

## **The Prevalence of Sarcopenia in the Elderly: How the Consumption of Protein Supplement Interacts in Individuals of a Fortaleza Institution**

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### **Abstract**

Introduction: Sarcopenia is a natural disturb that usually affects older people consisting in strength and muscle mass loss. Sedentary lifestyle and nutritional habits are some inducing factors. Supplementation may contribute to improvements on life quality in elders predisposed to sarcopenia. Objectives: verify the relevance of protein supplementation on life quality of elders predisposed to sarcopenia. Assess the individual's evolution along the study. Methods: protein supplementation application during 45 days on 13 elders, comparing them with 13 elders in control group without supplementation. Anthropometric measurements were performed before and after the 45 days period and evaluated for each participant, as well as their nutrition, individually. Results: We observed a improvement in some anthropometric measures, and a reduction in others, that might be explained by previous pathologies already diagnosed. Muscle mass changes were

positive, according with specific reference measures. Some elders reported motor strength improvements, disposition and energy. Physical active participants showed more significant results and sedentary ones. Conclusion: positive outcomes were obtained from protein supplementation in older people, and more correlated studies are still necessary, considering the field's relevancy to longevity and overall life quality.

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**Keywords:** Sarcopenia, supplementation, protein, elderly

## **Introduction**

Aging is a natural process that occurs in all individual since birth (Caetano, 2006). This process includes morphological, physiological and biochemical changes that may result in a reduced individual's capacity to adapt to the environment (Almeida, Valentim e Diefenbach, 2004). Elderly is an individual with 60 years old or more on undeveloped countries, or 65 years or more on developed countries. Despite the variation, senescence involves searching for a better life quality, disposition to perform stimulant activities and individual's manners for well-being (Gradim, Souza e Lobo, 2007).

Sarcopenia is considered as a geriatric syndrome and not as a disease, which has several risk factors and it gets aggregated to function decline, fragility and other malefic health results (Cruz-Jentoft, Landi, Topinková e Michel, 2010). However, numerous factors help initiating sarcopenia on young individuals or reducing muscle vitality in the elderly without a proper nutrition, with endocrine factors, sedentary lifestyle, inflammation and neurological damage (Cruz-Jentoft et al., 2010; Bataille et al., 2016). The skeletal muscle stores a large water volume, about 75% of the muscle mass (Mingrone et al., 2001). Furthermore, the water intake in elderly individuals may decrease caused by a reduction of the thirst perception caused by a disfunction of the regulation mechanism (Nakamura, Osonoi e Terauchi, 2010). It's assumed that starting at the age of 40 the individual will lose about 5% of the muscle mass every 10 years, and even quicker after 65 years old (Hairi et al., 2010). The skeletal muscle has a higher probability to overcome the aging process, cause by developed and noxious changes, associated with structural and functional disorganizations (Matsudo S.M. Matsudo K.R. e Barros 2000).

When the individual starts losing muscle mass, and therefore losing strength, the ability to perform daily activities gets impaired (Alexandre, Duarte, Santos e Leão 2008). Within advanced ages the individual may become more fragile, losing capacity to daily chores, increasing dependency, weight loss with significant muscle mass reduction, self-reported fatigue, spontaneous falls and even death (Silva e Conboy, 2008). Functional capacity

and muscle strenght are not only assotiated with muscle mass, but also with the current nutrition status of the individual (Augusto, 1995).

Eating habits classification as healthy or not varies frmoo different coultural groups. Sometimes, those classifications doesn't judge what may or may not be healthy. Also, among it we can find psychological, biological and social factors (Carvalho, Luz e Prado, 2011). Unfortunately, eating habits and nutrition are under studied on indivuald with at least 65 years old, receiving non-optimal attention from the scientific community (Najas et al., 1994).

This study has as it's main goal correlate sarcopenia with hipocaloric diets in elderly, assessing their nutritional need and providing a better nutritional status. The study also intends to offer better overall life quality to the elderly, analyzing the nutrition's role on sarcopenia disorder, expanding the studies on this field.

## **Methods**

The study is quantitative and descriptive, which evaluated protein supplementation intake among elderly with sarcopeny prevalence. The study was conducted from August, 2016 to June, 2017. We included 26 elder people, residents of the institution, without serious pathologies. All of them signed the consent form according with Resolution 466/12 from Brazil's National Health Council.

The project had started only after the approval of the Health Coordinating of Lar Torres de Melo Institution, firmed up through a consent form.

A anthropometric data questionnaire was created, and Mini Nutritional Avaliation (MAN) was applied.

Two groups were created with 13 participants in each: Control and Experimental. The following anthtopometric data were collected on both groups: wheight (kg), hight (m), Knee Height (KH), Arm Circunference (AC), Calves Circunference (CC), Waist Circunference (WC), Hip Circunference (HP), Body Mass Index (BMI) and Waist-Hip ratio.

Supplementation was delivered by a fruit shake, composed by proteic module, sucralose, fruit pulp and water. All ingredients were calculated and it's grammage portioned. Then, they were blended and served in cups identified for each participant. Shakes were served for 45 days straight, always on the same time and only for the experimental group. By the end of the period, anthropometric measurements were performed once again and the obtained data was tabulated for statistical analysis.

## **Results**

The experimental group was composed by 10 women (76,92%) only 3 males (23,08%) over 60 years-old. We were able to identify the most frequent

types of pathologies between the group's participantes, such as hypertension, diabetes, Parkinson's disease, epilepsy and depression (Table 1).

**Table 1.** Characterization of the elderly population of an institution in Fortaleza, Ce, 2017.

	VARIABLE	QUANTITIES	PERCENTUAL (%)
Gender	Female	10	76,92
	Male	3	23,08
TOTAL		13	100
Pathology	Hypertension	6	46,15
	Diabetes	3	23,08
	Parkinson's disease	2	15,39
	Epilepsy	1	7,69
	Depression	1	7,69
TOTAL		13	100

Source: Research data.

The Mini Nutritional Avaliation (MAN) was used to evaluate the nutritional status of each individual, considering three BMI levels: No malnutrition risk, Malnutrition risk and malnutrition, resulting in that the majority were classified without malnutrition risk (46,15%), despite a considerable difference for those with malnutrition risk, that corresponds to 38,46% (Table 2).

**Table 2.** Evaluation of the nutritional status of the elderly from the Mini Nutritional Assessment.

	VARIABLE	QUANTITIES	PERCENTUAL (%)
Nutritional status	No risk of Malnutrition	7	53,85
	Risk of Malnutrition	5	38,46
	Malnutrition	1	7,69
	TOTAL	13	100

Source: Research data.

Anthropometrical evaluations were made before supplementing, such as: Hight, Weight, BMI and Waist, Hip, Calves and Arm Circunferences.

Determining all anthropometric values, supplementation were applied on the elderly from experimental group. After 45 days the evaluations were performed once again to determine individual's evolution. An increase in some measurements were observed, as well as some decreases, which may be caused by previous pathologies, as shown below:

**Table 3.** Percentage variation between the before and after the diet.

Identification	CC	CQ	CB	CP
1	4%	4%	8%	13%
2	-5% <sup>1</sup>	0%	0%	0%
3	6%	-4%	6%	2%
4	-2%	-2%	-4%	2%
5	3%	1%	4%	2%
6	9%	1%	-2%	-2%
7	3%	1%	21%	-10%
8	-1%	-1%	-11%	2%
9	11%	6%	13%	15%
10	-1%	0%	2%	9%
11	4%	1%	16%	6%
12	-4%	5%	2%	6%
13	1%	0%	2%	5%

Source: Research data.

Analyzing table 3, some positive percentual variations stands out indicating circunferences increases that correlates with nutrition, physical activities and others. The negative values were on Waist and Calves circumference, on the last one it can indicate an association with pathologies and malnutrition in some participants.

## Discussion

The present study set its goal to look forward to observe muscle mass variations from protein supplementation on a elder population with sarcopenia prevalency.

Recent studies observed muscle gain from protein supplements on elders with Sarcopenia Prevalence. In 1989, Rosenberg first used the term Sarcopenia to describe muscle mass loss. Interventions are mandatory, considering that Sarcopenia's progression is multidimensional. Sarcopenia's progression covers physical inactivity, metabolic alterations, neuromuscular perishing and nutrients consumption as well as absorption (Kalyani, Corriere e Ferrucci, 2014). Its predominance between populations, age and gender, and

<sup>1</sup> The percentage relation was obtained by:  $\{(final\ measurement - initial\ measurement) / initial\ measurement\}$ . The negative sign represents that the patient reduced the curvature with the diet, that is, his final measurement was smaller than the initial one. The positive sign represents that the patient increased the curvature with the diet, that is, his final measurement was greater than the initial one.

between elder people living in community homes or long permanence institutions (Bahat et al., 2010).

An effective supplementation to prevent or to ease Sarcopenia should contain the necessary nutrients to stimulate protein metabolism and muscle development. Long term studies are necessary to analyze the efficiency of the distinctive protein supplementations in older people with or without Sarcopenia (Hedayati e Dittmar, 2010).

The macronutrient used was whey protein specifically. The ingestion of that protein causes a wide variety of biological effects such as glutathione and IGF-1 (Insulin Growth Factor I) synthesis stimulation, immunologic support, hypocholesterolemia and antitumoral properties, as well as longevity trials with animal experiments (Brink, 1996). Fast digestion proteins (e.g. whey protein) provides a better anabolic response in older people than slow digestion protein (e.g. casein) (Hedayati e Dittmar, 2010; Hwang et al., 2012).

It was observed that older people had significant measurement increases on Calves Circumferences (CC), and studies showed that CC has a strong correlation with muscle reserve and is considered a sensitive indicator of muscle mass loss in elderly, especially if the reduction occurs along with physical activities reduction (Opas, 2003).

Recent studies suggest that adults over 65 years old have a higher protein shortage compared with the recommendations (0,8g grams of proteins per kg of body weight), exceed by balance studies with adults, preserving physical conditions and independence (Bauer et al., 2013; Wolfe, Cifelli, Kostas e Kim, 2017). With that being said, the protein ingestions was 1,8g per kg of body weight with the experimental group and 0,8 g/kg with the control group, since protein module had 1.0 g/kg of protein, accordingly with each participant.

Malnutrition is a concerning life condition for elder people, since it may result in physical strength reduction, higher inactivity, higher accident risk and lower immune capacity, among others health issues (Machado e Coelho, 2011).

## **Conclusion**

Considering that protein-based supplementations requires attention and caution, analyzing factors such as preparation and accessibility, which requires time and dedication for everyone involved, despite the benefits to the experimental group, more correlated studies are needed since it's a wide field with large relevance for longevity. Having in mind that institutionalized elders tends to malnutrition due to factors beyond nutrition itself, the attention and caution are advised for a better understanding and expansion on this field.

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