EFFECTS OF RESISTANCE TRAINING AND PROTEIN SUPPLEMENTATION ON CARDIORESPIRATORY, METABOLIC, IMMUNOLOGICAL, RENAL, AND BODY COMPOSITION VARIABLES IN THE ELDERLY

Anamei Silva-Reis[1]
Meiry de Souza Moura Maia[2]
Rodolfo de Paula Vieira[3]

ABSTRACT

The aging process is associated with impairments in strength, lean mass (LM), cardiovascular health (CVH), and cardiorespiratory health (CRH), due to metabolic, hemodynamic, and body composition changes in the elderly. The implications of these changes within the aging process can have their effects mitigated through nutritional intervention and physical training. To test this hypothesis, a randomized clinical trial was determined to be conducted at the Evangelical University of Goiás (UniEVANGÉLICA), where elderly volunteers (60 to 85 years old) will be randomized (n = 40/group) into groups (1) Control (no protein supplementation and no physical training), group (2) Supplementation (only protein supplementation), group (3) Training (only physical training), and group (4) Protein supplementation + Physical training (physical training + protein supplementation). The supplementation protocol and the training protocol will be carried out for 3 months, and the evaluations will take place before the start of the protocol and after 3 months. Numerous cardiovascular, pulmonary, immunological, renal, muscular, and hematological parameters will be evaluated. The analyses will be expressed as mean and standard deviation. A significance level of $p \leq 0.05$ will be adopted for comparisons made in the paired T-test and for multiparametric analyses. It is expected that the effects of the resistance training protocol and protein supplementation, together or separately, will significantly improve the parameters described above, bringing positive results for the participants.

Keywords: Elderly, resistance training, metabolism, hemodynamic processes, body composition.

INTRODUCTION

This doctoral project aims to evaluate the effects of physical training and protein supplementation, both isolated and combined, in the elderly. The project is justified by the fact that the aging process is avoided and viewed negatively by many in society, as this process is commonly associated with problems in aesthetics, strength, loss of lean mass (LM), cardiovascular health (CVH), and cardiorespiratory health (CRH), as well as dependence on activities of daily living (ADLs). As the years go by, metabolic changes (glucose, lipid profile, renal function), hemodynamic changes (heart rate, blood pressure), and body composition changes (dehydration, muscle mass loss, weight and height reduction, bone mass reduction) occur in the elderly, which result in

[1] PhD candidate in the Graduate Program in Human Movement and Rehabilitation. Evangelical University of Goiás. E-mail: anameisreis07@gmail.com
[2] Master's student in the Graduate Program in Pharmaceutical Sciences. Evangelical University of Goiás. E-mail: meiry@unievangelica.edu.br
[3] Doctor in Pathology. Evangelical University of Goiás. E-mail: rodolfo.vieira@unievangelica.edu.br

a decline in quality of life and the development of non-communicable chronic diseases (CHEN et al, 2022).

Thinking about an adequate lifestyle, these individuals should follow a daily routine of health protection during adulthood, with continuous exercise, a balanced diet, and avoiding the consumption of tobacco and derivatives or alcohol. We know that not everyone has had this personal awareness of their habits, so it is necessary to raise awareness among the population about the need for a change in the lifestyle of the elderly. (KOLOKOTRONI, et al.2021).

The implications within the aging process can have their effects mitigated by reducing aggravating factors. It is possible for aging to occur in a healthy manner and to avoid the occurrence of pathologies. Since this process is extremely natural and immutable, aging should not be viewed through a stigmatized lens but rather respected (CAO, et al. 2019).

Strength training is seen as an essential tool for protective factors related to the loss of strength and muscle mass, as well as bone mass. In this sense, following the guidelines of the American College of Sports Medicine (ACSM), a moderate-intensity cardiorespiratory training of an average of 30 minutes for 5 days a week, totaling 150 minutes per week, or vigorous to moderate for 20 minutes for 3 days a week, totaling 75 minutes per week, is recommended (GARBER et al, 2011).

Furthermore, in their guidelines, resistance training, commonly known as weight training, is also recommended 2-3 times a week for the major muscle groups, involving neuromotor exercises such as agility, balance, and coordination (GARBER et al, 2011).

It is believed that this study may be promising for the foundation of future research, with the aim of enhancing the scientific literature on the effects of resistance training and protein supplementation, as there may be differences in hemodynamic, metabolic, and body composition values in the elderly.

METHODOLOGY

Population and Study Design

One hundred and sixty elderly individuals (160) aged between 60 and 85 years, sedentary and/or physically active, who will perform all activities within a continuous and guided resistance training program at the UniEvangélica gym and residents of the city of Anápolis-GO.

The elderly should be between 60 and 85 years old and will be randomly distributed into one of the four groups, with n = 40 in each group: Control Group (CG; untrained and unsupplemented; n = 40), Supplemented Group (SG; untrained and supplemented; n = 40); Trained Group (TG; trained and unsupplemented; n = 40); Trained and Supplemented Group (TSG; trained and supplemented; n = 40).

Inclusion Criteria:

a) Individuals who volunteer to participate in the study;
b) Sign the Free and Informed Consent Form – FICF;
c) Be willing to participate in all evaluations;
d) Have a minimum attendance of 75% of the classes;

Exclusion Criteria:

a) To be carriers of neurological diseases that prevent the completion of assessments and the physical training program.

Study Design

The controlled, non-blind clinical study will be conducted at the Exercise Physiology Laboratory of the Evangelical University of Anápolis (UniEvangélica), Anápolis-GO, and will only begin after approval by the Research Ethics Committee of UniEvangélica.

The 160 elderly individuals will be recruited and randomly distributed into 4 groups, namely, Control Group (CG; not trained and not supplemented; n = 40), Supplemented Group (SG; not trained and supplemented; n = 40), Trained Group (TG; trained and not supplemented; n = 40), and Trained and Supplemented Group (TSG; trained and supplemented; n = 40).

At the first meeting, the volunteers will receive explanations about the research and will be invited to sign the Free and Informed Consent Form – FICF. After signing the form, they will be invited to answer the elderly person's medical history and the proposed questionnaires. Next, they will begin to carry out the evaluations described below.

General Description of the Parameters and Evaluations to Be Analyzed

The parameters to be analyzed will be: questionnaires as described below, resting electrocardiogram (ECG), complete blood count and serum cytokines, body composition assessment through Bioimpedance Analysis (BIA), cardiovascular hemodynamic variables (Blood Pressure, Heart Rate, and impedance cardiography through PhysioFlow™), pulmonary function analysis by spirometry, urine analysis by reactive strip urinalysis and cytokine measurement, lower limb muscle strength test (sit-to-stand test), handgrip strength test (Handgrip Dynamometer), respiratory muscle strength test (manovacuometry).

Protein Supplementation Protocol

The protein supplementation will be provided through isolated whey protein, commonly known as whey protein isolate, which was provided free of charge by the Heroes Science Institute (HSI), see attached statement. It is an isolated whey protein, vanilla flavor, which comes in 25-gram sachets, providing a total of 20 grams of protein per dose/sachet.

Physical Training Protocol

The physical training will consist of weightlifting 3 times a week, with a load of approximately 75% of the one-repetition maximum, thus characterizing it as moderate intensity. 4 sets of 15 repetitions will be performed for each exercise. The exercises will be: (1) seated bench press, (2) lat pulldown, (3) lateral raise, (4) French triceps press, (5) bicep curl, (6) squat, and (7) leg curl.

THANKS

To the Goiás State Research Support Foundation (FAPEG) for the doctoral scholarship granted to Anamei Silva-Reis.

BIBLIOGRAPHIC REFERENCES

Cao Q, et al. Waist-hip ratio as a predictor of myocardial infarction risk: A systematic review and meta-analysis. Medicine. 2018;97(30):e11639. doi: 10.1097/MD.0000000000011639.

Chen W, et al. Association of sarcopenia with ideal cardiovascular health metrics among US adults: A cross-sectional study of NHANES data from 2011 to 2018. BMJ Open. 2022;12(9). doi: 10.1136/bmjopen-2022-061789.

Garber CE, et al. American College of Sports Medicine position stand. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise. Med Sci Sports Exerc. 2011;43(7):1334-1359. doi: 10.1249/MSS.0b013e318213fefb. PMID: 21694556.

Kolokotroni O, et al. Lifestyle habits of adults during the COVID-19 pandemic lockdown in Cyprus: evidence from a cross-sectional study. BMC Public Health. 2021;21:786. doi: https://doi.org/10.1186/s12889-021-10863-0.