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THE ERGOGENIC EFFECTS OF VITAMIN D AND CREATINE IN THE PREVENTION AND TREATMENT OF SARCOPENIA IN THE ELDERLY

EFEITOS ERGOGÊNICOS DA VITAMINA D E CREATINA NA PREVENÇÃO E TRATAMENTO DA SARCOPENIA EM IDOSOS

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ABSTRACT

Objective: to carry out a bibliographical review of the effects of the association of vitamin D and creatine supplementation in the prevention and treatment of sarcopenia in the elderly. Methodology: for the collection of scientific articles, original studies were used, published in journals indexed in databases. Study results were compiled and discussed to identify trends and relevant conclusions. Results: among the three reviewed articles addressing creatine exclusively, two were long-term and showed positive effects, and only one of them did not show significant effects. As for vitamin D, even though it has been studied in aging, its application in sarcopenia is debatable. The results seem to be more promising when the individual has low serum levels of vitamin D. Some studies have shown positive results when using vitamin D supplementation in sarcopenic individuals, but it is important to emphasize that only one of these studies tested it alone. Conclusion: vitamin D and creatine seem to be promising as supplements to combat sarcopenia in the elderly, although there are studies that have separately analyzed the effectiveness of vitamin D and creatine in combating sarcopenia, so far, there are no studies that have specifically investigated the combination of these two supplements for this condition. This gap in the literature underscores the need for further research to assess the possible synergy or interaction between vitamin D and creatine in the context of sarcopenia.

Keywords: Aging; Dietary Supplements; Muscle Mass.

RESUMO

Objetivo: realizar uma revisão bibliográfica dos efeitos da associação da suplementação de vitamina D e creatina na prevenção e tratamento da sarcopenia em idosos. Metodologia: para coleta dos artigos científicos foram utilizados estudos originais, publicados em periódicos indexados em bases de dados. Os resultados dos estudos foram compilados e discutidos para identificar tendências e conclusões relevantes. Resultados: observou-se que dos três artigos revisados abordando a creatina exclusivamente, dois foram de longo prazo e evidenciaram efeitos positivos, e apenas um deles não evidenciou efeitos significativos. Quanto à vitamina D, mesmo sendo estudada nos idosos, sua aplicação na sarcopenia é discutível. Os resultados parecem ser mais

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promissores quando o indivíduo apresenta baixos níveis séricos de vitamina D. Alguns estudos mostraram resultados positivos ao utilizar a suplementação de vitamina D em indivíduos sarcopênicos, mas é importante ressaltar que apenas um desses estudos a testou isoladamente. Conclusão: a vitamina D e a creatina parecem ser promissoras como suplementos para auxiliar no tratamento da sarcopenia em idosos, embora existam estudos que analisaram separadamente a eficácia da vitamina D e da creatina no combate à sarcopenia, até o momento, não há estudos que tenham investigado especificamente a associação desses dois suplementos para essa condição. Essa lacuna na literatura ressalta a necessidade de pesquisas adicionais para avaliar a possível sinergia ou interação entre a vitamina D e a creatina no contexto da sarcopenia.

Palavras-chave: *Envelhecimento; Massa Muscular; Suplementos alimentare*s.

INTRODUCTION

The aging process is characterized by biological events that occur naturally and are inherent to the human condition. Despite all the technological advances in geriatric medicine, aging remains irreversible. The physiological changes associated with age, along with the pathologies that arise during this process, directly affect the lives of older adults, impacting their health and quality of life (ZANOTTI; GIAZZON; WENDER, 2019). According to the World Health Organization (WHO), individuals aged 60 years or older in developing countries, or 65 years or older in developed countries, are classified as elderly (WHO, 2005).

Recent data collected in the city of São Paulo indicate that the prevalence of sarcopenia among individuals over 60 years of age is 17%, with a prevalence of 12% in men and 20% in women (DIZ *et al*., 2017). This finding reinforces the need to increase concern regarding the care of this population.

One of the most relevant characteristics of the aging process is musculoskeletal depletion, with a decrease in muscle contraction strength and bone mineral mass, which directly affects vital functions and the quality of life of the elderly, such as mobility, autonomy, and overall health (ARAÚJO; BERTOLINI; JUNIOR, 2014). This reduction in lean body mass, coupled with the loss of strength due to aging, is technically known as sarcopenia. It involves approximately a 40% reduction in lean mass between the ages of 20 and 60 and increases according to age, physical activity level, and sex. The lower limbs are the most affected, showing losses of 1% to 2%, along with an increase of about 7.5% in adipose tissue. Notably, the loss of lean mass begins to impact individuals significantly after the age of 40 and becomes more pronounced after 50 (PIERINE; NICOLA; OLIVEIRA, 2009).

The new consensus from the European Working Group on Sarcopenia in Older People (EWGSOP2) defines this comorbidity as a muscle disease (muscle failure) resulting from adverse changes in lean mass accumulated throughout life. It is common in older adults but can also occur earlier in life (CRUZ-JENTOFT *et al*., 2019).

Given the effects of aging on health and quality of life among older adults, several strategies have been proposed to mitigate the progression of muscle mass loss, decreased muscle strength,

and reduced bone mineral density - notably including vitamin D and creatine supplementation (DENISON *et al.*, 2015).

Studies have shown that creatine (**α**-methyl-guanidinoacetic acid) is a naturally occurring amine synthesized endogenously in the kidneys, liver, and pancreas from two amino acids: arginine and glycine. It can also be obtained exogenously through diet, particularly from red meat and fish. Creatine concentration in the body exists in free form (60-70%) or as phosphocreatine, with over 90% stored in skeletal muscle. Its recognition as a therapeutic agent in a wide range of conditions has increased (GUALANO *et al.*, 2010). The use of creatine in the prevention and treatment of age-related sarcopenia has proven to be an effective ergogenic aid for increasing strength (TSCHOLL *et al.*, 2010) and delaying muscle mass loss (DE MELO; ARAUJO; REIS, 2016). Evidence suggests that creatine supplementation is safe and effective, as studies have demonstrated that it increases muscle mass, strength, and endurance in older adults compared to placebo groups (CANDOW *et al.*, 2021).

Another factor associated with the incidence and progression of sarcopenia is low serum vitamin D levels. Current literature shows that vitamin D deficiency is positively related not only to sarcopenia but also to cardiovascular diseases, obesity, and cancer (REMELLI *et al.*, 2019).

One study demonstrated that the combined supplementation of vitamin D (1000 IU), whey protein (60 g), creatine (5 g), eicosapentaenoic acid (EPA, 2,800 mg), and docosahexaenoic acid (DHA, 1,780 mg) administered for six weeks significantly increased muscle mass in sarcopenic older adults, as assessed by dual-energy X-ray absorptiometry (DXA). However, it cannot be concluded that vitamin D and creatine were solely responsible for these results, as they were combined with other compounds (BELL *et al.*, 2017).

As previously discussed, and given the undeniable demographic increase in the elderly population since the last century, there are still no established parameters for the use of supplements in the treatment and prevention of sarcopenia among older adults. Since reduced muscle mass is associated with injuries such as falls, fractures, decreased quality of life, and mortality, it is essential to evaluate nutritional ergogenic factors that can mitigate this condition. Although genetic and lifestyle factors may accelerate muscle weakness and progression toward impairment and functional disability, interventions with vitamin D and creatine as ergogenic resources appear to slow down or even reverse these processes, while pharmacotherapy should be reserved as an adjunct treatment.

Therefore, the objective of this study is to conduct a literature review on the individual and combined effects of vitamin D and creatine supplementation in the prevention and treatment of sarcopenia in older adults.

METHODOLOGY

This study is based on a qualitative approach, conducted through a review of scientific studies with the aim of gathering and synthesizing research results on a specific topic in an organized manner.

It serves as a tool to enhance knowledge regarding the ergogenic effect of vitamin D associated with creatine in the prevention and treatment of sarcopenia in older adults. The literature review method enables the integration of various experimental and non-experimental research methodologies, emphasizing its role in evidence-based clinical practice.

The research involved a comprehensive search for articles indexed in the following databases: Latin American and Caribbean Literature on Health Sciences (LILACS), Scientific Electronic Library Online (SciELO), and Public Medical Publications (PubMed).

The following Medical Subject Headings (MeSH) descriptors were used: *Sarcopenia*, *Supplementation on sarcopenia*, *Vitamin D as a treatment for sarcopenia*, and *Creatine as a treatment for sarcopenia*. The procedure was based on studies published in Portuguese and English, between 2000 and 2023, and available in full text.

To describe the selected articles, a flowchart illustrating the selection process and a table summarizing key information (author(s), year of publication, title, objectives, and main findings) were created. Subsequently, a comparative discussion of the different studies was conducted to draw conclusions based on the compiled results.

The review process was carried out in the following stages: Formulation of the research problem; Data collection; Evaluation of collected data; Analysis and interpretation of data; Presentation of results.

As exclusion criteria, articles published outside the defined time frame, duplicates found in more than one database, theses, dissertations, review articles, protocols, recommendations, and studies not available in full text were disregarded.

RESULTADOS

A total of 32 articles were found in the databases consulted. After applying the inclusion and exclusion criteria, ten articles were selected for analysis. The characteristics of the studies identified are listed in Table 1 below, highlighting the main research sources on the use of creatine and vitamin D as interventions for sarcopenia in the elderly. The study protocols were highly heterogeneous. Different types of physical activities were investigated across populations that varied in sex, settings, and health status.

Table 1 - Summary of findings from studies on the effects of creatine and vitamin D in sarcopenia.

Author/Year	Objective	Methodology	Results
Aguiar *et al.* (2013)	To investigate the long-term effects of creatine combined with resistance training in a population of elderly Brazilian women.	12-week intervention. Participants were randomly assigned to two groups: (i) exercise + creatine (n=9); (ii) exercise + placebo (n=9). Participants received 5 g/day of creatine and performed resistance training three times per week. Treatments were administered in a double-blind manner.	Results indicate that long-term creatine supplementation combined with resistance training improves the ability to perform functional strength tasks and promotes greater gains in maximal strength, lean mass, and muscle mass in elderly women.

Bauer *et al.* (2015)	To verify the efficacy of protein, vitamin D, and leucine supplementation in improving outcomes in individuals with sarcopenia.	380 sarcopenic older adults (65% women, 35% men), mean age 77.7 years, were divided into two groups: active (n=184) received a nutritional supplement containing 20 g whey protein enriched with 4 g leucine and 800 IU vitamin D, twice daily before breakfast and lunch; control group (n=196) received an isocaloric product twice daily for 13 weeks.	The study confirmed improvements in appendicular muscle mass and lower-limb strength in the active group compared to the control. No significant differences were observed in handgrip strength or Short Physical Performance Battery results between groups.
Rondanelli *et al.* (2016)	To test the hypothesis that a nutritional supplement containing whey protein, essential amino acids, and vitamin D combined with resistance training improves sarcopenia.	Randomized, double-blind, placebo-controlled study with 130 older adults (77 women, 53 men) for 12 weeks. Body composition was analyzed by DXA, muscle strength by handgrip dynamometry, and blood biochemistry was used to assess nutritional and health status before and after 12 weeks of intervention.	Compared to physical activity plus placebo, supplementation combined with physical training increased lean mass, relative skeletal muscle mass, fat distribution, and handgrip strength.
El Hajj *et al.* (2018)	To evaluate the effects of vitamin D supplementation on handgrip strength and lean mass in pre-sarcopenic individuals.	Lebanese participants deficient in vitamin D (n=128; 62 men, 66 women) received either 10,000 IU cholecalciferol (vitamin D group; n=64) three times per week or placebo (n=64) for 6 months. 115 completed the study: 59 were normal-weight, 56 obese. Functional, strength, and biochemical assessments were performed at baseline and six months.	Results showed that vitamin D use in pre-sarcopenic older adults was beneficial for skeletal muscle mass. However, no significant improvement was observed in handgrip strength compared with placebo. The effects of vitamin D were more pronounced among normal-weight individuals.
Pinto *et al.* (2016)	To examine the efficacy of low-dose creatine supplementation combined with resistance training on muscle mass in elderly individuals.	32 men and women randomly assigned to: creatine group (5 g/day + resistance training, n=14) and placebo group (5 g/day maltodextrin + resistance training, n=13). Both groups trained for 12 weeks (60 min, 3×/week).	An increase in skeletal muscle mass index was observed in the treated group compared to placebo.
Chami & Candow (2019)	To evaluate the effect of creatine supplementation dosage strategies combined with resistance training on muscular performance during aging.	Double-blind repeated-measures study with 33 participants randomized to three groups: High-Creatine (0.3 g/kg/day creatine + 0.1 g/kg/day maltodextrin), Moderate-Creatine (0.1 g/kg/day creatine + 0.3 g/kg/day maltodextrin), or Placebo (0.4 g/kg/day maltodextrin) for ten consecutive days.	Short-term creatine supplementation, regardless of dosage or resistance training, did not show significant effects on muscular performance or functionality in older adults.

Bo *et al.* (2019)	To examine the effect of a nutritional supplement containing whey protein, vitamin D, and vitamin E on sarcopenia indicators.	60 sarcopenic elderly individuals participated in a randomized, double-blind, placebo-controlled trial for 6 months. Muscle mass (bioimpedance), handgrip strength, gait speed, chair rise, TUG test, SF-36 quality of life, and biochemical markers were evaluated pre- and post-intervention.	Combined supplementation with whey protein, vitamin D, and E significantly improved skeletal muscle mass index, muscle strength, and anabolic markers (IGF-I, IL-2) in elderly with sarcopenia.
Yamada *et al.* (2019)	To investigate the synergistic effects of bodyweight resistance exercise and protein + vitamin D supplementation on skeletal muscle in sarcopenic elderly.	112 sarcopenic older adults randomly assigned to four groups: (1) resistance training + supplementation (n=28); (2) exercise only (n=28); (3) supplementation only (n=28); (4) control (n=28). Interventions lasted 12 weeks. Thigh muscle density was assessed using ultrasound.	The study concluded that combining vitamin D + protein supplementation with resistance training effectively improves muscle quality and strength in sarcopenic elderly individuals.
Negro *et al.* (2019)	To confirm previous findings suggesting that combined supplementation may enhance muscle strength, mass, and power, and to assess neuromuscular fatigue and aging-related changes.	38 healthy elderly (30 women, 8 men) were randomized into supplement or placebo groups. The supplement group received twice-daily doses for 12 weeks of a multi-ingredient formula containing EAA, creatine, vitamin D, and Muscle Restore Complex® (alpha-lipoic acid, coenzyme Q10, resveratrol).	The 12-week multi-ingredient EAA-based supplementation did not alter electromyographic fatigue parameters but positively influenced muscle mass, strength, power, and visceral fat, offsetting over one year of age-related muscle loss.
Nilsson *et al.* (2020)	To test the efficacy of home-based resistance training combined with a set of five supplements (M5) over 12 weeks.	44 sedentary older men (normal to high BMI) participated in a 12-week resistance training (3×/week) combined with a multi-nutrient supplement (M5) containing whey protein (40 g/day), creatine (3 g/day), casein (16 g/day), vitamin D (1,000 IU/day), and omega-3 (10 ml/day).	Results showed significant improvements in muscle mass, anti-inflammatory, and cognitive benefits. The study concluded that M5 is safe and may potentiate the effects of resistance training in older men.

Legend: EAA - Essential Amino Acids; IL-2 - Interleukin 2; BMI - Body Mass Index; CG - Creatine Group; PG - Placebo Group; HBRE - Home-Based Resistance Exercise; M - Men; IGF-I - Insulin-Like Growth Factor I; W - Women; SF-36 - Short-Form 36-Item Health Survey; SUPP - Supplement; TUG - Timed Up and Go; IU - International Unit; RT - Resistance Training.
Source: Prepared by the authors.

DISCUSSION

This review aimed to conduct a bibliographic analysis of the effects of vitamin D and creatine supplementation in the prevention and treatment of sarcopenia in older adults. A total of 10 studies examining the impact of therapeutic interventions involving isolated or combined supplementation of creatine and vitamin D were evaluated. The study protocols were considerably heterogeneous, involving different types of physical activities, populations varying by sex, setting, and health status.

It is noteworthy that some studies included multiple supplements, which may represent a bias in attributing the observed effects solely to the compounds under study.

As shown in Table 1, the supplementation protocols in sarcopenic individuals-especially when combined with resistance training-proved effective in preventing and reducing sarcopenia indices in older adults, leading to improvements in quality of life due to the multiple benefits associated with this practice (AGUIAR *et al.*, 2013; PINTO *et al.*, 2016; BO *et al.*, 2019; YAMADA *et al.*, 2019; NEGRO *et al.*, 2019; BAUER *et al.*, 2015; NILSSON *et al.*, 2020; EL HAJJ *et al.*, 2018; RONDANELLI *et al.*, 2016).

Among the ten studies included in the review, nine reported positive effects of supplementation on muscle mass in older adults, supporting improvements in sarcopenia status. Only one study did not observe increases in muscle mass or strength compared to the placebo group; however, this study had a very short duration-ten consecutive days of exercise-and a lower-than-usual dose (high-dose creatine group: 0.1 g/kg/day; low-dose group: 0.3 g/kg/day) (CHAMI; CANDOW, 2019). The other positive studies used longer intervention periods and higher doses-12 weeks and 5 g/day (PINTO *et al.*, 2016; AGUIAR *et al.*, 2013)-confirming that nutritional and physical treatments are more effective over longer durations, as suggested by other research (MARGUTTI; SCHUCH; SCHWANKE, 2017; MARTINEZ; CAMELIER; CAMELIER, 2014). Recently, Pessoa *et al.* (2023) concluded in a review that creatine plays an anabolic and anti-inflammatory role, offering a therapeutic strategy for age-related changes, particularly sarcopenia.

Regarding vitamin D, it has been widely studied for its potential role in improving muscle mass and strength in individuals with low serum levels (ALMEIDA; COLOMBINI; MACHADO, 2020). Although vitamin D therapy is recognized in the European Working Group on Sarcopenia in Older People (EWGSOP2) consensus (CRUZ-JENTOFT *et al.*, 2019), evidence of its effects on muscle strength and sarcopenia improvement remains limited (UCHITOMI; OYABU; KAMEI, 2020). Some studies in this review reported positive results with vitamin D supplementation in sarcopenic individuals (BO *et al.*, 2019; YAMADA *et al.*, 2019; RONDANELLI *et al.*, 2016; NEGRO *et al.*, 2019; BAUER *et al.*, 2015; NILSSON *et al.*, 2020). However, only one of these studies tested vitamin D as a single intervention. Even without resistance training, El Hajj *et al.* (2018) found that a daily dose of 10,000 IU increased skeletal muscle mass, although not muscle strength, in pre-sarcopenic older adults with vitamin D deficiency.

Another important aspect to highlight is that among the studies analyzed, 60% involved supplementation combined with resistance training, while 40% investigated supplementation alone, which complicates determining the authenticity of the effects of creatine and vitamin D on sarcopenia. Furthermore, studies examining creatine in synergy with vitamin D are scarce. In this review, 3 out of 10 studies investigated creatine alone, while 7 out of 10 studies involving vitamin D used it as part of multi-ingredient formulas. No study was found evaluating creatine and vitamin D combined; when present, these compounds were used within multi-ingredient interventions or in isolation.

In addition to these ergogenic aids, numerous studies have examined the effects of whey protein, branched-chain amino acids (BCAA), and β-hydroxy-β-methylbutyrate (HMB) in the treatment of sarcopenia (BEAUDART *et al*., 2017).

CONCLUSION

In conclusion, based on the reviewed studies, the ergogenic effects of vitamin D and creatine, either individually or in combination, on the prevention and treatment of sarcopenia are evident. However, the synergistic effect of these two compounds remains inconclusive, as most studies analyzed included additional ingredients and physical exercise as part of the methodology. Therefore, further research is essential to clarify the role of supplementation in sarcopenia, particularly regarding the combined use of creatine and vitamin D, which remains insufficiently explored in the current literature.

REFERENCES

AGUIAR, A. F. *et al.* Long-term creatine supplementation improves muscular performance during resistance training in older women**. Eur J Appl Physiol**., [*s.l.*], v. 113, n. 4, p. 987-996, apr. 2013. Disponível em: https://doi.org/10.1007/s00421-012-2514-6. Acesso em: 03 jun. 2023.

ALMEIDA, D.; COLOMBINI, A.; MACHADO, M. Creatine supplementation improves performance, but is it safe? Double-blind placebo-controlled study. **J Sports Med Phys Fitness**, [*s.l.*], v. 60, n. 7, p. 1034-1039, jul. 2020. Disponível em: https://doi.org/10.23736/s0022-4707.20.10437-7. Acesso em: 03 jun. 2023.

ARAÚJO, A. P; BERTOLINI, S. M. M. G; JUNIOR, J. M. Alterações morfofisiológicas decorrentes do processo de envelhecimento do sistema musculoesquelético e suas consequências para o organismo humano. **Perspectivas: biológicas & saúde,** Campos dos Goytacazes, v. 12, n. 4, p. 22-34, 2014. Disponível em: https://doi.org/10.25242/8868412201442. Acesso em: 02 jun. 2023.

BAUER, J. M. *et al.* Effects of a vitamin D and leucine-enriched whey protein nutritional supplement on measures of sarcopenia in older adults, the PROVIDE study: a randomized, double-blind, placebo-controlled trial. **J Am Med Dir Assoc.**, [*s.l.*], v. 16, n. 9, p. 740-747, sep. 2015. Disponível em: https://doi.org/10.1016/j.jamda.2015.05.021. Acesso em: 02 jun. 2023.

BEAUDART, C. *et al.* Sarcopenia Working Group. Nutrition and physical activity in the prevention and treatment of sarcopenia: systematic review. **Osteoporos Int**., [*s.l.*], v. 28, n. 6, p. 1817-1833, jun. 2017. Disponível em: https://doi.org/10.1007/s00198-017-3980-9. Acesso em: 02 jun. 2023.

BELL, K. E. *et al.* A whey protein-based multi-ingredient nutritional supplement stimulates gains in lean body mass and strength in healthy older men: A randomized controlled trial. **PLoS One**, [*s.l.*], v. 12, n. 7, e0181387, jul. 2017. Disponível em: https://doi.org/10.1371/journal.pone.0181387. Acesso em: 03 jun. 2023.

BO, Y. *et al.* A high whey protein, vitamin D and E supplement preserves muscle mass, strength, and quality of life in sarcopenic older adults: A double-blind randomized controlled trial. **Clin Nutr.**, [*s.l.*], v. 38, n. 1, p. 159-164, feb. 2019. Disponível em: https://doi.org/10.1016/j.clnu.2017.12.020. Acesso em: 01 jun. 2023.

CANDOW, D. G. *et al.* Effect of 12 months of creatine supplementation and whole-body resistance training on measures of bone, muscle and strength in older males**. Nutr Health**, [*s.l.*], v. 27, n. 2, p. 151-159, jun. 2021. Disponível em: https://doi.org/10.1177/0260106020975247. Acesso em: 03 jun. 2023.

CHAMI, J.; CANDOW, D. G. Effect of Creatine Supplementation Dosing Strategies on Aging Muscle Performance. **J Nutr Health Aging**, [*s.l.*], v. 23, n. 3, p. 281-285, 2019. Disponível em: https://doi.org/10.1007/s12603-018-1148-8. Acesso em: 03 jun. 2023.

CRUZ-JENTOFT, A. J. *et al.* Writing Group for the European Working Group on Sarcopenia in Older People 2 (EWGSOP2), and the Extended Group for EWGSOP2. Sarcopenia: revised European consensus on definition and diagnosis. **Age Ageing**, [*s.l.*], v. 48, n. 1, p. 16-31, 2019. Disponível em: https://doi.org/10.1093/ageing/afy169. Acesso em: 02 jun. 2023.

DE MELO, A. L.; DE ARAÚJO, V. C.; REIS, W. A. Efeito da suplementação de creatina no treinamento neuromuscular e composição corporal em jovens e idosos. **Revista Brasileira de Nutrição Esportiva**, São Paulo, v. 10, n. 55, p. 79-86, jan./feb. 2016. Disponivel em: http://www.rbne.com.br/index.php/rbne/article/view/612. Acesso em: 01 jun. 2023.

DENISON, H. J *et al.* Prevention and optimal management of sarcopenia: a review of combined exercise and nutrition interventions to improve muscle outcomes in older people. **Clin Interv Aging**, [*s.l.*], v. 10, p. 859-869, may. 2015. Disponível em: https://doi.org/10.2147/cia.s55842. Acesso em: 03 jun. 2023.

DIZ, J. B. *et al.* Prevalence of sarcopenia in older Brazilians: A systematic review and meta-analysis. **Geriatr Gerontol Int**., [*s.l.*], v. 17, n. 1, p. 5-16, 2017. Disponível em: https://doi.org/10.1111/ggi.12720. Acesso em: 02 jun. 2023.

EL HAJJ, C. *et al.* Vitamin D supplementation and muscle strength in pre-sarcopenic elderly Lebanese people: a randomized controlled trial. **Arch Osteoporos**, [*s.l.*], v. 14, p. 4, 2018. Disponivel em: https://doi.org/10.1007/s11657-018-0553-2. Acesso em: 01 jun. 2023.

GUALANO, B. *et al.* Exploring the therapeutic role of creatine supplementation. **Amino Acids**, [*s.l.*], v. 38, n. 1, p. 31-44, jan. 2010. Disponível em: https://doi.org/10.1007/s00726-009-0263-6. Acesso em 29 maio 2023.

MARGUTTI, K. M. de M.; SCHUCH, N. J.; SCWANKE, C. H. A. Marcadores inflamatórios, sarcopenia e seus critérios diagnósticos em idosos: uma revisão sistemática. **Rev. Bras. Geriatr. Gerontol**., Rio de Janeiro, v. 20, n. 3, p. 444-456, 2017. Disponível em: http://dx.doi.org/10.1590/1981-22562017020.160155. Acesso em: 02 jun. 2023.

MARTINEZ, B. P.; CAMELIER, F. W. R; CAMELIER, A. A. Sarcopenia em idosos: um estudo de revisão. **Revista Pesquisa Em Fisioterapia,** [*s.l.*], v. 4, n. 1, p. 62-70, 2014. Disponível em: https://doi.org/10.17267/2238-2704rpf.v4i1.349. Acesso em: 03 jun. 2023.

NEGRO, M. *et al.* Effects of 12 Weeks of Essential Amino Acids (EAA)-Based Multi-Ingredient Nutritional Supplementation on Muscle Mass, Muscle Strength, Muscle Power and Fatigue in Healthy Elderly Subjects: A Randomized Controlled Double-Blind Study. **J Nutr Health Aging**, [*s.l.*], v. 23, n. 5, p. 414-424, 2019. Disponível em: https://doi.org/10.1007/s12603-019-1163-4. Acesso em: 02 jun. 2023.

NILSSON, M. I. *et al.* A Five-Ingredient Nutritional Supplement and Home-Based Resistance Exercise Improve Lean Mass and Strength in Free-Living Elderly. **Nutrients**, [*s.l.*], v. 12, n. 8, p. 2391, aug. 2020. Disponível em: https://doi.org/10.3390/nu12082391. Acesso em: 02 jun. 2023.

OMS - ORGANIZAÇÃO MUNDIAL DA SAÚDE**. Envelhecimento ativo:** uma política de saúde. Brasília: Organização Pan-Americana da Saúde, 2005. Disponível em: https://bvsms.saude.gov.br/bvs/publicacoes/envelhecimento_ativo.pdf. Acesso em: 01 jun. 2023.

PESSOA, J. P. A. *et al.* Creatine supplementation in the elderly: effects and benefits. **Research, Society and Development**, [*s.l.*], v. 12, n. 2, p. e3112239822, 2023. Disponível em: https://rsd-journal.org/index.php/rsd/article/view/39822. Acesso em: 3 jun. 2023.

PIERINE, D. T.; NICOLA, M.; OLIVEIRA, É. P. Sarcopenia: alterações metabólicas e consequências no envelhecimento. **Revista Brasileira de Ciência e Movimento**, [*s.l.*], v. 3, n. 17, p. 96-103, nov. 2009. Disponivel em: https://doi.org/10.18511/rbcm.v17i3.999. Acesso em: 03 jun. 2023.

PINTO, C. L. *et al.* Impact of creatine supplementation in combination with resistance training on lean mass in the elderly. **J Cachexia Sarcopenia Muscle**, [*s.l.*], v. 7, n. 4. p. 413-421, sep. 2016. Disponível em: https://doi.org/10.1002%2Fjcsm.12094. Acesso em: 03 jun. 2023.

REMELLI, F. *et al.* Vitamin D Deficiency and Sarcopenia in Older Persons. **Nutrients,** [*s.l.*], v. 11, n. 12, p. 2861, nov. 2019. Disponível em: https://doi.org/10.3390%2Fnu11122861. Acesso em: 03 jun. 2023.

RONDANELLI, M. *et al.* Whey protein, amino acids, and vitamin D supplementation with physical activity increases fat-free mass and strength, functionality, and quality of life and decreases inflammation in sarcopenic elderly. **Am J Clin Nutr**., [*s.l.*], v. 103, n. 3, p. 830-840, mar. 2016. Disponivel em: https://doi.org/10.3945/ajcn.115.113357. Acesso em: 03 jun. 2023.

TSCHOLL, P. *et al.* The use of drugs and nutritional supplements in top- level track and field athletes. **American Journal of Sports Medicine**, Indianápolis, v. 38, n. 1, p. 133-140, jan. 2010. Disponível em: https://doi.org/10.1177/0363546509344071. Acesso em: 02 jun. 2023.

UCHITOMI, R.; OYABU, M.; KAMEI, Y. Vitamin D and Sarcopenia: Potential of Vitamin D Supplementation in Sarcopenia Prevention and Treatment. **Nutrients**, [*s.l.*], v. 12, n. 10, p. 3189, oct. 2020. Disponivel em: https://doi.org/10.3390/nu12103189. Acesso em: 03 jun. 2023.

YAMADA, M. *et al.* Synergistic effect of bodyweight resistance exercise and protein supplementation on skeletal muscle in sarcopenic or dynapenic older adults. Geriatr Gerontol Int., [*s.l.*], v. 19, n. 5, p. 429-437, may. 2019. Disponível em: https://doi.org/10.1111/ggi.13643. Acesso em: 03 jun. 2023.

ZANOTTI, J.; GIAZZON, P.; WENDER, M. C. O. Avaliação do estado nutricional e qualidade de vida de mulheres idosas institucionalizadas de Caxias do Sul. **Revista da Associação Brasileira de Nutrição**, São Paulo, v. 10, n. 1, p. 39-45, 2019. Disponível em: https://www.rasbran.com.br/rasbran/article/view/882. Acesso em: 03 jun. 2023.