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Effects of nutritional supplementation on muscular mass, muscular strength and physical performance in sarcopenic elderly

Efeitos da suplementação nutricional na massa muscular, força muscular e desempenho físico em idosos sarcopênicos
Efectos de la suplementación nutricional sobre la masa muscular, la fuerza muscular y el rendimiento físico en ancianos sarcopênicos

RESUMO

OBJETIVO: analisar os efeitos da suplementação nutricional na Massa Muscular, Força Muscular e no Desempenho Físico de idosos sarcopênicos. **MÉTODO:** Revisão integrativa realizada através das bases de dados: PubMed e Cochrane Library, utilizando os descritores do Medical Subject Headings (MeSH): "sarcopenia", "food supplements", "protein", "amino acids", "leucine", "whey protein", "vitamin D" e "HMB". **RESULTADOS:** Para a pesquisa dos artigos foram selecionados os que possuíam critérios de clareza em relação ao título, identificando 22 artigos, sendo excluídos 12, restando apenas 10 que estavam condizentes com o objetivo principal. **CONCLUSÃO:** A ingestão adequada de nutrientes é a melhor forma de tratar a sarcopenia. A intervenção nutricional, com ingestão de alta quantidade de proteínas de soro do leite promove a síntese de proteínas no corpo, preservando ou aumentando os parâmetros observados. A suplementação nutricional é eficaz no tratamento da sarcopenia em idosos e os seus efeitos são positivos nas medidas de sarcopenia.

DESCRIPTORIOS: Proteínas; Aminoácidos; Vitamina D; Suplementos Nutricionais

ABSTRACT

OBJECTIVE: To analyze the effects of nutritional supplementation on Muscle Mass, Muscle Strength and Physical Performance in sarcopenic elderly. **METHODS:** Integrative review conducted using the PubMed and Cochrane Library databases, using the Medical Subject Headings (MeSH) descriptors: "sarcopenia", "food supplements", "protein", "amino acids", "leucine", "whey protein", "vitamin D" and "HMB". **RESULTS:** To search the articles, we selected those with clear title criteria, identifying 22 articles, 12 of which were excluded, leaving only 10 that were consistent with the main objective. **CONCLUSION:** Adequate nutrient intake is the best way to treat sarcopenia. Nutritional intervention, with ingestion of high amounts of whey protein, promotes protein synthesis in the body, preserving or increasing the observed parameters. Nutritional supplementation is effective in treating sarcopenia in the elderly and its effects are positive on sarcopenia measures.

DESCRIPTORS: Proteins; Amino acids; Vitamin D; Dietary Supplements

RESUMEN

OBJETIVO: Analizar los efectos de la suplementación nutricional sobre la masa muscular, la fuerza muscular y el rendimiento físico de ancianos sarcopênicos. **MÉTODOS:** Revisión integradora realizada a partir de las bases de datos PubMed y Cochrane Library, utilizando los descriptores Medical Subject Headings (MeSH): "sarcopenia", "food supplements", "protein", "amino acids", "leucine", "whey protein", "vitamin D" y "HMB". **RESULTADOS:** Para la búsqueda de los artículos, se seleccionaron los que tenían criterios de claridad en relación al título, identificando 22 artículos, siendo excluidos 12, quedando solamente 10 que eran consistentes con el objetivo principal. **CONCLUSIÓN:** La ingesta adecuada de nutrientes es la mejor manera de tratar la sarcopenia. La intervención nutricional, con la ingestión de una elevada cantidad de proteína de suero, promueve la síntesis de proteínas en el organismo, preservando o aumentando los parámetros observados. La suplementación nutricional es eficaz en el tratamiento de la sarcopenia en los ancianos y sus efectos son positivos en las mediciones de la sarcopenia.

DESCRIPTORIOS: Proteínas; Aminoácidos; La vitamina D; Suplementos nutricionales

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INTRODUCTION

The changings of the world's population composition in consequence of the increase of life's expectation and decrease of fecundity rate has resulted in the elder's percentual growth¹. In Brazil, it is estimated that in the next decades the prevalence of individuals with the age of sixty or more years will be bigger than 35,0% if compared to the actual situation².

Aging is associated with the loss of muscular mass (MM) and its evolution may result in sarcopenia, a disease most prevalent in older people. The occurrence varies according with the age: elderly people from 60 to 70 years have occurrence from 5 to 13,0%, while in elderly people with 80 years old or more the prevalence may get to 50,0%³.

The definition and the identification of sarcopenia are not yet totally elucidated. The term sarcopenia was used for the first time to describe the decline at the MM, muscular strength (FM) and muscular performance (DF) associated with age.

In Brazil, it is estimated that in the next decades the prevalence of individuals with the age of sixty or more years will be bigger than 35,0% if compared to the actual situation².

Although the definition of sarcopenia has managed to be widely accepted to be part of the clinical essays and at clinical practice only recently⁴.

The European's Work Group Over Sarcopenia in Elderly People has provided a functional concept for the sarcopenia that it's characterized progressive reduction at the MM, strength and physical inability, and consent that the sarcopenia's diagnose must be done using the parameters whom assess the low MM skeletal, FM e DF. However, the report created by this group has not entered into consensus about the Thresholds that characterize disease 5. Similar to that approach, the Asian's Group of Work for Sarcopenia has proposed the diagnosis based on the reduction of the MM combined with the bad physical performance⁶.

Based on the actual knowledge, nutrition has an important role in the treatment of sarcopenia. The use of whey protein food supplements, essential amino acids (EAA), vitamins or their mixtures have a central function in the MM's regulation. The inadequate consume of food may result in a

compensatory response in the skeletal muscles, therefore, nutritional interventions that promote the appropriate offer of nutrients act in the treatment and prevention of sarcopenic⁷.

The appropriate ingestion of proteins or amino acids (AA) is more effective if its response in the regulation of muscular proteins is considered. The addition of food proteins raises muscular protein synthesis, providing benefits in the result of the treatment or prevention of sarcopenia, being an essential component to improve the body's composition and the physical performance of the patients⁸.

The European Society of Clinical Nutrition and Metabolism has provided recommendations of daily consumption of proteins to maintain muscular force and strength. For healthy older people the ideal protein ingestion must include from 1,0 to 1,2 g/kg and for undernourished, at risk of desnutrition or carriers of acute or chronic diseases elder people the ideal consumption is from 1,2 to 1,5 g/kg⁹.

It 's indispensable the application of effective measures to reduce the accometiment of sarcopenia in older people and improve the life' s quality of the patients. Therefore this perception was elaborated with the following guiding question: "what are the effects of the nutritional supplementation on the muscular mass, muscular strength and physical performance in sarcopenic aged people?" The main aim of this research is to identify the contribution of the nutritional intervention from the supplementation to the modification of these parameters in the older people's population with sarcopenia.

METHODS

This article treats about one integrative revision of the literature, singular tool to ensure the practice fundamented in evidences, mainly in the field of health, with the synthesis of a diversity of studies about certain theme, who permit the searcher a analysis more detailed and profound, of scientific nature¹⁰.

This revision was built in six stages: (1)

identification of the matter and hypotheses of the research; (2) establishing of the standards of inclusion and exclusion/search at the literature; (3) definition of the informations to be collected from the studies; (4) critical evaluation of the studies included; (5) interpretation of the results; and the submission of the revision/synthese of the agnowledge.

The research was made during the months from february to april of 2012, and the search was directed to the articles published from 2015 to 2020. The keywords from the Medical Subject Headings (MeSH) was used to effectuate the research at the electronic database PubMed and Cochrane Library, were used associations of the keywords from MeSH written in english language: "sarcopenia", "food supplements", "protein", "amino acids", "leucine", "whey protein", "vitamin D" and "HMB". The selection was limited to the articles that had the keywords in its title and/or abstract. Articles published in the English language were reviewed and read thoroughly and in full, to determine if the essays met the eligibility standards.

Therefore, the standards of inclusion were: the article (original or from revision) published from the last five years, in Portuguese, English or Spanish language and be disponsible in full as well as presenting important relations with the thematic research. The standards of exclusion were: publishing made from more than five years, a different theme approach that does not answer the guiding question, or with unspecific description about the nutritional supplementations and its effects at the parameters set out in this revision' s objectives.

770 publications, in total, were found in a preliminary research. Of those, 537 articles were identified in the database PubMed and 233 in the Cochrane Library. To determine which ones would be included, primarily a reading of the titles and abstracts of these articles were made; They were selected based on the criterias of inclusion and exclusion. 22 articles had their titles and abstracts read, and after the screening, the complete text of 10 articles was reviewed and validated to compose this

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integrative revision.

Those 10 articles were evaluated accordingly to the following criteria: (1) the participants had 60 years old or more and show symptoms according to the diagnosis criteria for sarcopenia; (2) The nutritional supplementation has involved the offer of nutrients as proteins, essential amino acids (EAA), vitamin D and β -hidroxi β -“metilbutirato” of calcium (CaHMB); (3) At least one of the criterias of sarcopenia was measured: MM, FM or DF; (4) Studies with intervention of exercises were included if the measures of outcome related to the interventions include muscular mass and/or muscular strength and/or physical performance.

RESULTS

The sample of this study was composed of 10 relevant articles to the subject proposal, attending to the criteria of inclusion that was established. The following image (1), describes the stages of the methodology used to achieve the sample mentioned.

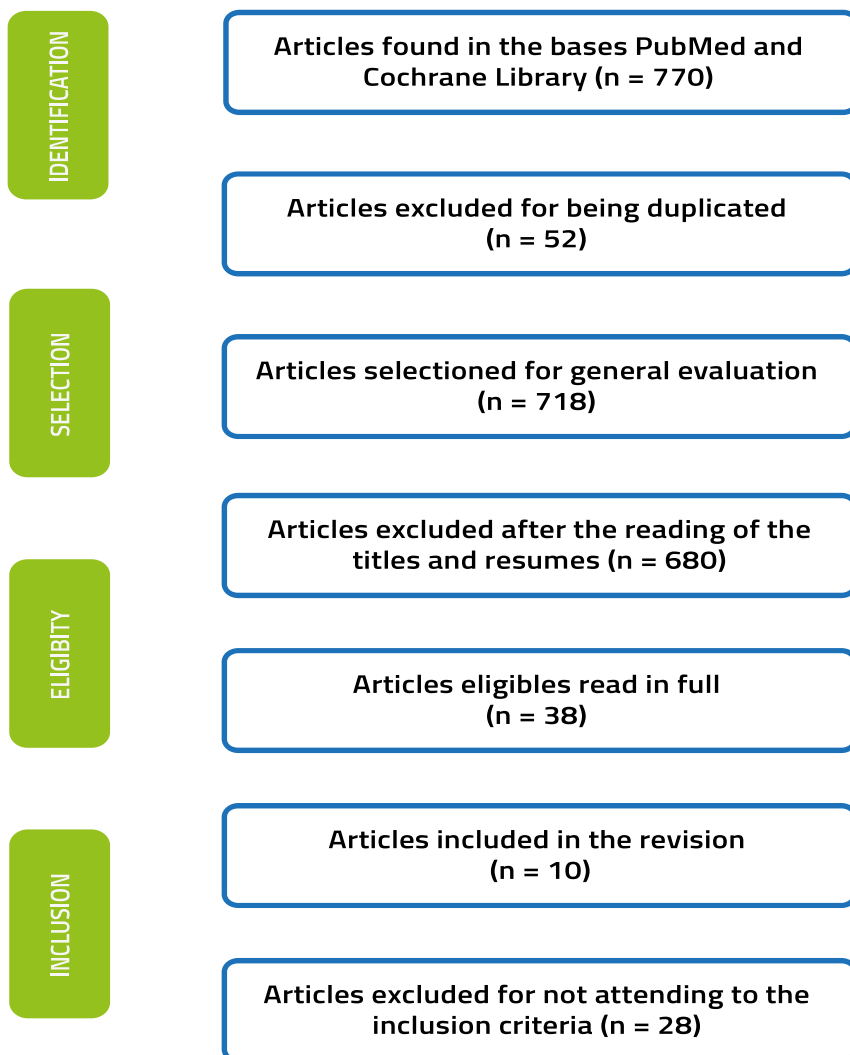
The effects of nutritional supplementation in the measures of sarcopenia, as MM, FM and DF are summarized in the following table (1).

DISCUSSION

In some of the studies the sarcopenia was measured accordingly to the guidelines proposed by the European Group of Work about Sarcopenia in Aged People 11;12;13;14;15, based in one or more criteria accepted of measure of the muscular function (low physical performance or low strength) and of muscular mass, with fat-free mass (MLG) appendicular skeletal divided for the square of their height below average for young adults (masculin $\leq 7,0$ kg / m²; feminin $< 5,5$ kg / m²), low strength of manual grip (FPM) (masculin < 30 kg; feminin < 20 kg) and/or low speed of march /ou ($\leq 0,8$ m / s walking 4,6 m)5.

Other measures were taken to evaluate the sarcopenia: the diagnosis algorithm was created based on the presence of low muscular function and decrease of MM

Figura 1 - PRISMA



Source: Cajazeiras, Paraíba, Brasil, 2021

16, and the skeptical appendicular muscle rate divided for the square of the height 17. Both studies have followed the criteria created by the Asian Work Group for Sarcopenia (masculin $\leq 7,0$ kg / m²)6.

Sarcopenia may be determined from the appendicular muscle mass (MMA) adjusted from the rate of body mass index (IMC) lower than 10,75 kg/m² or (IMC $< 18,04$ kg/m²)18. This classification it's also possible by using the cutoff point of the skeletal muscle mass index (IMME) $< 0,789$ e FPM < 26 kg19, suggested accordingly to the National's Healthy Institutes Foundation 20.

The rate of body mass index was used

to investigate the effects of the supplemental nutrition at the MM, revealing its rise. However, due to changes that occur at the body composition with aging process, like the low MLG and fat mass (MG) risen, beyond the changes of quantity of intra and extracellular water, those conditions affects the anthropometrics evaluation parameters, leading to an possible body mass index alteration 21.

At the only study that has evaluated the effects of CaHMB12 and that only the intervention's group has received supplement, the daily dose has corresponded to 1,5 g. The calcium's beta hydroxy beta methylbutyrate (CaHMB) is found between

Table 1 - Main characteristics and measurement of the used criteria of sarcopenia.

SOURCE	AGE GROUP	CHARACTERISTICS OF THE SAMPLES SEX (M/F)	MUSCULAR MASS	MUSCULAR STRENGTH	PHYSICAL PERFORMANCE
BAUER et al. 2015 ¹¹	[> 77]	individuals from the community 380 (133/247)	DXA	FPM	Score SPPB
ZDZIEBLIK et al. 2015 ¹²	[> 72]	Individuals from the community 53(53/0)	DXA	FIQ	Non determined
RONDANELLI et al. 2016 ¹³	[≥ 80]	Individuals hospitalised 130 (53/77)	DXA	FPM	AVDs' s performance
MALTAIS; LADOUCEUR; DIONNE, 2016 ¹⁸	[60 a 75]	Individuals from the community 26(26/0)	DXA	1RM in 2 different MM groups	Speed of walking, TUG, chair' s elevation and "in feet" balance tasks.
CRAMER et al. 2016 ¹⁴	[≥ 65]	Individuals from the community. Malnourished patients 330 (126/204)	DXA	PT for leg extension exercise, FIQ and FPM	Walking speed
KEMMLER et al., 2017 ¹⁹	[≥ 70]	Individuals from the community. Patients with sarcopenic obesity 100 (100/0)	BIA	FPM	Non determined
ZHOU et al. 2018 ¹⁷	[60 a 80]	Individuals from the community. Patients with sarcopenic obesity 60 (60/0)	BIA	Not determined	Non determined
YAMADA et al. 2019 ¹⁶	[≥ 65]	Individuals from the community 112 (39/73)	BIA	FEJ	Time of walking, maxime time of walking, performance at the one leg support test and chair' s test.
YOSHIMURA et al. 2019 ³⁹	[>79]	Individuals hospitalized after AVC 44 (14/30)	BIA	FPM	Performance of the AVDs (MIF)
ARNAU et al. 2020 ¹⁵	[>78]	Institutionalized individuals 50 (14/29)	BIA	FPM	Speed of walking

Source: researching data
 Subtitle: DXA, dual-energy X-ray absorptiometry; FPM, handgrip strength; SPPB, Physical Performance Short Battery; FIQ, quadriceps isokinetic strength; FEJ, knee extension strength; ADLs, activities of daily living; RM, maximum rotation; PT, ringing peak; BIA, bio-impedance analysis; MIF, Functional Independence Measure.

Table 2 - Characterising the intervention and its effects over the parameters of sarcopenia in aged people.

SOURCE	INTERVENTION (G/DAY)	LENGHT IN WEEKS	MAIN RESULTS
BAUER et al. 2015 ¹¹	Group 1 SUPP: milk' s serum protein (40 g), vitamin D (1600 UI) e EAA [11 g (3 g de LEU)] Group 2 CON: PLA (isocaloric product without protein content)	13	The gain of MM was higher than in the group SUPP, if compared with the group CON (P = 0,045). The FPM and the SPPB have improved in both groups (SUPP e CON) The group SUPP had the best performance at the "chair' test", if compared with the other group CON (P = 0,018)

ZDZIEBLIK, et al. 2015 ¹²	Group 1 SUPP: collagen' s peptide (15 g) + RET Group 2 CON: PLA (silica) + RET	12	The collagen has improved the effect of the RET in the group SUPP, whom has risen significantly the MLG e FIQ (P < 0,01), and declined significantly the MG (P < 0,01), if compared with the group CON) P < 0,05, for all)
RONDANELLI et al. 2016 ¹³	Group 1 SUPP: Whey' s protein (22 g), EAA [10,9 g (4 g de LEU)] e vitamin D [2,5 µg (100 UI)] + AF; Group 2 CON: PLA (isocaloric product of maltodextrin) + AF	12	The group SUPP + AF: has risen significantly a MLG (P < 0,001), MM (P = 0,009), FPM (P = 0,001) and the AVDs (P = 0,001), when compared with the group CON
MALTAIS; LADOUCEUR; DIONNE, 2016 ¹⁸	Group 1 EAAsupp: soy' s protein (12 g) e EAA (7 g) [3,5 g de LEU] + RET; group 2 EAAmilk:Whey' s protein (13,53 g), EAA (7 g) [3,5 g de LEU] + RET; Group 3 CON: PLA (rice milk, protein, carbohydrates and fat) + RET	12	The MLG, MM and the IMC has risen significantly in all of the groups (EAAsupp, EAAmilk and CON) (P ≤ 0,05).All groups (EAAsupp, EAAmilk e CON) had at least one parameter of the FM improving (P ≤ 0,05). The group Had better results at the TUG test. At the group EAAmilk and at the group CON, there were improves at the FM, although, there was no difference at the DF (P ≤ 0,05)
CRAMER et al. 2016 ¹⁴	Group 1 SUPP: milk' s serum protein (20 g), CaHMB (1,5 g) e vitamin D (499 UI); Group 2 CON: milk' s serum protein (14 g) and vitamin D (147 UI)	24	The IMC, the body wheight and the MG have increased in both groups (SUPP e CON) (P < 0,001). The elder ones with severe sarcopenia (44%) have shown MM, PT, QM, FPM and lower walking speed, as individuals with light and moderate sarcopenia whom has presented MM, PT, QM, FPM and higher walking speeds (P = 0,032).
YAMADA et al, 2019 ¹⁶	Group 1 SUPP: milk' s serum protein (10 g), vitamin D [800 UI] + RET. Group 2 RET. Group 3 SUPP: milk' s serum protein (10 g), vitamin D (800 UI). Group 4 CON: has not received PLA	12	The group SUPP + RET had an significantly improved MM, at FEJand at the maximum walking time, if compared with the others groups (RET, SUPP e CON) (P < 0,05)
YOSHIMURA et. al.2019 ³⁹	Group 1 EAA (7,5g) + RET Group 2 CON: has not received PLA, but held RET	8	The IMM has risen significantly at the group EAA + RET, and there was no rising at the group CON (P < 0,01). The FPM and the MIF has risen significantly in both groups (EAA + RET e CON), although, significantly only in the group EAA + RET, if compared with the group CON (P < 0,05) e (P < 0,045), respectively.
ARNAU et al., 2020 ¹⁵	Group 1 LEUsupp: LEU (6 g) Group 2 CON: PLA (lactose)	13	CON) at the IMM (P = 0,08) and at the values of FPM (P = 0,55). There was a significant difference between the groups in the time of walking, with a reduction in the time needed to complete the distance in the group LEUpp (P = 0,011).
ZHOU et al., 2018 ¹⁷	Group 1 EAA (10 g) + AE Group 2 EAA (10 g)	28	Both groups (EAA + AE e EAA) showed significant reduction at the %GC and rising of the IMEA if compared with the basal values (P = 0,000). Between the two groups (EAA + AE e EAA) there was significant differences at the reduction % GC after 12, 20 and 28 weeks of treatment (P = 0,000) and the rising of the IMEA after 20 and 28 weeks (P = 0,000) for both). The values of p < 0,05 were considered significatives.
KEMMLER et al., 2017 ¹⁹	Group 1 SUPP; milk' s serum protein (1,7 -1,8g/ kg) and vitamin D (800 UI)+WB- EMS; Group 2 SUPP: milk' s serum protein (1,7-1,8g/ kg) and vitamin D (800 UI); Group 3 CON : has not received PLA	16	The group SUPP + WB-EMS and the gropu SUPP has significant loss GC (P < 0,001), if compared with the other group CON (P ≤ 0,004). There was no differences between WB-EMS and the group SUPP to GC (P = 0,051). The IMM was bigger at the groups SUPP+ WB-EMS and SUPP, if compared with the group CON (P < 0,001). The FPM was higher only related with the SUPP + WB-EMS (P < 0,001)

Source: research data

Subtitle: SUPP, supplement; CON, control; PLA, placebo; RET, resistance exercise training; MG, fat mass; MLG, fat-free mass; IMEA, appendicular skeletal mass index; PA, physical activity; EAAsupp, soy protein supplement and EAA; EAAmilk, whey protein supplement and EAA; BMI, body mass index; IMM, muscle mass index; IMEA, appendicular skeletal mass index; QM, muscle quality; WB-EMS, whole-body electromyostimulation; AE, acupuncture, electrical; GC, body fat; %BF, percentage of body fat; LEUsupp, leucine supplement;

the favorable nutritional supplements to maintain the adequate muscular lean mass status. CaHMB is a metabolite formed from the leucine's decomposition, functioning as an anabolism regulator to the muscular proteins that results in a rise of lean muscle mass 22.

The ideal nutritional supplementation in geriatric patients has shown that the daily supplementation of CaHMB (usually 3g/dia) has extended the anticatabolic stims, promoted the anabolism, reducing the proteólisis and rising the protein synthesis. However, this study researchers have recommended that more tests should be done to define the effects of the supplementations of this nutrient at the MM and DF, establishing a unique nutritional intervention standard or a pattern which shows statistics results more significant 23.

Four clinic essays, in which a study has used the collagen peptide 12, has used a mixture of whey protein, EAA and vitamin D 13, one of those has provided proteins 19, an the other has offered a mixture of whey protein, CaHMB e vitamin D 13, they contacted an significative rise at the MLG. This protein can be maintained or increased from adequate protein consumption, due to the anabolic effect that is proportional to the skeletal muscle 24.

The protein quality it's also a determining factor. The high biological value of a protein is considered by the presence of EAA, leucine, in particular, which has important regulation acting at the skeletal muscle that are necessary to satisfy the protein synthesis demands. Beyond that, the protein anabolic effect and EAA may be improved with the addition of CaHMB, for with the aging, the protein synthesis may provoke a limited response to the protein and AA, causing an anabolic resistance 25.

Modifications at the fat mass (MG) were observed in two clinical essays: one of them through the administration of the collagen peptide 11 and the other with protein 18. Both have shown significant reduction of MG, demonstrating that the protein ingestion increases the muscular protein synthesis level, beyond reducing the MG. Proteins

with a high quantity of EAA and branched chain amino acids (BCAA) generate positive effects at the muscular nitrogen equilibrium, resulting in an increase of protein synthesis 19.

The use of whey protein, CaHMB and vitamin D was associated to the risen of MG between the elders with severe sarcopenia 13, what might be a result of the most affected condition of the disease, related to the inflammatory process, metabolic and vascular dysfunction, ocasionating negative responses of the skeletal muscle to the nutritional supplementation consume at the differents types of sarcopenia diagnosis 26.

Body fat (GC) was evaluated in two clinical essays in which the participants showed sarcopenic obesity, characterized by the reduction of skeletal muscle and rise of body fat 27. The GC has decreased significantly, whats may be attributed to the high protein ingestion (1,7-1,8g/kg) of high biological value, with a proportion of >2,8 g of leucine, for is known that it may result in positive effects at the nitrogen retention and at the synthesis of new muscular protein. The muscular mass was measured in seven clinical essays, in which its significant rise was evidenced, demonstrating that the higher protein consume results in positive effects at the recuperation of lean body mass, increasing the anabolic response of the sarcopenia treatment's essential muscle demonstrating that the more elevated protein consume results in positive effects at the lean body mass recovery, increasing the muscle's anabolic response that is essential in the sarcopenia's treatment 28.

The PROT_AGE study group recommends that the ingestion of protein must be from 25 to 30g, contening 2,5 to 2,8 g of leucine to prevent and treat the sarcopenia and from 1,2 to 1,2 g/kg, daily. The protein ingestion is recommended by $\geq 1,2\text{g/kg/day}$ to elders who have active lifes or practice physical exercises. However, exceeding those limits may block the positive effects in sarcopenic aged people 29.

The isolated nutritional supplementation of leucine has obtained low effects at the gain of MM and strength, but at the control group there was a decline at these

It is important to evidence that, the quality of life in the physical scope, reflects the quality of other domains, as well as the psychic, social relations, satisfaction with life and with health, among other factors that are significant to a healthy aging

parameters 14. Therefore, the leucine classified as a EAA has developed important functions at the regulatory actions at the skeletal muscles, decreasing the proteolysis and proportioning the preservation of the lean muscular mass at the patients throughout the supplementary treatment 30.

The nutritional supplementation has perform an important role at the FM, for the loss of mobility associated to the age may lead to the muscle's disuse for a long period and result into problems with resistance to the anabolic proteins, influencing at the use of proteins with changes at the gain and loss of muscular proteins, what reduce gravely the strength. The protein's supplementation, AA and the co-supplementation with other nutrients are capable of leading to the protein synthesis and, in that way, increase the strength associated with the increasing of MM in older people with sarcopenia 31.

The adequate status of vitamin D has positive effects especially at the FM and DF 32 in which the participants have initially received a 100.000 UI dose and, posteriorly 200.000 UI of vitamin D at week and during four months. The results indicate that

supplementation has increased the FM, however, the adequate levels to preserve it or maintain it were not determined 33.

The evaluation performance of the 25-hydroxyvitamin D (25OHD) at the muscular-skeletal disturbs have obtained increasingly positives results. The deficiency of vitamin D is associated with higher risks of falls and reduction of the bone mass, resulting in bone fragility 34.

The protein consume and vitamin D are related with the preservatiog necessary to define which are the protein's energy ideal values associated to a high physical fonction³⁸.

The proteins nutritional supplementation, AA, vitamin D and A CaHMB are appropriate to increase the physical function of older and sarcopenic people. One narrative revision evaluate the observational evidences and interventionists about the associations and the nutrient role at the MM, FM and DF of healthy elder people or in risk of fragility and constate that the supplementation combined with protein, leucine and vitamin D may bring additional benefits at the sarcopenia prevention and functional decline³⁹.

It is important to evidence that, the quality of life in the physical scope, reflects the quality of other domains, as well as the psychic, social relations, satisfaction with life and with health, among other factors that are significant to a healthy aging⁴⁰.

CONCLUSION

The nutritional supplementation has shown itself as deeply essential at the mentioned aspects related to sarcopenia in elderly, presenting a significant increase at the lean body mass parameters, strength and improve at the physical performance. The proteins may perform a protect role at the skeletal muscle's health, however, the anabolic effects of a mixture that contains major quantity of whey proteins and high levels of essential amino acids, in particular the leucine, have potentialized the lean mass synthese and the co-supplementation with others nutrients (vitamin D and CaHMB)has helped at the manutention and increase of the anabolic resistance caused by the aging.

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