Effect of an Exercise Program That Includes Deadlifts on Low Back Pain

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Clinical Scenario: Low back pain is a common condition for the general population with 29% of adults having low back pain within the last 3 months. A deadlift is described as a free weight exercise in which a barbell is lifted from the floor in a continuous motion by extending the knees and hips. For those without low back pain, the deadlift was found to have the highest muscle activation of paraspinal musculature compared with other exercises. There are a limited number of studies that investigate the usefulness of incorporating deadlifts as part of a rehabilitation program for low back pain. **Clinical Question:** For those who live with low back pain, is an exercise routine that includes a deadlift a viable treatment option to improve pain and/or function? **Summary of Key Findings:** The literature search yielded 3 total studies meeting the inclusion and exclusion criteria: 1 randomized control trial, 1 secondary analysis of a randomized control trial, and 1 cohort study. Exercise programs that include deadlifts can yield improvements in both pain and function for those living with low back pain but were not found to be more beneficial than low load motor control exercises. Those with lower pain levels and higher baseline lumbar extension strength may be most appropriate to participate in an exercise program that includes deadlifts. Further research is needed to compare exercise programs that include deadlifts to other interventions for those living with low back pain. **Clinical Bottom Line:** There is minimal evidence that exercise programs that included deadlifts are a clinically effective option for the treatment of low back pain for both pain scores and functional outcome measures. **Strength of Recommendation:** Level B evidence exists that exercise programs that include deadlifts are a clinically effective option for the treatment of low back pain for both pain scores and functional outcome measures.

Keywords: deadlift, low back pain, rehabilitation

Clinical Scenario

Low back pain (LBP) is a common condition for the general population with 29% of adults having LBP within the last 3 months.¹ A deadlift is described as a free weight exercise in which a barbell is lifted from the floor in a continuous motion by extending the knees and hips.² For those without LBP, the deadlift was found to have the highest muscle activation of paraspinal musculature compared with other exercises,³ which may be relevant for those with LBP, who demonstrate increased slumped posture with sitting and decreased lumbar multifidus activation.⁴ There are limited studies that investigate the usefulness of incorporating deadlifts as part of a rehabilitation program for mechanical low back pain (MLBP).

Focused Clinical Question

For those who live with MLBP, is an exercise program that includes deadlifts a viable treatment option to improve pain and/or function?

Summary of Search Strategy, “Best Evidence” Appraised, and Key Findings

- The literature search yielded 3 total studies meeting the inclusion and exclusion criteria: 1 randomized control trial

(RCT), 1 secondary analysis of a randomized control trial, and 1 cohort study.

- Exercise programs that include deadlifts can yield improvements in both pain and function for those living with LBP but were not found to be more beneficial than low load motor control exercise.
- People living with LBP that have lower reported pain levels and higher baseline lumbar extension strength may be most appropriate to participate in an exercise program that includes deadlifts.
- Further research is needed to compare exercise programs that include deadlifts to other interventions for those living with LBP.

Clinical Bottom Line

There is level B evidence that exercise programs that included deadlifts are a clinically effective option for the treatment of MLBP for both pain scores and functional outcome measures.

Strength of Recommendation

Level B evidence exists that exercise programs that include deadlifts are a clinically effective option for treatment of MLBP for both pain scores and functional outcome measures. (Levels of evidence determined based upon the Oxford Centre for Evidence-Based Medicine, 2011.) A level B evidence grade is defined as “consistent level 2 or 3 studies or extrapolations from level 1 studies.”⁵

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Search Strategy

PICO Framework

- Patient group: MLBP
- Intervention: exercise program that included deadlifts
- Comparison: none
- Outcome: pain and/or functional outcome measures

Sources of Evidence Searched

- PubMed
- Google Scholar
- PEDro
- Cochrane Library
- Additional resources obtained via review of reference lists

Inclusion and Exclusion Criteria

Inclusion

- Subjects diagnosed with MLBP
- Use of a deadlift variation included in an exercise program
- Use of a pain scale or functional outcome measure
- Symptom duration of 3 months
- English language
- RCT, cohort designs

Exclusion

- No deadlift related treatment options
- No diagnosis of LBP or non-MLBP
- No pain scale and/or functional outcome measure
- Symptoms less than 3 months
- Case study, case control, expert opinion, or case series designs
- Non-English studies

Search Results

A total of 3 relevant studies were identified based on the previously mentioned search strategies^{2,6,7} and are listed in Table 1 (based on the Oxford Centre for Evidence-Based Medicine 2011 Levels of Evidence).

Best Evidence

The 3 stated studies were identified based on inclusion and exclusion criteria and selected for inclusion in this CAT (Table 2). Selected studies were chosen because they included subjects with MLBP, used exercise programs that included deadlift, used a pain scale or functional outcome measure, had symptoms of at least 3 months, and were written in the English language.

Implications for Practice, Education, or Research

The purpose of this CAT was to assess if exercise programs that include deadlifts can be a viable option to improve pain and

Table 1 Summary of Study Designs

Level of evidence	Study design	Study
2	Randomized control trial	Aasa et al ⁶
2	Secondary analysis of randomized control trial	Berglund et al ²
3	Cohort	Welch et al ⁷

function in those living with MLBP. Overall, the studies included in this CAT provided minimal evidence that exercise programs that include deadlifts can be beneficial for both pain and function for those living with MLBP.

Aasa et al⁶ demonstrated that a high load lifting (HLL) exercise routine that consisted of progressive deadlifting and low load motor (LLM) control exercises both resulted in significant improvements in pain intensity, strength, and endurance. The groups were similar for all baseline characteristics except for the Patient Specific Functional Score (PSFS), which was significantly lower in the LLM (3.8 [1.4] and 4.8 [1.4], respectively). Participants in the LLM group (unadjusted mean score = 8.0) showed a significantly greater improvement in the PSFS (unadjusted mean score = 7.3) compared with participants in the HLL group at a 12-month follow-up ($P < .001$). There was no difference between groups in pain intensity at a 12-month follow-up ($P = .505$). Overall, after 12 months, about 65% experienced a meaningful improvement in perceived pain intensity (minimal important change of 30% or greater).

Berglund et al² was a secondary analysis of data from the Aasa et al⁶ study to investigate what characteristics of patients with MLBP in the HLL group predicted to benefit from a progressive deadlift routine. Activity scores based on PSFS increased from 4.8 (1.3) to 6.8 (2.2). Disability scores based on the Roland-Morris Disability Questionnaire decreased from 7.1 (4.1) to 3.8 (3.9). Pain intensity based on the visual analog scale decreased from 42.6 (23.5) to 22.2 (21.1). Results of this analysis showed that with high disability and pain intensity scores and low performance of the Biering-Sorensen test, participants were less likely to benefit from deadlift training. The Biering-Sorensen test for hip and back extension muscle endurance and strength was the best predictor for success (greater than 60 s). Low initial pain intensity (less than 60 mm on a visual analog scale) was the second-best predictor for success with a progressive deadlift routine.

Welch et al⁷ found that a free weight resistance training routine that included deadlifts was effective to improve pain, disability, and quality of life scores in a group with chronic MLBP. Pain, measured by the visual analog scale, improved from 4.5 (2.2) at baseline to 1.3 (1.4) at 16 weeks. Disability, measured by the Oswestry Disability Index, improved from 22.9 (1.2) at baseline to 5.4 (5.7) at 16 weeks. Quality of life scores, measured by Euro-QOL-5d V.2, improved from 0.7 (0.2) at baseline to 0.9 (0.1) at 16 weeks. In addition, lumbar paraspinal muscle fat infiltration at the L3/L4 and L4/L5 levels was significantly reduced ($P < .05$) following the interventions at 16 weeks. However, there was not a control group for comparison within this cohort study, so comparisons to other control or intervention groups cannot be drawn.

The previously mentioned studies included some limitations. Aasa et al⁶ had a highly homogeneous participant group, so generalizability to other populations is difficult. All participants were labeled as having nociceptive LBP, but the reliability for identifying mechanistic pain groups was not investigated. Finally,

Table 2 Characteristics of Included Studies

Characteristic	Aasa et al ⁶	Berglund et al ²	Welch et al ⁷
Study design	RCT	Secondary analysis of RCT	Cohort
Number of participants	70	35	30
Group descriptions	LLM control exercises and HLL exercise routine	HLL ⁶	No comparison group
Age range	LLM: 42 (11) y and HLL: 42 (10) y	42 (10) y	females: 40 (12) y and males are 40 (10) y
Gender	LLM: 19 females and 16 males HLL: 20 females and 15 males	20 females and 15 males	11 females and 19 males
Interventions	12 treatment sessions over 8 wk. All participants were also educated on pain mechanisms. LLM was encouraged to complete 10 repetitions 2–3×/d. HLL included progressive deadlift routine with a physical therapist selected initial weight that was completed 12 sessions over 8 wk.	12 treatment sessions over 8 wk which included education on pain mechanisms and HLL with progressive deadlift routine. ⁶	16 wk, progressive, free weight-based resistance training program that includes deadlift.
Outcome measures	Primary outcome measures were PSFS and average pain intensity over the last 7 d using the visual analog scale.	Outcome measures included PSFS, Roland–Morris Disability Questionnaire, and pain visual analog scale. Predictive variables also included pain-related fear of movement, 3 tests of trunk muscle endurance, and a movement control test.	Outcome measures included visual analog pain scale, Oswestry Disability Index, Euro-Qol V2 quality of life measure, biomechanical analysis of bodyweight squat movements, maximum strength, lumbar endurance, and lumbar paraspinal fat infiltration.
Main findings	Both interventions had significant improvement in pain intensity but there were no significant between group differences ($P = .505$). LLM (3.8–8.0) had a significant improvement in PSFS compared with HLL (4.8–7.3).	Participants with less disability, less pain intensity, and higher performance on the Biering-Sorensen test at baseline benefit from deadlift training. The Biering-Sorensen test was the best predictor of success.	Pain (72% improvement), disability (76% improvement), and quality of life (27% improvement) significantly improved along with reduction in fat infiltration and 18% increase in lumbar endurance.
Level of evidence	2	2	3
Validity score (PEDro)	7/10	7/10	Not applicable
Conclusion	LLM may be superior with PSFS outcomes compared with HLL, but both groups can significantly improve pain intensity scores.	Professionals who use deadlift for individuals with mechanical low back pain should test for sufficient back extensor strength and low pain intensity levels at baseline.	A free weight-based resistance training program that included deadlifts can be utilized to improve pain, disability, and quality of life in people living with low back pain.

Abbreviations: HLL, high load lifting; LLM, low load motor; PSFS, Patient-Specific Functional Scale; RCT, randomized control trial.

there was no placebo control group, so the observed effects could be from chance as well. The Berglund et al² study was a secondary analysis of the same population from Aasa et al,⁶ which is not preferred to generate predictive models. The authors wrote that the stated prediction was made to guide future prospective studies. Finally, the Welch et al⁷ study was a cohort design, so there was no comparison group to compare findings in a similar timeframe. This decreases the generalizability and significance of the findings.

This CAT also had limitations within its analysis. There is only one RCT to the writer's (SCF) literature review that met inclusion and exclusion criteria for this CAT. The other 2 trials were a secondary analysis of the RCT and a cohort trial without a comparison group. Further research, specifically more RCTs, is needed to generalize conclusions with higher clinical relevance and stronger significance. Future research should prioritize both short- and long-term results of an exercise routine that prioritize progressive deadlifting for participants with a variety of forms of LBP compared with control groups. Also, future research should consider specific loading principles with deadlifts and confirmation of responders to a deadlift routine.

The purpose of this CAT was to assess if exercise programs that include deadlifts can be a viable option to improve pain and function in those living with MLBP. Based on the included studies, there is minimal evidence that exercise programs that included deadlifts can improve pain and function with those with MLBP. Patients with higher baseline lumbar and hip extension strength and endurance with lower baseline levels of pain had a higher likelihood of benefiting from deadlift training for treatment of LBP.² Benefits from exercise programs that include deadlift for treatment of LBP can be seen as early as 8 to 16 weeks.^{6,7} Programs that include deadlifts have not been studied extensively within different subgroups of LBP. More research, specifically RCT, is required to make clinically significant conclusions about prioritizing deadlifting routines for the treatment of MLBP along with other types of LBP.

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