INPLASY

Effectiveness of Backward Walking Exercises combined with conventional treatments on Managing Pain Intensity and Disability in Patients with Knee Osteoarthritis: A Systematic Review and Meta-analysis of Randomized Controlled Trials

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ADMINISTRATIVE INFORMATION

Review Stage at time of this submission - Preliminary searches.

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 28 March 2025 and was last updated on 28 March 2025.

INTRODUCTION

*R*eview question / Objective To investigate the treatment effect of backward walking exercises combined with conventional treatments on pain intensity and disability in knee osteoarthritis.

Rationale Osteoarthritis (OA) is the most common form of arthritis, with the knee joint frequently affected, leading to pain, functional limitations, and reduced quality of life . Approximately 25% of individuals aged 55 and older experience recurrent knee pain annually, with one in six seeking medical care . The European League Against Rheumatism identifies six clinical criteria for diagnosing knee OA, while radiographic studies report a prevalence of 25.4%. Conservative treatments include both pharmacological options, such as NSAIDs, and non-pharmacological approaches, including manual therapy, exercise, and physical agents .

Backward walking exercise (BWE) has recently emerged as an effective therapeutic modality, shown to enhance quadriceps strength, reduce knee adduction moment, and impose greater cardiorespiratory demands than forward walking. Several RCTs suggest BWE may reduce pain and disability in knee OA by improving muscle strength and altering joint loading. However, despite growing evidence, the findings across RCTs remain inconsistent regarding the effectiveness of BWE combined with conventional therapies. This study aimed to systematically review and meta-analyze the effects of BWE combined with other treatments on pain and disability in patients with knee OA.

Condition being studied Therefore, we would like to perform The PICO (population, intervention, comparison, outcome) setting of the current meta-analysis included: (1) P: human participants with knee OA; (2) I: BWE combined with conventional

treatments; (3) C: other treatment; and (4) O: changes in pain scores and disability.

METHODS

Search strategy Two authors made independent electronic searches in the PubMed, Cochrane library, and ClinicalTrials.gov with keyword of ("backward walking exercise" OR "retro-walking exercise" OR "reverse walking exercise") AND ("knee osteoarthritis" OR "degenerative knee arthritis") through the earliest record to January 2025.

Participant or population Knee OA.

Intervention BWE combined with conventional treatments.

Comparator Control.

Study designs to be included Randomized controlled trials.

Eligibility criteria (1) RCTs investigating pain intensity and disability before and after BWE; (2) studies enrolling adults diagnosed with knee OA according to the Kellgren-Lawrence classification or American College of Rheumatology Criteria; (3) intervention groups performing BWE alone or in combination with other treatments; and (4) at least one control group receiving treatments other than BWE.

Information sources Two authors made independent electronic searches in the PubMed, Cochrane library, Pedro and ClinicalTrials.gov with keyword of ("backward walking exercise" OR "retro-walking exercise" OR "reverse walking exercise") AND ("knee osteoarthritis" OR "degenerative knee arthritis") through the earliest record to January 2025.

Main outcome(s) The primary outcomes were the changes in the pain scores following BWE combined with conventional treatments or control regimens. The validity and appropriateness of the pain scale used in each trial were also examined by checking the pertinent references.

Additional outcome(s) The secondary outcomes were the changes in the disability following BWE combined with conventional treatments or control regimens. The validity and appropriateness of the disability scale used in each trial were also examined by checking the pertinent references.

Data management Two independent authors extracted data from the recruited studies, encompassing demographic data, study design, details of BWE combined with conventional treatments and control regimens, and values of the outcomes. The evaluators paid special attention to the effect direction of the scale used in each trial to avoid mis-interpretation.

Quality assessment / Risk of bias analysis To evaluate the quality of the eligible randomized controlled trials (RCTs) in this review, the PEDro score was employed. This scoring system consists of 11 criteria assessing study robustness, including eligibility criteria, randomization process, allocation concealment, baseline comparability, blinding of participants, therapists, and evaluators, outcome measurement, intention-to-treat analysis, inter-group comparisons, and precision/variability measurements.

Strategy of data synthesis Because of heterogeneity of the treatment protocols of the enrolled studies, the effect sizes were pooled by using a random-effects model on Comprehensive Meta-Analysis software (version 3,Biostat, Englewood, NJ, United States). A two-tailed p value of less than 0.05 was considered statistically significant. We used Hedges' g to quantify the study outcomes and a value of 0.2, 0.5, and 0.8 were considered small, moderate, and large effect sizes, respectively .I square and Cochran's Q statistics were also employed to evaluate the degree of heterogeneity across studies. A I square value of 25, 50, and 75% were deemed low, moderate, and high grades of heterogeneity, respectively.

Subgroup analysis Subgroup analyses based on the walking speed, walking surface and the types of the control group was performed. Meta-regressions of the treatment effects on total treatment duration and session per week were conducted to see if the pain and disability relieving effect of BWE combined with conventional treatments correlated with the aforementioned parameter.

Sensitivity analysis To confirm the robustness of the meta-analysis, the sensitivity analyses were performed using one-study removal method to see if there was a significant change in the summary effect size after removing a particular trial from the analysis.

Language restriction No language limit.

Country(ies) involved Taiwan.

Other relevant information Non.

Keywords knee osteoarthritis, backward walking, therapeutic exercise.

Dissemination plans Study findings will be disseminated via journal publication and professional conference presentations to reach both academic and clinical audiences.

Contributions of each author
Author 1 - Long-Heui Lin - Conceptualized and designed the study, performed data extraction and quality assessment, conducted statistical analyses, prepared figures and tables, and drafted the initial manuscript.
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