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THE EFFECTS OF SHOES ON KNEE PAIN AND MEDIAL JOINT LOADING IN PERSONS WITH KNEE OSTEOARTHRITIS: A SYSTEMATIC REVIEW WITH META-ANALYSIS

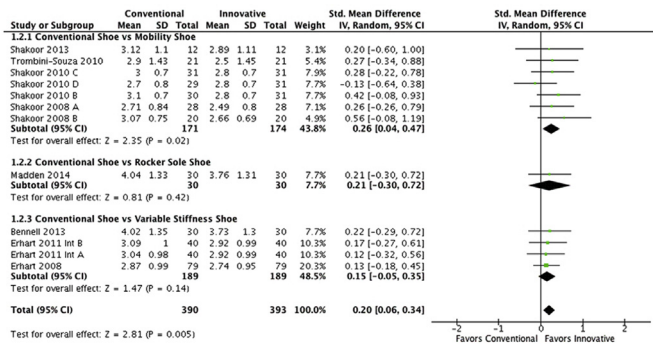
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Purpose: Osteoarthritis (OA) is common in the medial knee, where mechanical load, as measured by the external knee adduction moment during walking (KAM), can worsen knee pain and accelerate joint damage. A variety of shoe types have been trialed for their effects on knee pain and KAM in persons with knee OA, including: 1) shoes with rocker bottom soles, 2) shoes with variable stiffness midsoles, 3) mobility shoes designed to mimic barefoot gait, and 4) conventional shoes of varying heel height and stability. A summary of trial findings would valuably inform footwear prescription for knee OA and guide future investigation. The purpose of this systematic review was to determine, across published trials, the effects of these four shoe types on knee pain and KAM in persons with knee OA, and to characterize the methodological quality of these trials.

Methods: Following PRISMA recommendations, a systematic search of English and Portuguese language publications from the past 30 years was conducted within PubMed, Ovid Medline, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Embase. Citation lists of all previous reviews and included studies were hand searched. Two readers, blinded to author and journal, scored each study's methodological quality 0-10 using the PEDro scale (Inter-reader ICC= 0.80 for total score, κ = 0.58-1.00 for item scores). Disagreements were adjudicated in the presence of a third reader. Data were extracted using a modified Cochrane form, and results from each trial's last follow-up assessment were pooled for each shoe type using random effects meta-analysis, and presented as standardized mean differences (SMD) with 95% confidence intervals (CIs) indicating the effects of shoe type on knee pain and peak KAM.

Results: Among 13 eligible trials, mean +/- sd PEDro score was 5.23 +/- 1.42 (range: 3.0, 8.0). Higher methodological quality scores were recorded for RCTs of variable stiffness shoes, and lower scores were recorded for single group before-after trials of conventional and mobility shoes. Based on limited evidence of moderate quality, conventional shoes increase peak KAM compared to barefoot walking [pooled SMD = 0.33 (95% CI: 0.18, 0.48) % body weight (BW)*height (ht)], with the greatest increases observed for stiffer shoes and shoes with elevated heels. Compared to walking in low heel conventional shoes, the effects on peak KAM of innovative shoe types are summarized in the forest plot. Mobility shoes, variable stiffness shoes, and rocker sole shoes were found to produce non-significant reductions in peak KAM compared to conventional shoes in individual studies, but pooled results were only significant among low to moderate quality single group trials of mobility shoes [pooled SMD = 0.26 (95% CI: 0.04, 0.47) % BW*ht]. There is no evidence that any shoe type reduces knee pain in relation to any comparison condition.

Conclusions: Limited evidence of low to moderate quality suggests that mobility shoes can reduce medial knee load during walking in comparison to conventional shoes, while conventional shoes increase peak load in comparison to barefoot walking. There is no evidence of any shoe type effects on knee pain.



*A-D indicates comparison to a different conventional shoe

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DO MANUAL THERAPY OR BOOSTER SESSIONS IN ADDITION TO EXERCISE THERAPY FOR KNEE OSTEOARTHRITIS PROVIDE ADDITIONAL BENEFITS? A RANDOMIZED CLINICAL TRIAL

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Purpose: 1) To determine whether the addition of manual therapy to exercise therapy reduces pain, disability and physical function in people with knee osteoarthritis (OA); and 2) whether distributing interventions using periodic "booster sessions" improves outcomes compared with consecutive sessions.

Methods: A factorial randomized controlled trial. 75 participants with knee OA were allocated to groups: 1) exercise therapy - no booster sessions (Ex); 2) exercise therapy - with booster sessions (ExB); 3) exercise therapy plus manual therapy - no booster sessions (Ex+MT); 4) exercise therapy plus manual therapy - with booster sessions (ExB+MT). All participants were provided 12 x 40 minute sessions of physical therapist-supervised, multi-modal exercise therapy. Participants allocated to the manual therapy groups were additionally provided 12 x 30-40 minute sessions of physical therapist-provided, individualized manual therapy. Participants allocated to no booster groups were provided all 12 visits within a 9-week period. Participants allocated to the booster groups were provided 8 sessions in the initial 9-week period, 2 booster sessions at 5 months, 1 booster session at 8 months, and 1 booster session at 11 months, also for a total of 12 sessions. We report the relative risk (RR) per group for the number (proportion) of participants achieving a minimally important change of ≥20% improvement on the Western Ontario and McMaster Osteoarthritis Index (WOMAC) at 1-year follow-up, with group 1 as the reference.

Results: Of 75 participants recruited, mean age (SD) 64 (10), 65 (87%) were retained at 1-year follow-up. Complete case analysis by Poisson regression models showed group 2, exercise therapy with booster sessions (RR 2.67; 95% CI 1.21, 5.93) and group 3, exercise therapy plus manual therapy - no booster sessions (2.76; 1.25, 6.09) showed superior effects compared with group 1. Group 4 was not superior to group 1.

Conclusions: Providing manual therapy in addition to exercise therapy improved treatment effectiveness compared with providing 12 consecutive exercise therapy sessions only. Distributing exercise therapy over a year in the form of booster sessions was more effective than providing consecutive exercise therapy sessions. However due to an adverse interaction effect between providing manual therapy and distributing interventions over booster sessions, this combined strategy was not more effective than providing 12 consecutive exercise therapy sessions only.

