



# The Conventional Deadlift Exercise for Reducing Lower Back Pain in Physical Therapy Patients

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# Background

## Chronic Low Back Pain (LBP)

- Highly common, prevalence of 60-85% in a person's lifetime (Lizier, Perez, & Sakata, 2012).
- Activities of daily living, level of physical activity & quality of life.
- Causes: workplace injury, weight lifting, overuse, bending/twisting, etc.



Image:

<https://www.dynamicchiropractic.com/mpacms/dc/article.php?id=55893>

# Background Continued:

## The Conventional Deadlift

- Utilizes all aspects of standard low back rehabilitation plus strengthening of the back musculature.
- Not a typical exercise included in standard rehabilitation.
- If it can reduce low back pain to a greater extent than just standard physical therapy alone it may be beneficial to include in future lower back rehabilitation.



Image: <https://www.healigo.com/blog/2016/10/10/defending-the-deadlift>

# Literature Review



## Prevalence

- Chronic LBP is described as pain within the lumbosacral region, buttocks or thighs that is mechanical in nature, varies with physical activity and varies with time and pain which lasts at least 3 months (Campbell & Muncer, 2005).
- Age, sex, economic status, lifestyle factors, level of schooling, job title, hostile work/family life, etc. are included risk factors.
- Direct healthcare expenditure was reported to range from \$50 to \$90.7 billion in 2016 (Yang, Haldeman, Lu & Baker, 2016).

# Literature Review Cont.



## Causes

- **Specific Pain** is described as either:
  - Nociceptive- pain arising from ligaments, joints, muscles, fascia and tendons in response to tissue injury, inflammation or biomechanical stress.
  - Neuropathic- pain arising directly from injury or disease affecting the nerve roots that innervate the spine, lower limbs & of damaged lumbar discs.
  - Chronic LBP typically is a combination of these (Baron, Binder, Attal, Casale, Dickenson, Treede, 2016).
- **Non-Specific Pain**: unknown cause/unable to recall how injury first occurred.
  - Simply categorized into 3 subgroups: acute, subacute, or persistent (chronic).

# Literature Review Cont.



## Treatment

- Standard Physical Therapy (PT) interventions for LBP:
  - manual therapy
  - trunk coordination
  - strengthening and endurance exercises
  - centralization and directional preference exercises
  - flexion specific exercises
  - traction & nerve mobilization procedures.

(Delitto, George, Dillen, Whitman, & Sowa, 2012)
- Focus on contraction of the stabilizing muscles, rather than the deep trunk muscles; beneficial for reducing pain and disability in chronic LBP.
- Large focus on core/trunk stabilization, gluteus maximus strengthening & hip mobility.

# Literature Review Cont.



## Relation Between Strength Training & Low Back Pain:

- **Low motor control (LMC)** exercises typically used in standard PT for treatment of LBP.
  - LMC exercises are used to correct motor control deficiencies, retrain movement patterns and regain control of spinal motions (Michaelson, Holmberg, Aasa, & Aasa, 2016).
  - Focus on maintaining optimal movement patterns & effective activation of the stabilizing muscles during a high load.

# Literature Review Cont.

## The Deadlift Exercise

- Considered a free weight barbell compound exercise.
- Includes all aspects of standard PT treatment for LBP.
- Generally considered a high load lifting exercise.
- Causes high activation of the stabilizing muscles and focuses on the maintenance of optimal alignment of the spine; specifically the multifidus, longissimus, transversus abdominis and external and internal obliques.
- If the deadlift is done with enough intensity and proper form, the stabilizing muscles may be activated to a greater extent than than LMC exercises.

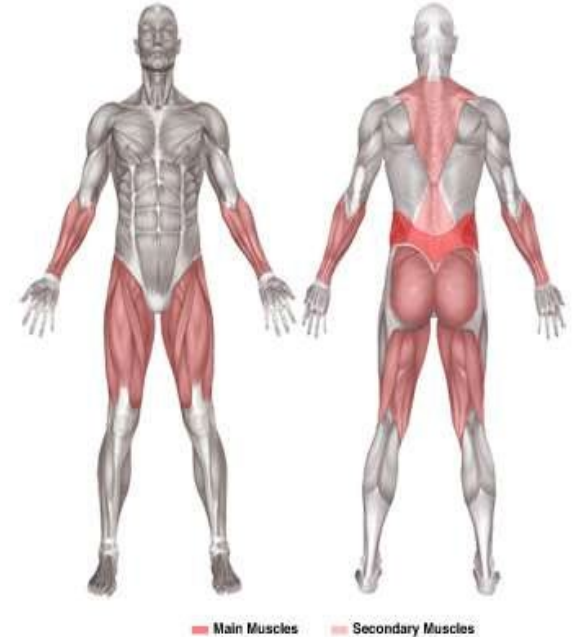


Image: <https://www.darkironfitness.com/what-muscle-groups-do-deadlifts-work-a-quick-display-of-the-different-types-of-deadlifts-and-the-muscle-groups-they-target/>



## Purpose:



The purpose of this investigation is to determine the effect of performing a conventional deadlift routine in conjunction with standard PT treatment on low back pain and functioning.

# Hypothesis:



**Ha:** It is hypothesized that the experimental group (conventional deadlift + standard PT) will demonstrate a greater improvement in low back pain and mobility compared to the control group (standard PT).

**Ho:** There will be no difference in the reduction of lower back pain and improved mobility between the experimental (conventional deadlift + standard PT) and control (standard PT treatment) groups.

# Participants



- 14 patients seeking treatment at Ortho Montana Physical Therapy Clinic.
- Diagnosed by a physician with chronic low back pain or pain lasting longer than 3 months.
- 14 years and older.
- No other injuries.
- Can hold the Biering-Sorensen test (modified or standard) for at least 1 minute.

# Table 1. Participant Characteristics at Baseline

	<b>Control Group</b>	<b>Experimental Group</b>	<b>P-values</b>
<b>Sex</b>	Male (n=3), Female (n=4)	Male (n=4), Female=(n=3)	
<b>Age (years)</b>	57.7 ± 17.7	40.1 ± 19.1	.100
<b>Weight (lbs.)</b>	204.9 ± 45.0	171.6 ± 38.9	.164
<b>Height (cm)</b>	173.8 ± 10.1	171.3 ± 8.3	.612
<b>BMI (kg/m<sup>2</sup>)</b>	30.9 ± 6.9	26.4 ± 4.2	.162
<b>Length of Pain (years)</b>	10.4 ± 13.5	9.8 ± 12.4	.930

# Procedure



- Initial Assessment:
  - Patient completes the Biering-Sorenson test as a screening tool to help determine if the deadlift is an appropriate intervention for that individual patient.
  - Explain procedure to client, have them fill out a PARQ, consent form & Patient Data Sheet.
  - Anthropometric data of height, age, weight, sex & BMI will be recorded, as well as how long (years) patient back has been hurting them, if they have lifting experience & if they are taking pain medication.
  - Fill out the VAS & ODI assessment.
  - Leave opportunity for subjects to ask questions.

# Procedure Continued:



- Two groups:
  - **Experimental** : standard PT treatment with additional deadlifting intervention.
  - **Control** : standard PT treatment alone.
- Group Assignments based on current and new patients during 4 week intervention period.
- Proper technique and form will be taught for the deadlift within the first couple of sessions.
- The PT's will be the ones adjusting & supervising the patients intensity, load, repetitions, sets, etc. based on each individuals own progress and/or ability throughout the intervention.

## Procedure Continued:



- 4-week intervention period
- Prescription: 3 sets x 10 reps, 3x/week
- 2 sessions were at PT appointments, third session to be completed at home.
- The at home session was to include any household objects so the patient could practice moving through the movement patterns while maintaining proper form.

# Statistical Analysis:



- Descriptive stats: mean and SD
- Independent t tests: used to compare baseline characteristics, initial VAS & ODI scores and improvement (change score; finalinitial) between the Control and Experimental group.
- Dependent t tests: Compare final and initial VAS & ODI scores within each group.
- Meaningfulness assessed by calculating cohen's d to determine effect size.
- Statistical significance set at  $p$ value  $< .05$ .



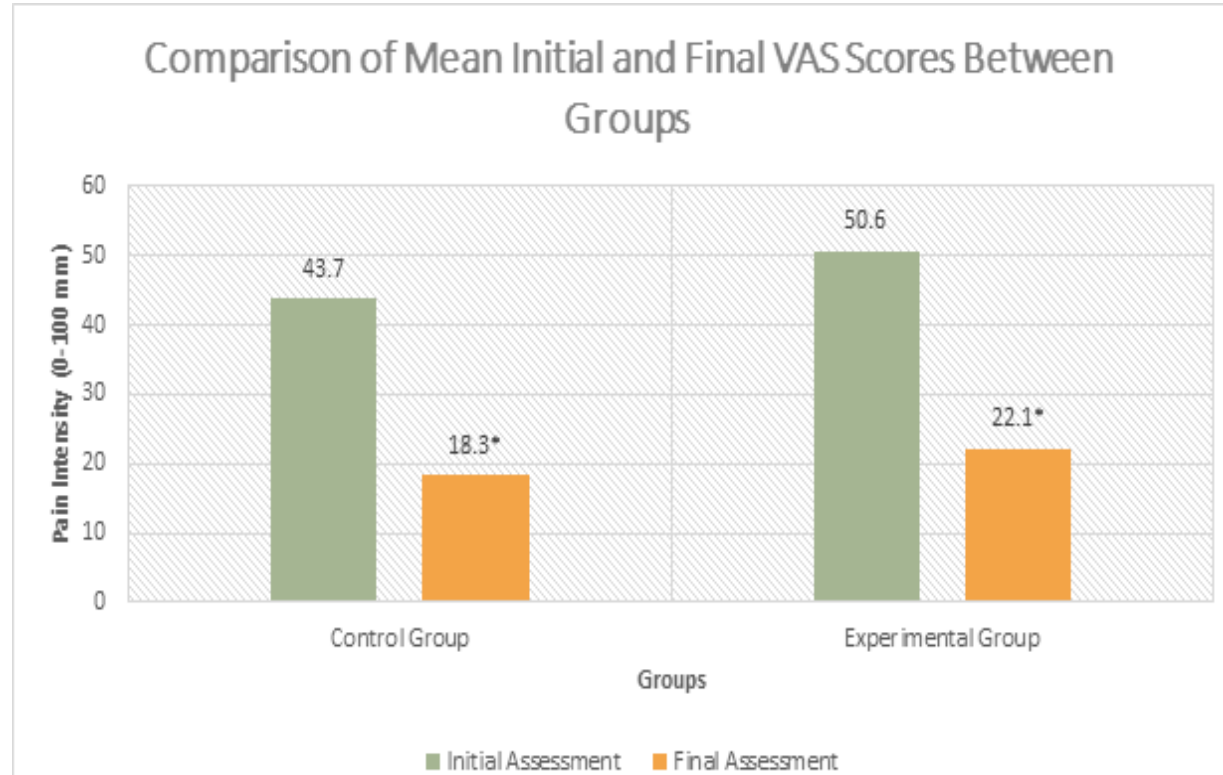
# Results



- There was no statistically significant differences in initial VAS & ODI scores between the Control and Experimental Groups.
  - **VAS Scores:  $p=.592$** 
    - Control:  $43.7 \pm 25.7$
    - Experimental:  $50.6 \pm 21.5$
  - **ODI Scores:  $p= .640$** 
    - Control:  $30.3 \pm 10.3$
    - Experimental:  $27.4 \pm 12.0$
- Both groups started out with equal pain and functioning.

# Mean Initial and Final Assessment VAS Scores

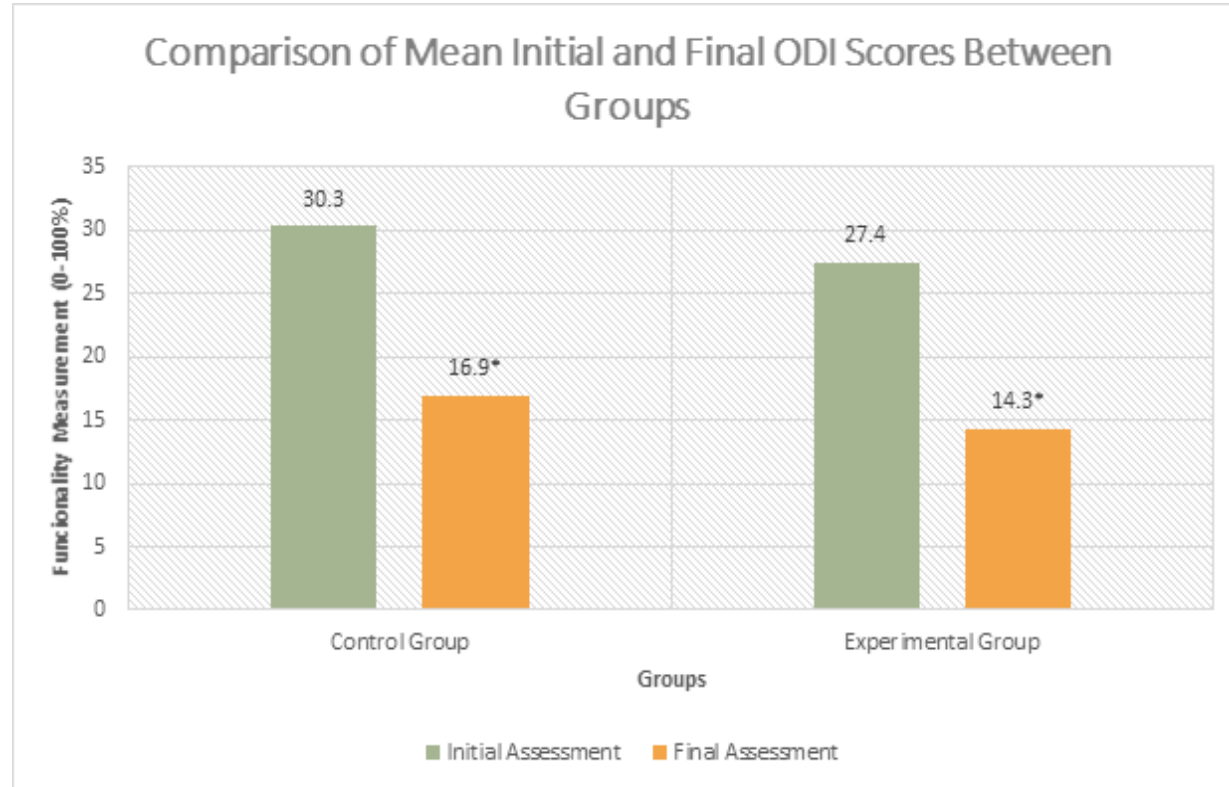
- There were statistically significant differences in average VAS scores for the Control and Experimental Group.
  - Control:  $p = .012$ , cohen's  $d = 1.26$ 
    - Initial:  $43.7 \pm 25.5$
    - Final:  $18.3 \pm 12.7$
  - Experimental:  $p = .014$ , cohen's  $d = 1.48$ 
    - Initial:  $50.6 \pm 21.5$
    - Final:  $22.1 \pm 16.6$



# Mean Initial and Final Assessment ODI Scores



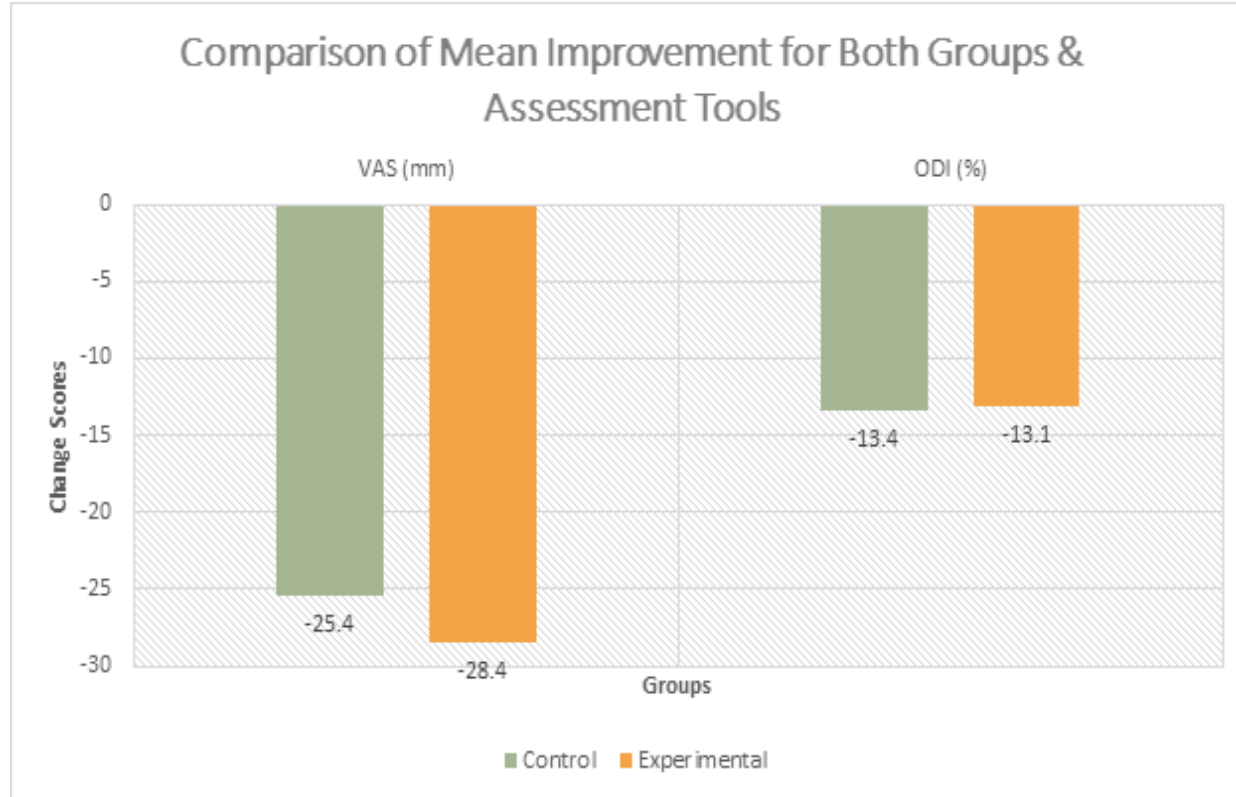
- There were statistically significant differences in average ODI scores for the Control and Experimental Group.
  - **Control:**  $p = .001$ , **cohen's d = 1.38**.
    - Initial:  $30.3 \pm 10.3$
    - Final:  $16.9 \pm 9.2$
  - **Experimental:**  $p = .015$ , **cohen's d = 1.12**.
    - Initial:  $27.4 \pm 12.0$
    - Final:  $14.3 \pm 11.6$



# Comparison of Improvement (Change Score)



- There was no significant difference observed in the average improvement between the Control and Experimental groups for either VAS or ODI scores.
  - **VAS Scores:**  $p = .411$ , cohen's  $d = .122$ .
    - Control:  $-25.4 \pm 22.6$
    - Experimental:  $-28.4 \pm 26.3$
  - **ODI Scores:**  $p = .480$ , cohen's  $d = .029$ .
    - Control:  $-13.4 \pm 7.1$
    - Experimental:  $-13.1 \pm 12.3$



# Discussion



## Implications:

- The addition of the deadlift did not improve pain and functioning better than standard PT alone (accept the null hypothesis).
- No negative effects on participants influence of pain and functionality; the results demonstrate the deadlift exercise can be completed successfully in a compromised population without injury.
- At the end of the 4-week intervention, all participants had significantly improved their pain and function, although no significant results were found when change scores were compared between intervention groups.

# Related Research



Individualized low-load motor control (LMC) exercises and education versus a high-load lifting (HLL) exercise (the deadlift) and education to improve activity, pain intensity, and physical performance in patients with low back pain (Aasa et al. 2015).

- Took place in an outpatient physical therapy clinic, participants aged 25-60.
- LMC exercises included those that focused on finding neutral positions, especially in the spine and lumbopelvic region (low back), ultimately to be able to control dynamic movements better than before treatment.
- VAS scores reported at baseline and 2-month follow up:
  - Baseline: LMC ( $47 \pm 28$ ) & HLL ( $43 \pm 24$ )
  - 2-Month Follow Up: LMC (30) & HLL (22),  $p = .687$  between group mean change.
- Current study VAS scores:
  - Baseline: Control (44) & Experimental (51)
  - Final: Control (18) & Experimental (22)
- Similar pain intensities in current studies patients to other studies patients.

# Limitations



- Small sample size of only n=14 participants more participants, more significant changes/results?
- Short study period of only 4-weeks - participants may not have been able to reach their full improvement in this time period.
- Lack of control of participants commitment outside of the PT clinic- unknown if participants implemented the deadlift into their at -home routine.
- Diminished knee range of motion in older and physically limiting people participants may not have been going through the entire range of motion of the deadlift exercise.

# Limitations Continued



- Three participants were taking some kind of pain medication:
  - Participant 11 had an initial VAS score of 88mm (out of 100mm) which was the highest for all participants in both the control and experimental groups.
  - Participant 1 was on pain medication and from the initial to final assessments their VAS score did not deviate from 30mm.
- COVID-19 :
  - 3 participants had to do over the phone final assessments since there were limited patients allowed inside the clinic.
  - Affected some patients seeing their PT twice a week.



# Positive Influences

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- The ability to modify the Biering-Sorensen test.
- The majority of the participants (n=12) had previous experience lifting weights.



# Future Research



- More research on the deadlift being used for rehabilitation.
- Larger sample sizes
- More structured training protocol - weight, intensity, etc.
- Training might need to be done strictly in a controlled setting.
- Future studies to include more rehabilitation settings, but healthy populations as well for use of the deadlift in low back treatment.

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