DIFFERENCES IN MUSCLE ACTIVATION BETWEEN THE TRADITIONAL AND SWISS BARBELLS DURING THE BENCH PRESS EXERCISE

[1,3]Grant Malone, [2,3]Nicholas Buoncristiani, [3]Dano Tolusso, [1]Hayley MacDonald, [3]Scott Arnett

[1]The University of Alabama, Tuscaloosa, AL.[2]University of North Carolina, Chapel Hill, NC.

[3]Western Kentucky University, Bowling Green, KY.

INTRODUCTION

- Exercise selection is a critical component of resistance training program design.
- The bench press is a popular exercise, typically performed using a traditional barbell (TB).
- The Swiss barbell (SB) provides an alternative implement for the bench press and may allow for a more sport specific movement compared to the TB.
- The SB allows the exerciser to use a neutral grip which may be a better option for individuals with limited shoulder mobility.
- It is unknown how the use of the SB affects the magnitude of muscle activation during the bench press exercise.

PURPOSE

The purpose of this study was to compare the magnitude of muscle activation elicited during the bench press exercise using the TB and SB.

METHODS

- 9 college-aged males experienced in resistance training visited the lab on three separate occasions.
- Visits 1 and 2: Anthropometric measurements and 1RM bench press test using the TB or SB (assigned in counterbalanced order).

- Visit 3: Participants performed a maximal voluntary isometric contraction (MVIC) followed by 2 sets of 3 repetitions of bench press at 65% and 85% of 1RM using the TB and the SB in the same order of 1RM testing.

  Surface electromyography (EMG) measured the magnitude of muscle activation during the above exercises.

- Raw EMG signals were collected at 2000 Hz (high and low pass filter cutoffs 10-500 Hz respectively). The EMG signal from the concentric portion of each repetition was rectified, smoothed (by root mean square algorithm with a 100 ms window), and normalized relative to the MVIC.

RESULTS

- There were no statistically significant differences in muscle activation magnitude between the TB and SB ($p > 0.05$).
- There were statistically significant differences in muscle activation between 65% and 85% of 1RM for the anterior deltoid ($p = 0.01$), medial ($p = 0.004$) and lateral heads ($p = 0.003$) of the triceps brachii, and the latissimus dorsi ($p = 0.043$).
- No interaction effects of bar type and intensity were observed ($p > 0.05$).

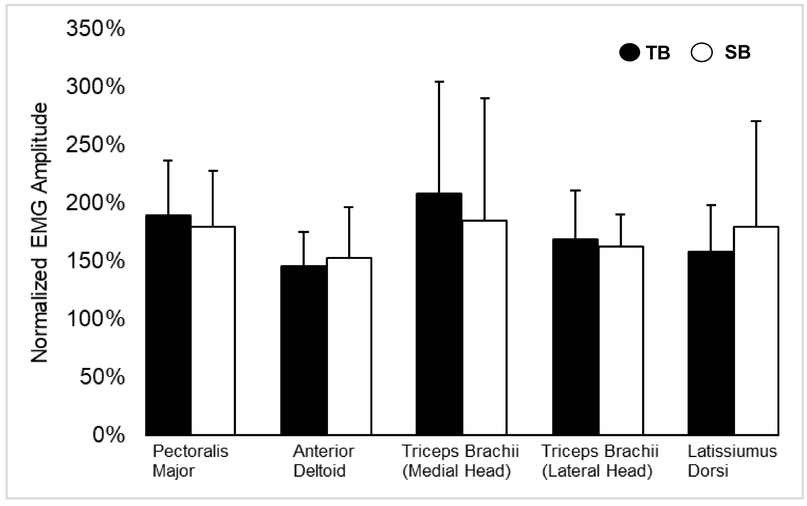

Figure 1. Average Peak EMG at 85% 1RM

Table 1. Subject Characteristics (N = 9)

Variables	M ± SD	Min - Max
Height (m)	1.78 ± 0.06	1.70 – 1.86
Weight (kg)	87.45 ± 13.41	78.84 – 120.66
TB 1RM (kg)	106.97 ± 21.66	70.31 – 142.89
SB 1RM (kg)	98.84 ± 20.91	65.77 – 138.35

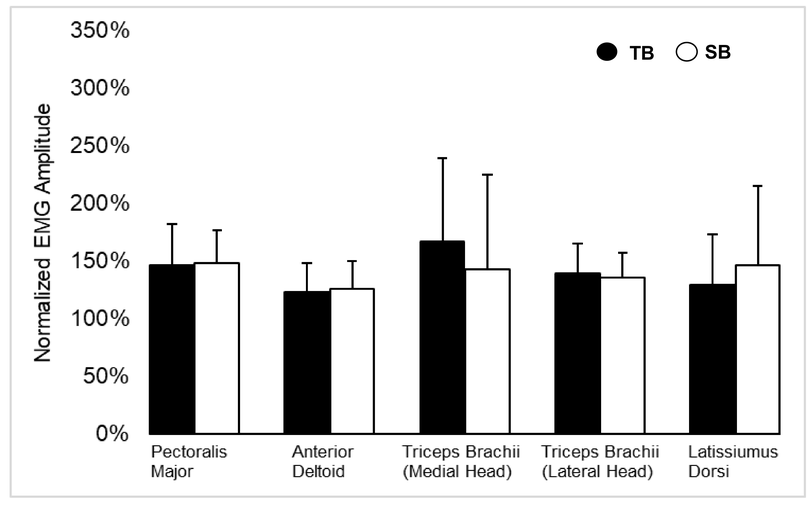

Figure 2. Average Peak EMG at 65% 1RM

Table 2. Peak EMG at 85% 1RM

Muscle	TB	SB
Pectoralis Major	189.54 ± 46.90	179.58 ± 28.54
Anterior Deltoid	145.80 ± 29.54	153.20 ± 43.11
Triceps Brachii (Medial Head)	168.70 ± 42.40	162.87 ± 27.47
Triceps Brachii (Lateral Head)	208.25 ± 95.77	185.00 ± 105.19
Latissimus Dorsi	157.70 ± 40.45	179.32 ± 91.65

Table 3. Peak EMG at 65% 1RM

Muscle	TB	SB
Pectoralis Major	147.63 ± 36.03	148.97 ± 28.54
Anterior Deltoid	123.23 ± 43.11	126.10 ± 24.37
Triceps Brachii (Medial Head)	167.13 ± 72.91	143.29 ± 81.60
Triceps Brachii (Lateral Head)	139.75 ± 25.95	136.82 ± 21.61
Latissimus Dorsi	129.26 ± 44.39	146.83 ± 68.37

CONCLUSIONS

- This study suggests that there is no difference in muscle activation between the TB and SB when using equal relative loads.
- Strength and conditioning professionals may consider the use of the SB when it better mimics a sport specific movement or when mobility limitations are present without compromising muscle activation or potential adaptation.
- Future research should consider assessing differences in adaptations of the upper body musculature while training with the TB versus the SB.