



Exercise for Sarcopenia in the Elderly: What Kind, Which Role?



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Abstract

Introduction: Sarcopenia is a progressive and generalized loss of skeletal muscle mass and strength associated with ageing. Regular exercise has been indicated to be the only strategy which consistently improves sarcopenia and physical function in elderly. The aims of this study are to review the mechanisms of sarcopenia and to evaluate the role of exercise in the elderly with sarcopenia and the current recommendations about the exercise interventions.

Discussion: Exercise significantly improve mobility, functionality, muscle mass, bone mineral density, balance and proprioception; thus, decreasing the risk of falls, increasing quality of life and reducing morbidity and mortality. Different types of exercise may be of interest in patients with sarcopenia: aerobic, progressive resistance, flexibility and balance training. Supervised or group exercise programs may be preferable for elders, with regard to both safety and compliance.

Conclusion: Sarcopenia is a strong predictor of disability, morbidity, and mortality in elderly. Anaerobic exercise seems to be the most important tool to prevent and treat sarcopenia.

Keywords: Exercise; Sarcopenia; Elderly

Introduction

Sarcopenia is a progressive and generalized loss of skeletal muscle mass and strength associated with ageing [1]. It is a complex medical condition that leads to a decreased functional status, disability, a higher risk of falls, reduced quality of life and increased health care costs [2]. Several factors seem to play a role in the onset and progression of sarcopenia; however, its pathophysiology is still unclear. Regular exercise has been indicated to be the only strategies which consistently improve sarcopenia and physical function in elderly. The aims of this study are to review the mechanisms of sarcopenia and to evaluate the role of exercise in the elderly with sarcopenia and the current recommendations about the exercise interventions.

Discussion

Mechanisms of sarcopenia

The muscle mass is considered the primary determinant of strength [3]. Studies have shown that the loss of muscle mass during the ageing process reduce strength and exercise capacity, which are required to undertake daily living activities. Several mechanisms are involved in the development of sarcopenia in the elderly, such as: changing's in neuromuscular transmission, muscle and tendon

architecture, fiber composition, excitation-contraction coupling and metabolism [4,5]; increased concentrations of proinflammatory cytokines and acute phase reactants with direct detrimental effects on skeletal muscle, resulting in loss of myofibers and disruption of contractile function [6]; decrease of anabolic hormones such as growth hormone, testosterone and estrogen with decrease of its trophic effect and muscle atrophy [7]; infiltration into muscle of fat (sarcopenic obesity or myosteatorsis). Disuse may be the underlying reason for muscle atrophy and weakness, rather than aging, per se [7]. Suetta et al. [8] showed that following some periods of disuse that occur with increasing frequency in the elderly (illness, hospitalization) the rate of sarcopenic muscle loss is accelerating and it is more difficult for the elderly to recovery. Furthermore, literature shows that poor nutrition may also have a significant contribution in sarcopenia development [3].

The role of exercise

Exercise significantly improve mobility, functionality, muscle mass, bone mineral density, balance and proprioception; thus decreasing the risk of falls, increasing quality of life and reducing morbidity and mortality [9-12]. Even in previous sedentary people, the initiation of an exercise program at older age carries additional

benefit, improving significantly the survival and the quality of life [9].

Type of exercise

Different types of exercise may be of interest in patients with sarcopenia: aerobic, progressive resistance, flexibility and balance training. Supervised or group exercise programs may be preferable for elders, with regard to both safety and compliance [13,14].

Aerobic exercise

Aerobic exercise evolves repetitive and rhythmic movements of large muscles, for sustained periods. It requires primarily the use of oxygen to meet energy demands through aerobic metabolism. This aims to improve the cardio-respiratory fitness, body composition and cardio-metabolic health [13-17]. Jogging, swimming, water aerobics, dancing or bicycle riding are some modalities of aerobic exercise.

Progressive resistance exercise

The progressive resistance exercise constitutes the ideal type of exercise for sarcopenia [13,14]. It comprises lifting weights, working with resistance bands, doing calisthenics using body weight for resistance and other modalities. Progressive resistance exercise requires muscles to generate force to move or resist weight, with the intensity increasing as physical capacity improves [13]. It increases muscle mass, power, strength, bone mineral density and tendon strength and improves various cardio-metabolic risk factors in the absence of weight loss [18]. The protein synthesis rate and the neuromuscular adaptive-responses among elderly adults seems to be similar to that of young people, even after short periods of progressive resistance exercise and despite a much lower pre-exercise rate [19,20].

Flexibility exercise

Flexibility is the capability to move joints through a complete range of motion. The presence of limited range of motion may contribute to gait changes and increase the risk of falls. Flexibility exercises or stretching may be static, dynamic, active or a combination (such as, proprioceptive neuromuscular facilitation) [15].

Balance training

There are numerous changes that occur with aging: impaired proprioception, postural hypotension, larger postural sway, slower gait velocity and slower correcting reflexes. Balance training helps to attenuate it and maintaining stability during daily activities, preventing falls [15].

Conclusion

Sarcopenia is a strong predictor of disability, morbidity, and mortality in elderly. Anaerobic exercise seems to be the most important tool to prevent and treat sarcopenia. Motivating older persons to increase their physical activity level as well as providing safe access to exercise programs seems to be a mandatory task. More exercise programs need to be developed and adapted to the

elderly. In an increasingly sedentary population, the approach should also focus on lifestyle modifications.

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