# Implementation and evaluation of a nutritional supplementation protocol for older adults in a private hospital

**Maisa Estefânia de Oliveira Pedreira**
Master's Degree in Nutrition and Longevity from the Federal University of Alfenas (UNIFAL-MG)
✉ maisa.estefania@sou.unifal-mg.edu.br

**Isabela Casarine Almeida**
Nutritionist, Federal University of Alfenas (UNIFAL-MG)
✉ isabelacasarine@yahoo.com.br

**Julieuza Camila Alves**
Nutritionist, Federal University of Alfenas (UNIFAL-MG)
✉ julieuzaalves.nutricionista@gmail.com

**Denismar Alves Nogueira**
PhD in Statistics and Agricultural Experimentation from the Federal University of Lavras, and faculty member at the Federal University of Alfenas (UNIFAL-MG)
✉ denismar.nogueira@unifal-mg.edu.br

**Fernanda de Carvalho Vidigal**
PhD in Nutritional Science from the Federal University of Viçosa, and faculty member at the Federal University of Alfenas (UNIFAL-MG)
✉ fernanda.vidigal@unifal-mg.edu.br

**Camilla Ribeiro Vieira**
Nutritionist and PhD in Applied Health Biosciences from the Federal University of Alfenas (UNIFAL-MG)
✉ camilla_vga@hotmail.com

**Roberta Ribeiro Silva Barra**
PhD in Sciences from the Federal University of Minas Gerais, and faculty member at the Federal University of Alfenas (UNIFAL-MG)
✉ roberta.silva@unifal-mg.edu.br

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**Abstract:**
With the aim of describing self-injurious behavior among adolescents, including predisposing factors, Physiological changes resulting from the aging process can significantly impact the nutritional status of the elderly, especially those hospitalized. However, most health institutions still lack standardized protocols for nutritional supplementation. Given this scenario, this study aimed to design and implement a supplementation protocol for older adults in a private hospital in southern Minas Gerais, using a non-controlled clinical intervention trial with convenience samples and approved by the Ethics Committee on Human. **Methods:** Fifty-one patients participated in the study, divided into two groups: supplemented composed of 38 participants (18 women and 20 men, mean age 80 years (SD=7.57)) and non-supplemented composed of 13 participants (11 women and 02 men, mean age 73 years (SD=8.13)). They were screened using the Nutritional Risk Screening (NRS 2002) and classified by Global Leadership Initiative on Malnutrition (GLIM). Anthropometric, dietary, hand grip strength and biochemical tests were monitored on admission and discharge. **Results:** Statistical analysis showed a significant difference ($P < 0.05$), with a higher estimated mean value in BMI and value in dietary zinc and a lower value serum creatinine for the non-supplemented group. The analysis also showed statistical difference for platelets, but has not clinical significance. **Conclusion:** The development and implementation of supplementation were carried out, but the evaluation showed that supplementation was not statistically effective. And adjustments can be made and better designed for a more accurate assessment.
**Keywords:** Older adults, Hospitalization, Longevity, Protocol, Nutritional Supplementation.

## Implementação e avaliação de protocolo de suplementação nutricional para idosos em um hospital privado

**Resumo:**
Introdução: As mudanças fisiológicas decorrentes do processo de envelhecimento podem impactar significativamente o estado nutricional dos idosos, especialmente aqueles hospitalizados. No entanto, a maioria das instituições de saúde ainda carece de protocolos padronizados para suplementação nutricional. Diante desse cenário, este estudo teve como objetivo elaborar e implementar um protocolo de suplementação para idosos em um hospital privado do Sul de Minas Gerais, utilizando um ensaio clínico de intervenção não controlado com amostras de conveniência e aprovado pelo Comitê de Ética. Métodos: Participaram do estudo 51 pacientes, divididos em dois grupos: suplementados, composto por 38 participantes (18 mulheres e 20 homens com idade média de 80 anos (DP=7,57)) e não suplementados, composto por 13 participantes (11 mulheres e 02 homens, com idade média de 73 anos (DP=8,13)). Eles foram selecionados usando o Nutritional Risk Screening (NRS 2002) e classificados pelo Global Leadership Initiative on Malnutrition (GLIM). Foram monitorados exames antropométricos, dietéticos, de força de preensão manual e bioquímicos na admissão e na alta. A análise estatística mostrou uma diferença significativa (P < 0,05), com um valor médio estimado maior no IMC e no zinco dietético, e um valor menor na creatinina sérica para o grupo não suplementado. A análise também mostrou diferença estatística para plaquetas, mas não apresentou significância clínica. Conclusão: O desenvolvimento e a implementação da suplementação foram realizados, mas a avaliação mostrou que a suplementação não foi estatisticamente eficaz. Ajustes podem ser feitos e melhor planejados para uma avaliação mais precisa.
**Palavras-chave:** Idoso, Hospitalização, Longevidade, Protocolo, Suplementação Nutricional.

## Implementación y evaluación de un protocolo de suplementación nutricional para adultos mayores en un hospital privado

**Resumen:**
Introducción: Los cambios fisiológicos resultantes del proceso de envejecimiento pueden afectar significativamente el estado nutricional de los ancianos, especialmente de aquellos hospitalizados. Sin embargo, la mayoría de las instituciones de salud aún carecen de protocolos estandarizados para la suplementación nutricional. Ante este scenario, este estudio tuvo como objetivo desarrollar e implementar un protocolo de suplementación para personas mayores en un hospital privado del sur de Minas Gerais, mediante un ensayo clínico de intervención no controlado con muestras de conveniencia y aprobado por el Comité de Ética. Métodos: participaron en el estudio 51 pacientes, divididos en dos grupos: suplementados compuesto de 38 participantes (18 mujeres y 20 hombres, con una edad media de 80 años (DE=7,57)) y no suplementados compuesto de 13 participantes (11 mujeres y 02 hombres, con una edad media de 73 años (DE=8,13)). Fueron seleccionados mediante Nutritional Risk Screening (NRS 2002) y clasificados por Global Leadership Initiative on Malnutrition (GLIM). Se realizaron controles antropométricos, dietéticos, de fuerza de prensión manual y bioquímicos al ingreso y al alta. El análisis estadístico mostró una diferencia significativa (P < 0,05), con un mayor valor medio estimado de IMC y zinc dietético, y un menor valor de creatinina sérica en el grupo sin suplementación. El análisis también mostró una diferencia estadística en plaquetas, pero sin significancia clínica. Conclusión: Si bien se desarrolló e implementó la suplementación, la evaluación demostró que no fue estadísticamente efectiva. Por lo tanto, se pueden realizar ajustes y un mejor diseño para una evaluación más precisa.
**Palabras clave:** Anciano, Hospitalización, Longevidad, Protocolo, Suplementación Nutricional.

**INTRODUCTION**

Population aging has occurred systematically and progressively in developed societies and is considered a demographic phenomenon of great global relevance (ABREU *et al.*, 2018). Worldwide, the absolute growth of older adults was 15.2 times between 1950 and 2020: in 1950, this population group corresponded to 202 million, 8% of the total population, while it increased to 1.1 billion in 2020, constituting 13.5% in relative terms (UNITED NATIONS, 2019). In developing countries, older adults are individuals aged 60 years or older. However, besides chronological age, aging is a natural process involving several anatomical, physical, physiological, nutritional, psychological, and social changes that impact health (SANTOS, 2010). These changes, associated with chronic diseases, may contribute to changes in their nutritional status (CAVALLI *et al.*, 2011), which is often neglected or undertreated (MURPHY *et al.*, 2020; TILLY, 2017).

Progressive muscle wasting has an estimated prevalence of 10% in older people aged 60 or over, increasing to 50% in 80 or over (FRAGALA *et al.*, 2019; SHAFIEE *et al.*, 2017). Studies demonstrate that elderly patients with lower muscle mass and strength are more likely to become prematurely dependent (SANTOS *et al.*, 2017), have longer and more frequent hospitalizations (GANI *et al.*, 2016), a high risk of mortality (LANDI *et al.*, 2016), which, in turn, translates into higher health costs (GANI *et al.*, 2016).

Malnutrition in older adults, including those hospitalized, has been responsible for several complications (GUEDES, GAMA, and TIUSSI, 2008) and is associated with increased hospitalization rates, higher prevalence of complications, infections, and mortality (CRUZ-JENTOFT *et al.*, 2019). A balanced diet is critical for maintaining lean body mass. A hyper protein diet can also help with muscle mass gain, as protein is involved in muscle formation. One of the strategies to control and prevent progressive loss of muscle mass has been nutritional supplementation (MELO, ARAÚJO, REIS, 2016).

The Nutritional Risk Screening (NRS 2002) was developed twenty years ago and certified by the European Society for Parenteral and Enteral Nutrition (ESPEN) to detect nutritional risk (KONDRUP *et al.*, 2003), it stood out by its good correlation with anthropometric and biochemical parameters, including mortality prediction and greater efficacy than other protocols (LIMA, 2014; RASLAN *et al.*, 2008). The risk factors belonging to the nutritional

screening tools are predictors of malnutrition, which affirms the need for its performance in all inpatients (TOLEDO *et al.*, 2018).

The Global Leadership Initiative on Malnutrition has established a new consensus through its working committee to diagnose malnutrition in adult patients called the Global Leadership Initiative on Malnutrition (GLIM), where at least one phenotypic and one etiologic criterion must be present to characterize it. This tool allows the improvement of the nutritional screening by following the complete assessment of the patient, assuming the importance of expansion and assistance within the care and intervention processes related to nutrition (CEDERHOLM, 2019).

Nutritional therapy aims at the adequate supply of macro- and micronutrients to patients for the maintenance or recovery of their nutritional status (ARAÚJO, 2018), which along with other multidisciplinary care, is extremely important for maintaining skin integrity, thus avoiding the appearance of pressure ulcers (Pus), which are more common in malnourished patients, and adequate oral supplementation helps their healing (GONZALEZ *et al.*, 2019).

In the aging process, there is a reduction in serum zinc levels, an essential mineral for health maintenance, which enhances nutritional deficiency. Baarz *et al.* (2022) found a prevalence of zinc deficiency in 68% of hospitalized older adults. This finding may indicate that drug supplementation using high micronutrient doses is necessary for older adults. Thus, food supplements can help in the oral replacement of zinc and other nutrients, especially in hospitalized older adults displaying a higher prevalence of zinc deficiency.

Although some studies have found no association between nutritional interventions and mortality (CANO-TORRES *et al.*, 2017; ALMEIDA *et al.,* 2023), other randomized clinical trials show that nutritional support can reduce the risks of mortality and complications, besides improving outcomes and care quality (DÍEZ- MANGLANO & CLEMENTE-SARASA, 2019; MATOS *et al.*, 2020; HERSBERGER *et al.*, 2021). Therefore, the importance of malnutrition screening, nutritional assessment, and nutritional support for hospitalized malnourished patients emphasizes that adequate food in the nutritional status of the older people is fundamental, with nutritional supplementation being an alternative when the patient's oral intake is insufficient.

Since the changes associated with aging, resulting in low food acceptance that affects older people's nutritional status, especially of those hospitalized, and the absence of supplementation protocols defined in most health institutions, it is believed that the implementation of a supplementation protocol can help improve the nutritional component, functional capacity, and life quality of hospitalized older people. Thus, this work aimed to develop and implement a nutritional supplementation protocol for older people in a private hospital in southern Minas Gerais.

## METHODOLOGY

### Target Audience

This work was conducted with a non-controlled intervention clinical trial using convenience samples according to local demand. The study included patients aged 60 years or older admitted to the inpatient unit of a private hospital in Alfenas - MG, from May 2021 to March 2022, who were not in isolation for COVID-19, who had no cognitive impairment, and who signed the Informed Consent Form. The participants were divided into two groups: participants who demonstrated food acceptance with caloric and protein adequacies above 80%, verified through quantitative analysis of the 24-hour food recall, performed with the help of the DietSmart program, or participants who refused to receive the supplement since the first day of hospitalization were part of the non-supplemented group. The remaining participants were in the supplemented group. The study was approved by the Ethics Committee on Human Research of the Federal University of Alfenas (UNIFAL-MG) under the consolidated opinion number 4,644,758, CAAE 4 4896821.0.0000.5142. All participants signed the Informed Consent Form.

### Patient Assessment

Validated tools were used for nutritional triage and nutritional assessment of patients at hospital admission and discharge, which are in the public domain and already used in the

work routine of the hospital where the study was conducted. Patients were initially screened using the NRS 2002 tool, in which current weight (when possible), usual weight, height (self-reported or informed by family members when the patient was unable to answer), percentage of weight loss, and food intake in the last week were collected individually to detect nutritional risk, using a digital dynamometer brand WCT with a maximum capacity of 90kg, a portable digital scale with a maximum capacity of 150kg, and a 150-cm flexible body measuring tape. After the nutritional screening and nutritional risk assessment, we applied the GLIM tool to diagnose and classify the severity of malnutrition. The functional capacity of older people in both groups was measured using the Katz scale for basic activities of daily living and the Lawton & Brody scale for instrumental activities of daily living. From the variables weight and height, the body mass index (BMI) was calculated and classified (Kaengi-Braun et al., 2021).

We monitored the following anthropometric data from patients in the two groups studied in hospital admission and discharge: weight, calf circumference (CC), arm circumference (AC), handgrip strength (HGS), as well as biochemical tests, which are part of the hospital's medical routine (complete blood count, serum albumin), taking all care with the information obtained, according to the Data Use Commitment Term. The nutritionist responsible for the research collected data during her working hours at the institution and spent around 30 minutes per patient.

**Application of the supplementation protocol**

The nutritional supplementation protocol was previously developed by the incumbent nutritionist in the hospital, with all of the supplements used in the hospital routine described and separated according to their indication and nutritional composition. Patients identified in the nutritional screening as being at nutritional risk or malnourished during their hospital stay received the Nutritional Supplementation protocol developed. We used Food supplements from different brands already standardized by the hospital as described in the protocol. To calculate the protein requirement of the patients, the amount of 1.2 g protein/kg/day was standardized (DAMANTI *et al.*, 2019) for all patients. Supplements were used according to the daily needs regarding the length of the patient's stay.

We followed all safety recommendations adopted in the institution. Such as the use of a surgical mask (the professional and the patient), hand hygiene before and after contact with the patient, disposable gloves, use of 70% alcohol, and maintaining social distancing during the interview. Each patient was screened in their respective hospital beds in a well-ventilated environment, ensuring health safety and privacy during data collection. Scales and tapes were sanitized with 70% alcohol before and after the use.

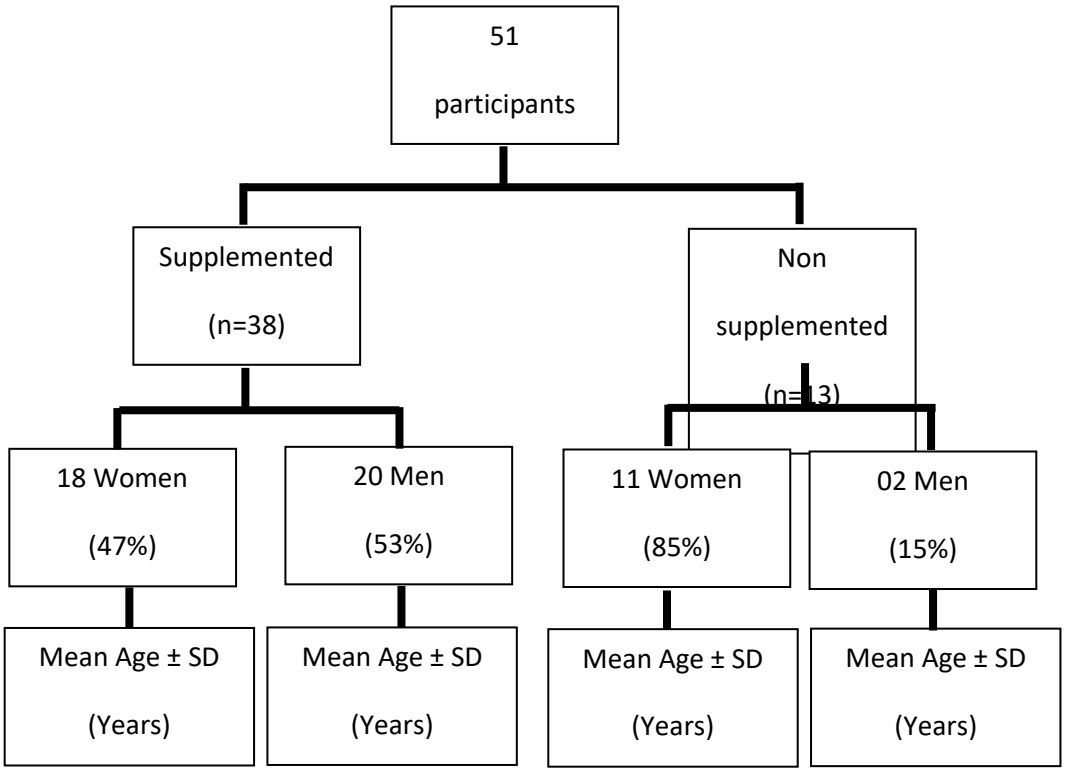
### Statistical analysis

The anthropometric, laboratory data, body composition and handgrip strength were used to evaluate the effect of nutritional supplementation on patients from admission to discharge, generalized linear mixed models (GLMM) using, which allow the use of distributions different from normal, belonging to the exponential family and the incorporation of a random effect such as that of the individual. As for modeling, it was decided to consider the measurement obtained at entry (initial) as a covariate or baseline to allow correction of the final for everyone, with the individual being their own control. The normal, gamma and lognormal distributions were used for adjustment, with only three variables using non-normal distribution (creatinine, urea and vitamin B12). The link functions used were identity, log and identity, respectively. The analysis used SAS software with proc glimmix and a significance level of 5%. In addition, an adjustment study was carried out with a Pearson residual graph and Shapiro-Wilk normality test and the models were chosen using the akaike's information criterion.

## RESULTS

Fifty-one patients took part in the study, 74.5% (n = 38) of the supplemented group received oral (35 patients) or enteral supplementation (03 patients) for at least one day of hospitalization, and 25.5% (n = 13) of the non-supplemented group received neither oral nor enteral supplementation during the stay (Figure 1).

**Figure 1.** Profile of the participants in the study. Alfenas, MG, 2022.

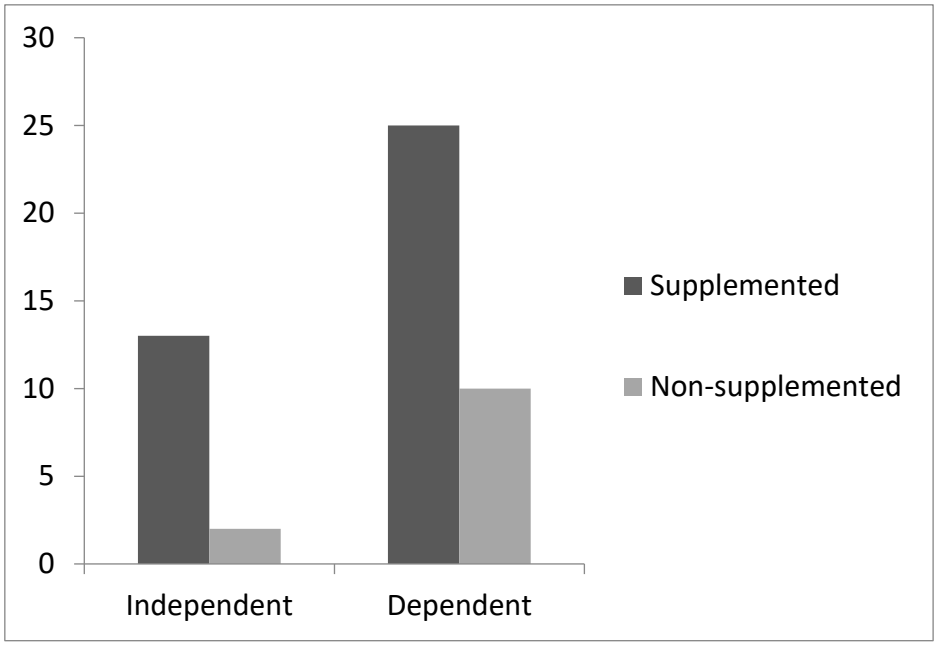



SD: standard deviation
**Source:** Authors.

There was no loss of participants during the study. The supplemented group consisted of 47% women (n = 18) and 53% men (n = 20), with a mean age of 80 (SD = 7.56) years. The non-supplemented group consisted of 85% women (n = 11) and 15% men (n = 2), with average age of 73 (SD=8.13) years.

Regarding the functional capacity of older people in the supplemented group (Figure 2), 13 participants were independent (34.21%) and 25 were dependent (65.79%). In the non-supplemented group, 02 participants were independent (15.38%), 10 were dependent (76.92%) and 01 participant did not respond (7.7%). There was no statistically significant difference between groups by the Fischer test ($p > 0.05$).

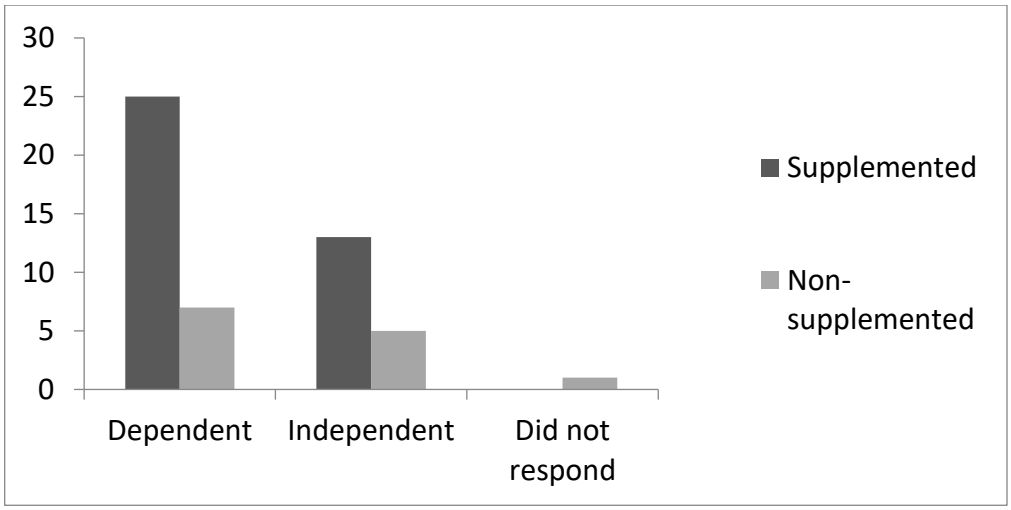
**Figure 2.** Dependency classification, according to the Katz Scale, in hospitalized older adults. Alfenas, MG, 2022. Fisher's test: p =1.0.




**Source:** Authors.

The scale analysis for the basic activities of daily living showed the supplemented group with 25 participants dependent (65.79%) and 13 independent (34.21%), as for the non-supplemented group, 07 were classified dependent (53.85%), 05 independent (38.46%) and 01 did not respond (7.69%) (Figure 3). There was no significant difference between the groups by Fischer's test (p > 0.05).

**Figure 3.** Classification of hospitalized older adults according to the Lawton & Brody scale. Alfenas, MG, 2022. Fisher's test: p =1.0




**Source:** Authors.

We classified the participants according to their body mass index (BMI), with the supplemented group presenting 13 participants classified as underweight (34.2%), 13 eutrophic (34.2%), and 12 overweight (31.6%), whereas the non-supplemented presented 05 underweight (39%), 02 eutrophic (15%), and 06 overweight (46%).

During the study, the supplemented group received: a powdered supplement for glycemic control, a standard powdered supplement, a closed-system enteral formula for glycemic control and the standard one. The average time to furnish the food supplement to the participants was two days, considered a short period due to the limited stay of these patients in the Institution. The regular hospital meals are breakfast, lunch, afternoon coffee, dinner, and supper. The food supplements were offered punctually in some meals, such as breakfast, afternoon coffee, and supper, while the enteral diets were injected in a continuous infusion pump for 24 hours. The mean daily macronutrient at the discharge of the patients participating in the supplemented group are presented in Table 1. The amount of zinc calculated on supplement powder and Closed-system enteral formula for glycemic control was (mean= 4.42 e standard deviation = 2.85) and on Standard Unflavored Supplement Powder and closed-system enteral formula was (mean= 10.64 e standard deviation = 9.74).

**Table 1 –** Average daily intake of macronutrients of participants in the supplemented group at discharge. Alfenas, MG, 2022.

| Supplement/Enteral formula | Kcal | Carbohydrates (g) | Proteins (g) | Lipids (g) |
|---|---|---|---|---|
| | | Mean ±SD | | |
| ***Supplement powder and Closed-system enteral formula for glycemic control*** | 956.50±511.03 | 150.36±96.29 | 32.91±18.04 | 23.61±8.92 |
| ***Standard Unflavored Supplement Powder and closed-system enteral formula*** | 745.60±806.56 | 106.68±118.10 | 32.48±34.47 | 20.54±23.10 |

**Source:** Authors.

It can be observed that the average intake of calories was higher in participants who received supplement powder and Closed-system enteral formula for glycemic control, on the other hand, all participants of had similar average daily intake of protein.

Table 2 shows the comparison of the averages between the supplemented and non-supplemented groups using the analysis of the GLMM model. Significant differences were found in BMI, serum creatinine and platelet levels and zinc consumption between the groups evaluated.

**Table 2 –** Averages adjusted for baseline effect of supplementation on biochemical and nutritional markers in hospitalized older adults at hospital discharge. Alfenas, MG, 2022**.**

| Markers | Non-supplemented | Supplemented group | P |
|---|---|---|---|
| **Antropometric markes** | | | |
| **Estimated averages ±SE** | | | |
| BMI (kg/m$^2$) | 24.72 ±0.08 | 24.46 ±0.03 | **0.006** |
| AC (cm) | 29.24 ±0.60 | 29.09 ±0.33 | 0.836 |
| CC (cm) | 32.33 ±0.50 | 32.76 ±0.29 | 0.462 |
| HGS (kg) | 18.55 ±2.18 | 18.89 ±1.19 | 0.892 |
| **Biochemical markers** | | | |
| **Estimated averages ±SE** | | | |
| Lymphocytes (cell/mm$^3$) | 1397.97 ±243.74 | 1542.15 ±141.19 | 0.616 |
| Urea (mg/dl) | 3.82 ±0.14 | 3.75 ±0.09 | 0.701 |
| Albumin (g/dl) | 2.80 ±0.20 | 2.98 ±0.09 | 0.431 |
| Creatinin (mg/dl) | -0.05 ±0.09 | 0.159 ±0.05 | **0.049** |
| Sodium (mmol/l) | 140.71 ±1.37 | 137.43 ±0.86 | 0.053 |
| Potassium (mmol/l) | 3.96 ±0.16 | 3.76 ±0.10 | 0.286 |
| Calcium (mg/dl) | 534.60 ±112.44 | 510.63 ±79.49 | 0.863 |
| Magnesium (mg/dl) | 230.10 ±54.91 | 192.94 ±38.83 | 0.587 |
| CRP (mg/l) | 56.27 ±22.24 | 79.59 ±12.24 | 0.366 |
| MCV (u$^3$) | 88.72 ±0.29 | 88.93 ±0.16 | 0.532 |
| MCH (pg) | 29.07 ±0.17 | 29.15 ±0.09 | 0.703 |
| MCHC (%) | 32.75 ±0.21 | 32.65 ±0.11 | 0.607 |
| Hm (milhões/mm$^3$) | 3.71 ±0.13 | 3.67 ±0.07 | 0.804 |
| Hb (g/dl) | 10.84 ±0.35 | 10.70 ±0.20 | 0.738 |
| Ht (%) | 33.16 ±1.07 | 32.70 ±0.61 | 0.709 |
| Leucocytes (cel/mm$^3$) | 9513.79 ±934.66 | 8747.16 ±530.85 | 0.480 |
| Platelets (cel/mm$^3$) | 250702 ±9127.81 | 251967 ±9127.81 | **<0.001** |
| **Dietary markers** | | | |
| **Estimated averages ±SE** | | | |
| Kcal | 1152.51 ±253.09 | 903.81 ±178.54 | 0.433 |
| Carbohydrates (g) | 164.62 ±39.25 | 137.42 ±27.75 | 0.578 |
| Proteins (g) | 51.67 ±10.66 | 33.93 ±7.53 | 0.190 |

| | | | |
|---|---|---|---|
| Lipids (g) | 29.21 ±6.37 | 23.95 ±4.51 | 0.509 |
| Calcium (mg) | 534.60 ±112.44 | 510.63 ±79.48 | 0.864 |
| Iron (mg) | 10.65 ±2.91 | 7.99 ±2.05 | 0.464 |
| Magnesium (mg) | 240.07 ±50.83 | 187.95 ±35.86 | 0.414 |
| Zinc (mg) | 11.22±1.95 | 6.12±1.37 | **0.047** |
| Vitamin D (mcg) | 2.06±0.46 | 1.38±0.37 | 0.249 |
| Vitamin B12 (mcg) | 0.036±0.37 | -0.03±0.27 | 0.884 |
| Vitamin C (mg) | 185.72±56.84 | 148.12±40.19 | 0.596 |
| Selenium (mcg) | 12.81±3.89 | 12.96±2.76 | 0.975 |
| Vitamin A (mcg) | 439.93±105.56 | 382.54±74.64 | 0.662 |

SE: Error deviation; BMI: body mass index; Analysis period; AC: arm circumference; CC: calf circumference; HGS: hand grip strength; CRP: C-reactive protein; MCV: mean corpuscular volume; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; RBCs: red blood cells; Hb: hemoglobin; Ht: hematocrit; Kcal: kilocalories.
**Source:** Authors.

## DISCUSSION

The number of underweight patients in this study was approximately 1/3 in both the supplemented and non-supplemented group, which corroborates the results obtained by Fidelix *et al.* (2013), who, in their literature review, found that the prevalence of malnutrition in hospitalized older adult patients ranges from 2% to 80% due to several factors, including the population heterogeneity. The underweight prevalence among older adults has become of concern, especially with the increased lifespan of the population. Norman, Ha, and Pirlich (2021) state that the development of malnutrition in older adults is likely facilitated by aging. The physiological changes that occur with aging can lead to changes in the absorption of vitamins and minerals and can interfere with their nutritional status.

Regarding the measurement of muscle strength at hospital discharge, it was observed that the mean grip strength was higher in the supplemented group, composed mainly of men, compared to the non-supplemented group, composed principally of women. Duarte *et al.* (2021) also found higher mean grip strength in the male population compared to the female population. Thus, the fact that the supplemented group was mostly male may

have contributed to the higher average grip strength in this group, regardless of supplementation. The non-supplemented group, composed mainly of women, had a lower average grip strength, which may be related to this physiological predisposition (NUZZO, 2022).

The Patients of our study needed supplementation had a lower BMI than those non-supplemented. They were probably patients with higher energy and nutritional demands from the critical state that triggered the hospitalization (THIBAULT, et al., 2021).

Among the markers used in following-up older adults are the intake and serum dosages of micronutrients, including zinc. In the present study, serum dosages of this micronutrient were not performed because it was not part of the routine exams requested in the hospital, making it impossible to analyze the serum levels in the participants. However, after analyzing the 24-hour recall, it was found that zinc intake was higher in the non-supplemented group. The supplemented group had more adequate zinc intake than that of the non-supplemented group. In addition, there were few patients in study, and may be that in practice a decreased consumption of the group that requested supplementation may have influenced the result.

Creatinine is an endogenous biomarker of glomerular filtration rate (HUIDOBRO, TAGLE, AND GUZMAN, 2018). When glomerular filtration capacity is impaired, serum creatinine levels increase. In the present study, we observed that serum creatinine levels were lower in non-supplemented patients. Furthermore, serum creatinine is affected by multiple non-nutritional factors.

The results also showed a significant difference for platelets but has no clinical significance for these estimated mean values.

Although the supplements and meals were sent in the correct amount for each patient, considering their nutritional need, their acceptance was not necessarily satisfactory due to total or partial refusal by the study participants, either due to hyporexia or early satiety. This study limitation may have reduced the effectiveness of the nutritional intervention, making it difficult to accurately assess the impact of supplementation.

It was noted that the supplemented group presented, at discharge, lower protein intake and calorie averages than at admission. The mean protein intake of this patient group

was 0.5g/kg/day when considering the mean weight of the studied population, which was 66.56kg, staying below the standardization used for daily protein requirement calculations for patients of 1.2g/kg/day. Without the supplementation offered, the average intake of this nutrient would be even lower than the patients' daily recommendation for the macronutrient under discussion. This divergence between recommended and actual protein intake is attributed to the variation in the patient's food intake, hospital environment, uncontrolled oral food supply during the study, and the removal of the patient from the family environment. It is also observed that the non-supplemented group had higher calorie and protein intake averages than the supplemented group, which was expected since one of the criteria for not receiving the food supplement was to present adequate calorie and protein above 80%.

Since there was no significant difference between the use of the food supplement and the anthropometric variables, it was deduced that adequate nutrition was furnished for the patients of both groups studied. According to Kirkland and Shaughnessy (2017), about 70% of malnourished hospitalized patients show worsening nutritional status during hospitalization, which did not happen in this study. According to Ruiz *et al.* (2018), greater attention to nutrition during hospitalization is vital for quality care.

The length of nutritional supplementation was a limiting factor in this study. The average time of supplementation was approximately two days due to patients' reduced hospitalization for the pandemic since a prolonged stay would increase the risk of contamination, which may have further limited the results obtained in this study. Since the duration of the supplemented food to the patient will determine the individual's nutritional status, the supplementation protocol could have better influenced the anthropometric, biochemical, and dietary markers if it had been followed up for longer. Borrego & Cantaria (2013) observed weight gain in older adults after receiving food supplementation for 30 consecutive days. Although it was conducted on an outpatient basis, with a different setting from the present study, it is noted that the time of food supplementation determined the nutritional status of individuals. Söderström, BergKvist, and Rosenblad (2022), in a study conducted with malnourished older adults or those at risk of malnutrition, also concluded that using food supplementation improved the patient's life quality.

Even though the average time of supplement administration was short, Wolfe (2017) emphasizes that muscle protein is in constant turnover and that protein synthesis happens continuously. Thus, the supplement may have played a role in older adult protein synthesis, although anthropometric results take longer to be obtained.

The COVID-19 pandemic was certainly another limitation of the study since the number of older adult hospitalizations as well as the stay length of those who were hospitalized during the experimental time were shorter, rendering small sample sizes for the data collection period and interfering with the time of receiving the dietary supplements by the participants in the supplemented group, which may probably have impacted the results of the variables analyzed. According to Bezerra *et al.* (2020), social isolation significantly reduced medical care, treatments, and surgeries, corroborating what occurred in this study. The study also highlights problems in balancing the groups adjusted in the analysis, including controlling the inter-individual variation regarding the research participants.

Despite the limitations, the study is very important, as there are still few studies that have implemented and evaluated a supplementation protocol in the elderly. Thibault *et al.* (2021) state that, in most hospital environments, dietary prescriptions are often made arbitrarily and independent of the assessment of nutritional status. In this context, Rodrigues (2020) emphasizes that adequate nutritional intake prevents hospital malnutrition, improves quality of life and reduces complications during hospitalization. Therefore, the implementation and evaluation of the dietary supplementation protocol is crucial to ensure safety, treatment effectiveness and consistency in supplement administration, both for healthcare professionals and patients.

This study can serve as a basis for future research, allowing the comparison of results between different studies and contributing to the advancement of knowledge in the area of dietary supplementation in the elderly. Furthermore, this work may spark future research interest in exploring how different supplementation protocols can be customized to meet individual patient needs, considering factors such as age, gender, health status, and lifestyle.

## CONCLUSION

The supplementation protocol was designed, implemented, and evaluated. The development and implementation of supplementation were carried out, but the evaluation showed that supplementation was not statistically effective. Although clinically the data demonstrated that the supplementation increased the average protein and calorie intake of the participants in the supplemented group. And adjustments can be made and better designed for a more accurate assessment. More studies need to be conducted to evaluate the controlled effect of food supplement use and the variables related to the nutritional status of hospitalized older adults.

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## AUTHORSHIP CONTRIBUTION STATEMENT

**Maísa E. O. Pedreira:** Conceptualization, Data curation, Investigation, Methodology, Visualization, Writing – original draft;

**Julieuza C. Alves:** Data curation, Investigation; Isabela C. Almeida: Data curation, Investigation;

**Denismar A. Nogueira:** Data curation; Formal Analysis; Fernanda C Vidigal: Conceptualization Project administration Writing – original draft;

**Camilla R Vieira:** Writing – review & editing.

**Roberta R S Barra:** Conceptualization, Methodology, Project administration, Writing – original draft, Writing – review & editing.

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