



REVIEW ARTICLE

In the Elderly Population does Creatine Supplementation Play a Beneficial Role in Memory and Cognition A CAT Manuscript

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Abstract

Creatine has been used for decades to aid in performance/energy system output and even more recently in bone health. However recent literature has suggested creatine has much more far-reaching effects. A combined PubMed and Google scholar search within the last 7 years demonstrated numerous high-quality papers discussing the benefits of creatine on cognition. Unfortunately, only three of these papers met the criteria of being an RCT. The rest was made up of meta-analysis and review papers. Due to this, the author notes a need for further research in the area of cognition and creatine use. Overall creatine is deemed effective and safe for use in the elderly population and can be used to support and possibly improve cognitive outcomes.

Clinical Questionnaire: In the elderly population does creatine supplementation play a beneficial role in memory & cognition?

Keywords

Creatine, Elderly, Cognition

Introduction

Historically creatine was touted as a performance/energy system supplement. Until recently a majority of the literature supported the use of creatine to aid in the body's natural creatine phosphate energy system allowing athletes more explosive muscle contraction [1]. This, often, in turn, resulted in bigger faster stronger athletes.

Overtime research began to show us that creatine may have larger more global benefits to the human body than just performance. One example is that of Stares and Bains [2] who demonstrated that creatine

supplementation can benefit the muscular and bone health of the elderly population. Such outcomes can be largely beneficial due to increased inactivity and loss of muscle and bone density in this specific group. These studies opened the door to the vast benefits creatine may possess. One wide-reaching effect was described by Gualano et, al. [3] who demonstrated that creatine had positive benefits in elderly cognition, especially during times of stress and even times of sleep deprivation [4]. Avgerinos, et al. [5] demonstrated that oral creatine supplementation aided in short-term memory and intelligence/ reasoning in healthy individuals. This effect came while simultaneously stating the need for future studies on the benefits of creatine on those with cognitive/ memory and dementia disorders.

To date, many RCT reviews on this subject have been done but few recent studies were specifically done on the use of creatine in the elderly population measuring cognitive outcomes. Therefore this CAT manuscript looks to answer the question. "In the elderly population does creatine supplementation play a beneficial role in memory & cognition?"

Focused Clinical Question

The focused clinical question for this paper is "In the elderly population does creatine supplementation play a beneficial role in memory & cognition?"

Search Strategy

The search was conducted using a combination of PUBMED and google scholar search engines. The search was performed with the inclusion criteria being set for

5-7 years. Papers included contained a cohort classified as elderly and the study design must have tested cognition in at least 1 evidence-based format. The key search term used was “creatine, cognition, elderly”. Overall this strategy returned 126 studies from which 3 papers met the final inclusion criteria for date and title relevance.

Evidence Quality

The level and quality of evidence surrounding this clinical question were high. Despite only a select few articles meeting the inclusion criteria for this CAT manuscript, a large body of evidence for creatine and its benefits on cognition are present in recently released literature reviews. Despite this, the level of evidence present in the last 5-7 years in the form of RCT studies proved positive with an average literature PEDro Scale score of 8 and an Oxford Center for Evidence-Based Med score of 1B. Both these scores suggest high-quality levels of evidence for the structure of the studies.

Results of Search

Search Criteria: Pub Med and google scholar. 5-7 years, including clinical trials and RCTs. Search Terms “Creatine Cognition elderly” with 126 results.

Results of Evidence Quality Assessed

The quality of evidence included in the assessment is deemed high. The PEDro score and the Oxford Center for Evidence-Based Medicine scores were used as baseline criteria for analyzing evidence quality.

Ostojic, et al. [6] studied 1340 older adults (51.8% women; age 71.4 ± 7.8 years) and compared their cognitive ability as assessed by the WAIS-III Digit Symbol Substitution Test (DSS) to the amount of creatine consumed. This paper was deemed a high-quality paper due to its score of 9 on the PEDro Scale and 1B on the Oxford Center for Evidence-Based Medicine score. One point was deducted on question 6 of the PEDro scale because it was unclear if those performing the study were blinded to any of the data.

Seper, et al. [7] analyzed twenty-one healthy elderly individuals (age 69.6 ± 4.9 years, body mass index 27.6 ± 4.2 kg/m²; 13 women). These individuals were tested cognitively using the Montreal Cognitive Assessment (MoCA) at an 8-week follow-up. This paper lost a point on the PEDro Scale due to an unclear standing on whether 85% or more of the subjects obtained one key outcome, however, received an Oxford Center for Evidence-Based Medicine score of 1B again signifying a high-quality paper.

Smolarek, et al. [8] analyzed 26 adults over 60 yrs old (5 male and 21 female) who were randomly assigned to the Control Group (CG, n = 13). Cognitive function was tested using the Montreal Cognitive Assessment (MoCA). This paper obtained a PEDro score of 6 due to a

lack of clarity on blinding and specific inclusion criteria, yet still maintained an Oxford Center for Evidence-Based Medicine score of 1B. Despite the deductions, overall these papers demonstrate a high level of quality and validity towards the outcomes.

Clinical Bottom Line

The clinical bottom line is formulated by the quality of the papers used in the CAT manuscript. Due to the high quality of the three papers obtained (Oxford Center for Evidence-Based Medicine score 1B for all papers and an average of 8 on the PEDro scale), it can confidently be stated that the use of creatine benefits cognition in older adults. To what significant extent still required more high-level research, however, due to the low cost of creatine and the lack of negative effects seen at even high levels of consumption, creatine can be safely used for the elderly population if the goal is to support cognitive function.

Strength of Recommendation

The current literature, with an average PEDro score of 8, suggests a high level of recommendation for the use of creatine to support cognitive function in the elderly. Creatine has demonstrated its ability to improve muscle and bone health for many years, but now is continuing to demonstrate its ability to promote systemic benefits. These recommendations come not only from high-quality recent literature but through the consensus of multiple systematic reviews and meta-analyses on the topic [2,5,9]. Creatine continues to prove to be both safe and effective in numerous ways to those who consume it regularly.

Implications for Practice, Education, and Future Research

Creatine is a cost-effective low-risk supplement used for decades in the physical fitness world to support the creatine phosphate energy system. Historically such use has yielded tremendous results in power output for those using it. However, modern research has now proposed a possible alternative use for creatine than may benefit the non-athlete in a very impactful way, cognition.

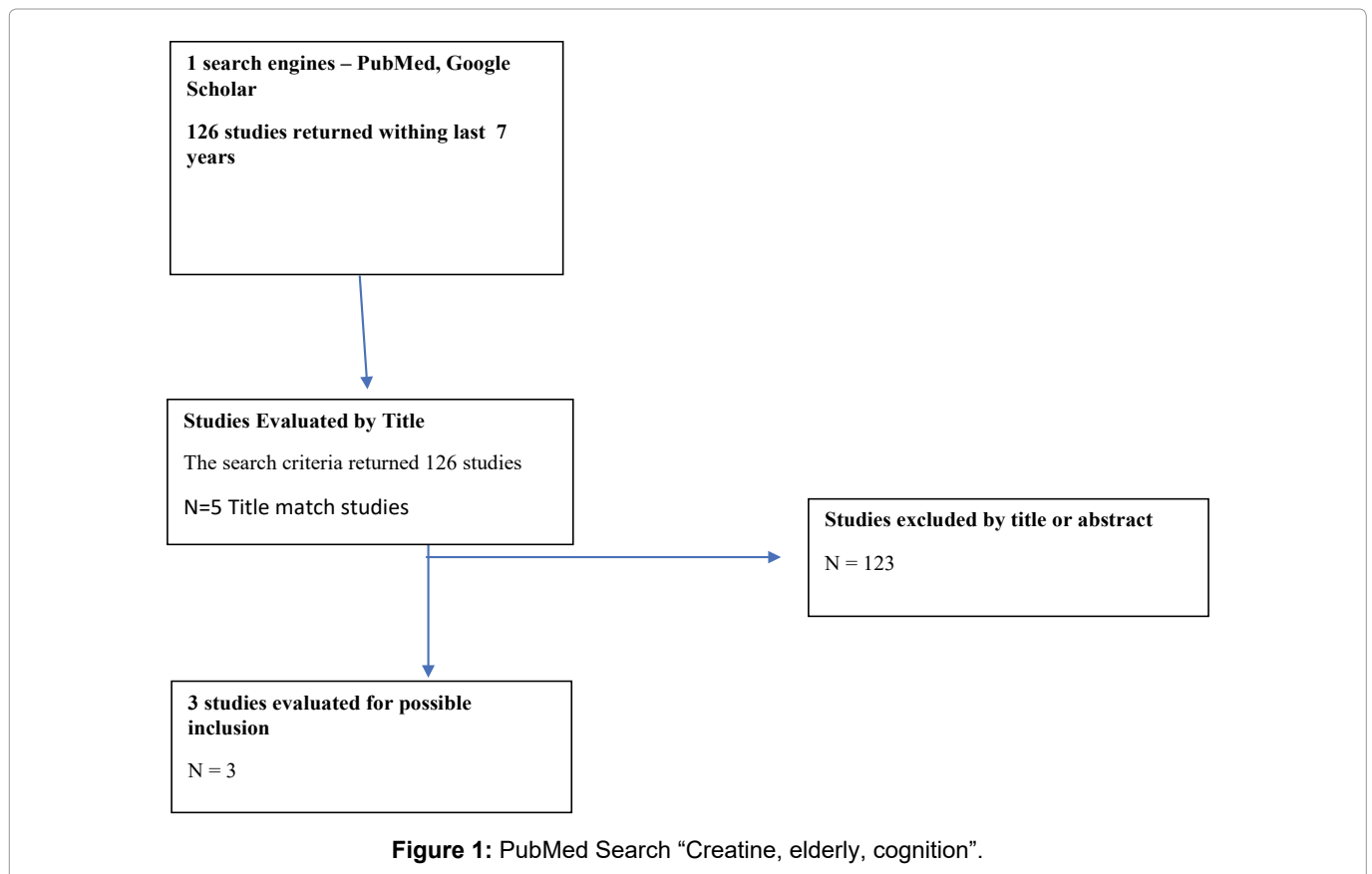
Each study evaluated a population considered elderly for changes in cognition with the use of creatine. Each one of these high-quality studies demonstrated positive cognitive outcomes for the cohort. These conclusions match many previous review articles [2,5,9] which also concluded on the efficacy of the use of creatine and its cognitive benefits.

Based on this information and the quality of literature, clinicians should feel confident in prescribing creatine to those seeking to benefit from its vast array of physiological effects.

Future research should focus on producing more

Table 1: Study Articles.

Characteristics	Ostojic, et al. 2021	Seper, et al. 2021	Smolarek, et al. 2020
Study Title	Dietary creatine and cognitive function in U.S. adults aged 60 years and over	Guanidinoacetate-Creatine Supplementation Improves Functional Performance and Muscle and Brain Bioenergetics in the Elderly: A Pilot Study	Effect of 16 Weeks of Strength Training and Creatine Supplementation on Strength and Cognition in Older Adults: A Pilot Study
Participants (Test subjects with relevant variables)	NHANES 2001–2002 round included a total of 1340 older adults (51.8% women; age 71.4 ± 7.8 years)	Twenty-one healthy elderly individuals (age 69.6 ± 4.9 years, body mass index 27.6 ± 4.2 kg/m ² ; 13 women)	26 adults over 60 yrs old (5 male and 21 female) who were randomly assigned to the Control Group (CG, n = 13)
Inclusion / Exclusion Criteria	NHANES 2001–2002 round included a total of 1340 older adults (51.8% women; age 71.4 ± 7.8 years) who provided valid dietary information and cognitive testing measures.	Twenty-one healthy elderly individuals (age 69.6 ± 4.9 years, body mass index 27.6 ± 4.2 kg/m ² ; 13 women)	The study included 26 adults over 60 yrs of age (mean ± SD, 68.9 ± 6.8) residing in a longterm care center for the elderly. Only older people with full physical and mental capacities were part of the study
Outcome Measures	WAIS III Digit Symbol Substitution Test (DSS)	The primary outcome (brain creatine levels) and secondary outcomes (muscle creatine levels, cognitive performance, sarcopenia quality-of-life score, functional mobility, and safety biomarkers) were assessed at baseline (pre-intervention) and 8-week follow-up. Cognitive function was determined via Montreal Cognitive Assessment (MoCA)	Handgrip strength using dynamometer and cognitive capacity with the cognitively using the Montreal Cognitive Assessment (MoCA).
Results	Creatine from food may help cognitive performance in the 60+ cohort	No differences were found between interventions for MoCA scores.	Positive MoCA changes were noted between the creatine group and the control group.
Evidence Quality Score	PEDro Score = 9 Strong	PEDro Score = 9 Strong	PEDro Score = 6 Strong
Supportive Answer	Yes 1B	Yes 1B	Yes 1B



high-quality repeatable tests demonstrating the effects of creatine on memory, cognition, problem-solving, and even stress-related mental fatigue. A focus on effective dosage would also be a beneficial addition to the current body of literature.

Overall the implication for the use of creatine as a cognitive support supplement seems promising. Clinicians should feel safe and confident in prescribing this over-the-counter supplement with little worry of adverse reactions [Table 1](#) and [Figure 1](#).

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