




EFFECTS OF CREATINE SUPPLEMENTATION IN ELDERLY PEOPLE WITH MUSCLE MASS LOSS

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ABSTRACT

Aging is directly associated with the progressive loss of muscle mass and strength, a phenomenon known as sarcopenia, which compromises the functionality and quality of life of the elderly. Creatine supplementation has been widely studied as an effective strategy to mitigate the impacts of sarcopenia, promoting the preservation of muscle mass, increased strength, and improvements in functionality. The present study aims to review the effects of creatine supplementation in the elderly, analyzing its mechanisms of action, muscle and cognitive benefits, and evaluating its safety and efficacy. The results indicate that creatine, when combined with resistance training, significantly enhances strength gain and muscle recovery, in addition to having neuroprotective effects, contributing to memory maintenance and reducing the risk of neurodegenerative diseases. In addition, supplementation has been shown to be safe for the elderly, as long as it is used under professional supervision. It is concluded that creatine is a promising alternative for the management of sarcopenia, providing physical and cognitive benefits, and is recommended as a complementary strategy to promote healthy aging.

Keywords: Creatine. Sarcopenia. Elderly. Supplementation. Healthy aging.

INTRODUCTION

The aging process is characterized by significant physiological changes in the body, resulting in progressive loss of functional capacity, and among these changes, the reduction of muscle mass stands out, a phenomenon known as sarcopenia, which frequently affects the elderly, directly impairing quality of life, in addition to generating problems in the execution of daily activities and an increase in the risk of falls (Alves, 2025).

In this sense, there is a need to seek alternatives to prevent or minimize such effects of aging, with food supplementation being one of the most discussed strategies today, especially the use of creatine, due to its central role in muscle recovery and strengthening, providing benefits beyond physical gains, also including cognitive and functional improvements that have a direct impact on the autonomy and well-being of the elderly (Rodrigues, 2025).

Although creatine was initially used by athletes, in recent years its use has been studied in older populations due to the potential benefits in the prevention and treatment of sarcopenia; thus, this study seeks to critically evaluate the effects of creatine supplementation, based on a review of the most recent and relevant scientific findings on the subject (Almeida, 2025).

The relevance of this approach lies precisely in the fact that population aging has become a global and growing reality, requiring public policies aimed at the preventive health of the elderly; therefore, understanding the potential benefits of creatine in this age group directly contributes to improving not only physical condition, but also general well-being and functional autonomy (Rodrigues, 2025).

Therefore, the general objective of this article is to analyze, through a detailed literature review, the effects of creatine supplementation in older adults who have muscle mass loss associated with sarcopenia, with emphasis on improvements in muscle strength, functionality, quality of life, and possible cognitive benefits resulting from this supplementation (Santos, 2025).

In addition, it is intended to describe the mechanisms of action by which creatine acts in the body, highlighting both the muscular and cognitive benefits, to evaluate the protocols used in current research and to critically compare the results presented by different authors, seeking to identify consistent patterns of efficacy of this supplementation in the elderly population (Ferreira; Souza, 2025).

Thus, it is hoped that the conclusions obtained can inspire new research, offering consistent subsidies for further investigation in future scientific investigations, in addition to assisting health professionals in the development of effective and safe clinical practices

aimed at maintaining muscle health, functionality, and autonomy in the elderly (Alves, 2025).

THEORETICAL FRAMEWORK

MECHANISMS OF ACTION OF CREATINE IN THE MUSCLES OF THE ELDERLY

To properly understand the benefits of creatine supplementation in older adults with muscle loss, it is essential to understand its mechanism of action in detail; in this sense, it should be noted initially that creatine is a substance naturally produced by the liver, kidneys and pancreas, being transported to muscle fibers where it plays an important role in the rapid regeneration of ATP, the primary source of cellular energy, during short-term and high-intensity physical efforts (Silva; Pear tree; Oliveira, 2025).

In practice, when the muscle needs energy for intense activities, such as lifting heavy objects or performing resistance exercises, the stored creatine is quickly converted into phosphocreatine, allowing immediate energy availability for muscle contraction; in this way, the muscle becomes more resistant to fatigue, being able to perform more prolonged efforts, which, in turn, promotes greater strength gain and muscle hypertrophy over time, especially in elderly people who suffer from muscle loss (Rodrigues, 2025).

Another important point related to creatine's mechanism of action is that its use increases the intracellular water content in muscle fibers, a phenomenon called cell volumization; this muscle hydration significantly improves the intracellular environment, favoring protein synthesis, reducing muscle degradation and directly contributing to more efficient recovery after intense exercise, something especially valuable in elderly individuals, whose muscle regeneration process is usually slower (Ferreira; Souza, 2025).

In addition, studies indicate that creatine promotes an indirect action on hormonal factors that regulate muscle growth, such as IGF-1 (insulin-like growth factor), which plays an important role in the activation of satellite cells, essential in muscle regeneration and growth; this process is especially relevant for the elderly, since with age there is a natural decrease in the activity of these cells, contributing to the muscle decline observed in this age group (Martins, 2025).

It is also important to note that creatine has antioxidant properties, acting to reduce oxidative stress that significantly affects aging muscle tissue; as a result, it not only improves muscle performance, but also offers protection to muscle fibers, preserving them against structural and metabolic damage, helping to maintain a healthier and more functional muscle structure over time (Santos, 2025).

In addition, a relevant effect of creatine is its indirect anti-inflammatory action; by reducing chronic inflammatory processes in the muscle, it promotes a more conducive environment for the growth and maintenance of muscle mass, preventing recurrent inflammation from generating a catabolic environment, harmful to the elderly who already have a marked muscle reduction due to natural aging (Almeida, 2025).

Creatine's mechanism of action also involves an important regulation of metabolic pathways related to muscle energy production; it enhances the activity of mitochondria, organelles responsible for cellular respiration and continuous energy production, allowing a more efficient and prolonged performance of the muscle during physical activities, a condition particularly beneficial for the elderly, who often suffer from low muscle resistance (Rodrigues, 2025).

At the same time, creatine also helps to decrease muscle protein degradation induced by aging, minimizing continuous muscle loss; recent studies have shown that older adults supplemented regularly have a lower expression of genes associated with muscle degradation, better preserving the integrity and function of muscles, even in the face of advanced age (Costa; Lima, 2025).

Regular creatine supplementation in the elderly also works by significantly improving muscle regeneration after physical exercise; due to faster and more efficient recovery, the elderly are able to maintain a more regular frequency of physical activity, an important factor for maintaining strength and muscle mass, in addition to increasing motivation and adherence to physical exercise routines, something extremely beneficial in this population (Santos, 2025).

Another interesting aspect refers to the action of creatine in the central nervous system; although indirectly related to the musculature, this action also positively influences the physical capacity of the elderly by reducing the perception of mental fatigue, allowing them to perform more prolonged and frequent physical efforts, reinforcing the muscular results obtained with supplementation (Pereira, 2025).

It is important to highlight that the beneficial effects of creatine on the muscles are also dependent on the combination of resistance physical activity and adequate nutrition; supplementation alone, without structured exercises, has limited results in the elderly, since the mechanical stimulus of exercise serves to fully activate these biochemical mechanisms related to muscle growth (Martins, 2025).

In addition, studies show that elderly people supplemented with creatine and trained regularly have a much superior muscle response, with significant gains in strength, lean mass, and muscle endurance, compared to those who only perform exercises without

supplementation, thus proving the synergistic effect of this nutritional strategy associated with resistance training (Alves, 2025).

It should be noted that detailed knowledge of these mechanisms is very necessary for health professionals, enabling more effective and safer interventions, ensuring that older adults are supplemented correctly and achieve the maximum benefits of this highly promising nutritional intervention in the treatment of sarcopenia (Santos, 2025).

In this way, a clear understanding of how creatine acts on elderly muscles strengthens the scientific evidence in favor of the use of this supplement as an effective and safe therapeutic resource, significantly amplifying the possibilities of promoting active and healthy aging (Rodrigues, 2025).

Therefore, the importance of continuous deepening of studies on the subject is evident, allowing even more effective strategies in the management of sarcopenia, directly benefiting the quality of life of the elderly (Almeida, 2025).

COGNITIVE AND NEUROPROTECTIVE EFFECTS OF CREATINE IN THE ELDERLY

Although creatine was initially widely studied and recognized for its benefits on physical performance and muscle hypertrophy, recent research has broadened its scope, revealing significant positive effects also on cognition and brain functioning in the elderly; thus, it is currently presented as a physical supplement, and also as a potential neuroprotective agent capable of improving functions such as memory, attention, and general cognitive performance in aging populations (Pereira, 2025).

These cognitive benefits associated with creatine supplementation are directly related to its ability to quickly deliver energy to brain cells; the brain is an organ highly dependent on energy, and any reduction in its energy supply, which is common with aging, can compromise important functions such as logical reasoning, short-term memory, and the ability to concentrate, aspects that are often impaired in the elderly (González, 2025).

Creatine, in this sense, acts as an additional and immediate source of brain energy, rapidly delivering ATP to neuronal cells; thus, by ensuring greater energy availability, it allows the brain to maintain its full functioning, even in the face of the metabolic challenges typical of aging, reducing the occurrence of mental fatigue and substantially improving overall cognitive performance (Pereira, 2025).

In addition, creatine has shown neuroprotective effects by reducing oxidative stress, one of the main factors associated with brain aging and neurodegenerative diseases; through this antioxidant action, the supplement helps preserve the integrity of neurons and their synaptic connections, slowing down the natural degeneration that occurs with

advancing age, also preventing the early occurrence of diseases such as Alzheimer's and Parkinson's (Ramírez, 2025).

Clinical studies conducted with elderly people supplemented with creatine have pointed to important improvements in specific neuropsychological tests, including significant gains in working memory, episodic memory, and attention span, clearly suggesting that regular use of creatine can reduce or even partially reverse the cognitive deficits common in this population, providing better quality of life and greater functional independence to the elderly (González, 2025).

Another relevant finding concerns the beneficial effect of creatine in older adults with mild cognitive impairment (MCI), a condition that often precedes more severe dementia; recent research indicates that elderly people in this condition, when supplemented with creatine, showed significant improvement in standardized cognitive tests, demonstrating the potential to delay progression to more advanced cases of cognitive decline (Pereira, 2025).

Also in this context, creatine supplementation can be especially advantageous for elderly people who practice regular physical activity; studies show that the combination of the supplement with physical exercise further enhances its cognitive effects, since exercise also plays an important role in neurogenesis, that is, in the formation of new neurons and in the preservation of brain functions (Ramírez, 2025).

It is also important to note that the cognitive benefits observed with creatine supplementation are even greater when associated with a balanced diet rich in essential nutrients for the brain, such as omega 3, B vitamins and antioxidants; this shows that creatine should not be seen in isolation, but rather as an integral part of a broad nutritional strategy aimed at healthy brain aging (Pereira, 2025).

Although the exact mechanisms by which creatine positively influences cognition are still being investigated, it is believed that its role in providing energy to brain cells is the main factor responsible; however, other complementary mechanisms, such as the reduction of brain inflammatory processes and the increase in neuronal protection against ischemic damage, have also been observed in recent studies (Ramírez, 2025).

The safety of creatine in cognitive improvement in the elderly is also widely highlighted in recent scientific literature; Systematic reviews show that, when following the recommended protocols, supplementation does not have significant adverse effects, and is therefore a safe and low-risk strategy for the elderly, including those with some clinical vulnerability, as long as they are adequately monitored by qualified professionals (González, 2025).

In this sense, creatine also has a complementary therapeutic role in the elderly who already face clinical conditions, such as depression or anxiety, often associated with reduced cognition and increased functional decline; preliminary studies show that elderly patients with mild depression showed improvement in mood and cognitive functions after regular creatine supplementation (Ramírez, 2025).

It is noteworthy that due to its low cost and ease of use, creatine becomes a viable and practical alternative to promote significant improvements in the cognitive performance of the elderly, especially in clinical and institutional contexts, and can be easily integrated into care routines for the elderly, improving their quality of life and reducing costs associated with more complex treatments (Pereira, 2025).

Despite the advances already achieved in research on the cognitive effects of creatine in the elderly, the current literature still suggests the need for additional studies to fully clarify its mechanisms of brain action, as well as to define more precise and effective supplementation protocols aimed at maximizing the observed cognitive benefits (González, 2025).

In view of the above, the inclusion of creatine in nutritional strategies aimed at the brain health of the elderly seems highly promising, being recommended as an additional therapeutic alternative in the management of cognitive health and prevention of neurodegenerative diseases common in this population, strengthening the idea of healthy and active aging in all aspects (Ramírez, 2025).

Thus, it is essential to highlight that, although promising, creatine should always be used with professional guidance, ensuring that its supplementation occurs safely and adapted to the individual needs of the elderly, aiming not only at physical benefits, but also at the maintenance and significant improvement of cognitive and emotional health (Pereira, 2025).

METHODOLOGY

The present study is characterized as an integrative review of the scientific literature, an approach that allows for a critical evaluation and synthesis of previous research results, enabling a deeper understanding of the investigated theme; in this way, it becomes possible to accurately analyze the accumulated scientific knowledge, identifying consensus, contradictions, and gaps related to the effects of creatine supplementation in older adults with muscle mass loss (Santos, 2025).

To carry out this integrative review, a guiding question was initially established, which clearly directed the process of searching and selecting the studies: what are the effects of

creatine supplementation in elderly people who have sarcopenia or significant loss of muscle mass due to aging, especially in relation to the physical, functional, and cognitive benefits reported in the current literature?

Thus, the bibliographic survey was carried out from the electronic databases most used in studies in the area of health and nutrition, such as PubMed, SciELO, LILACS and Google Scholar, ensuring access to a wide spectrum of national and international scientific publications; The following main descriptors were used, in Portuguese and English: creatine, sarcopenia, elderly, muscle mass, supplementation and aging, combined using Boolean operators "AND" and "OR".

Thus, the methodology used ensured a rigorous criterion for the selection and analysis of the reviewed scientific articles, providing safety, validity and reliability to the results obtained, allowing solid conclusions about the real benefits of creatine supplementation in the elderly sarcopenic population (Rodrigues, 2025). Articles that did not address the benefits of supplementation in the elderly population, including old articles or articles with a low reliability rate, were excluded.

In this way, the method adopted allowed the main objective of this research to be clearly fulfilled, offering a significant scientific contribution and providing a solid basis for future clinical interventions and studies that seek to better understand the effects of creatine on the health and quality of life of the elderly population (Rodrigues, 2025).

RESULTS AND DISCUSSION

The studies analyzed in this integrative review demonstrate that creatine supplementation in elderly people with sarcopenia has significant and positive effects both in the preservation of muscle mass and in the increase of strength and functional capacity; The results observed indicate that, when associated with resistance training, supplementation enhances the effects of physical exercise, providing substantial gains in muscle endurance and quality of life in the elderly (Silva; Pear tree; Oliveira, 2025).

One of the main findings of the reviewed studies is that creatine is important for the resynthesis of adenosine triphosphate (ATP), resulting in greater energy availability for the muscles during exercise, allowing the elderly to perform workouts with greater intensity and efficiency, consequently favoring the growth and maintenance of lean mass; in addition, creatine has demonstrated the ability to attenuate muscle degradation associated with aging, delaying the impacts of sarcopenia and aiding in post-exercise recovery (Rodrigues, 2025).

Research shows that elderly people supplemented with creatine have increased muscle strength, and improvements in global functionality, reflected in the ability to perform daily tasks more easily, such as walking, climbing stairs and carrying objects, which significantly reduces the risk of falls and fractures, factors that represent one of the greatest challenges of longevity, directly impacting the autonomy and quality of life of this population (Martins, 2025).

It was identified in the studies analyzed that creatine supplementation promotes an increase in intracellular water retention, which can contribute to muscle volumization and better cellular hydration, providing a more favorable metabolic environment for protein synthesis and muscle recovery, in addition to improving the elasticity and resistance of muscle fibers, making them less susceptible to injuries and ruptures (Ferreira; Souza, 2025).

The efficacy of creatine in maintaining muscle mass in the elderly has been widely confirmed in randomized controlled trials, in which supplemented participants showed a significant increase in muscle cross-sectional area compared to placebo groups; these findings indicate that supplementation can be an efficient strategy to combat muscle atrophy, reducing natural losses related to the aging process (Santos, 2025).

In addition to the muscle benefits, the reviewed studies also indicate that creatine may be important in improving cognitive performance in the elderly, especially in working memory and information processing speed, and this effect is attributed to the greater availability of energy to neuronal cells, a factor that contributes to the maintenance of brain functions over time. minimizing the impact of age-related cognitive decline (Pereira, 2025).

Recent clinical studies have shown that elderly people who made continuous use of creatine supplementation had better performance in tests of memory and executive functions, indicating that its use may be a promising neuroprotective strategy to prevent or delay neurodegenerative diseases, such as Alzheimer's and Parkinson's; these findings significantly expand the clinical applications of creatine, suggesting that its positive impact goes beyond the musculature, also reaching the central nervous system (Ramírez, 2025).

However, despite the benefits evidenced, the studies analyzed indicate that creatine supplementation is more effective when combined with a structured physical exercise program, especially resistance training; without the practice of exercise, the gains provided by the supplement are limited, as the mechanical stimulation of the muscle contributes to activating the processes of hypertrophy and muscle strengthening (Costa; Lima, 2025).

The scientific literature also points out that the most effective supplementation protocol for the elderly involves an initial saturation dose of approximately 20 g per day,

divided into four portions throughout the day, over a period of five to seven days, followed by a maintenance dose of 3 to 5 g daily; however, some studies indicate that the saturation phase may not be necessary for the elderly, and the adoption of the maintenance dose for prolonged periods is sufficient to obtain muscular and cognitive benefits (Almeida, 2025).

Although creatine is considered a safe supplement, the studies analyzed reinforce the importance of professional monitoring, especially in elderly people with a history of kidney disease; Although there is no consistent evidence that creatine causes kidney damage in healthy individuals, it is recommended that its administration be carried out under nutritional and medical guidance, ensuring proper use and minimizing any risks (Santos, 2025).

Regarding adverse effects, the reviewed studies indicate that creatine supplementation in older adults is rarely associated with significant side effects; the few reports of gastrointestinal discomfort and water retention were minimized with adjustments in the dosage and administration of the supplement, reinforcing the idea that creatine is a safe and well-tolerated intervention by most individuals (Rodrigues, 2025).

It is noteworthy that the adherence of the elderly to supplementation, as studies show that when creatine is associated with an exercise program and nutritional monitoring, the adherence rate is high, especially because it is an easy-to-administer supplement, without the need for complex preparations or additional dietary restrictions (Martins, 2025).

The results also indicate that creatine may play an important role in maintaining bone health, as some studies suggest that supplementation may stimulate bone formation and reduce the risk of osteoporosis in the elderly, which further reinforces its usefulness in preventing conditions associated with aging (González, 2025).

Based on the studies analyzed, it is evident that creatine is a multifunctional supplement, which not only combats sarcopenia, but also promotes substantial gains in strength, functionality and cognition in the elderly, being an effective and accessible alternative to improve the quality of life of this population, as long as it is used appropriately and associated with an active and healthy lifestyle (Pereira, 2025).

Therefore, the present review confirms that creatine supplementation in older adults with muscle wasting is a promising strategy and widely supported by scientific evidence, with benefits for both muscle health and cognitive function; however, it is recommended that future research explore the effects of creatine for longer periods, evaluating its impacts on different population groups and clinical conditions associated with aging (Santos, 2025).

CONCLUSION

The present integrative review demonstrated that creatine supplementation in elderly people with muscle mass loss has significant benefits both in preserving strength and in improving functionality and quality of life in this population; The studies analyzed point out that creatine, when associated with resistance training, enhances the effects of exercise, favoring muscle mass gain, maintaining strength and more efficient recovery after physical exertion, contributing to the reduction of the impact of sarcopenia and its consequences.

The mechanisms of action of creatine involve the rapid resynthesis of ATP, ensuring greater energy availability for skeletal muscles, allowing the elderly to perform physical exercises with greater efficiency and endurance, in addition to minimizing the catabolic effects of aging; Studies indicate that supplementation promotes cell volumization, increases muscle hydration, and stimulates protein synthesis, which results in a faster and more efficient recovery of muscle tissue, preventing the progression of sarcopenia and its functional consequences.

In addition to the muscle benefits, the reviewed findings reinforce that creatine has significant neuroprotective potential, being able to improve cognitive function in the elderly, especially with regard to working memory and information processing speed; This effect is attributed to its role in the energy supply to brain cells, in addition to its antioxidant and anti-inflammatory capacity, factors that contribute to the reduction of cognitive decline associated with aging and to the prevention of neurodegenerative diseases, such as Alzheimer's and Parkinson's.

It was also identified in the reviewed studies that creatine supplementation has even more significant effects when combined with a balanced diet and a structured physical exercise program; The scientific literature reinforces that creatine should not be used in isolation, but rather as part of an integrated approach to the health of the elderly, promoting a more active and healthy aging, with a lower risk of complications associated with the loss of muscle mass and functionality.

The supplementation protocols analyzed indicate that the most used dose for the elderly varies between 3 and 5 grams daily, with or without an initial saturation phase; Studies also indicate that the safety of creatine is widely proven, with a low risk of adverse effects, as long as the recommendations for use are respected and adequate supervision is carried out by health professionals, especially in the elderly with a history of kidney or metabolic diseases.

However, despite the favorable evidence, there are still gaps in the literature that need to be further explored, such as the long-term impact of creatine on cognitive function

and bone health, as well as its interaction with other nutritional and therapeutic interventions in older adults with different clinical profiles; Thus, it is recommended that future research deepen these aspects, enabling the development of even more precise guidelines for the use of this supplement in the promotion of the health of the elderly.

In view of the above, it is concluded that creatine represents a safe, accessible and effective alternative for maintaining muscle and cognitive health in the elderly, being a valuable tool in the prevention and treatment of sarcopenia and functional decline associated with aging; In addition, its clinical application can be expanded to other contexts, such as the rehabilitation of hospitalized elderly or in postoperative processes, in which the loss of muscle mass represents a critical factor for the patient's recovery and prognosis.

The relevance of these findings suggests that creatine should be considered as a complementary strategy in health promotion programs for the elderly, encouraging its inclusion in public policies and nutritional guidelines aimed at this population, since its cost-benefit ratio is highly favorable and its efficacy is supported by a large volume of high-quality scientific evidence.

Thus, the present review contributes to the expansion of knowledge about creatine supplementation in the health of the elderly, reinforcing the importance of interdisciplinary approaches that integrate nutrition, physical therapy, physical education and gerontology to ensure a better quality of life in this phase of life; It is hoped that this study will serve as a basis for new scientific investigations and that its findings can help health professionals in making evidence-based decisions, promoting healthier and more active aging.

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