








## REVIEW ARTICLE

# Exercise vs Conventional Treatment for Treatment of Primary Osteoporosis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

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**Objective:** Physical exercise has obvious effects on bone loss, pain relief, and improvement of bone metabolism indexes in patients with osteoporosis, but currently lacks sufficient evidence. The aim of this systematic review and meta-analysis was to synthesize and present the best available evidence on the effectiveness and safety of exercises in the treatment of primary osteoporosis.

**Methods:** Publications pertaining to the effectiveness of exercise on bone mineral density (BMD), visual analog scores (VAS), and biochemical markers of bone metabolism in primary osteoporosis (POP) from PubMed, Cochrane Library, Embase, VIP, CNKI, and Wanfang Database were retrieved from their inception to April 2020.

**Results:** A total of 20 studies with 1824 participants were included. The results of the meta-analysis revealed that exercise therapy for lumbar spine and femoral neck BMD is statistically different from conventional therapy (lumbar spine BMD: SMD = 0.78, 95%CI: 0.46, 1.10,  $P < 0.00001$ ,  $I^2 = 85\%$ ; femoral neck BMD (SMD = 0.80, 95%CI: 0.34, 1.27,  $P = 0.0007$ ,  $I^2 = 88\%$ ), exercise therapy can significantly increase the lumbar spine BMD of patients with OP, especially in lumbar spine 2-4 BMD (SMD = 0.47; 95%CI: 0.20, 0.75;  $P = 0.0008$ ;  $I^2 = 69\%$ ). Compared with conventional treatment, kinesitherapy also has significant differences in alleviating the pain of POP patients (SMD = -1.39, 95%CI: -2.47, -0.31,  $P = 0.01$ ,  $I^2 = 97\%$ ). Compared with conventional therapy, kinesitherapy has no significant difference in improving biochemical markers of bone metabolism such as bone glaprotein (BGP) (SMD = 2.59, 95%CI: 0.90, 4.28,  $P = 0.003$ ,  $I^2 = 98\%$ ), N-terminal pro peptide of type I procollagen (PINP) (SMD = 0.77, 95%CI: -0.44 to 1.98,  $P = 0.21$ ,  $I^2 = 95\%$ ), serum phosphorus (SMD = 0.04, 95%CI: -0.13, 0.22,  $P = 0.61$ ,  $I^2 = 30\%$ ), alkaline phosphatase (ALP) (SMD = -0.08, 95%CI: -0.44, 0.27,  $P = 0.64$ ,  $I^2 = 76\%$ ), and serum calcium (SMD = 0.12, 95%CI: -0.18, 0.43,  $P = 0.42$ ,  $I^2 = 63\%$ ) in POP patients.

**Conclusions:** Kinesitherapy significantly improved lumbar spine and femoral neck BMD, and relieve the pain of patients in the current low-quality evidence. Additional high-quality evidence is required to confirm the effect of exercise therapy on the biochemical markers of bone metabolism in POP patients.

**Key words:** Bone metabolism; Bone mineral density; Kinesitherapy; Primary osteoporosis

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