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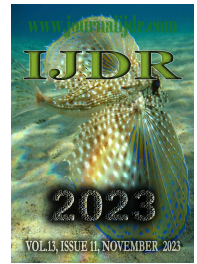
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RESEARCH ARTICLE

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THE BENEFIT OF WEIGHT TRAINING FOR THE ELDERLY IS THE PREVENTION OF SARCOPENIA

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ABSTRACT

Sarcopenia is the progressive loss of strength and muscle mass in the human body, a skeletal muscle condition that compromises quality of life, physical performance, and mobility. It is a notable condition, especially in older people, but it is not a strict rule, as there are records of cases of sarcopenia in young individuals who also have other pathological factors, such as obesity, cancer, or degenerative diseases. Sarcopenia has been recognized as a disease by the World Health Organization since 2016 (ICD M62.84), a syndrome that began to be studied in 1980, first described by Irwing Rosemberg. Studies in this review show the importance of physical activity and weight training in slowing down the progression of sarcopenia and improving the quality of life of older people through gains in strength, hypertrophy, balance, independence and self-esteem.

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INTRODUCTION

We human beings are destined to age according to the natural flow of life, but with the increase in life expectancy, the number of elderly people is growing. According to the UN's World Population Projections in 2019, older people will account for 28.2% of the world's population by 2100. The WHO today shows us that the third age begins between 60 and 65 years of age. With the increase in longevity, there is a concern about the well-being and bodily integrity of the elderly population, often affected by muscle sarcopenia, which brings several changes in body composition, including hormonal changes, accumulation of visceral fat, increase in body fat mass and reduction in lean mass. This results in decreased mobility, autonomy, and well-being of older adults (Roth SM, *J Nutr Health Aging*, 2000). Sarcopenia can affect both highly sedentary people and older people who engage in physical activity. Several studies indicate that weight training and strength training help slow down the process of sarcopenia (Roth SM, *J Nutr Health Aging*, 2000). The objective of this literature review is to highlight weight training and strength training as essential tools to slow the progression of sarcopenia. A simple review was carried out, using platforms such as PubMed, Scielo, books and scientific journals.

Human Aging: The aging process is natural for humans and compromises the cognitive and physical aspects of the individual.

This process occurs due to three main factors: biological, social, and psychic. In some people, aging may be accelerated due to the emergence of aging-related diseases. Physiologically, changes occur in organ functions and homeostatic balance, leading to a decrease in functions in relation to normal parameters. An elderly individual, under normal conditions, can lead a normal life, but may face difficulties in maintaining homeostasis when subjected to situations of physical stress, which can result in the emergence of various pathologies. From a physiological point of view, aging manifests itself according to the individual's lifestyle, covering all periods of life, from childhood to aging (Firmino, 2006). Aging is a process that involves biological changes in the human body, resulting in structural and functional changes. With advancing age, there are several important changes in body composition. This includes increased body fat, especially visceral fat in the abdominal cavity, along with loss of lean body mass, which is caused by reduced skeletal muscle mass. This progressive age-related loss is termed "Sarcopenia" and was recognized as a disease by the World Health Organization in 2016. The disease develops due to several factors, including a sedentary lifestyle, decreased protein synthesis, among others (Fisioter Mov. 2011). In the midst of this process, we have strong perceptions of some variants between capacities and basic senses, according to Roger Fontaine, the perception of degradation is different and varies according to each individual and each of the sensory modalities has its levels of perception of degradation and the greatest deficit is linked to balance, vision and hearing according to advancing age. The

individual will feel effects on the items represented in the table below (Fontaine, 2000).

VARIANT	EFFECT
Taste	Very weak
Kinesthesia	Very weak
Tact	Strong
Temperature	Strong
Pain	Strong
Equilibrium	Very Strong
Vision	Very Strong
Hearing	Very Strong
Smell	Very weak

Adapted from Fontaine, 2000

Sarcopenia: Aging is a unique process for each individual, and as cited by Levet-Gautrat (1987), "there is no single entry into old age, but different and successive entries." Sarcopenia is a syndrome related to the loss of muscle mass and predominantly affects the elderly. This condition represents a physiological vulnerability that results in deficits in biological homeostasis and abnormalities in the human body's ability to adapt to stressful situations. This increases the risk of falls, balance problems, fractures from falls or impacts and can lead to dependence on others to perform daily activities due to lack of walking ability and loss of muscle strength (Rev Bras Reumatol, Nov/Dec, 2006). Sarcopenia syndrome began to be studied in 1980 and was first described by Irwing Rosenberg, a term he suggested in 1989. Originating from Greek, the word sarcopenia means "reduction of meat" and is characterized by the loss of skeletal muscle mass related to aging and a sedentary lifestyle, resulting in an increase in the volume of morbidity of the individual and the loss of functional capacity (Rosenberg, 1997). It is correct to state that the syndrome develops due to multiple factors, including physical inactivity, a drop in protein synthesis, and hormonal imbalances. These elements contribute to the decline in muscle mass and function, significantly impacting the quality of life of the elderly. The onset of chronic diseases, such as pulmonary and renal disability, and heart failure, are pathologies triggered by aging and morbidity, leading to impairment and loss of skeletal muscle mass, leading to the inability to perform daily activities, physical dependence, and, finally, death (Mitchell *et al.*, 2012).

Diagnosis: Today we have several methods by which it is possible to diagnose sarcopenia. It is a multifactorial syndrome, so some means are used to detect it, such as imaging tests, blood tests, measurement of muscle mass and strength. Studies show that, during aging, we humans tend to have alterations in some components necessary to maintain the normality of skeletal muscle mass, such as a decrease in water content, a decrease in muscle mass and an increase in body fat (Forbes GB, 1991). Among the methods mentioned, we have bone densitometry, performed by equipment that uses ionizing radiation and X-rays. When the frequency is attenuated by the individual, the machine calculates, by means of algorithms, the values of bone, muscle and other tissue mass (Grecco; Marcondes, 2015). The bone densitometry test consists of analyzing and evaluating the bone mineral composition, providing very accurate results of bone mineral density, fat mass and lean muscle mass values (Salamat, 2014)."

Prevention and Benefits of Bodybuilding: In the aging process, a significant decline in functional capacity is notable, accompanied by a loss of muscle strength in a comprehensive manner, including concentric, eccentric, and isometric strength (Fleck and Kraemer, 2006). This decline can result in accidents, falls, and injuries, increasing the individual's vulnerability and negatively impacting their physical autonomy. Basic daily tasks, such as walking, sitting, lying down, and even personal hygiene, can become challenges for the elderly. It is crucial to implement strength activities, resistance training, and weight training as an integral part of care for the elderly. These practices contribute to increased muscle strength, make it easier to carry out daily activities, and play a key role in preventing muscle loss associated with aging. The loss of muscle mass is caused by some factors such as lifestyle, poor nutrition and inactivity, so to prevent and slow down this process, it is necessary that through

physical exercises we can strengthen the muscles in youth and maintain this principle throughout life, keeping the muscles active until middle age and during. thus reducing the advance of muscle loss, thus considering aging as the main factor and secondary factors linked to sedentary lifestyle, poor nutrition and diseases. (Cruz-Jentoft, 2019). Physical activity is of great help for the prevention and control of sarcopenia, weight training plays a major role in muscle strengthening, resistance training and strength progression. The benefits of weight training for the elderly are remarkable, which include muscle hypertrophy, mobility and strength gain, increasing the ability to perform daily activities with greater independence, increased self-esteem and quality of life. Emphasizing that resistance training is about physical activities that use external resistance with the help of elastic bands, dumbbells and even one's own body weight, introducing functional activities, training that must respect the biological individuality and the current situation of the individual (Dent, 2018). Additionally, strength training can play a significant role in postoperative recovery by reducing the risk of complications and trauma caused by falls (Fleck and Kraemer, 2006). Encouraging and promoting these practices among older adults can be crucial for improving their quality of life and maintaining functional independence over time.

Physical activities and resistance training are great allies against sarcopenia, in a preventive and rehabilitative way, respecting the biological individuality of the individual, so the constancy of training can increase longevity, quality of life representing benefits before the disease manifests itself and in a rehabilitative way (Silva *et al.*, 2014). In recent studies, bodybuilding training was applied to a group of elderly people who were already debilitated and dependent, presenting dementia, lack of balance and also a very high level of dependence. This study was presented in an article by (Izquierdo *et al.* 2014). The study consisted of performing physical training focusing on balance and cognition for 4 weeks, and the weight training work was applied in only two sessions per week, using the leg press, with the full help of the study applicators. At the end of the study, a good result was obtained, in which the elderly showed cognitive improvements, improvements in gait, improvements in strength and locomotion. Some of them stopped using supports to get around. Multiple studies, including the European Society of Clinical Nutrition and Metabolism (ESPEN) guidelines on sarcopenia, underscore the importance of physical exercise as a key intervention for maintaining muscle mass and muscle function at different ages. Strengthening the muscles from a young age and continuing with the practice throughout life can help preserve muscle health.

CONCLUSION

According to the present review article, it is concluded that sarcopenia is a syndrome that was considered a disease in 2016 by the World Health Organization. It is a multifactorial syndrome. However, aging, poor nutrition, inactivity and lack of regular physical exercise can accelerate the degenerative process of lean muscle mass, leading the individual to enter old age with a high possibility of triggering sarcopenia in an accelerated way, impairing mobility, quality of life, opening doors to other types of pathologies and increasing the great possibility of becoming dependent on others to perform daily tasks much earlier of reaching an old age. The studies presented in this review emphasize how the practice of weight training can bring benefits to the health of the elderly and contribute to aging with less physical and degenerative impacts on the individual. Among the results shown in the studies, it is concluded that locomotion and muscle strength are considerably improved with resistance training, which also plays a very significant role in postoperative recoveries and in reducing the risk of falls, which can cause severe trauma to the elderly. For greater effectiveness, the individual should have a physical exercise routine long before entering old age. However, resistance training has been shown to be effective for older adults with various problems related to aging, such as dementia and sarcopenia, which were introduced in a new routine, and in a few weeks, obtained good results. A healthy exercise habit and a good diet

contribute to the prevention of sarcopenia, which can be monitored by means of diagnoses made by currently existing tests.

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