

INPLASY PROTOCOL

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None declared.

The Effect of Whey Protein, Leucine, and Vitamin D Supplementation in Sarcopenic people: A Systematic Review and Meta-analysis

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Review question / Objective: Sarcopenia is an age-associated syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength with ageing. Some previous studies reported that oral nutritional interventions would be have potential for improving functional disability. In this study, we performed a meta-analysis to evaluate the effect of the use of whey protein, leucine, and vitamin D supplementation on sarcopenic people.

Eligibility criteria: The following studies were included: (1) randomized controlled trials involving patients with sarcopenia, (2) studies comparing the effect of the use of whey protein, leucine, and vitamin D supplementation with isocaloric supplementation, (3) studies evaluating muscle function and muscle strength after intervention, (4) studies with full text, (5) written in English. Studies published as case reports, reviews, letters, or other undistinctive forms, and studies with insufficient data or results were excluded.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 04 December 2022 and was last updated on 04 December 2022 (registration number INPLASY2022120016).

INTRODUCTION

Review question / Objective: Sarcopenia is an age-associated syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength with ageing. Some previous studies reported that oral nutritional interventions would be have potential for improving functional disability. In this study, we performed a

meta-analysis to evaluate the effect of the use of whey protein, leucine, and vitamin D supplementation on sarcopenic people.

Condition being studied: Nutritional recommendation for older adults is to increase daily protein intake (1-1.2g/kg/day) with containing large amount of essential amino acids, such as leucine. Leucine has a potent and independent

modulator of protein turnover, particularly of protein anabolism. It is recommended that up to 2.8~3g of leucine should be provided at each meal and at least twice a day. For the adequate intake of high-quality protein or amino acids, high-quality oral nutritional supplementation (ONS) can be considered in older adults. Especially, people with sarcopenia frequently intake food inadequately and insufficiently, therefore ONS can be particularly helpful for them to intake enough amount of protein and amino acids. Whey protein is a valuable protein source that results in greater anabolic stimulation due to higher content of essential amino acids and faster digestion, compared with other protein sources. In whey protein, leucine is highly contained. In addition, for older adults, taking vitamin D supplement (at least 800-1000 IU/day) should be considered. Vitamin D has a synergic effect with leucine in enhancing protein anabolism. Also, vitamin D has a potential to improve muscle function and physical activity in older adults. Therefore, it was supposed that the use of whey protein, leucine, and vitamin D supplementation can be beneficial for increasing muscle mass and enhancing physical function. However, previous studies on this topic shows conflicting result.

METHODS

Participant or population: Participants diagnosed with sarcopenia.

Intervention: Use of whey protein, leucine, and vitamin D supplementation.

Comparator: Use of isocaloric supplementation.

Study designs to be included: The study designs included in this systematic review and meta-analysis were randomized controlled trials.

Eligibility criteria: The following studies were included: (1) randomized controlled trials involving patients with sarcopenia, (2) studies comparing the effect of the use of whey protein, leucine, and vitamin D

supplementation with isocaloric supplementation, (3) studies evaluating muscle function and muscle strength after intervention, (4) studies with full text, (5) written in English. Studies published as case reports, reviews, letters, or other undistinctive forms, and studies with insufficient data or results were excluded.

Information sources: We searched trial registers and databases PubMed, Cochrane library, Embase, and Scopus for studies published up to December 4, 2022. The search terms were as follows: ("whey protein" OR "leucine" OR "vitamin D" OR "nutrition") AND ("sarcopenia") AND ("muscle strength" OR "muscle function").

Main outcome(s): Studies were eligible for inclusion in this review if they report on the muscle strength or muscle function.

Quality assessment / Risk of bias analysis: The methodological quality was evaluated using the criteria described in the Cochrane Handbook for Systematic Reviews of Interventions to assess the causes of potential bias.

Strategy of data synthesis: A review management software (RevMan 5.3) was used for statistical analysis of the pooled data. For each analysis, a heterogeneity test was performed using I^2 statistics, which measures the extent of inconsistency among results. When I^2 values were $\leq 50\%$, the pooled data were considered homogeneous, and the fixed-effect model was applied. In contrast, if I^2 values were $> 50\%$, the pooled data were considered to have substantial heterogeneity, and the random-effect model was used for data analyses. The analyzed data were continuous variables; therefore, the data calculated the standardized mean differences (SMDs) and 95% confidence intervals (CIs). P-values < 0.05 were considered to indicate statistical significance.

Subgroup analysis: Since there were studies that included and did not include exercise intervention, a subgroup analysis

was performed to analyze the heterogeneity between studies.

Sensitivity analysis: The studies were excluded one by one, and then the metaanalysis was performed in the remaining studies.

Country(ies) involved: Republic of Korea.

Keywords: whey protein; leucine; vitamin D; sarcopenia; meta-analysis.

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