LUMEN ET VIRTUS
ISSN: 2177-2789

EFFECTS OF 8 WEEKS OF STRENGTH TRAINING ON BODY COMPOSITION AND MUSCLE STRENGTH: A CASE STUDY

https://doi.org/10.56238/levv15n43-075

Submitted on: 20/11/2024 **Publication date:** 20/12/2024

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ABSTRACT
Strength training is known to provide several benefits to practitioners. Thus, the present study intends to investigate the effects of an 8-week strength training program on an elderly individual, observing possible changes in body composition and muscle strength. An elderly male aged 80 years participated in the study. The bioimpedance scale (Nova BC 601 FS Tanita) was used to measure the variables: weight, fat, fat mass and muscle mass. To measure the strength of the lower limbs, the sit-and-stand test was used. For upper limb strength (handgrip strength), a dynamometer was used. In the intervention, the elderly participated in a training program that involved three weekly sessions, lasting 50 minutes, over a period of 8 weeks. Regarding the weight variable, there was an increase of 0.7 (76.4 - 77.1) kg. Adipose mass went from 22.7 kg to 22.4 kg. The percentage of body fat from 29.7% to 29.1%. Muscle mass decreased by 0.9 (51 - 51.9) kg. The handgrip test decreased from 27 kg to 20 kg. The sit-and-stand test showed a reduction in time from 23s to 20s. It is concluded that 8 weeks of strength training can be seen as a viable tool to maintain body composition variables, but not to establish significant changes in upper limb strength.

Keywords: Strength Training. Muscle Strength. Body Composition. Elderly.

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INTRODUCTION

Among the various changes that occur in the aging body, the deterioration of mobility and daily functional capacity of the elderly results mainly from the loss of muscle mass and, consequently, muscle strength (Matsudo et al., 2001). In this context, strength training (bodybuilding) stands out as one of the main allies to delay this loss, being recommended to maintain or increase the muscle strength of this audience (Mendonça, Moura and Lopes, 2018).

Strength training is known to provide several benefits to practitioners (Da Silva Junior, 2023). The practice of physical exercise can present relevant results, both physiological and psychological, such as reducing stress, controlling body weight, also improving cardiorespiratory and musculoskeletal capacities, ensuring significant prevention of cardiovascular and metabolic dysfunctions (Da Costa et al., 2024).

Strength training not only results in strength-oriented benefits, but also physiological benefits related to body composition. Among them: glucose control (Nahas, 2003), decrease in body fat rate and lipid profile (Matsudo, 2002), decrease in body weight (Matsudo, 2002), and among others (Lima et al, 2016; Nahas, 2010; Queiroz et al, 2016).

This type of training aimed at the elderly public is of great importance, as it helps to mitigate the natural effects of aging, such as the loss of muscle mass (sarcopenia) and the decrease in bone density, which increase the risk of falls, fractures, and, consequently, loss of muscle mass - the main factor responsible for the deterioration of mobility and functional capacity of individuals in the aging process (Matsudo et al., 2001). By improving muscle strength, this type of exercise promotes greater autonomy in daily activities, increasing functional capacity and reducing the risk of injury. For this reason, physical exercises have become increasingly essential in the active aging process, since they are able to preserve the functional capacity of the elderly, ensuring greater independence, well-being and quality of life (Assumpção, Souza and Urtado, 2008).

Thus, the present study intends to investigate the effects of an 8-week strength training program on an elderly individual, observing possible changes in body composition and muscle strength.

METHODOLOGY

This case study looks at responses in body composition and muscle strength related to strength training. An 80-year-old male elderly man who joined the CEPEU in Motion Extension Project at the Federal University of Rondônia participated in the study. Where its purpose is to promote the quality of life of students and campus servers, thus emphasizing the importance of physical exercise for all its users. In view of this, the CEPEU-UNIR space preserves an excellent amount of equipment and equipment essential for the physical development of practitioners, also counting on monitors, accompanied by their supervisors, who prepare and apply training and anamnesis sheets, containing relevant information about the participant, from medical restrictions and objectives for physical training.

To observe the effects on body composition, the bioimpedance scale *(Nova BC 601 FS Tanita*) was used to measure the variables: weight, fat, fat mass and muscle mass. It is a physical and nutritional assessment that provides fundamental information so that the Physical Education professional can verify and monitor the evolution of the training (Antonini et al., 2020), which is an important procedure to establish important and specific objectives, the prescription of physical exercise and also readjustments during the training process (Alves et al., 2021).

In addition, this test involved a whole protocol that was passed on to the participant the day before his evaluation, such as: fasting from food and drinks in the 4 hours before the exam time; Do not consume alcoholic beverages the day before the exam; Avoid excessive consumption of foods rich in caffeine (chocolates, dark teas, and coffee) in the two days prior to the exam; On the day before the exam, do not perform intense physical activity and do not take a sauna; Not be feverish on the day of the test; Urinate at least 30 minutes before the test; People with a pacemaker, or other electronic device internal to the body that supports life, cannot be allowed.

To check the strength of the lower limbs, the Sit and Stand Test was used. The initial pose involved keeping the body vertically aligned, with the feet parallel and with the upper limbs resting at the sides of the body. After the verbal command of the evaluator, "ready", the participant could start the movement of sitting at any time. The test ended when the subject performed 5 movements.

To measure handgrip strength, a Dynamometer instrument was used, which allows the verification of handgrip strength. In the present study, handgrip strength was measured with the subject standing and arms extended along the body. Two measurements were taken from each hand and the best one was used for the analysis.

In the intervention, the volunteer participated in a training program that involved three weekly sessions, lasting 50 minutes each, over a period of 8 consecutive weeks. The planning of the activities was reviewed every six training sessions, and the exercises were prescribed based on the anamnesis together with a physical education professional, the initial physical evaluation and the direct observation of the participant's evolution during the monitoring of the activities. In addition, 10 minutes before each session, static stretches were performed for the upper and lower limbs.

The investigated participant was presented with the Informed Consent Form (ICF), ensuring the confidentiality and privacy of the data collected, in accordance with the principles set forth in Resolution No. 466/2012. This study was approved by the Research Ethics Committee of the Federal University of Rondônia, No. 4.630.406 (CAAE: 06783119.7.0000.5300).

RESULTS AND DISCUSSION

The investigation of the effects of an 8-week strength training program on an elderly individual regarding body composition showed that (Table 1): regarding the weight variable, there was an increase of 0.7 (76.4 - 77.1) kg. Adipose mass went from 22.7 kg to 22.4 kg. Regarding the percentage of body fat, it was observed that there was a decrease from 29.7% to 29.1%, presenting 0.6% less. Muscle mass increased by 0.9 (51 - 51.9) kg.

Table 1. Scores related to the body composition of the investigated participant.

Variables	Pre	Post	Difference
Weight (kg)	76,4	77,1	0,7
Fat mass (kg)	22,7	22,4	-0,3
Fat (%)	29,7	29,1	-0,6
Massa Muscular (kg)	51	51,9	0,9

(kg) = measured in kilograms; (%) = percentage value.

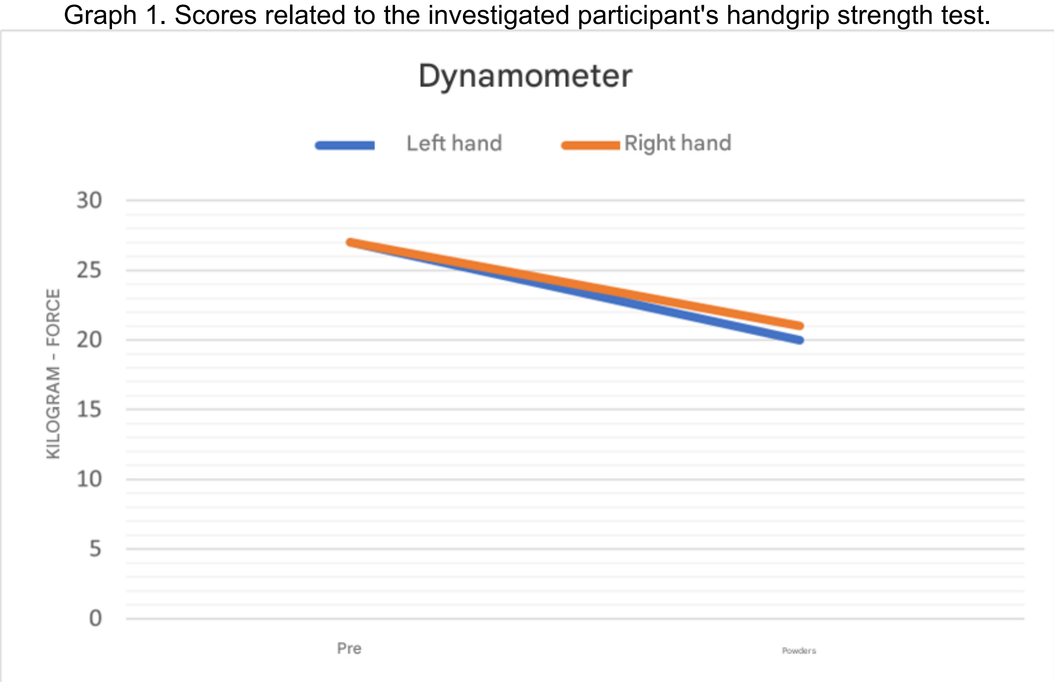
Regarding the weight variable, it is also noted that between the pre- and post-intervention periods, there was no reduction, but a small increase (0.7 kg). Matsudo (2003) states that the morphological changes induced by this type of exercise in this population group are especially effective in controlling the increase in body weight and adipose tissue, considering the complications associated with these factors. This increase may be related to external factors, and therefore are not significant for the results of this research.

A decrease in adipose mass of 0.3% presented in this study, Glaner (2005), says that the reduction of this variable benefits the health of the elderly, reducing the risk of cardiovascular diseases and propensity to chronic degenerative diseases, such as hypertension, diabetes, dyslipidemias, among others. In another study carried out by Almeida and Silva (2016), he exposes that after eight classes divided with an emphasis on functional strength capacities, there was also a significant reduction in the percentage of body fat, as well as a trend towards better cardiorespiratory endurance results.

Observing the result of muscle mass in Table 1, an increase of 0.9 (51 - 51.9) kg was observed. The most basic physiological response to strength training, especially for an older person, is a good increase in muscle mass, thus benefiting activities of daily living, as well as maintaining and improving aerobic capacity (Frontera et al., 2001). Frontera et al. (2001), also reveals that when there is a dramatic increase in muscle strength, there can be positive functional changes for mobility, specifically, habitual gait speed and ability to climb stairs and spontaneous physical activities.

In a literature review study carried out by Mendonça, Moura and Lopes (2018), it was found that structured strength training enables the increase of power and muscle strength, improves body composition, increases the functional capacity of the individual and reduces the risk of mortality. Consequently, it favors the performance of daily activities by the elderly. These improvements are very desired for this audience, as they allow the elderly to carry out their daily activities autonomously.

Graph 1. Scores related to the investigated participant's handgrip strength test.



Graph 1 shows that the results of handgrip strength worsen after an 8-week training intervention. In a study by Raso, Matsudo and Matsudo (2001), investigating the decrease in muscle strength in a 12-week program with three weekly repetitions and 6 types of exercises for the lower and upper limbs, the authors emphasize that there was a significant decrease in the capacity to produce muscle strength of the lower limbs of -27.5% and upper limbs of -35.1%, especially after the eighth week of interruption.

It is suggested that a strength exercise program with sufficient intensity should be continued to minimize and prevent the reduction of muscle strength in older people. It is important to make it clear that training does not prevent the person from aging or the loss of strength, but it is possible to minimize this loss and its impact on the functional capacity in daily activities of elderly people (Côrtes and Silva, 2005).

Graph 2. Scores related to the Sit and Stand Test of the investigated participant.

The results in the sit-and-stand test, presented in Graph 2, also showed important improvements after the intervention, where there was a decrease in time, increasing the strength of the lower limbs, which have an influence on functional capacities, such as walking, climbing stairs, sitting, standing, among others (Barbosa et al., 2014). In a study by Tricoli (2013), he says that the gains made in the first weeks are due to adaptations of the nervous system, and that later improvements would be linked to contractile components of skeletal muscle, which is also linked to the individuality of each subject, however, it seems to be between 6 and 8 weeks of training.

In a study by Lima and Lima (2023), where they carried out six months of functional training practices with elderly women, there was a significant increase ($p<0.05$) in the lower limb strength of the elderly women participating in the program. In a study by Silva et al (2006), who carried out a resistance training program for twelve weeks, they observed that after this period they showed an increase in the strength of knee flexion and extension movements, but that there was no significant mass gain and loss of body fat, similar to this study. These findings in different types of training programs can help older adults improve their functional capabilities in everyday activities (Lima and Lima, 2023).

For clearer and more definitive results, more in-depth studies are needed, which can complement these variables so that the results presented here can serve as an aid to increase physical activity for the elderly population, especially following recommendations for volume and intensity of exercise.

CONCLUSION

In this study, we can observe that strength training applied for 8 weeks resulted in visible improvements in lower limb strength and stability in body composition variables, but a reduction in upper limb strength (handgrip strength). There was a slight reduction in adipose mass and body fat percentage, as well as an increase in muscle mass, confirming the benefits of training for this population. These findings are consistent with the literature, which points to strength training as an effective strategy for preventing chronic diseases, improving quality of life, and maintaining autonomy in daily activities. However, a decrease in handgrip strength was observed, suggesting the need for adjustments in the training program or its continuity to minimize this loss, as recommended in previous studies. Biological individuality also proved to be a determining factor for the different levels of adaptation, reinforcing the importance of personalized exercise programs.

Thus, it is concluded that 8 weeks of strength training was a fundamental tool for promoting the health and well-being of the elderly, however, it must be continuous and adjusted according to individual needs to ensure significant and effective gains.

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