

INTRODUCTION

- The back squat (BS) is a primary movement when training lower body muscles across all levels of athletes and is considered a vital component in strength training for athletes to improve muscle growth and power development because of the large activation of major muscle groups
- Two squat variations that are commonly performed are the BS and front squat (FS)
- Muscle activation using surface electromyography (EMG) signals is commonly measured and quantified by researchers as a way to help practitioners make informed decisions regarding exercise selection

PURPOSE

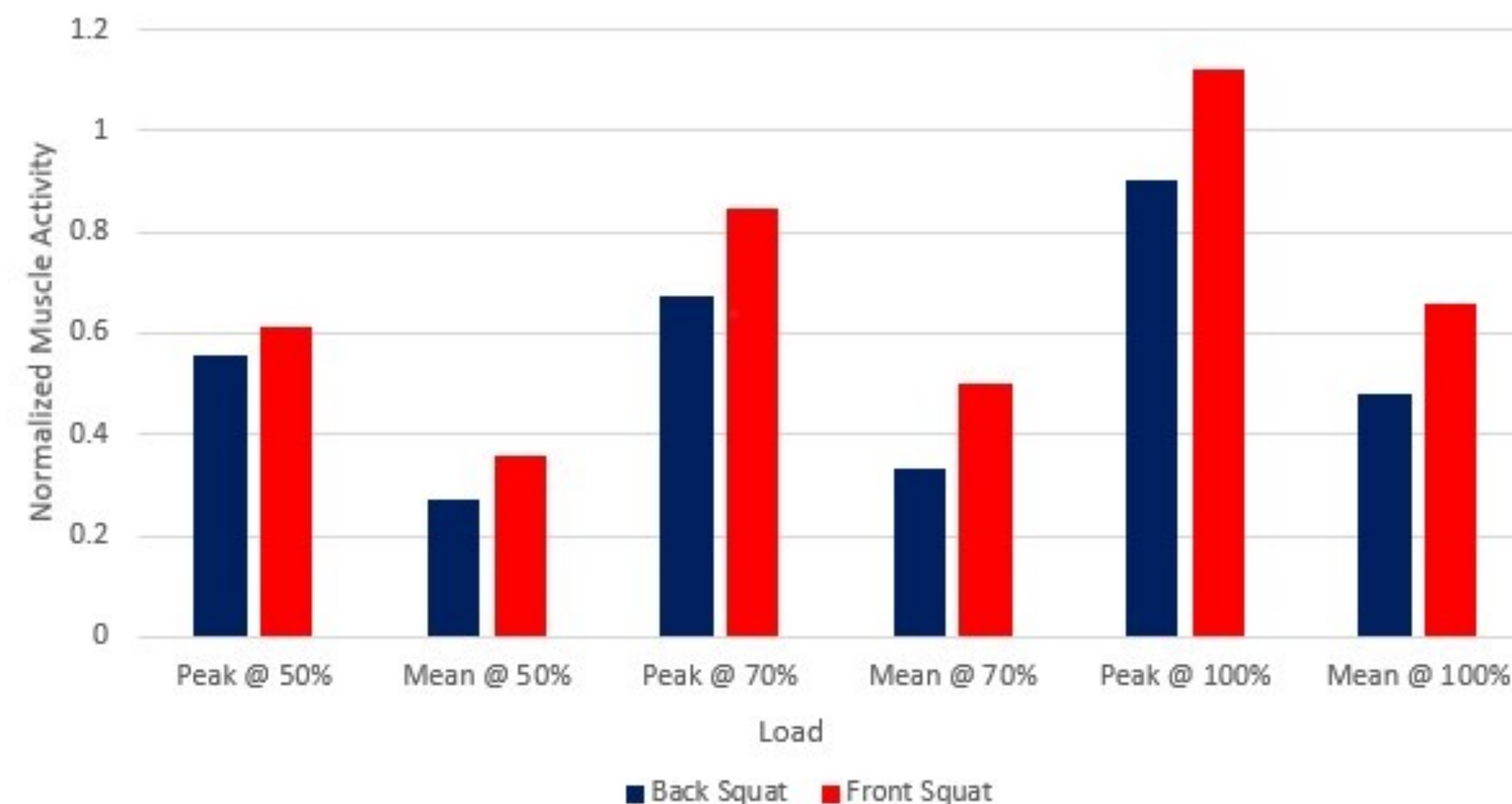
- Compare peak and mean EMG signal levels of the gluteus maximus (GM), vastus lateralis (VL), vastus medialis (VM), and trapezius ascendens (TA) of the FS and the BS in resistance trained individuals

METHODS

- EMG was used to measure muscle activity of the GM, VL, VM, and TA during both the FS and BS. The data analyzed were taken from a larger data collection set and included 4 male and 7 female participants ($M \pm SD$: $n=11$; age: 27.45 ± 7.89 years; height: 174 ± 10.11 cm; body mass: 79.43 ± 15.36 kg; BS 3RM: 115.45 ± 62.82 kgs; FS 3RM: 77.5 ± 33.03 kgs).
- Participants completed two testing sessions in the same day, one BS and one FS
- In both sessions, participants completed 3RM testing (used for normalization) and 50 and 70% values were taken from sets leading up to the participants 3RM (all within $\pm 10\%$) and are representative of 50 and 70% of the participants 3RM. This study design was meant to reflect a typical ramping training session protocol where an athlete would work up to a 3RM.
- Peak and mean muscle activity between the FS and BS were analyzed using 12 paired sample t-tests for both the peak and mean muscle activity data

Trapezius Ascendens muscle activity is greater during the front squat than back squat across training loads

Figure 1: Peak and Mean Muscle Activity Data in the TA between the Front and Back Squat at 50, 70, and 100% of 3RM-Test



RESULTS

- Significantly greater peak muscle activity in the TA was seen in the FS than the BS at 3RM ($t(10) = -2.34$, $p = 0.04$)
- Significantly greater mean muscle activity occurred in the TA during the FS at all loads: 50% 3RM ($t(10) = -2.25$, $p = 0.048$), 70% 3RM ($t(10) = -3.78$, $p = 0.004$), and 3RM ($t(10) = -4.79$, $p < 0.001$). The only other significant difference occurred in the VM at 50% 3RM ($t(10) = 2.29$, $p = 0.04$).

Conclusion

- The TA is typically regarded as a stabilizing muscle during most movement patterns and the FS provided greater muscle activity in the TA than back squat. This result likely occurred because of the bar placement during the FS demands a more upright posture and greater mid-back stabilization than the BS.

Practical Applications

- Prescribing a FS instead of a BS may promote greater activity of musculature which stabilizes the mid and upper back. When programming for sports requiring upright postures and mid to upper back strength and stabilization, it may be beneficial to utilize a FS opposed to a BS.

KEY REFERENCES

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