

Strength Training as an Assistant Tool in the Prevention of Falls in Elderly Sarcopenics: a Review

Jerônimo Ramos de Lima Silva¹, Morgana Alves Correia da Silva⁴, Adelmo José de Andrade¹, Katarina Kelly Dias Fernandes⁴, Priscyla Praxedes Gomes², Gabriela Carvalho Jurema Santos³, Thiago de Amorim Carvalho⁵, Matheus Santos de Sousa Fernandes¹ and Camila Tenório Calazans de Lira^{1,2}

Abstract

An elderly society has been growing gradually in Brazil and after retirement some tend to show levels of sedentary behavior index. In addition, the aging process creates a weakness in physical and emotional health, in addition to other things, the increase in the number of falls, caused by dysfunction and loss of muscle mass, called Sarcopenia. Considering all the benefits of strength training for the most varied audiences and that the aging process is gradual and irreversible resulting in the development of Sarcopenia that tends to worsen with the lack of physical exercises, the objective of this study was to investigate how strength training can generate benefits in elderly people who present with Sarcopenia and promote the reduction of falls. From a literature review in the Scielo and PubMed databases, eight articles were selected to compose the results. Thus, it was possible to conclude that this protocol is known as an alternative for the prevention of falls due to Sarcopenia, since it is capable of promoting a significant increase in muscle mass, as well as improving the balance and functional capacity of the elderly.

Keywords: Old man; Accidents due to falls; Sarcopenia; Resistance training

Received: February 08, 2021, **Accepted:** February 22, 2021, **Published:** February 26, 2021

Introduction

The elderly population has been growing gradually in Brazil. It is considered an elderly individual, people aged 60 and over (Ministério da Saúde). Recent data from the Brazilian Institute of Statistical Management (IBGE) indicate that approximately 29 million people make up the elderly population, this number represents 14.3% of the country's total population.

According to Brito and Litvoc [1], the aging process is dynamic, gradual, and inconvertible, affecting all human beings, involving physical and psychosocial factors. This whole process affects certain vulnerabilities and weaknesses in individuals, both in physical, psychological, and social aspects. Difficulties of the locomotor system that impairs the individual's functional capacity, the development of anxiety and depression and the emergence of chronic diseases such as hypertension and diabetes, are some of the problems promoted by aging [1].

The aging process can cause, among other things, an increase in balance problems, caused by dysfunction and loss of muscle mass called Sarcopenia. Sarcopenia is defined as a slow and progressive process that is associated with other chronic diseases and their consequences, directly affecting the functionality and autonomy of many elderly people, especially about falls, leading them to acquire musculoskeletal problems [2]. Even so, Sarcopenia is

- 1 Faculty of Communication, Tourism and Technology of Olinda, Olinda, Pernambuco, Brazil
- 2 Higher School of Physical Education, University of Pernambuco, Recife, Pernambuco, Brazil
- 3 Nutrition Postgraduate Program, Universidade Federal de Pernambuco – UFPE, Recife, PE, Brazil;
- 4 Federal University of Pernambuco, Recife, Pernambuco, Brazil
- 5 University of Porto, Portugal

*Corresponding author:

Matheus Santos de Sousa Fernandes

✉ theusfernandes10@hotmail.com

Tel: +5581999963176

Universidade Federal de Pernambuco, Departamento de Educação Física, Av. da Engenharia s/n Cidade Universitária 50740060 - Recife, PE – Brasil, Brazil

Citation: Silva JRL, Silva MAC, Andrade AJ, Fernandes KKD, Gomes PP, et al. (2021) Strength Training as an Assistant Tool in the Prevention of Falls in Elderly Sarcopenics: a Review. Health Sci J. 15 No. 1: 804.

associated with the individual's lifestyle, and is not limited only to age characteristics [3].

One in three elderly people over 65 years of age suffered a fall, and among twenty, one needed hospitalization, according to the National Institute of Traumatology and Orthopedics. Burns et al. [4] shows that fractures caused by falls in the elderly are responsible for a high rate of morbidity and mortality, in addition, even if most injuries caused by falls result only in bruises, sprains and lacerations, this type of accident can limit the capacity functional elderly.

A characteristic of this population is that some individuals tend to have high levels of sedentary behavior, low adherence to physical exercise leads individuals to decrease their functional and motor capacity, increasing the risk of falls, as well as increasing development chronic non-communicable diseases such as cardiovascular problems. For Fleck and Kraemer [5], strength training has become one of the most popular forms of exercise used, being characterized by a wide range of training modalities, which integrate weight and weightless body exercises, in addition to other diverse techniques, to promote an increase in strength, decrease in body fat, increase in lean mass, in addition to improving physical fitness and sports performance [6-11].

Although many elderly people, when they practice physical exercises, opt for aerobic exercise, as an effective alternative in the control of hypertension, diabetes, and other chronic diseases, for De Oliveira et al. [12], muscle mass gain is directly associated with strength training, which is the most suitable for an efficient gain and reversal of the effects promoted by

Sarcopenia. Therefore, the objective of this study is, through a literature review, analyze the effects of strength training on Sarcopenic elderly.

Methods

A literature review was conducted, based on the bibliographic research of original articles on strength training in the prevention of falls in elderly people with Sarcopenia. As inclusion criteria, used to carry out this investigation, we adopted: 1) Articles published in Portuguese and English, 2) Published in the last 10 years (2010 to 2020), 3) Articles from field research and original studies. And as exclusion criteria: 1) Articles that are not related to the theme, 2) Literature reviews. To carry out the research, the health descriptors "Resistance Training", "Elderly" and "Sarcopenia" were used, as well as their equivalents "Resistance Training", "Old man" and "Sarcopenia", with the Boolean operator "and". The selection and inclusion of articles were carried out through a search in the following databases: Scielo and PubMed, configured as shown in Organization **Figure 1**.

Results

The research was based on the analysis of the following scientific articles related to the theme of strength training in the prevention of falls in elderly people with Sarcopenia. After the complete reading of these studies, all contents were analyzed specifically with a focus on the objectives research and considerations about its methodologies. The works are organized according to the year of publication.

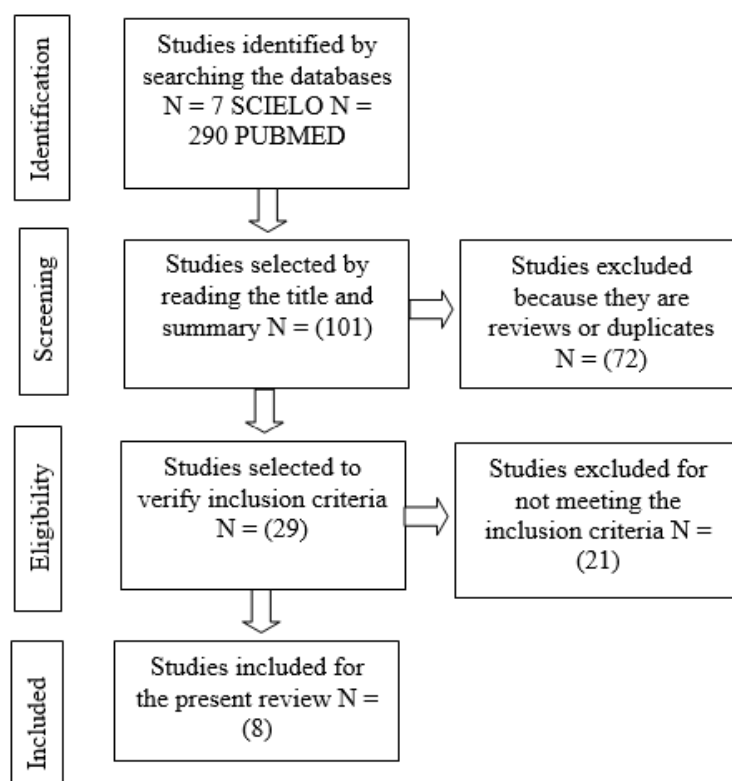


Figure 1 Selection of articles in the databases.

Discussion

This integrative review aimed to investigate the effects of strength training in preventing falls in elderly Sarcopenia. Therefore, the selected articles were analyzed to identify these parameters. The results of this review corroborate the integrality of the aspects already evidenced in the literature, showing that strength training is a possibility and alternative in the prevention of falls in the elderly, as it can promote the significant increase in lean mass, muscle strength, functional capacity and balance, with the promotion of quality of life and health.

Bernardi et al. [10] addresses aspects related to Sarcopenia, its causes, and consequences. The authors indicate that the use of strength training for the elderly prevents Sarcopenia, preventing falls in old age. In addition, some aspects must be taken into account, such as: the adaptation period, which individuals need to adapt and recognize the training, repetitions and equipment; warm-up exercises that should be performed in the form of stretching, working with flexibility; the interval between sets, which must be between 60 and 120 seconds; the number of exercises that should be established in a range of five exercises that work with various muscle groups and the frequency and duration of the exercises that should take place three times a week. The work points out fruitful discussions for this study since it analytically addresses some technical and specific aspects about the use of strength training to prevent Sarcopenia in the elderly.

The studies by Martinez et al. [2] and Teodoro et al. [7] correlate in the detailed description of aspects related to Sarcopenia, related to strength training for the elderly. Both studies allow us to have a broad view on the themes and provide a correlation of the two aspects, corroborating the statement that the use of strength training for the elderly prevents Sarcopenia, as well as helps in the treatment process. Strength exercises result in an improvement in the lives of the elderly who aim to have a healthy quality of life. Thus, having the reversal of the disease and the increase in their physical sensations and the factor of constant falls has some improvement. Suetta et al. [8] emphasizes the importance of strength exercises in increasing strength, improving functional capacity and to reverse possible muscular atrophy in elderly people with Sarcopenia and corroborate the information by Silva et al. [11] that the most effective method to achieve prevention and reversal of Sarcopenia is the exercises performed with resistance.

An important study evidenced in the literature is that of Silva et al [11] which aimed to verify the effect of weight training, prescribed

by zone of maximum repetitions, on body composition and muscle strength in women over 50 years. The work was carried out with 30 elderly women, without health problems. An analysis of height, total and lean body mass, absolute and relative fat, in addition to the body mass index was performed. The following variables were assessed in the evaluation of maximum muscle strength: strength of the flexor muscles of the elbows, strength of the flexor muscles of the knee, strength of the extensor muscles of the elbow and strength of the knee extensor muscles. The training protocol encouraged participants to use a load that made it possible to perform at least 10 repetitions and a maximum of 12 repetitions, and when the participants were able to perform more than 12 repetitions, the load

was increased. The studies were carried out for 12 weeks, with three weekly sessions lasting 40 minutes. Two series were performed with the following exercises: flying, pull over in the pull, knee extension and flexor table, scott thread and triceps in the pulley and lateral elevation [13,14].

The recovery time between sets was 2 minutes. The study noted a significant difference in aspects related to total body mass and body mass index and that the results also point to a significant increase in muscle strength in the muscle groups assessed. The study proves to be important in the discussion because it brings descriptive and evaluative technical aspects about the effects of using strength training for elderly people with Sarcopenia [15-20].

Conclusions

According to the exposed work, it was possible to conclude that the use of strength training for elderly people with Sarcopenia is satisfactory, as long as the protocols are followed, respecting the individualities of each one and that the monitoring is performed by a Physical Education professional properly qualified. On average, all studies used a frequency of 70% to 80% of MR, except the Lopes et al. [10] because it is a case study with a 91-year-old, in a way, the number of series and repetitions are consistent in all surveys, performing an average of 2-4 series with 10 to 15 repetitions, showing be an efficient protocol in relation to this age group, but without forgetting to consider the individualities and specificities of each group or individual.

Thus, this study is of great importance for correlating important aspects of strength training in the prevention of falls in the elderly, encouraging these important discussions, seeking to meet the needs of these individuals affected by Sarcopenia every day, always promoting the improvement of quality of life it is possible to minimize the effects promoted by such.

References

- 1 Brito FC, Litvoc CJ (2004) Basic concepts. In: Brito and Litvoc (Editors). Aging - prevention and health promotion. São Paulo: Atheneupp: 1-16.
- 2 Martinez BP, Camelier FWR, Camelier AA (2014) Sarcopenia In The Elderly: A Review Study. *Revista Pesquisaem Fisioterapia* 4: 62-70.
- 3 Barbosa AR, Santarém JM, Filho WJ, Marucci MFN (2012) Effects of a Training Program against Resistance on the Muscular Strength of Elderly Women. *Rev Bras Ativ Fis Saúde, Florianópolis* 5: 12-20.
- 4 Burns ER, Stevens JA, Lee R (2016) The direct costs of fatal and non-fatal falls among older adults - United States. *J Safety Res* 58:99-103.
- 5 Fleck SJ, Kraemer WJ (2017) *Fundamentals of Muscle Strength Training*. Artmed Editora.
- 6 Daniela FB, Reis AS, Mariana de, Natália BL (2008) The Treatment Of Sarcopenia Through The Exercise Of Power In The Prevention Of Falls In Elderly : Review Of Literature. *Essays and Science : Biological , Agricultural and Health Sciences* 12: 197-213, 2008.
- 7 Teodoro BG, Moreira PVS, Resende NM, Neto AMM, Espindola FS (2006) Effects of resisted training in elderly people. *RevistaAção e Movimento* 3: 27-31.
- 8 Suetta C, Magnusson SP, Beyer N, Kjaer M (2007) Effect of strength training on muscle function in elderly hospitalized patients. *Scand J Med Sci Sports* 17: 464-472.
- 9 da Silva CM, Gurjão ALD, Ferreira L, GobbiLTB, Gobbi S (2006) Effect of weight training, prescribed by zone of maximum repetitions, on muscle strength and body composition in elderly women. *Rev Bras Cineantropom Desempenho Hum* 8: 39-45.
- 10 Lopes KG, Bottino DA, Farinatti P, Coelho de Souza MGC, Maranhão PA, et al. (2019) Strength training with blood flow restriction—a novel therapeutic approach for older adults with Sarcopenia? A case report. *ClinInterv Aging* 14: 1461-1469.
- 11 Silva BSA Fábio Santos Lira, Rossi FE, de Freitas MC, Freire APCF, et al. (2018) Elastic resistance training improved glycemic homeostasis, strength, and functionality in Sarcopenic older adults: a pilot study. *J Exerc Rehabil* 14: 1085-1091.
- 12 de Oliveira JC, Rodrigues AMS (2007) Fatores Intervenientes No Ganho Da Massa Muscular.
- 13 Lichtenberg T, von Stengel S, Sieber C, Kemmler W (2019) The favorable effects of a high-intensity resistance training on Sarcopenia in older community-dwelling men with osteoSarcopenia: the randomized controlled FrOST study. *Clin Interv Aging* 14: 2173-2186.
- 14 Ministry of Health (2014) How to reduce falls in the elderly. Rio de Janeiro.
- 15 Nilsson MI, Mikhail A, Lan L, Di Carlo A, Hamilton B, et al. (2020) A five-ingredient nutritional supplement and home-based resistance exercise improve lean mass and strength in free-living elderly. *Nutrients* 12: 2391.
- 16 Osuka Y, Kojima N, Wakaba K, Miyauchi D, Tanaka K, et al. (2019) Effects of resistance training and/or beta-hydroxy-beta-methyl butyrate supplementation on muscle mass, muscle strength and physical performance in older women with reduced muscle mass: Protocol for a randomised, double-blind, placebo-controlled trial. *BMJ open* 9:e025723.
- 17 Teodoro BG (2006) Effect of resistance training for the elderly. *Action and Movement Magazine* 3: 27-31.
- 18 Viana JU, Dias JMD, Batista PP, Silva SLA, Dias RC, et al. (2018) Effect of a resistance exercise program for Sarcopenic elderly women: quasi-experimental study. *FisioterMov* 31.
- 19 Vikberg S, Sörlén N, Brandén L, Johansson J, Nordström A, et al. (2019) Effects of resistance training on functional strength and muscle mass in 70-year-old individuals with pre-Sarcopenia: a randomized controlled trial. *J Am Med Dir Assoc* 20: 28-34.
- 20 Zdzieblik D, Oesser S, Baumstark MW, Gollhofer A, König D (2015) Collagen peptide supplementation in combination with resistance training improves body composition and increases muscle strength in elderly Sarcopenic men: a randomised controlled trial. *Br J Nutr* 114: 1237-1245.