



Brief Report

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

Gustavo D. Pimentel , Thaís C. Borges and Tatyane L. N. Gomes

Faculty of Nutrition, Federal University of Goiás, Rua: 227, quadra 68, S/N, Goiânia 74605-080, GO, Brazil; thaisborges2041@gmail.com (T.C.B.); tatyaneleticianogueiragomes@gmail.com (T.L.N.G.)

* Correspondence: gupimentel@yahoo.com.br

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 ($\text{SARC-F} \geq 4$) or sarcopenia risk [$\text{SARC-F} + \text{calf circumference (CC)} \geq 11$]. Pearson's correlation was used to assess the relationship between SARC-F and food intake. Results: We found that 51% of patients presented with $\text{SARC-F} \geq 4$ and 56.6% with $\text{SARC-F} + \text{CC} \geq 11$. 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, $\text{SARC-F} + \text{CC}$ 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 ($\text{SARC-F} \geq 4$) or sarcopenia risk ($\text{SARC-F} + \text{CC} \geq 11$). In addition, we showed an inverse weak correlation between SARC-F and food intake, but not between $\text{SARC-F} + \text{CC}$ 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



Citation: Pimentel, G.D.; Borges, T.C.; Gomes, T.L.N. Correlation between Sarcopenia Risk and Food Intake in Older Hospitalized Unselected Cancer Patients. *J. Ageing Longev.* **2022**, *2*, 98–101. <https://doi.org/10.3390/jal2020009>

Academic Editors: Paolo Caserotti and Yunhwan Lee

Received: 22 February 2022

Accepted: 12 May 2022

Published: 16 May 2022

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

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 Goiás 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 (Soluções 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/m^2) 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 ($\text{SARC-F} \geq 4$) or at risk of sarcopenia using the calf circumference (CC) ($\text{SARC-F} + \text{CC} \geq 11$) [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 $\text{SARC-F} \geq 4$ (3.7 ± 3.2) and $n = 30$ (56.6%) $\text{SARC-F} + \text{CC} \geq 11$ (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 $\text{SARC-F} \geq 4$ ingested less calories and macronutrients than $\text{SARC-F} < 4$ 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 $\text{SARC-F} + \text{CC}$ and calories and carbohydrates (Figure 1).

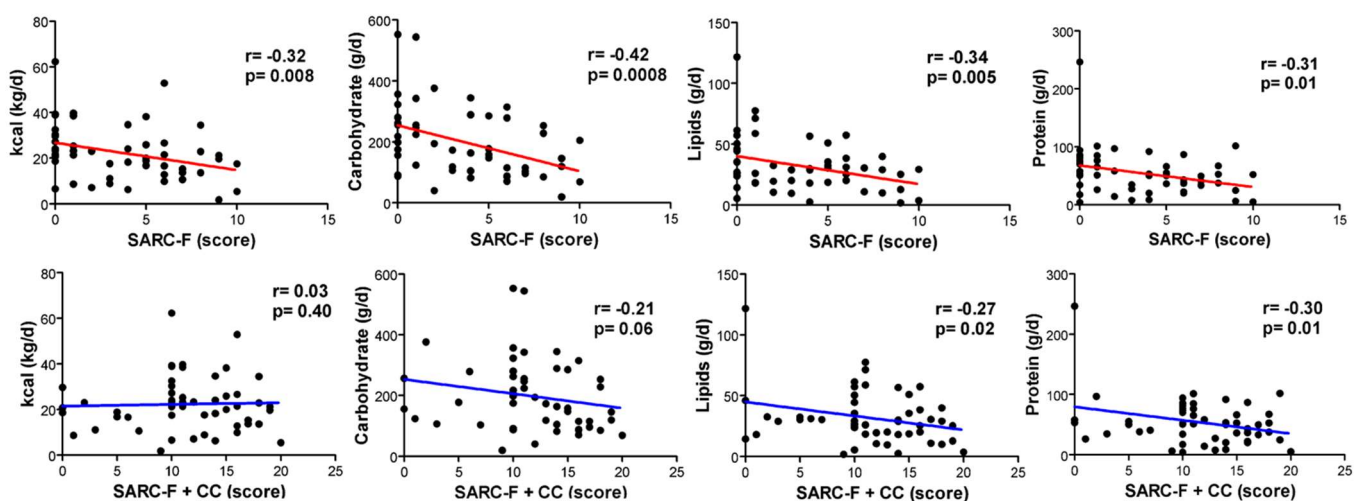


Figure 1. Correlations between SARC-F and food intake in hospitalized cancer patients.

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.

Author Contributions: T.L.N.G., T.C.B. and G.D.P. did the study design. T.L.N.G. and T.C.B. collected and compiled the data of manuscript. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of Federal University of Goiás (protocol code 3.981.055 and 20 April 2020).

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.

Acknowledgments: T.L.N.G. and T.C.B. would like to thank the Capes, Brazil. G.D.P. would like to thank The Brazilian National Council for Scientific and Technological Development (CNPq, Brazil, 312252/2019-6).

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

References

1. Cruz-Jentoft, A.J.; Bahat, G.; Bauer, J.; Boirie, Y.; Bruyere, O.; Cederholm, T.; Cooper, C.; Landi, F.; Rolland, Y.; Sayer, A.A.; et al. Sarcopenia: Revised European consensus on definition and diagnosis. *Age Ageing* **2019**, *48*, 16–31. [[CrossRef](#)] [[PubMed](#)]
2. Valentino, N.P.; Gomes, T.L.N.; Barreto, C.S.; Borges, T.C.; Soares, J.D.P.; Pichard, C.; Lavino, A.; Pimentel, G.D. Low phase angle is associated with the risk for sarcopenia in unselected patients with cancer: Effects of hydration. *Nutrition* **2021**, *84*, 111122. [[CrossRef](#)] [[PubMed](#)]
3. Gomes, T.L.N.; Borges, T.C.; Pichard, C.; Pimentel, G.D. Correlation between SARC-F Score and Ultrasound-Measured Thigh Muscle Thickness in Older Hospitalized Cancer Patients. *J. Nutr. Health Aging* **2020**, *24*, 1128–1130. [[CrossRef](#)] [[PubMed](#)]
4. Siqueira, J.M.; de Oliveira, I.C.L.; Soares, J.D.P.; Pimentel, G.D. SARC-F has low correlation and reliability with skeletal muscle mass index in older gastrointestinal cancer patients. *Clin. Nutr.* **2021**, *40*, 890–894. [[CrossRef](#)] [[PubMed](#)]
5. Mori, N.; Maeda, K.; Fukami, Y.; Matsuyama, R.; Nonogaki, T.; Kato, R.; Ishida, Y.; Shimizu, A.; Ueshima, J.; Nagano, A. High SARC-F score predicts poor survival of patients with cancer receiving palliative care. *Support Care Cancer* **2022**, *30*, 4065–4072. [[CrossRef](#)] [[PubMed](#)]
6. Martins, A.R.; Soares, J.D.P.; Siqueira, J.M.; Pimentel, G.D. Correlation between the SARC-F Score and Hydration Status in Older Gastrointestinal Cancer Outpatients. *J. Nutr. Health Aging* **2021**, *25*, 748–750. [[CrossRef](#)] [[PubMed](#)]
7. Borges, T.C.; Gomes, T.L.; Pichard, C.; Laviano, A.; Pimentel, G.D. High neutrophil to lymphocytes ratio is associated with sarcopenia risk in hospitalized cancer patients. *Clin. Nutr.* **2021**, *40*, 202–206. [[CrossRef](#)]
8. Weijzen, M.E.G.; Kouw, I.W.K.; Geerlings, P.; Verdijk, L.B.; van Loon, L.J.C. During Hospitalization, Older Patients at Risk for Malnutrition Consume <0.65 Grams of Protein per Kilogram Body Weight per Day. *Nutr. Clin. Pract.* **2020**, *35*, 655–663. [[CrossRef](#)]
9. Wang, J.; Tan, S.; Wu, G. Oral nutritional supplements, physical activity, and sarcopenia in cancer. *Curr. Opin. Clin. Nutr. Metab. Care* **2021**, *24*, 223–228. [[CrossRef](#)] [[PubMed](#)]