

INPLASY PROTOCOL

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Network meta-analysis of four kinds of traditional Chinese exercise therapy in the treatment of degenerative lumbar instability: protocol for a systematic review

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Review question / Objective: Our network meta-analysis aims to compare the clinical efficacy of four different traditional Chinese exercise therapy treatments for patients with degenerative lumbar instability and provide evidence for the selection of a more effective exercise regimen.

Eligibility criteria: Types of studies. This study will only include randomized controlled trials (RCTs) of TCME for patients with DLI. To reduce heterogeneity, crossover trials will be excluded. There are no language or publication status restrictions. Types of participants. Patients diagnosed with DLI will be included in the study. There are no restrictions on patient age, gender, race, or lumbar instability segments. Types of interventions and comparisons. The treatment group received one of the four TCMEs of Tai Chi, Wuqinxi, Yijinjing, and Baduanjin for treatment. The control group received non-exercise therapy (e.g., health education, manipulative therapy) Types of outcome measure. We will focus on the outcomes of interest: subjective pain intensity such as visual analogue scale (VAS) and numeric rating scale (NRS); subjective physical functioning levels such as Oswestry disability index (ODI) and RolandMorris disability questionnaire (RMDQ).

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 09 February 2023 and was last updated on 09 February 2023 (registration number INPLASY202320036).

INTRODUCTION

Review question / Objective: Our network meta-analysis aims to compare the clinical efficacy of four different traditional Chinese exercise therapy treatments for patients with degenerative lumbar instability and

provide evidence for the selection of a more effective exercise regimen.

Condition being studied: Degenerative lumbar instability (DLI) is defined as translation and rotation between the functional units of the spine (FUS) beyond

the normal range under normal physiological posture and loading, which in turn produces injurious irritation. [1] The spinal stabilization system is implemented through three control subsystems: passive, active and neural control. [2] When the subsystems are compromised, abnormalities in FUS motion may occur. Prevalence of low back pain in the global population is 7.3%, as shown by epidemiological studies. [3] Low back pain is a major contributor to physical disability globally and has become a serious public health problem. [4] Previous studies have shown that 20-30% of low back pain is associated with lumbar instability. [5]

The treatment for DLI includes conservative and surgical treatment. Most patients with DLI have positive outcomes with conservative treatment, and therefore conservative treatment is generally considered the preferred treatment for DLI patients. [6] Some DLI patients may be referred for surgery due to progressive aggravation causing lumbar spondylolisthesis. However, 22% of patients who underwent spinal fusion had a recurrence of persistent lumbar instability three years after surgery. [7] Conservative treatment includes physiotherapy, bracing, acupuncture and exercise therapy.

Accumulating evidence shows that exercise therapy can assist DLI patients in reducing pain and improving physical function, and possibly avoiding surgery. [8,9] The type of training that enhances trunk stability has attracted a lot of attention from researchers, and it focuses on improving spinal stability by increasing the strength and endurance of the key stabilizing muscles of the trunk (transverse abdominis and lumbar multifidus) and improving the coordination of neuromuscular control. [10,11] Traditional Chinese medicine exercise therapy (TCME) is a mild to moderate-intensity aerobic activity, such as Tai Chi, Wuqinxi, Yijinjing, and Baduanjin. [12] In China, TCME is a preferred form of exercise for older persons in the community compared to Western exercise therapy. It emphasizes a variety of slow physical movements, combined with musculoskeletal relaxation, breath control, and meditative states, with

the advantages of mind-body therapy and movement therapy. When practicing TCME, on the one hand, the neutralization/stabilization of the trunk muscles is required to maintain the center of gravity, whether single or double-legged support, which reflects the movement principle of core stability; On the other hand, breathing control during exercise can strengthen the positive control of respiratory muscles to maintain appropriate abdominal pressure, thus improving trunk stability. [13-15]

Currently, most studies in this field use randomized controlled trials (RCTs) to validate the clinical efficacy of a single TCME for DLI. [14,16] However, it is difficult to determine the superiority of different TCMEs by RCT or two-by-two meta-analysis. Network meta-analysis (NMA) is a quantitative and comprehensive statistical analysis that integrates relevant clinical evidence from direct and indirect comparative relationships while performing comparisons between multiple interventions. Our NMA aims to compare the clinical efficacy of four different TCME treatments for patients with DLI and provide evidence for the selection of a more effective exercise regimen.

METHODS

Participant or population: Patients diagnosed with degenerative lumbar instability will be included in the study. There are no restrictions on patient age, gender, race, or lumbar instability segments.

Intervention: The treatment group received one of the four traditional Chinese exercise therapy TCMEs of Tai Chi, Wuqinxi, Yijinjing, and Baduanjin for treatment.

Comparator: The control group received non-exercise therapy (e.g., health education, manipulative therapy).

Study designs to be included: This study will only include randomized controlled trials of traditional Chinese exercise for patients with degenerative lumbar instability. To reduce heterogeneity, crossover trials will be excluded. There are

no language or publication status restrictions.

Eligibility criteria: Types of studies. This study will only include randomized controlled trials (RCTs) of TCME for patients with DLI. To reduce heterogeneity, crossover trials will be excluded. There are no language or publication status restrictions. Types of participants. Patients diagnosed with DLI will be included in the study. There are no restrictions on patient age, gender, race, or lumbar instability segments. Types of interventions and comparisons. The treatment group received one of the four TCMEs of Tai Chi, Wuqinxi, Yijinjing, and Baduanjin for treatment. The control group received non-exercise therapy (e.g., health education, manipulative therapy) Types of outcome measure. We will focus on the outcomes of interest: subjective pain intensity such as visual analogue scale (VAS) and numeric rating scale (NRS); subjective physical functioning levels such as Oswestry disability index (ODI) and RolandMorris disability questionnaire (RMDQ).

Information sources: Sources of information include electronic databases and through contact with authors.

Main outcome(s): We will focus on the outcomes of interest: subjective pain intensity such as visual analogue scale (VAS) and numeric rating scale (NRS); subjective physical functioning levels such as Oswestry disability index (ODI) and RolandMorris disability questionnaire (RMDQ).

Quality assessment / Risk of bias analysis: We will use the Cochrane risk-of-bias tool for methodological quality assessment of RCTs. The tool will consist of assessing random methods, allocation concealment, blinding, incomplete outcome data, selective reporting, and other sources of bias. The risk assessment results for each project will be further scored as low, high, or unclear. Two reviewers (CSL and YTL) independently evaluated the risk of bias in the included studies based on the above description and cross-checked the results.

If necessary, third-party professionals will be invited to help with the discussion and interpretation of the quality evaluation.

Strategy of data synthesis: In this study, data was analyzed and compared using RevMan 5.1 (<https://training.cochrane.org/online-learning/core-software/revman>) and Stata 17.0 software (<https://www.stata.com/why-use-stata/>). For measurement data, weighted mean differences were used, and relative risk was used for count data. Each effect size was expressed as an estimate with a 95% confidence interval. The degree of heterogeneity between the results of the included studies was measured using I². I² values of 25%, 50%, and 75% indicate low, medium, and high statistical heterogeneity, respectively. Nodal analysis was employed to perform consistency tests, and if $P > 0.05$, the difference between direct and indirect comparisons was not statistically significant, the consistency model was utilized for analysis; otherwise, the inconsistency model was applied. The effectiveness of the interventions was rated by creating cumulative ranking curves.

Subgroup analysis: When adequate data are available, subgroup analyses will be conducted to assess differences between age, gender, intervention dose/intensity, and the number of treatments.

Sensitivity analysis: To assess the stability of the results, we will undertake sensitivity analyses by removing low-quality studies or modifying the effects model.

Country(ies) involved: China.

Keywords: traditional Chinese exercise therapy, degenerative lumbar instability, protocol, network meta-analysis.

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