GEORGIAN COURT UNIVERSITY
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Examining Gender Differences within the Effects of Blood Flow Restriction on Peak Power and Electromyography

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PURPOSE

Blood Flow Restriction (BFR) has gained significant popularity in exercise training and rehabilitation. This study examined the gender differences within the effects of blood flow restriction (BFR) on the muscular peak power and electromyogram (EMG) of leg muscles.

METHODS

Thirty-nine Participants underwent two Wingate power test sessions - one with and one without BFR - at least one week apart. During the initial visit, participants' body composition was measured using an InBody machine. A Wingate Power Test without BFR was conducted to measure muscular peak power and EMG activity. During the second visit, participants performed a Wingate Power Test with BFR.

SUBJECTS

- **39 Participants**
  - 20 Males
  - 19 Females
- **Age**: 20.04 ± 0.32 yrs

TESTING & MEASUREMENTS

- **Wingate**
  - Monark Cycle Ergometer
  - Resistance: 7.5% Body Weight
  - 30 seconds
  - Maximal Effort
- **Electromyogram**
  - iWox
  - Vastus lateralis and the gastrocnemius of the right leg
  - Obtained during the Wingate test
- **Blood Flow Restriction (BFR)**
  - Smart Cuffs (SMART Tools Plus, LLC)
  - An inflatable cuff placed on the upper thigh to moderately restrict blood flow
  - 65% of the Upper Operational Pressure

STATISTICS

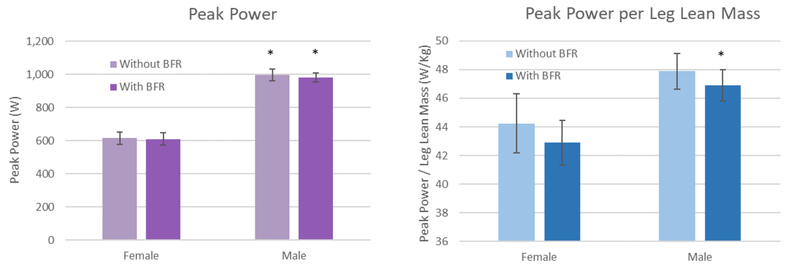
- Paired Sample T-Test
- Repeated Measures ANOVA
- IBM SPSS 28

RESULTS

Peak Power is higher in males than in females either with or without BFR (P<0.001). However, when adjusted to leg lean mass, the difference in peak power diminished without BFR (P=0.133), but the difference remained with BFR (P=0.039). There is no significant difference in EMG between males and females either with (P=0.329) or without BFR (P=0.889). When adjusted to leg lean mass, females exhibited a higher EMG per kilogram of leg lean mass than males either with (P=0.016) or without BFR (P<0.001). The peak power generated per mV of EMG is higher in males than females, either with BFR (P=0.027) or without BFR (P<0.001). Males dropped power faster than females either with (P<0.001) or without (P<0.001) BFR. The speed of power-drop diminished when adjusted to leg lean mass either with (P=0.665) or without BFR (P=0.304). There is no gender difference regarding the effects of BFR on peak power (P=0.601), peak power per leg lean mass (P=0.705), EMG (P=0.436), EMG per leg lean mass (P=0.316), power-drop speed (P=0.660), and power-drop speed per leg lean mass (P=0.926)

CONCLUSION

While males have higher absolute peak power than females, the capability of muscle fiber to generate peak power are the same between males and females without BFR. While the absolute myoelectric activities are the same when performing the maximum power test between the gender, males generate higher peak power per mV of myoelectric activity, indicating a more efficient muscle fiber recruitment or force production in males. BFR represented the same effects on males and females when performing a maximal power exercise.



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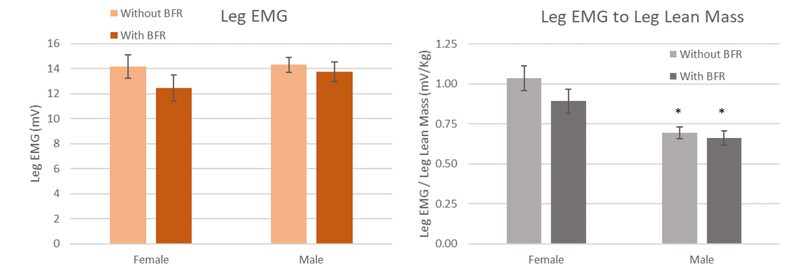

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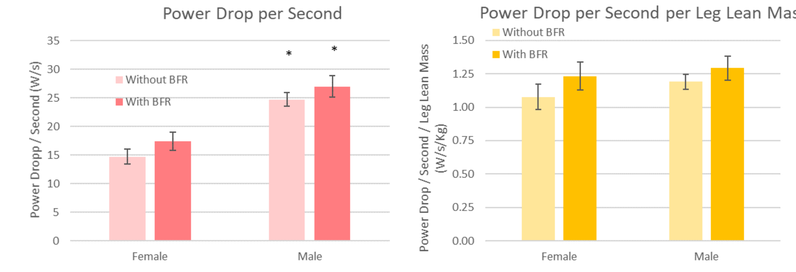

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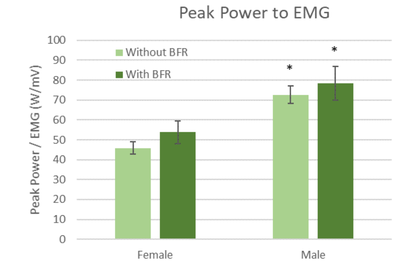

The peak power generated per mV of EMG is higher in males than females, either with BFR (P=0.027) or without BFR (P<0.001).

* Significant difference between male and female
Data are Mean ± SEM.