Short Communication

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Exercise Therapy in Prevention and Treatment of Postmenopausal Osteoporosis: An Update

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Abstract

This short communication was aimed to enumerate the evidence for exercise therapy in preventing and treating postmenopausal osteoporosis from a preliminary search of PubMed. There were two systematic reviews, seven clinical trials and one narrative review emphasizing the role of exercise training in prevention and treatment of women with postmenopausal osteoporosis. There is moderate evidence for efficacy of weight-bearing and aerobic exercises for improving muscular strength, coordination, and balance and decreasing risk for falling and subsequent fractures in women with postmenopausal osteoporosis.

Keywords: Preventive Rehabilitation; Preventive Exercises; Bone Mineral Density; Osteoporosis.

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Systematic Reviews

The first Cochrane systematic review by Bonaiutiet al [1] reviewed 18 randomized controlled trials with a mean methodological quality score of 2.53, which reported efficacy of aerobics, weight bearing and resistance exercises for improving spine BMD, with walking improving spine and hip BMD whereas aerobic exercise improved wrist BMD.

The second Cochrane systematic review was an update of the earlier review, performed by Howe et al [2] which identified 27 new RCTs with 4320 participants; and found that the most effective type of exercise intervention on bone mineral density (BMD) for the neck of femur appears to be non-weight bearing high force exercise such as progressive resistance strength training for the lower limbs; and the most effective intervention for BMD at the spine was combination exercise programmes. Exercise was concluded to have the potential to be a safe and effective way to avert bone loss in postmenopausal women.

Clinical Trials

Prince et al [3] studied the effects of three approaches (41 received exercises; 39 received exercises plus dietary calcium supplementation; and, 40 received exercises plus continuous replacement of estrogen and progesterone hormone-replacement therapy)in the prevention of osteoporosis in 120 postmenopausal women with low bone density.

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Whilst the control and exercise alone groups had bone loss, the exercise-calcium group had lower bone loss, and exercise-estrogen group had higher bone density in forearm compared to the other groups. Their findings suggested that bone loss can be slowed or prevented by exercise plus calcium supplementation or estrogen-progesterone replacement, the former was also associated with more side effects.

Kemmleret al [4] studied the effect of a 2-year vigorous, combined high-impact, strength, and endurance training program on bone mineral density (BMD) determined by dual-energy x-ray absorptiometry (DXA), quantitative computed tomography (QCT), and ultrasound in 90 early postmenopausal women with osteopenia who were given 14 months of exercise training, with 2 joint sessions and 2 additional home training sessions. The exercise group had improvements in lumbar spine BMD, maximum isometric strength (grip strength, trunk flexors and extensors, hip flexors, leg adductors and abductors, arm flexors and extensors), and VO2max, than the control group.

Kemmleret al [5] determined the effects of intense exercise on physical fitness, bone mineral density (BMD), back pain, and blood lipids in 50 early postmenopausal womenwho exercised over 26 months (exercise group [EG]), and 33 women who served as a non-training control group (CG).Physical fitness (isometric strength: trunk extensors,trunk flexors and maxi, mum oxygen consumption); BMD (lumbar spine, QCT L1-L3 trabecular region of interest, QCT L1-L3 cortical region of interest, and total hip); serum levels (total cholesterol, and triglycerides); and pain indexes at the spine improved in EG at 26 months follow-up.

Mayoux-Benhamouet al [6] conducted a 18-month prospective study to assess the long-term compliance and its determinants for an osteoporosis prevention exercise program in 135 postmenopausal women who participated in an educational session added to usual medical care. 17.8% practised exercises at a rate greater than 50% of prescribed dosage. Lack of motivation was the main reason for withdrawal from program. The predictor variables for compliance were contraindication for hormone replacement therapy, and general physical function scores from an SF-36 questionnaire, and osteoporosis risk, defined as a femoral T-score < or =-2.5, predicted compliance.

Kemmleret al [7] determined the impact of multipurpose exercise training on bone, body composition, blood lipids, physical fitness, and menopausal symptoms in 48 early postmenopausal women with osteopenia. After 38 months, significant differences between EG and CG were observed for the BMD at the lumbar spine and the femoral neck, body composition (waist circumference, waist-to-hip ratio), blood lipids (total cholesterol, triglycerides), and menopausal symptoms (insomnia, migraines, mood changes). Maximal isometric strength and one repetition maximum and VO(2max) increased significantly in the EG.

Teixeira et al [8] studied the effect of 18-week progressive muscular strength and proprioception training program on the muscle strength of the quadriceps, balance, quality of life, and prevention of falls in 100 postmenopausal women with osteoporosis who were randomized into two groups: the intervention group comprised of 50 patients who underwent a 18-week of progressive load training for the quadriceps muscle (50% up to 80% of 1-RM-one maximum repetition) and proprioception training associated to a drug treatment of osteoporosis and the control group that included 50 patients who only underwent a drug treatment of osteoporosis. The exercise program improved the SF-36 in the eight sub-scales, Timed Up & Go Test, 1-RM test, Berg Balance Scale, and also a decrease in the number of falls in the intervention group compared to control group.

Kemmleret al [9] studied supervised long-term exercise (EG) training on "overall" fracture incidence and bone mineral density (BMD) in 65 postmenopausal osteopenic women.

Exercisers performed in two group sessions / week and two home training sessions / week, and both groups received Calcium and vitamin D supplementation. Not only does exercises reduce fracture incidence, but also increased the lumbar spine BMD and femoral neck BMD compared to control group.

Narrative Review

Weight-bearing exercises provide osteogenic stimulus as a lifestyle factor that prevents bone loss, and the beneficial effects of weight training are increased muscular strength, coordination, and balance which could decrease risk for falling and subsequent fractures [10].

There were two systematic reviews, seven clinical trials and one narrative review emphasizing the role of exercise training in prevention and treatment of women with postmenopausal osteoporosis. There is moderate evidence for efficacy of weight-bearing and aerobic exercises for improving muscular strength, coordination, and balance and decreasing risk for falling and subsequent fractures in women with postmenopausal osteoporosis.

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