

INPLASY PROTOCOL

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**Review Stage at time of this
submission:** The review has
not yet started.

Conflicts of interest:
None.

Spine strengthening exercise for treating aged hyperkyphosis: a protocol of systematic review and meta-analysis

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Jiang, LM⁸.

Review question / Objective: **P:** hyperkyphosis in aged females; **I:** Spine strengthening exercise; **C:** passive motion handed by a physical therapist, ordinary life, care education, or usual physical activity; **O:** Primary outcomes: change in Cobb angle of kyphosis will be conducted between baseline and trial as the gold standard for measuring and evaluating. The Cobb angle was obtained by standing lateral spine radiographs and standardized protocol for measuring kyphosis. The pain scores will be measured on a visual analogue scale or concise pain scale. **Secondary outcomes:** The secondary outcomes included changes in isometric spinal extensor muscle strength or computed tomography (CT) paraspinal muscle density, kyphometer derived kyphosis, physical function, Health-Related Quality of Life (HRQoL), and symptoms.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 18 December 2020 and was last updated on 18 December 2020 (registration number INPLASY2020120091).

INTRODUCTION

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activity; **O:** Primary outcomes: change in Cobb angle of kyphosis will be conducted between baseline and trial as the gold standard for measuring and evaluating. The Cobb angle was obtained by standing lateral spine radiographs and standardized protocol for measuring kyphosis. The pain

scores will be measured on a visual analogue scale or concise pain scale. Secondary outcomes: The secondary outcomes included changes in isometric spinal extensor muscle strength or computed tomography (CT) paraspinal muscle density, kyphometer derived kyphosis, physical function, Health-Related Quality of Life (HRQoL), and symptoms.

Condition being studied: Hyperkyphosis is a common age-related progressive deformity of the thoracic spine. Once kyphosis progresses beyond 50°, the older women with hyperkyphosis will suffer from awful and worsening health-related quality of life. Despite significant findings regarding its adverse effects, hyperkyphosis is only recently recognized by healthcare providers as a major health concern. In recent years, the effectiveness of spine strengthening exercise for treating aged female hyperkyphosis with pain was not systematically reviewed. We believe that this study will offer systematic and comprehensive evidence employing spine strengthening exercise for treating older females with hyperkyphosis.

METHODS

Participant or population: Female patients aged ≥ 60 years, kyphosis angle $\geq 40^\circ$ at the screening visit, and ability to walk one block without an assistive device will be used to limit our search to evaluate the influence of spine strengthening exercise on pre-existing hyperkyphosis, regardless of ethnicity, length, and severity of the disease. Participants will be excluded for inability to straighten the thoracic spine at least 5° , cognitive impairment (unable to draw a normal clock or recall any words on the Mini-Cog), and inability to pass safety tests in the examination or any disorder or disease likely to prevent or interfere with safe participation.

Intervention: Any type of spine strengthening exercise intervention will be included with or without auxiliary equipment, as long as the participants performed independently to distinguish

active exercise from passive motion handed by a physical therapist.

Comparator: The participants were asked to continue their ordinary life, care education, usual physical activity, or passive motion handed by a physical therapist, will be considered in the control group.

Study designs to be included: Randomized controlled trials(RCTs) will be included in this systematic review regardless of publication status and language.

Eligibility criteria: All randomized controlled trials(RCTs) that employed spine strengthening exercise, and/or compared with no treatment, usual physical activity, and postural education for treating older females with hyperkyphosis were considered in this study. There were no limitations between language limitations and publication dates.

Information sources: PubMed, EMBASE, Web of Science, Cochrane Library, China National Knowledge Infrastructure (CNKI), and Chinese Biomedical Literature Database (CBM).

Main outcome(s): Change in Cobb angle of kyphosis will be conducted between baseline and trial as the gold standard for measuring and evaluating. The Cobb angle was obtained by standing lateral spine radiographs and standardized protocol for measuring kyphosis. The pain scores will be measured on a visual analogue scale or concise pain scale.

Additional outcome(s): The secondary outcomes included changes in isometric spinal extensor muscle strength or computed tomography (CT) paraspinal muscle density, kyphometer derived kyphosis, physical function, Health-Related Quality of Life (HRQoL), and symptoms.

Data management: Once the relevant literature was collected, two researchers independently extracted relevant data from each study. Any conflicts in their data extraction and conclusions were resolved

by a third reviewer. Using a standardized data abstraction list, the following characteristic information extracted from eligible studies were included in table 2, such as a title, authors, publication time, journal, study design, sample, age, gender composition, treatment, intervention, outcome, etc. In case of missing important information, the original authors were contacted for further details on their research.

Quality assessment / Risk of bias analysis:

Two contributors will independently carry out quality evaluation and review the risk of bias recommended by the Cochrane Collaboration's risk-of-bias assessment method (v6.1). [31] This scale includes seven risks of bias items based on the following criteria: randomization, allocation concealment, blinding of participants and personnel, blinding of outcome assessors, incomplete outcome data, selective report, and other biases, and each item will be further described as "high", "unclear", or "low". Data are presented as the risk of bias graph. Any divergence will be settled, or as required, by a third reviewer.

Strategy of data synthesis: We will implement Review Manager 5.3 (Cochrane Community, London, UK) to synthesize and analyze the data, and to perform a meta-analysis if possible. If acceptable heterogeneity is examined among the included trials, we will conduct a meta-analysis following the few variations in the study and patient characteristics, and few differences in treatments, controls, and outcomes. If considerable heterogeneity is identified, we will perform subgroup analysis and sensitivity analysis to determine any possible sources of obvious heterogeneity. If it is impossible to undertake a meta-analysis, we will report instead study results as a descriptive summary.

Subgroup analysis: We will observe the source of considerable heterogeneity by subgroup analysis based on variations in the study and patient characteristics, study quality, different interventions, comparators, and outcomes.

Sensibility analysis: We will perform sensitivity analysis to test the robustness and stability of conclusions by excluding low-quality studies and small population studies.

Language: There were no language limitations.

Country(ies) involved: China.

Keywords: kyphosis, spine strengthening exercise, meta-analysis, protocol.

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