

Clinical data such as tumor type and performance status using the Karnofsky scale were acquired from the medical records; the BMI (kg/m²) was calculated using the body mass and height; and the SARC-F questionnaire was self-reported by patients with the help of trained nutritionists, as reported in a previous study [5]. Patients were classified as being at risk for muscle function loss (SARC-F ≥ 4) or at risk of sarcopenia using the calf circumference (CC) (SARC-F + CC ≥ 11) [7]. Clinical, demographic, anthropometric, and food intake variables were described in terms of means and standard deviations. The relationship between SARC-F and food intake was assessed using Pearson’s correlation. Statistical analyses were performed using MedCalc® software (Ostend, Belgium) and the significance level was set at \( p \leq 0.05 \).

3. Results

We found in older hospitalized unselected cancer patients that 77% of patients had a solid tumor and 17% received oral nutrition supplements or enteral nutrition. In addition, all patients were receiving the hospital’s standardized diet. CC was 30.8 ± 4.7 cm and performance status score was 57.5 ± 23.9. In addition, \( n = 27 \) (51%) presented SARC-F ≥ 4 (3.7 ± 3.2) and \( n = 30 \) (56.6%) SARC-F + CC ≥ 11 (11.4 ± 5.2). Moreover 22.6% are smokers, 17% drink alcohol, and 13.2% practice regular physical activity.

Although the patients had hypocaloric consumption (22.4 ± 11.9 kcal/kg/d), they had an adequate distribution of macronutrients: carbohydrates made up 61.2% (119 ± 114 g) of the total calorie intake, lipids 22.5% (31.8 ± 21.4 g), and total protein 16.3% (0.9 ± 0.6 g/kg/d).

We found that patients with SARC-F ≥ 4 ingested less calories and macronutrients than SARC-F < 4 patients (calorie: 1051 vs. 1535 kcal, \( p = 0.004 \), carbohydrate: 160 vs. 239 g, \( p = 0.004 \), lipids: 26 vs. 37 g, \( p = 0.03 \) and proteins: 44 vs. 64 g, \( p = 0.02 \), respectively.

In addition, we found a negative but weak correlation between SARC-F and calorie and macronutrient intake but not between SARC-F + CC and calories and carbohydrates (Figure 1).

![Figure 1](image-url). Correlations between SARC-F and food intake in hospitalized cancer patients.
4. Discussion

Approximately half of older hospitalized unselected cancer patients presented muscle function loss or risk of sarcopenia. Moreover, we showed an inverse weak correlation between SARC-F and food intake, but not between SARC-F + CC and calories and carbohydrates.

Indeed, the hospital meals policy for malnourished patients is to offer a high-protein diet. However, during hospitalization, the food intake remains below the recommended level, mainly in those who do not take oral nutrition supplements [8]. In the present study, we found that SARC-F + CC was not correlated with calorie and carbohydrate intake, suggesting that isolated SARC-F more easily detects disturbances in food intake since it does not use any anthropometric data. Additionally, we showed that only 17% of cancer patients received enteral nutrition or oral nutrition supplements, a factor that increases the chance of sarcopenia during hospitalization, which may be related to postoperative complications, toxicity of chemotherapy, and length of hospitalization [9]. Thus, early intervention with a multimodal protocol, including enteral nutritional or oral nutrition supplements and physical exercise, is imperative to attenuate the development of sarcopenia in cancer patients.

SARC-F + CC was correlated only with lipids and protein but considering that CC is a good muscle marker it is probable that protein intake (around 1 g/kg) is crucial to negatively correlate with the risk of sarcopenia. Additionally, these patients ingested an adequate quantity of lipids, which could explain this co-relationship since any oral nutrition supplements and enteral nutrition contain omega 3 fatty acids, which have an anti-inflammatory action and thus protect against sarcopenia.

Our study has two limitations: the study design does not allow a causal relationship to be established; and we assessed food intake only with a single 24-h dietary food recall. However, its strength is that it is a pioneer study in evaluating the relationship between food intake and risk of sarcopenia and/or muscle function loss by means of the SARC-F questionnaire.

In conclusion, approximately half of older hospitalized unselected cancer patients presented either muscle function loss or risk of sarcopenia. In addition, we showed an inverse weak correlation between SARC-F and food intake, but not between SARC-F + CC and calories and carbohydrates.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

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Conflicts of Interest: All authors declare that they have no conflict of interest.
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