

Effectiveness and Comparison Between Land and Water Exercises as Treatment for Osteoporosis: A Systematic Review and Meta-Analysis

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Abstract:

Introduction: Osteoporosis is a pervasive global health issue characterized by low bone mass, deterioration of bone tissue, and increased bone fragility. The International Osteoporosis Foundation estimates that over 200 million people worldwide are affected. Therefore, it is important to identify effective prevention and treatment strategies against osteoporosis, one of which is exercise. Currently, land-based and water-based exercises are implemented to improve osteoporosis. However, there is no meta-analysis comparing the effects of land-based and water-based exercise on osteoporosis improvement.

Objective: This study aims to compare the effectiveness between land-based and water-based exercises in osteoporosis management.

Method: This study followed the Preferred Reporting Item for Systematic Review and Meta-analysis (PRISMA) statement guidelines, and literature searching was done on several databases, such as PubMed, ScienceDirect, Wiley, and Google Scholar up to 13 March 2023. The 10 selected studies were further assessed for risk of bias using Cochrane Risk of Bias 2.0. Then a meta-analysis was conducted using Review Manager 5.4, which assessed the extracted data.



Results: Ten trials are included in the random effect meta-analysis of the efficacy of land-based exercise compared with water-based exercise. The results suggest that land-based exercise would decrease the odds of postmenopausal women experiencing osteoporosis (OR = 0.47, 95% CI; 0.23 to 0.96, p-value = 0.04). However, the subgroup meta-analysis of the four proxies that measure bone mineral density (BMD) after the intervention shows that, land-based exercise has no significant effect on the total BMD (SMD = 0.34, p-value = 0.20), femoral neck BMD (SMD = 0.29, p-value = 0.50), lumbar spine BMD (SMD = 0.06, p-value = 0.91), and total hip BMD (SMD = 0.01, p-value = 0.94) in comparison with water-based exercise.

Conclusion: Land-based exercises are better than water-based exercises for osteoporosis, but combinations with calcium and vitamin D supplements are recommended.

Keywords: *Osteoporosis, Land, Water, Exercises*