Muscle Activation of Deadlift Variations

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Background

- The deadlift is a popular resistance exercise used to develop lower body and posterior muscular strength.
- Deadlift variations include, sumo (SD), stiff leg (SLD) and conventional (CD) (Figure 1.).
- These variations of the deadlift have differences in the range of motion of the knee, hip, and back.

Purpose

- The purpose of our project was to quantify the muscle activity of the lower back and leg muscles using surface electromyography during the different deadlifts.
- By understanding the muscles activation levels during the different variations, we can make more informed decisions on exercise selection for strength training.

Hypothesis

- We hypothesized there would be greater muscle activation in the biceps femoris and erector spinae in the stiff leg deadlift (SLD).
- We also hypothesized the gluteus maximus and rectus femoris, would have greater muscle activation in the sumo (SD) and the conventional deadlifts (CD).

Methods

- One male experienced powerlifter.
- Surface electromyography (EMG): erector spinae, biceps femoris, gluteus maximus, and rectus femoris.
- Three repetitions for each of the deadlifts using 93 kg.
- EMG data were processed (rectified and filtered) to determine the average millivolts.
- Average millivolts for each muscle were compared across the conventional (CD), sumo (SD) and stiff leg (SLD) deadlift variations.

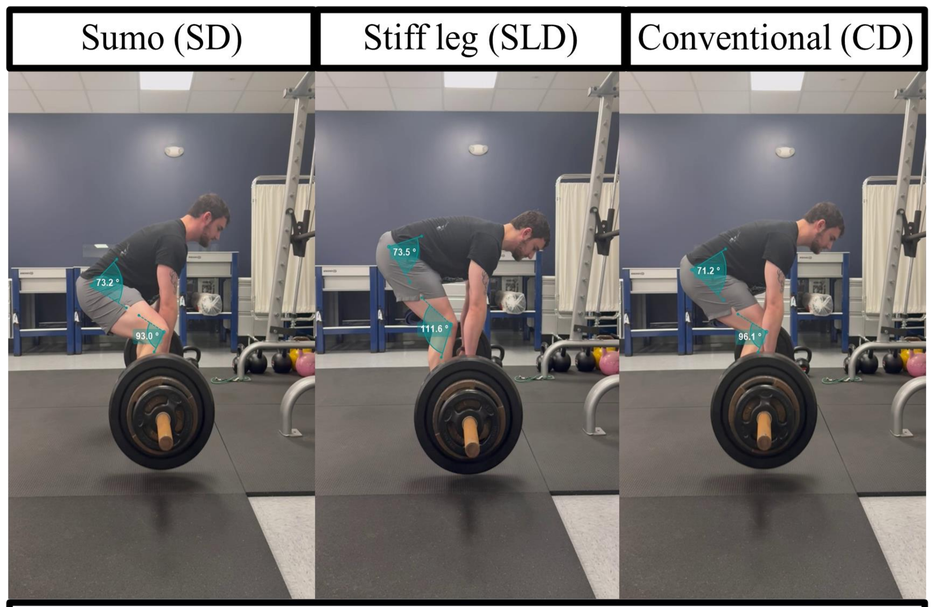

Figure 1. Deadlift Variations.

Results

- There was no meaningful difference in the average erector spinae muscle activity across the three lifts (CD= 0.30mV, SD = 0.28mV, SLD = 0.25mV).
- There was a difference in the average biceps femoris muscle activity with the SLD demonstrating the greatest muscle activity (CD= 0.16mV, SD = 0.17mV, SLD = 0.43mV).
- There was a difference in the average gluteus maximus muscle activity with the CD and SD demonstrating greater muscle activity compared to the SLD (CD= 0.15mV, SD = 0.13mV, SLD = 0.08mV).
- There was a difference in the average rectus femoris muscle activity with the CD and SD demonstrating greater muscle activity compared to the SLD (CD= 1.00mV, SD = 1.0mV, SLD = 0.75mV).

Conclusion

- Our project demonstrates that there are differences in muscle activity levels of the leg muscles depending on the deadlift variation used.
- This knowledge is useful for individuals who engage in weightlifting and are trying to improve lower body muscular strength.
- Lifters can use this information to target specific leg muscles based on the deadlift variation used.