

Review Article

Resistance Exercise Applied to Osteoporosis in Women in the Climacteric

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Abstract

Some of the benefits of resistance exercise are improved muscular strength, physical conditioning, reduced stress, social interaction, improvement of self-image among others. This kind of exercise has been around from the earliest times, according to accounts found in the city of Olympus and ancient Egypt. Among its many benefits, resistance training increases bone mineral density; when the bone is submitted to resistances through exercises it is stimulated which facilitates its modeling. Osteoporosis is a disease that decreases the amount of bone mineralization, and affects especially women, due to greater hormonal changes at the onset of menopause. The objective of this study was to present, through bibliographical references, the benefits of resistance exercise in the prevention and treatment of osteoporosis in women in the climacteric phase, and to assist in its treatment. We concluded with this study that resistance exercise can be used to prevent osteoporosis in pre-menopausal women and as indirect treatment in already osteoporotic women.

Keywords: Resistance exercise; Osteoporosis; Climacteric

Introduction

The first accounts of resistance exercise come from Olympus and Egypt. Since then, its history has evolved, making its training methods essential for this evolution [1]. When you think about resistance exercise, what comes to mind are perfect and defined bodies, but nowadays it goes much further. Due to the various types of training, it can be used by any group of the population, from adolescents to the elderly, including the physically disabled. The most important benefits of resistance exercise are: improved muscle tone, flexibility, physical conditioning, reduced stress, social interaction and improvement of self-image. Consequently, its exercises have been used to prevent and treat many ailments, including osteoporosis [2]. With the increase of life expectancy, osteoporosis has aroused more interest, becoming a public health issue [3]. Osteoporosis is defined as a chronic and evolving disease that affects more women because they have greater hormonal changes at the onset of menopause. There are two kinds: primary or physiological and secondary, which is caused mostly by other diseases. Postmenopausal women are directly affected in the case of osteoporosis type I. (type I osteoporosis is the first level of the disease, in the initial phase). Treatment includes the use of drugs, a proper diet and physical exercise [4]. Exercises such as load training increase bone mineral density because when the bone is submitted to resistances through exercises it is stimulated. This stimulus facilitates the entire process of bone remodeling, which occurs so that the bone structure can withstand mechanical resistance [5]. Our methodology was literature review, with the purpose of presenting the benefits of resistance exercise in the prevention and treatment of osteoporosis in women in the climacteric phase.

Literature Review

The benefit of resistance exercise for osteoporosis is due to the strengthening action of the bone structures. It is also an activity with

individual training program, with slow to moderate movements [6]. Due to age-related changes in musculoskeletal health, one of the most beneficial forms of training for the elderly may be resistance training, as it is indicated for people who need to increase musculoskeletal strength, muscle mass, bone mineral density and other factors related to strength [7]. The muscular condition itself determines the variable of the bone condition, and weak muscles lead to weak bones. Other factors, such as genetic, hormonal and nutritional factors, play an important role in bone health, but resistance exercises help bone strength and develop a stronger musculoskeletal system. Resistance exercises are effective for all age groups, especially for the elderly. However, they should be prescribed with caution, because, when we age, physiological changes are slower, thus deserve greater attention. To become denser, the bone must be subjected to a pressure greater than normal levels. When this happens, the bone goes through growth and adaptation processes, until its structure is able to manage the imposed pressure [8].

During physical activity calcitonin is released and helps prevent calcium loss, making it essential to maintain the percentage of bone mineral density [9]. Body weight is directly related to the level of mineral bone density. An overweight person, for example, has very strong bones. Studies indicate that, physical activities with greater intensity and weight lifting have a great positive effect on the skeleton [5]. When force or pressure (resistance) is applied to the bone, it curves and a series of events occur, causing the cells to be stimulated into strengthening the bone. Bone adapts to either pressure or the absence of it, thus forming or losing bone mass [9].

Cunha, et al. [10] argue that exercises on machines may be more feasible for beginners (both osteoporotic and those who do not have the disease), because of their ease of execution, safety and convenience; after the adaptation period some free exercises can be included. As a precaution, increases on loads should be monitored, and should

occur as muscle strength increases. These loads, but should not be increased by more than 10% per week, for an increase over this might result in increased risk of trauma. During an eight-week resistance training, with bench press, squats and tread exercises performed by men and women, greater muscle strength increase was observed in women than men. It was observed that the women presented greater development of muscular strength after short periods of training with weight. This difference can be attributed in part to initial lower levels of strength in the volunteers or to a lower contribution of neural factors [11]. Lima and Vasconcelos [12] conducted a literature review in order to confirm the key scientific evidence on the effectiveness of physical exercise with overload for women in the menopause period as prevention to osteoporosis. They concluded that exercises with overload (bodybuilding) act positively on the inevitable aging process and can be used to prevent osteoporosis, especially in women. While weight carrying activity is essential for the normal development and maintenance of a healthy skeleton, physical activity cannot be recommended as a substitute for hormone-replacement therapy in the menopausal period. A general activity program emphasizing strength, flexibility, coordination and cardiovascular fitness may indirectly reduce the risk of osteoporotic fractures by reducing the risk of falls and enabling elderly women to remain active, thus avoiding bone loss due to inactivity. The process of reconstitution is permanent, but the peak of bone density is determined in time. It happens around 30 years. Until that age, we have more bone than we lose. Then the process reverses and the bone loss that characterizes osteoporosis should be avoided. Between 30 and 40 years the woman loses 0.18% of spongy bone per year - the predominant tissue in the vertebrae, in the bones of the pelvis and in the extremities of the long bones and the flat bones. In the first five years after menopause, the loss becomes 1.4% per year. It is not the end of the skeleton, of course, but the female disadvantage is great in this area, as women have 25-30% less bone mass than men and lose 35% of compact bone and 50% of spongy tissue throughout. While men lose less than half of those percentages [13]. In a cross-sectional study of 42 women in the post-menopausal period, with 21 women suffering from osteoporosis and 21 women without osteoporosis who did regular physical activity, it was verified through interviews and a multidimensional questionnaire that women who already are osteoporotic, but do not have fractures caused by low impact and who do regular physical activity, have similar quality of life when compared to women with the same characteristics, but not osteoporotic [14].

Another study that gathered information on strength training and its positive influence on osteoporosis emphasized that resistance exercise is an efficient and safe way to prevent osteoporosis because it increases muscle mass and bone density and also decreases body fat. These factors contribute to the better quality of life and functional capacity of individuals. However, the authors stated that doing physical activity and strength training are helping instruments in the prevention and maintenance of osteoporosis. Therefore, it is important to maintain the hormone-replacement therapy or calcium intake [15]. A study of eight sedentary peri-menopausal women, which included physical exercises combining strength and endurance over a twenty-week period, concluded that there were no changes in maximal oxygen consumption and body components, noting that the 20-week period is not enough. However, a maintenance trend

or changes in all body components (bone mass, fat mass and lean mass) was observed, suggesting that a longer period of activity could be more efficient for data analysis [16].

Ocarino and Serakides [17] concluded in a literature review that the benefits of physical activities with overload (strength, flexibility, increased bone mineral density, among others) to bone tissue in either non-osteoporotic individuals and in the prevention and treatment of the disease are unquestionable, even if some results are contradictory. And, through studies that have already explained the factors and mechanisms by which bone mass increases through physical activity, it is possible to develop more adequate treatments for osteoporotic individuals with physical activity restrictions, or post-menopausal women, who due to the side effects, have had the use of hormone-replacement therapy increasingly restricted [18]. Based on the results described above, it is possible to verify that, although there are several points of view, all authors agree that the practice of physical activity, even indirectly, is beneficial for the prevention and treatment of osteoporosis. Since, over the years, loss of bone mass is inevitable as part of a natural aging process, especially in women, there are some factors that, when well used, help decrease the percentage of this loss. One of these factors is the practice of resistance exercise, which stimulates bone remodeling through the overload principle, which generates new bone adaptations and increases bone mineral density, especially during adolescence and adulthood, until about thirty-five years [19-21]. Load exercises are not only the most efficient for increasing bone mass but also for increasing skeletal muscle mass and strength. They also improve flexibility and coordination, avoiding falls which could cause fractures in the osteoporotic bones of the elderly. Obviously, the exercises should be accompanied by specific medical treatment, such as hormone-replacement therapy and an adequate, calcium-rich diet so that prevention and treatment are effective. However, excessive exercise should be considered, as it can be harmful. Excessive exercise can, for example, lead to an absence of menstruation in women, which would decrease bone mass precociously [22].

Therefore, it is possible to agree with the arguments and various studies about how effective resistance exercises are, with intensity and frequency prescribed according to the level of each individual to prevent and treat osteoporosis as long as the physical activity is done alongside clinical treatment and an adequate diet when necessary. In prevention treatments, a prescribed program should be chosen according to the specific needs of each individual, thus avoiding excesses that can be harmful.

Conclusion

In this study, we concluded that resistance exercise can be used as a method to prevent osteoporosis in pre-menopausal women and as indirect treatment in women who already are osteoporotic. Having as principle a prescription based on the variables and training methods convenient for each biotype, not suppressing the need of clinical and nutrition treatment, but as a complement to them.

Women, the most affected group, especially in relation to osteoporosis I, due to the loss of bone mass caused by the decrease of estrogen beginning in pre-menopause, should do resistance exercises. It can be very important in the prevention of osteoporosis especially

if done from an early age when bone remodeling is at its highest point, besides bringing benefits to life quality as a whole.

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