

PERFORMING HIGH LOAD BENCH PRESS WITH BLOOD FLOW RESTRICTION DOES NOT SIGNIFICANTLY AFFECT BAR VELOCITY



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Introduction & Purpose

Introduction: Previous research has shown that using blood flow restriction (BFR) cuffs can increase peak velocity and power during high load ($\geq 65\%$ one repetition maximum (1RM)) bench press exercise. Those previous studies, however, utilized high occlusion pressures i.e., greater than 80% arterial occlusion pressure (AOP). These higher occlusion pressures are typically applied to the lower body and may be too uncomfortable or painful during extended usage with the upper limbs.

PURPOSE: The purpose of this study therefore was to investigate the effects on power and velocity of a more moderate 50%AOP applied continuously during an acute high load bench press exercise.

Methods

- 12 resistance trained individuals came to the lab for three separate sessions.
- Each separated by 7-14 days
- See Table 1 for participant demographics.
- The 1st session was for collection of anthropometric data and 1RM testing on the bench press.
- During sessions 2 and 3, participants completed four sets of four (4x4) of free weight bench press at 75%1RM with 2-minutes inter-set rest
- During both sessions, a GymAware Power Tool was attached to the right-hand side of the barbell. Participants were instructed to perform the concentric portion of each rep as quickly as possible.
- One session was a control condition and the other was the experimental (BFR) condition:
 - Order of sessions was randomized; see Figure 1.
 - During the BFR condition, Delfi PTS Blood Flow Restriction cuff wrapped around both arms and inflated to 50% AOP. See Figure 2
 - During the BFR condition, the cuffs would only be inflated shortly before the 1st set and deflated at the end of the 4th set.
 - During the control session, cuffs were not applied to the arms.
- During all sessions, grip width was set to 150% bi-acromial distance. Set mean velocity and power, and highest peak velocity and power were recorded for each set.

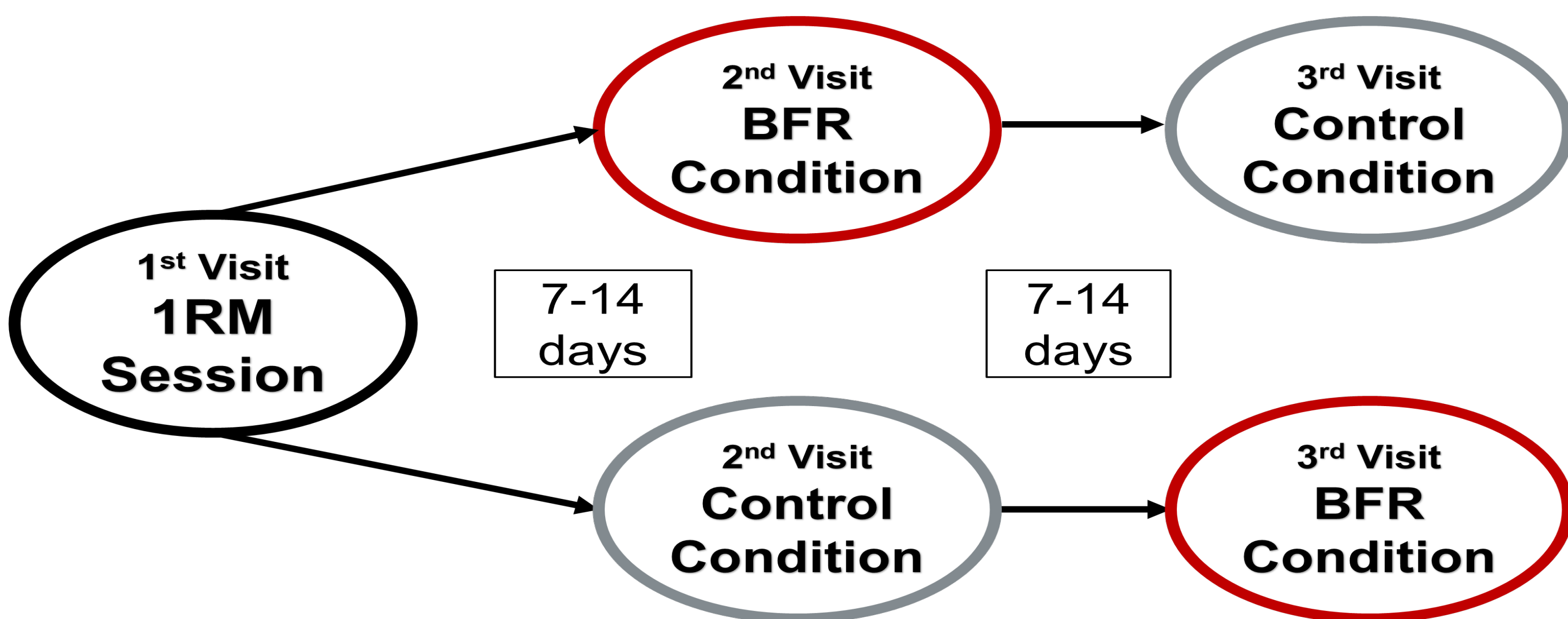


Figure 1: Graphical presentation of the flow study visits in a randomized repeated measures fashion.

Methods

	N =12	Mean	SD
Age		26.83	6.64
Body mass (kg)		84.00	10.77
Height (cm)		176.33	10.44
1RM (kg)		112.12	20.15
PTP		149.33	15.96
50%AOP		75.04	8.03

Table 1: Demographics of Participants

PTP: Personalized Tourniquet Pressure;
AOP: Arterial Occlusion Pressure



Figure 2: Setup for the bench press during the BFR condition. Delfi PTS cuffs are placed on the upper arm. A GymAware is Power Tool is located on the floor on the right-hand side of the rack.

2A & 2B: Side and front views, respectively, of the start and finish position for each rep.

2C: Side view of the bottom position of each rep.

Results

A series of two-way repeated measures (2X2) ANOVAs were run to assess differences across the two conditions and across the four sets.

- No significant ($p > 0.05$) effects for 'Condition' or the interaction of 'Condition x Set' for all four variables.
- There were significant ($p < 0.05$) effects for 'Set' for mean velocity, peak power, and peak velocity.
- Effect sizes were calculated as partial eta squared and were 0.265 for Mean Velocity, 0.263 for Peak Power, and 0.315 for Peak Velocity.
- Pairwise comparisons did not show reveal significance between individual sets.

Results

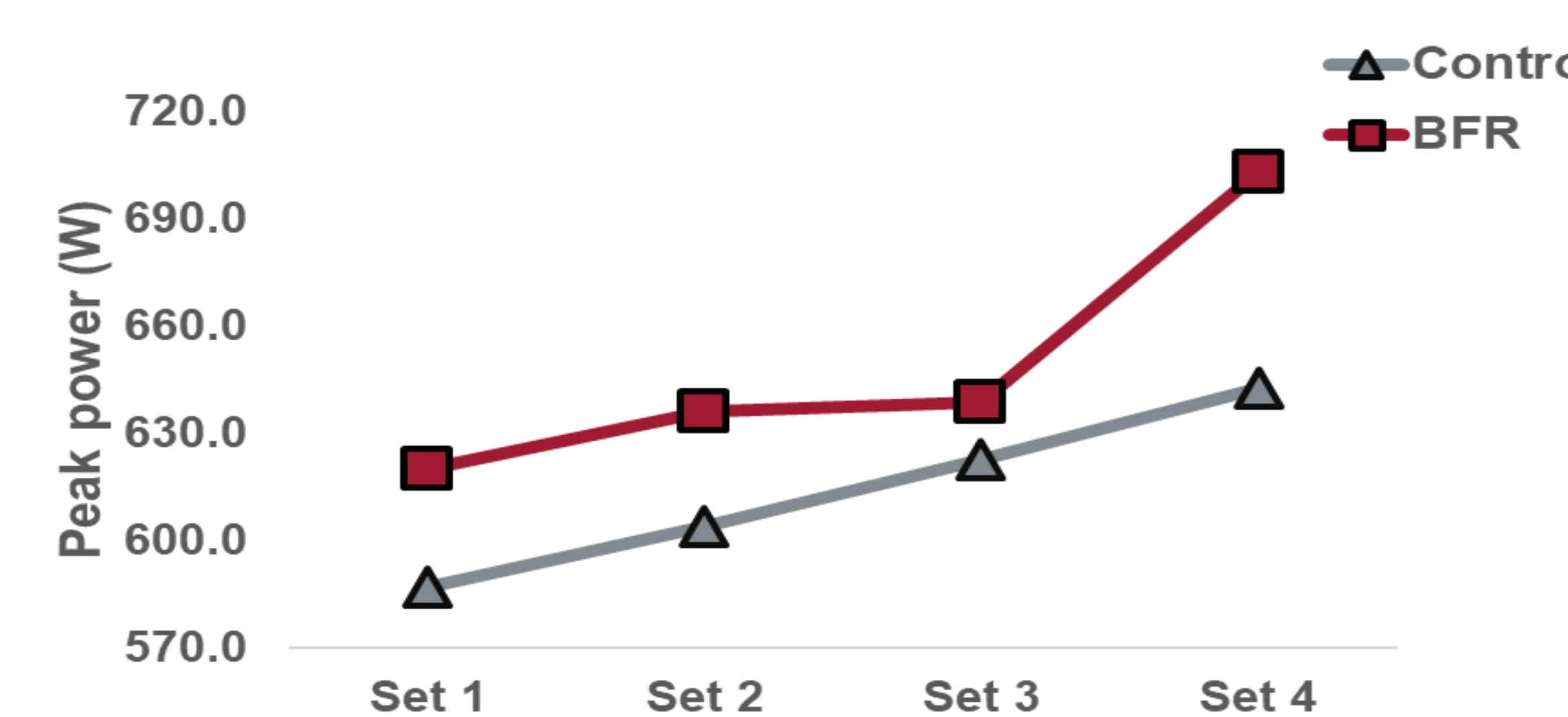


Figure 3: Changes in peak power from set-to-set in both Control and BFR conditions. There were no significant ($p > 0.05$) differences between any sets.

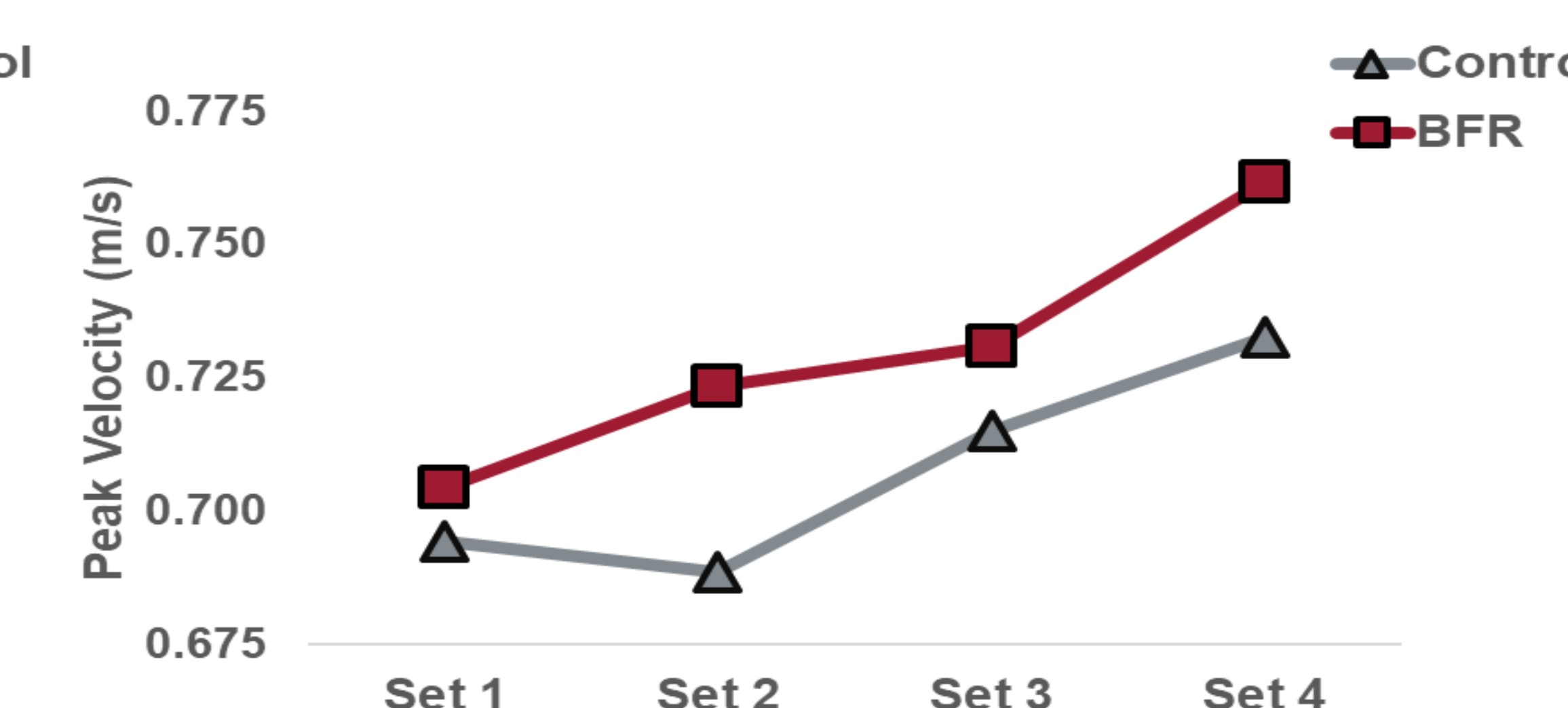


Figure 4: Changes in peak velocity from set-to-set in both Control and BFR conditions. There were no significant ($p > 0.05$) differences between any sets.

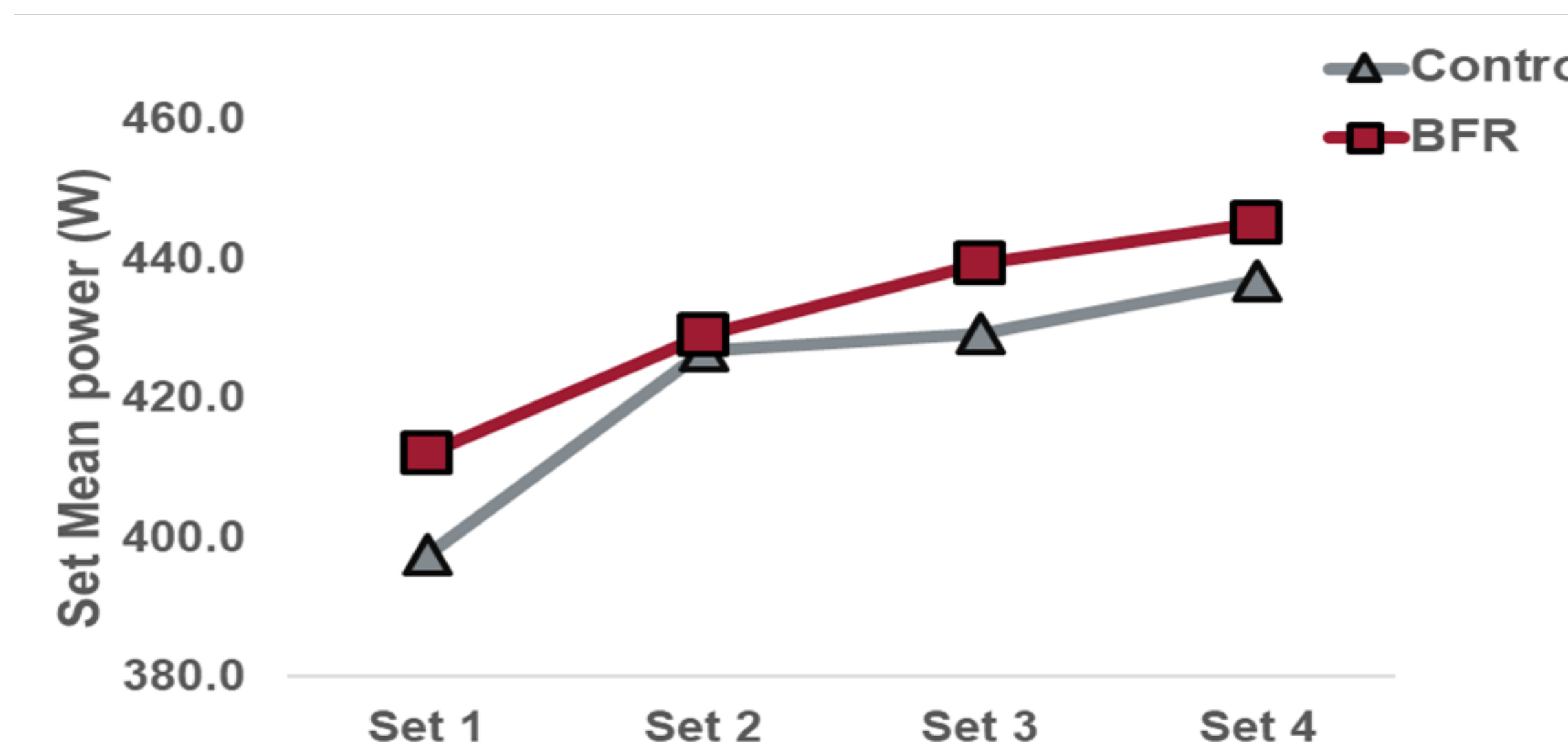


Figure 5: Changes in mean power from set-to-set in both Control and BFR conditions. There were no significant ($p > 0.05$) differences between any sets.

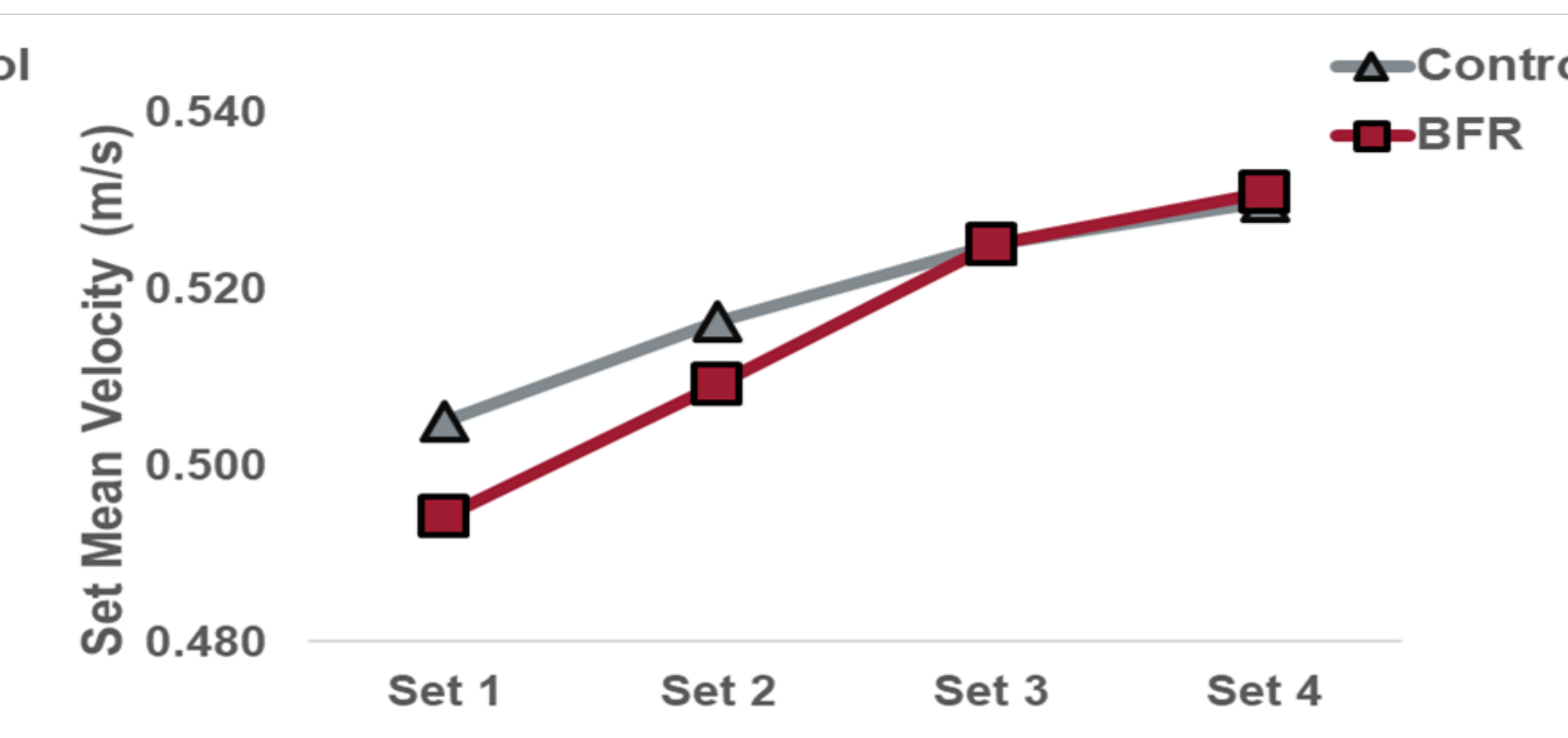


Figure 6: Changes in mean velocity from set-to-set in both Control and BFR conditions. There were no significant ($p > 0.05$) differences between any sets.

Conclusion

Blood flow restriction when applied to both arms at 50% AOP does not cause significant increases in mean or peak power or velocity during the bench press exercise when lifting against 75%1RM.

Practical Application

Application of BFR at 50%AOP is not capable of producing significantly greater bar velocity or power during high load bench press. As such, coaches and athletes should look to other potential means or use higher, and potentially less comfortable, pressures of BFR to increase bar velocity and power during the bench press exercise.

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