INPLASY PROTOCOL

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Corresponding author:
Zhang Miao

zhanmf117@163.com

Author Affiliation:
Shaanxi University of Chinese Medicine.

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Comparison of the effectiveness and safety of aerobic exercise in postmenopausal osteoporosis: A protocol for systematic review and network meta-analysis

Wang, QF[1]; Sun, MZ[2]; Liu, LL[3]; He, CM[4]; Zhang, M[5].

Review question / Objective: **The therapy of postmenopausal osteoporosis (PMOP), a disease unique to women, is a focal and difficult issue worldwide. High-intensity exercise is prone to sports injuries and not very interesting for menopausal women. Aerobic exercises such as tai chi, Baduanjin, yoga, Pilates, and swimming are very safe forms of exercise for older adults. A variety of aerobic exercises have been shown to be effective in the treatment of this disease, but it is still unclear which ones are most effective. Therefore, we propose a network meta-analysis (NMA)protocol to observe the efficacy of various Aerobic exercises for this disease and provide guidance for clinical practice.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 17 March 2023 and was last updated on 17 March 2023 (registration number INPLASY202330063).

INTRODUCTION

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various Aerobic exercises for this disease and provide guidance for clinical practice.

Condition being studied: The prevalence of postmenopausal osteoporosis (PMOP) is rapidly increasing, and the disease is characterized by high disability, high mortality, high economic burden, and low quality of life, which has attracted widespread medical attention, especially the research on the prevention and treatment of the disease has received increasing attention. Currently, long-term pharmacological treatment is often used to prevent osteoporosis and bone loss, however, poor compliance with this treatment has been observed. Epidemiological surveys have shown that the prevalence of osteoporosis in Chinese people over 50 years of age is 20.7% in women, and the prevalence of osteoporosis in women over 60 years of age is particularly prominent. Osteoporosis-associated fragility fractures constitute a major health problem all over the world. It is estimated that more than 40 million American citizens over 50 years of age are at risk of osteoporotic fractures, and that due to the demographic changes, this number will at least double until the year 2040.

METHODS

Participant or population: According to the PMOP Diagnostic Criteria issued by the American Association of Clinical Endocrinologists(AACE), we will include patients diagnosed with PMOP.

Intervention: Tai chi, Baduanjin, yoga, Pilates, and swimming.

Comparator: Intervention of different aerobic exercises for postmenopausal osteoporosis.

Study designs to be included: This study will systematically evaluate the efficacy of different aerobic exercises on postmenopausal osteoporosis and perform a network meta-analysis of the included randomized controlled trials (RCTS). Because this is a literature-based study, ethical approval is not required.We will include published RCTS in China and internationally.Whether blind or not, and language is limited to Chinese and English.

Eligibility criteria: Patients diagnosed with PMOP regardless of age, race, ethnicity, primary disease or Clinical stage.

Information sources: Embase, PubMed, Cochrane Library, Web of Science, China National Knowledge Infrastructure, Chinese Biological and Medical database and Wanfang Database were searched up to 10 March 2023 for randomized controlled trials of postmenopausal osteoporosis treatments using defined terms.

Main outcome(s): Main outcome indicators:new fracture; Quality of life; Severe side effects; Death caused directly or indirectly.

Quality assessment / Risk of bias analysis: The quality of the literature was assessed by 2 investigators using the risk of bias assessment tool recommended by the Cochrane Systematic Assessor's Handbook using Review Manager 5.4 software and cross-checking the results. The following 7 items were included: (1) randomization methods; (2) allocation concealment; (3) blinding of investigators and subjects; (4) blinding of study outcome evaluators; (5) completeness of outcome information; (6) selective outcome reporting; and (7) other sources of bias. The included literature was finally evaluated for quality in terms of low risk, unclear risk, and high risk.

Strategy of data synthesis: The data were subjected to frequency-based net meta-analysis and graphical plotting using Stata 14.0. The effect values of dichotomous variables in the outcome indicators were expressed as the ratio of ratios (OR), and the effect values of continuous variables were expressed as the mean difference (MD), and 95% confidence intervals (CI) were used to express the results of statistical analysis. Network evidence plots for direct comparisons among

interventions were first drawn; then the consistency of the closed loop of each outcome indicator was evaluated by the ring inconsistency test, and when the 95% CI of the ring inconsistency factor contained 0, it indicated a good agreement between direct and indirect evidence. The results of the reticulated meta-analysis were presented by two-by-two comparison forest plots. Cumulative ranking probability plots based on the area under the cumulative curve values were used to determine the best stimulus modality. Comparison-corrected funnel plots were used to test for publication bias and small sample effects.

Subgroup analysis: Depending on the problems encountered during the analysis, we will analyze different subgroups, such as the quality of the articles, the degree of disease, etc. If possible, we will do some additional subgroup analysis based on heterogeneity and inconsistency of results.

Sensitivity analysis: If heterogeneity is high, we will perform sensitivity analyses to exclude studies with missing important data, low-quality or small samples, and studies with high risk of biased trials to ensure stability of results.

Language restriction: Chinese or English.

Country(ies) involved: China.

Keywords: PMOP, Aerobic exercises, tai chi, Baduanjin, yoga, Pilates, swimming, network meta-analysis.

Contributions of each author:
Author 1 - Wang Qianfeng.
Author 2 - Sun Mingzhu.
Author 3 - LIU Linglan.
Author 4 - He Chenming.
Author 5 - Zhang Miao.