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The Effect of Traditional Chinese Medicine Exercise Therapy on Bone Mineral Density in Middle-Aged and Elderly Women: A Meta-Analysis of Randomized Controlled Trials

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 06 January 2024 and was last updated on 06 January 2024.

INTRODUCTION

Review question / Objective Osteoporosis (OP) is a systemic bone disease characterized by decreased bone mass and destruction of bone microstructure, which progresses insidiously and is a global epidemic, severely affecting the health and quality of life of middle-aged and elderly people, and can even lead to paralysis or death, and has been classified by the World Health Organization (WHO) as the second most harmful human health.

At present, there are more and more studies on the use of traditional Chinese medicine exercises to intervene in osteoporosis in middle-aged and elderly women, but the research programs are diverse and have not yet formed a quantifiable exercise prescription with clinical practice guidance. Based on this, this study used Meta-analysis to combine the effect sizes of traditional

Chinese medicine gongfu interventions on whole-body BMD in middle-aged and elderly women to investigate the overall intervention effect.

Condition being studied Osteoporosis (OP) is a systemic bone disease characterized by decreased bone mass and destruction of bone microstructure [1], which progresses insidiously and is a global epidemic, severely affecting the health and quality of life of middle-aged and elderly people, and can even lead to paralysis or death, and has been classified by the World Health Organization (WHO) as the second most harmful human health. It has been listed as the second most dangerous disease to human health after cardiovascular disease by the World Health Organization (WHO). Currently, there are more than 200 million OP patients worldwide, with a prevalence rate of more than 25%, and the prevalence rate in women is much higher than that in men. According to statistics,

about 30 million women in the United States suffer from OP, and the related cost is over \$19 billion/year, and is expected to increase to \$25.3 billion in 2025.

METHODS

Participant or population Middle-aged and elderly women (≥ 45 years old) who meet the diagnostic criteria for osteoporosis or are healthy, including middle-aged women, elderly women and postmenopausal women. Subjects were not limited to race and nationality, but excluded those who suffered from serious chronic diseases (e.g. cardiovascular diseases and bone metabolism diseases, etc.) or those who were unable to cooperate.

Intervention Traditional Chinese medicine exercise (taijiquan, eight-duanjin, six-character technique, Yiqi Jing, and Wuquiquan) in the experimental group, without combining other intervention modalities or limiting the blinding method.

Comparator Conventional lifestyle, health education or irregular exercise in the control group.

Study designs to be included Randomized controlled trial (RCT).

Eligibility criteria randomized controlled trial (RCT).

Information sources Computerized searches were performed on six databases: PubMed, EBSCO host, Web of Science, Embase, China Knowledge Network (CNKI) and Wan Fang. The search strategy used Boolean operations for combinatorial searching and was determined after repeated pre-screening, supplemented by manual searching and tracing the references included in the literature when necessary.

Main outcome(s) unlimited Bone density measurement site, measurement method and unit of expression. Bone density was measured at the lumbar spine, hip, ward's triangle, greater trochanter, femoral neck, and other parts of the body (e.g., forearm, tibia, distal radius, distal ulna, etc.); Measurement methods include dual-energy X-ray absorptiometry (DXA), quantitative computed tomography (QCT), or computed tomography (Micro-CT).

Quality assessment / Risk of bias analysis In accordance with the guidelines for evidence-based medical research, the risk of bias assessment tool of the Cochrane Systematic Review was used to

evaluate the quality of the literature in terms of "method of generating randomized sequences", "allocation concealment", "blinding of subjects and interveners", "completeness of outcome data", "selective reporting", "blinding of assessors of outcome data", "completeness of outcome data" and "selective reporting". "Blinding of subjects and interveners" "Blinding of assessors of outcome data" "Completeness of outcome data" "Selective reporting The risk of bias of the included literature was evaluated in seven dimensions, namely, "low bias" and "other bias". Each aspect was evaluated using "low risk of bias", "uncertainty of bias", and "high risk of bias".

Strategy of data synthesis Review Manage 5.3 was used to produce a Cochrane risk of bias assessment schematic, and Stata 12.0 software was used for statistical analysis. The experimental data were continuous variables and the BMD measurement site, measurement method and unit of expression were different between studies, so the standardized mean deviation (SMD) was used as an indicator of the effect scale and 95% confidence intervals (95% CI) were calculated. According to the interpretation of Cohen (1988) [12], when SMD was calculated as the effect size, $d < 0.2$ was considered as a small effect size, $0.2 \leq d < 0.5$ was considered as a small effect size, $0.5 \leq d < 0.8$ was considered as a medium effect size, and $d \geq 0.8$ was considered as a large effect size. The Q statistic was used to determine inter-study heterogeneity, and P 40%, a random-effects model was selected for Meta-analysis with moderator variable analysis of the source of heterogeneity.

Subgroup analysis Based on the overall effect test, which concluded the possibility of the existence of potential moderating variables, a random-effects model was used to examine the effects of the seven moderating variables in the traditional Chinese medicine exercise intervention for bone mineral density in middle-aged and elderly women.

Sensitivity analysis The number of literature included in this study reached more than 10, so it was possible to conduct a bias test. Egger's test was used for bias analysis, as shown in Table 5, the intercept of regression analysis was 2.89, 95% CI of intercept (0.90-4.89), $P=0.005 < 0.05$, indicating the existence of publication bias.

Country(ies) involved China.

Keywords Traditional Chinese Medicine (TCM); Elderly people; Bone Mineral Density Cognitive functions.

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