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Assistive technologies (lumbar supports and other devices) for treating chronic low back pain

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Abstract

Rationale: Low back pain (LBP) is a major global health problem. It is the most common cause of activity limitation amongst individuals younger than 45 years, and one of the most frequent reasons for visits to a doctor. The 2019 Global Burden of Disease study named LBP as the leading cause of the need for rehabilitation, estimated to affect 568 million people. Its socioeconomic burden is substantial, with LBP-related costs from productivity loss and healthcare services utilisation making a significant impact on national gross domestic products. In particular, chronic LBP (CLBP)-defined as pain, muscle tension, or stiffness lasting longer than 12 weeks-results in long-term suffering and a considerable increase in healthcare expenditure. A wide variety of assistive technologies are utilised to manage CLBP. These aim to provide mechanical support, using diverse modalities and levels of assistance.

Objectives: To assess the benefits and harms of assistive technologies (i.e. non-rigid and rigid lumbar braces, belts, supports, and devices to assist mobility and gait) in adults with chronic low back pain (CLBP).

Search methods: We searched CENTRAL, MEDLINE (PubMed), Embase, CINAHL, and trials registries up to 7 January 2025. We also searched the reference lists of included studies and any relevant systematic reviews.

Eligibility criteria: We included randomised controlled trials (RCTs) involving adults with CLBP comparing all types of assistive technologies versus placebo/sham, no intervention, or usual care. We planned to include non-randomised studies of interventions (NRSIs) in the absence of RCT evidence for some types of assistive devices.

Outcomes: Our critical outcomes were pain, disability, health-related quality of life, participant-reported treatment success, falls, adverse events, and withdrawals due to any adverse events. Our important outcomes were depression, anxiety, social participation, and reduced use of painkillers. We did not assess the certainty of the evidence for important outcomes; thus, their results are not included in the abstract.

Risk of bias: We used the Cochrane tool RoB 1 to assess the risk of bias in the studies.

Synthesis methods: We conducted meta-analysis using the random-effects model to calculate the mean difference (MD) or standardised mean difference (SMD) with 95% confidence interval (CI) for all outcomes. We assessed the certainty of the evidence using the GRADE approach. When pooling was not possible, we calculated effect estimates for individual studies; when data were not available, we summarised the results narratively.

Included studies: We included eight RCTs involving a total of 501 participants. We did not identify any NRSIs meeting the inclusion criteria. Participants in the eight studies were adults of both sexes who had CLBP of at least one year's duration being treated in the outpatient rehabilitation setting. All

eight studies investigated the effects of lumbar supports; no eligible studies assessed other assistive technologies, such as mobility or gait aids. Seven of the studies added lumbar supports to 'usual care'. Five of the studies were conducted in low- and middle-income countries and three in high-income countries. Most of the included studies were at high or unclear risk of bias due to lack of blinding, incomplete outcome data, and selective reporting. We judged the certainty of the evidence to be low or very low.

Synthesis of results: The available evidence mainly addresses pain intensity and disability. We found some limited data on health-related quality of life. None of the included studies reported participant-reported treatment success, falls, adverse events, withdrawals due to any adverse events, or any of our other prespecified outcomes. Compared to no intervention, lumbar supports may result in little to no difference in pain intensity in the intermediate term (three months), if we consider a minimum clinically meaningful change on the 0-to-100 pain scale to be 15 points (MD -8.00, 95% CI -15.02 to -0.98; 1 study, 107 participants), and may result in little to no difference in disability (MD -0.10, 95% CI -1.11 to 0.91; 1 study, 107 participants) (both low-certainty evidence). Compared with usual care (non-steroidal anti-inflammatory drugs (NSAIDs)), lumbar supports plus usual care (NSAIDs) may result in a small reduction in short-term pain intensity (after three to four weeks), if we consider a minimum clinically meaningful change on the 0-to-100 pain scale to be 15 points (MD -17.66, 95% CI -24.22 to -11.09; I^2 = 30%; 2 studies, 149 participants; low-certainty evidence). However, the effect of lumbar supports added to usual care (NSAIDs) on disability is very uncertain (SMD -0.63, 95% CI -1.43 to 0.17; I^2 = 76%; 2 studies, 149 participants; very low-certainty evidence). The evidence is very uncertain about the effect of lumbar supports plus usual care (education and exercise) compared with usual care (education and exercise) on pain intensity (MD -4.50, 95% CI -20.98 to 11.98; 1 study, 25 participants), disability (MD 2.80, 95% CI -21.58 to 27.18; 1 study, 24 participants), and health-related quality of life (1 study, 25 participants) in the short term (six weeks) (all very low certainty evidence). The evidence is also very uncertain about the effect of lumbar supports plus usual care (routine physical therapy) compared with usual care (routine physical therapy) on pain intensity (MD 3.10, 95% CI -5.89 to 12.09; 1 study, 41 participants) and disability (MD -4.27, 95% CI -7.71 to -0.83; 1 study, 41 participants) in the short term (four weeks) (both very low certainty evidence).

Authors' conclusions: Lumbar supports may result in a small reduction in pain intensity when provided in addition to NSAIDs, but may offer little to no benefit for pain intensity and disability when used alone. The evidence regarding health-related quality of life is very uncertain. No included studies reported on our other outcomes of interest or on adverse events, leaving uncertainty about the potential harms and broader functional impact of lumbar supports. Therefore, there is insufficient evidence to support the routine use of lumbar supports for managing CLBP. The absence of research on other assistive devices commonly used in clinical practice, particularly amongst people with disabilities or mobility limitations, is an evidence gap for future research to fill.

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