

Effect of probiotic supplementation on skeletal muscle mass in adults over 45 years of age. A systematic review and meta-analysis

INPLASY2023110053

doi: 10.37766/inplasy2023.11.0053

Received: 12 November 2023

Published: 12 November 2023

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ADMINISTRATIVE INFORMATION

Support - Red Académica Asesora de Revisiones Sistemáticas de la FES Zaragoza, UNAM (Project DGAPA PAPIIME PE210523).

Review Stage at time of this submission - Formal selection of search results versus eligibility criteria.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2023110053

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 November 2023 and was last updated on 12 November 2023.

INTRODUCTION

Review question / Objective Present a synthesis of knowledge about the effect of probiotic consumption on body composition in aging adults (≥ 45 years), through a systematic review.

The research question was formulated according to the acronym PICO, (Population, intervention, comparator and result), where: P, healthy adults ≥ 45 years old; I, consumption of probiotics; C, placebo or other treatment; O, body composition. The search for articles will be carried out on the following scientific article platforms: PubMed, Scopus, Web Of Science, LILACS, SciELO, Springer, Redayc, Cochrane and TESIUNAM, with the following keywords and strategy: (probiotics) AND (muscle mass or sarcopenia or muscle strength) and ("adult") AND ("probiotics") AND ("muscle strength" OR "skeletal muscle mass" OR "muscle mass" OR "fat free mass").

Rationale Human aging is characterized by several physical changes, among which body composition stands out. In this sense, from the fourth decade of life there is a decrease in muscle mass and bone tissue, as well as an increase in fat mass. These changes can contribute to the development of some chronic non-communicable diseases, such as obesity, sarcopenia and osteoporosis, which are associated with a decreased quality of life, a higher degree of dependency and a higher risk of mortality. Likewise, unhealthy lifestyles, such as diets rich in carbohydrates and fats, sedentary lifestyle and insufficient consumption of micronutrients, also contribute to these alterations in body composition linked to aging. Therefore, the main strategies applied for the prevention and control of these pathologies are focused on achieving a change in lifestyles and improving therapeutic adherence in the at-risk population. However, it is recognized

that the proposed strategies have not been entirely successful, which is why new alternatives have been tested, such as the intake of probiotics. In recent years, the study on the consumption of probiotics has been increasing as their health benefits have been recognized. Supplementation with probiotics as a therapeutic strategy with effects on body composition is recent with inconsistent results. Some research suggests that its intake is associated with a decrease in fat mass and an increase in muscle mass, these results have been observed predominantly in young population or athletes. However, the results in people in the process of aging (≥ 45 years) are inconsistent, since the positive effect of the consumption of probiotics on muscle mass and strength is reported especially in young adults. In this framework, the purpose of the systematic review is to present a synthesis of knowledge regarding whether probiotic supplementation has any effect on skeletal muscle mass in aging adults (≥ 45 years).

Condition being studied A growing number of studies have shown a positive effect of probiotic supplementation on muscle health. However, these studies are mostly based on the young or athletic population. It is recognized that aging entails different physiological changes within which the decrease in muscle mass stands out, which increases the risk of suffering from diseases such as sarcopenia. Therefore, it is important to promote research whose focus is on the development of strategies complementary to healthy lifestyles, such as probiotic supplementation to ensure an optimal quality of life during aging.

METHODS

Search strategy For the search in PubMed, the following strategy was used: ("Adult" [MeSH Terms] OR "Grown up") AND ("probiotics") [MeSH Terms] AND ("muscle strength" [MeSH Terms] OR "muscles" OR "skeletal muscle mass" OR "muscle mass" OR "fat free mass" [TIAB]), while for the other databases, the strategy was used: ("adult") AND ("probiotics") AND ("muscle strength" OR "skeletal muscle mass" OR "muscle mass" OR "fat free mass") (Supplement). A search for gray literature was also carried out to identify unpublished studies that could potentially be included in the review. The titles and summaries obtained through the search strategy were independently evaluated by two reviewers (J.G-N, V.M.M-N). Once the titles and abstracts that met the selection criteria were selected, the full texts of the articles potentially relevant for the review were

retrieved and those that met the eligibility criteria were selected.

Participant or population Adults ≥ 45 years of age.

Intervention Supplementation with probiotics.

Comparator Placebo.

Study designs to be included Randomized clinical trials.

Eligibility criteria The inclusion criteria were the following: (a) blind randomized clinical trials (RCTs); (b) the use of probiotics as a nutritional supplement; (c) compared to placebo; (d) published in English or Spanish; (e) evaluation of at least one of the following anthropometric measures: body weight; skeletal muscle mass; fat mass and body mass index; and (f) adults ≥ 45 years, regardless of sex, healthy or with controlled metabolic conditions, except cancer.

Information sources Electronic databases such as PubMed, Scopus, Web Of Science, LILACS, Springer, Redalyc, Cochrane and TESIUNAM.

Main outcome(s) The included studies have measured the effects of probiotic supplementation to adults ≥ 45 years on:

- Skeletal muscle mass;
- Fat mass;
- Body weight;
- Body mass index.

Additional outcome(s) None.

Data management Two researchers will independently examine the studies, extract relevant data from the articles and evaluate the risk of bias from the included studies and a third reviewer will resolve the discrepancies. If there is no data available for the manuscripts, we will contact the corresponding authors or co-authors to obtain the original data.

Quality assessment / Risk of bias analysis The selected full-text studies will be reviewed in detail to eliminate those that do not meet the eligibility criteria, in addition to evaluating their methodological quality. For this purpose, the RoB2 bias risk assessment tool of the Cochrane collaboration will be used. This tool considers 7 items for the evaluation: (i) generation of the random sequence, (ii) concealment of the assignment, (ii) blinding of staff and participants, (iv) blinding of the analysis of results, (v) data of

incomplete results, (vi) selective reports of results and (vii) other sources of bias.

Strategy of data synthesis To estimate the overall effect of probiotic supplementation on body composition, a random effects model will be used. This model considers intra-study and inter-study heterogeneity. Heterogeneity will be evaluated using the I² test, considering the existence of significant heterogeneity if I²>50%. It is considered statistical significance when p<0.05. Statistical analyses will be carried out with the Review Manager software version 5.4 of the Cochrane collaboration.

Subgroup analysis Taking into account the general results and the influence of heterogeneity, a subgroup analysis will be carried out, separating the publications included by body component, fat and muscle mass in either percentage or kilograms, body weight, and BMI.

Sensitivity analysis A sensitivity analysis will be carried out if it is relevant.

Language restriction English or Spanish.

Country(ies) involved México: Facultad de Estudios Superiores Zaragoza, Universidad Nacional Autónoma de México.

Other relevant information Dead loss.

Keywords Keywords: probiotics, muscle mass, fat-free mass, body composition, aging.

Dissemination plans The results will be published in a specialized international journal.

Contributions of each author

Author 1 - Jessica Gutiérrez-Nájera - Facultad de Estudios Superiores Zaragoza/Consejo Nacional de Humanidades Ciencias y Tecnologías (CONAHCYT). Contribution: Review design, data collection, data management, data analysis, data interpretation, protocol or review writing.

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