Effect of Deadlift Training on Core Strength in Previously-Untrained Males

Christian Wisdom M. Valleser
Garizaldy S. Santos, Jr.
Department of Sports Science
College of Human Kinetics
University of the Philippines
Diliman, Quezon City, Philippines

The purpose of this study was to examine the effect of a heavy compound exercise, in this case the deadlift, on core strength as determined through the 1-RM deadlift and the Bunkie test. The deadlift is a multi-joint movement that involves picking up a barbell from the floor and standing up to the erect position. This movement includes plenty of muscle activation, mainly the lower back, upper back, quadriceps, hamstrings, and abdominals. The core is a collection of muscles in the abdominal and lower back areas although it is commonly mistaken as simply the abdominal muscles. This study investigated the effect of deadlift training on core strength through a pretest–posttest comparison of significant differences specifically in the 1-RM deadlift and the Bunkie test for core strength. Twenty-one (21) previously-untrained male college students participated in a 5-week deadlift strength program using progressive overload with no direct core training involved. Two t-tests for dependent means were used for comparison of the pretest and posttest scores, and significant differences were evaluated for effect size using Cohen's d. All results were tested for significance at = 0.05. The 5-week deadlift program resulted in significant increases in both the 1-RM deadlift, derived from the Brzycki formula, and Bunkie test scores most notably in the posterior stabilizing line and the medial stabilizing line. Deadlift strength training, even without direct core training, leads to significant improvements in core strength in previously-untrained male college students.

Keywords: deadlift, core, strength, repetition max

INTRODUCTION

The deadlift is a resistance training exercise in which a loaded barbell is lifted off the floor by extending the hips and knees until the body reaches a fully erect torso position (Earle and Baechle, 2008). This barbell deadlift is one of the three lifts in the sport of powerlifting (along with the squat and bench press) and is a part of many resistance training programs. The deadlift entails plenty of muscle activation mainly the gluteal muscles, hamstring, quadriceps, and lower back as well as numerous synergist muscles in the upper body. Certain exercises like the squat and lunges require the same prime movers as the deadlift. However, the emphasis of the deadlift lies on the powerful activation of the gluteal and hamstring muscles to straighten the hips as well as highly involved synergistic role of the upper body. Such is the fundamental appeal of the deadlift in terms of physical enhancement that it has, along with its variations, been the subject of many reviews (Farley, 1995; Gardner and Cole, 1999; Frounfelter, 2000; Graham, 2000; Piper and Waller, 2001; Graham, 2001; Hales, 2010; Bird and Barrington-Higgs, 2010). The practical application of the deadlift is simple and can be used in daily life like picking items off the floor or moving heavy objects like furniture. All of these movements are mimicked by the deadlift, so an individual may perform better daily life activities.

Among the lifts that are widely beneficial for an individual, the deadlift is one of the most underrated and underappreciated. The reason for its unpopularity probably stems from the deep rooted idea that it is hazardous to the lumbar tract of the spine or the vertebral column (Casillo, 2008). Although assuming that the deadlift is completely safe and harmless is false, certain precautions can be done to minimize and even prevent injuries while training (Thibaudeau, 2008). The deadlift directly targets all of the major muscle groups responsible for correct posture and, in turn, core strength. Correct deadlifting technique enables one to hold their back straight and keep a correct posture when engaging in daily activities because of its emphasis on maintaining a straight back throughout the movement. The deadlift also strengthens all the surrounding supporting muscles of the waist, backside, and hips and, of course, lower back. This exercise can be an integral part of any resistance training program because it is very simple but is profound in its capacity to increase overall strength and can contribute to more strength and size gains compared with many other exercises (Robson, 2015).

The core can be broadly defined as the torso, an area of the human body that is essential for movement capacity such that a lack of muscular development may predispose one to injury (Karageanes, 2004). It can be further described as a collection of muscles in the abdominal and lower back areas. This includes all the abdominal muscles (rectus abdominus, internal and external obliques, transverse abdominus and intercostals) as well as the muscles associated with the spine (the erector spinae group) and the hip flexors (iliacus and psoas, collectively known as the iliopsoas). Having a strong core brings about many functions, one of which is to stabilize and protect the spine by creating stiffness that limits excessive movement in any direction—most notably, extension, flexion, lateral flexion, and rotation (Bumgardner, 2015). That being said, it is assumed that a strong core equates to better overall stability and balance. Core stability is an important attribute of the body and is vital to athletes and nonathletes alike.

The core has become a household term in the fitness industry. People seem to equate the core with abdominal training which explains why various websites, commercials, advertisements, and even trainers use the phrase to attract misinformed potential clients vying to get a "ripped" abdominal area. In truth, the core exists for a reason much more than the aesthetic value that lean abdominal muscles give and, thus, needs to be understood completely. The interaction of the overloading capacity of deadlift training and its inherent benefits to core strength and stability is yet to be objectively investigated. Thus, the aim of this study was to determine if there would be a significant change in the core strength of previously-untrained individuals after a deadlift training program, specifically whether a purely deadlift strength training program may elicit changes in one's core strength even without direct core training.

Muscular strength testing is an integral aspect of muscular fitness assessment, and this principle can be applied to the deadlift. The absolute strength of a muscle is defined as the greatest amount of weight the muscle can lift in a single time — called the One-Repetition Max (1-RM) — in this case, the 1-RM deadlift. Many strength tests are performed using free weights, so proper form and control are important to maintain safety. Studies on 1-RM testing have reported it to have high validity and test–retest reliability (English et al., 2008; Bezerra et al., 2013) making it an ideal method of measuring an individual's absolute strength.

Used to assess core strength, the Bunkie test is primarily a functional performance test consisting of five positions performed on the left and right sides of the body totaling 10 positions of evaluation. The Bunkie test was first introduced by de Witt and Venter (2009) to evaluate fascia mobility and athletic performance. The name Bunkie was derived from the Afrikaans word "bankie" which means "little bench". The results of the test depend on the participants' ability to hold each of the five positions. The test prescribes participants to hold each position for a specified amount of time or duration and would stop if pain or deviation from the standard form occurs. The test identifies performance in the anterior, posterior, medial, and lateral aspects of the core. Identifying weak areas is essential to determine how the core can be strengthened through training thus even rehabilitation professionals can utilize this test (Brumitt, 2011).

A study that assessed the relationship of the Bunkie test and athletic performance was done by van Pletzen and Venter (2012) on professional rugby players using the Bunkie test along with other tests for athletic performance. The results were groundbreaking as the participants who scored high in the Bunkie test (those who were able to hold the positions for the prescribed duration) exhibited positive significant relationships with the results for the other tests — agility, speed, anaerobic endurance, leg power, and upper body strength. Furthermore, the participants were familiar with all of the tests aside from the Bunkie test and therefore would not have been able to prepare for the Bunkie test in any way possible. When tested on a general, healthy population, the Bunkie test offered a high test–retest reliability for the five testing positions with intraclass correlation coefficients going as high as 0.95 (Brumit, 2015). Furthermore, the Bunkie test may also be a useful tool for diagnosing muscular asymmetry as the tests are done unilaterally or as a means of tracking muscular function progress for patients undergoing rehabilitation (Brumitt, 2011).

MATERIALS AND METHODS

Research Design

This study is a pretest–posttest comparison of significant differences specifically in the 1-RM deadlift and the Bunkie tests. The intervention was a 5-week, twice-a-week frequency (with rest days in between sessions)

deadlift strength program using progressive overload. The more common conventional deadlift style was used in this study. The conventional deadlift uses a narrower stance (feet about 32 to 35 cm apart) with hand/grip placement outside the stance feet compared with that of the sumo style (Escamilla et al., 2000; Escamilla et al., 2002) which involves a placement of the hands outside the stance feet. Aside from the 5-week training program, separate days were provided for the (1) briefing/orientation about the deadlift, (2) pretesting of the 1-RM deadlift, (3) pretesting of the Bunkie test, (4) posttesting of the 1-RM deadlift, and (5) posttesting of the Bunkie test.

Participants of the Study

Twenty-one previously-untrained but healthy male college students with a mean age of 20.6 (±2.6 yrs) — novices with no background in weight training — participated in the study. The diet, sleeping habits, fatigue management strategies, and pre- and postworkout nutrition of the participants were not monitored.

Instruments of the Study

Since novices are typically incapable of handling heavy free weights because of their lack of familiarity and experience, a derivative of the 1-RM was employed using predicted 1-RM testing through a conversion table. The Brzycki (1993) formula is one of the commonly used 1-RM prediction methods and is calculated using the formula "weight lifted/ (1.0278 – (0.0278 × repetitions))". It provides a fairly accurate estimation of the 1-RM especially in performances of less than 10 repetitions and was thus applied in the pretest and posttest of the 1-RM deadlift.

As introduced earlier, the Bunkie test is a method for assessing core strength and was applied in this study to determine the pretest and posttest core strength of the participants. The test involves five testing positions namely the (1) posterior power line (PPL), (2) anterior power line (APL), (3) posterior stabilizing line (PSL), (4) anterior stabilizing line (ASL), and (5) medial stabilizing line (MSL). Each position is to be held with the feet on a 30-cm bench and the upper extremities (palms and forearms) supporting the upper body. Once ready, the individual would raise one

leg or foot (depending on the test) a few inches off the bench. Although it is suggested that athletes are to hold the position for 20 to 40 seconds, the participants were novices and were just tested on how long they could hold the position as suggested by de Witt and Venter (2009). Aside from the individual scores that would be derived from each testing position, an overall score was also obtained by summing all five scores in the Bunkie test.

Tools for Analysis

Normality was assessed using the Shapiro-Wilk (1965) test and showed that data were normally distributed meeting the assumptions of a parametric test. Two t-tests for dependent means were used for comparison of the pretest and posttest scores. When applicable, significant differences were evaluated for effect size using Cohen's d to measure the magnitude of mean differences (by definition d = 0.20, small effect; d = 0.50, medium effect; d = 0.80, large effect) (Cohen, 1988). Significance was tested at $\alpha = 0.05$.

RESULTS

The principle of specificity, the foundation of all exercise programs today, states that individuals must train in a specific way to get specific results (Baechle and Earle, 2004). Thus, as expected because of training specifically for deadlifts, there was a significant increase in the 1-RM deadlift at 21% and was significant ($p = 0.000$) with a large effect size ($d = 1.13194$). This result was not surprising since the participants underwent a 5-week deadlift strengthening program with progressive overload.

Throughout the 5-week program, there was no direct core training, and the participants were not subjected to the Bunkie test at any point in the program. As implied by the specificity principle, this should not elicit any changes in core strength unless otherwise affected, directly or indirectly, by deadlift training. The researchers observed a 28.6% increase in the overall Bunkie test scores ($p = 0.0000$) with a large effect size ($d = 1.6810$). As can be observed in Figure 1 below, posttest scores in both the 1-RM deadlift and Bunkie test were considerably much higher than the pretest scores:

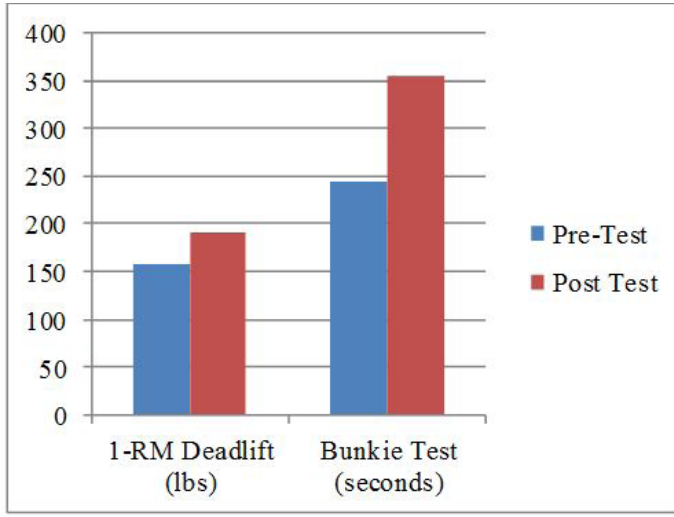

Figure 1. Pretest vs. posttest 1-RM deadlift and Bunkie test scores.

The outcome of the Bunkie test comparison is promising as it offers initial insight into the argument that many of the muscles targeted by the deadlift were similar parts of the core responsible for maintaining and ensuring proper posture for core strength. In effect, gains in core strength presumably came from the nature of the deadlift which has high muscle activation not only in the torso but also in the whole body as well. As stated earlier, movement during the deadlift does activate the abdominal muscles as well as the muscles associated with the spine and the hip flexors (Nilsson, 2003).

Further investigation into the individual Bunkie scores showed that there were significant improvements in all testing positions. The PPL had a 12.4% increase ($p = 0.0000$) with a large effect size ($d = 0.7860$). The APL increase was higher at 23.8% ($p = 0.0002$) with a large effect size ($d = 1.1678$) as well. The third position, the lateral stabilizing line LSL yielded impressive results with a 61.7% increase ($p = 0.0000$) also with a large effect size ($d = 1.3450$). Much more impressive were the results from the PSL with an 83.6% increase ($p = 0.0000$) and the MSL with an 87.8% increase ($p = 0.0000$) with both having large effect sizes ($d = 1.5927$ and $d = 1.5196$, respectively). These results are better appreciated through Figure 2 which illustrates the marked increase in performance in the test positions.

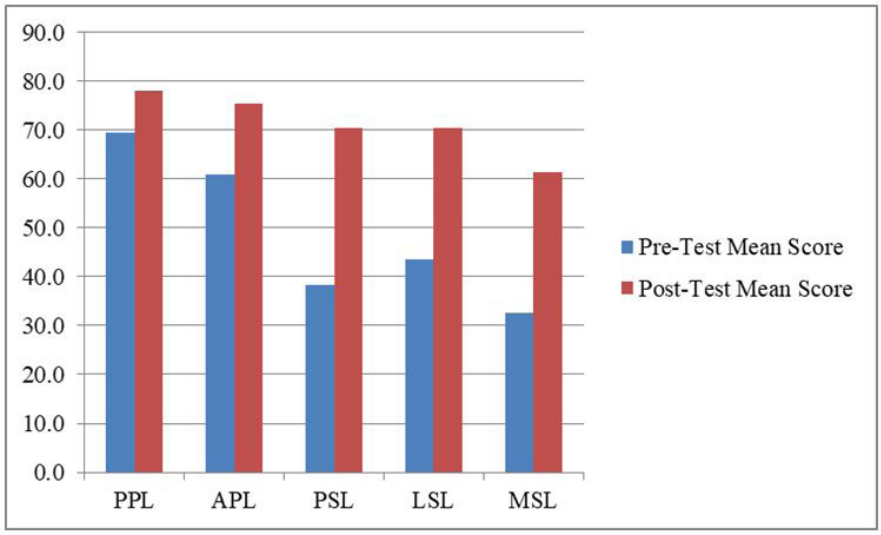

Figure 2. Pretest vs. Posttest mean scores in the individual Bunkie test positions.

CONCLUSION

The purpose of this study was to examine the effect of heavy compound exercise training, in this case the deadlift, on core strength as determined through the 1-RM deadlift and the Bunkie test. This hopefully contributes to research linking the positive effect of the deadlift on core strength through statistical evidence. The 5-week deadlift program resulted in significant increases in both the 1-RM deadlift, derived from the Brzycki formula, and Bunkie test scores most notably in the posterior stabilizing line and the medial stabilizing line. Deadlift strength training, even without direct core training, leads to significant improvements in core strength in previously-untrained, healthy males.

RECOMMENDATIONS

The sample population used in this study consisted of untrained males. Different groups may be investigated to find out whether the results would be similar especially among male and female athletes and/or trained individuals. Different training program durations may also be used to determine the effect of programs which may be shorter or longer than

the five weeks used in this study. Adjustments in training volume and/or intensity may also be investigated as well as using different exercises whether multi-joint or isolation exercises.

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