



PROXIMAL AND DISTAL EFFECTS ASSOCIATED WITH VASCULAR OCCLUSION DURING STATIONARY CYCLING

Jason Brumitt, PT, PhD, ATC, CSCS; Colton Cypert, SPT; Kelli Young, SPT; Kira Negrete SPT, CSCS;
Kristin Dunn, SPT; McKenzie Moore, SPT; Rainey Stoner, SPT

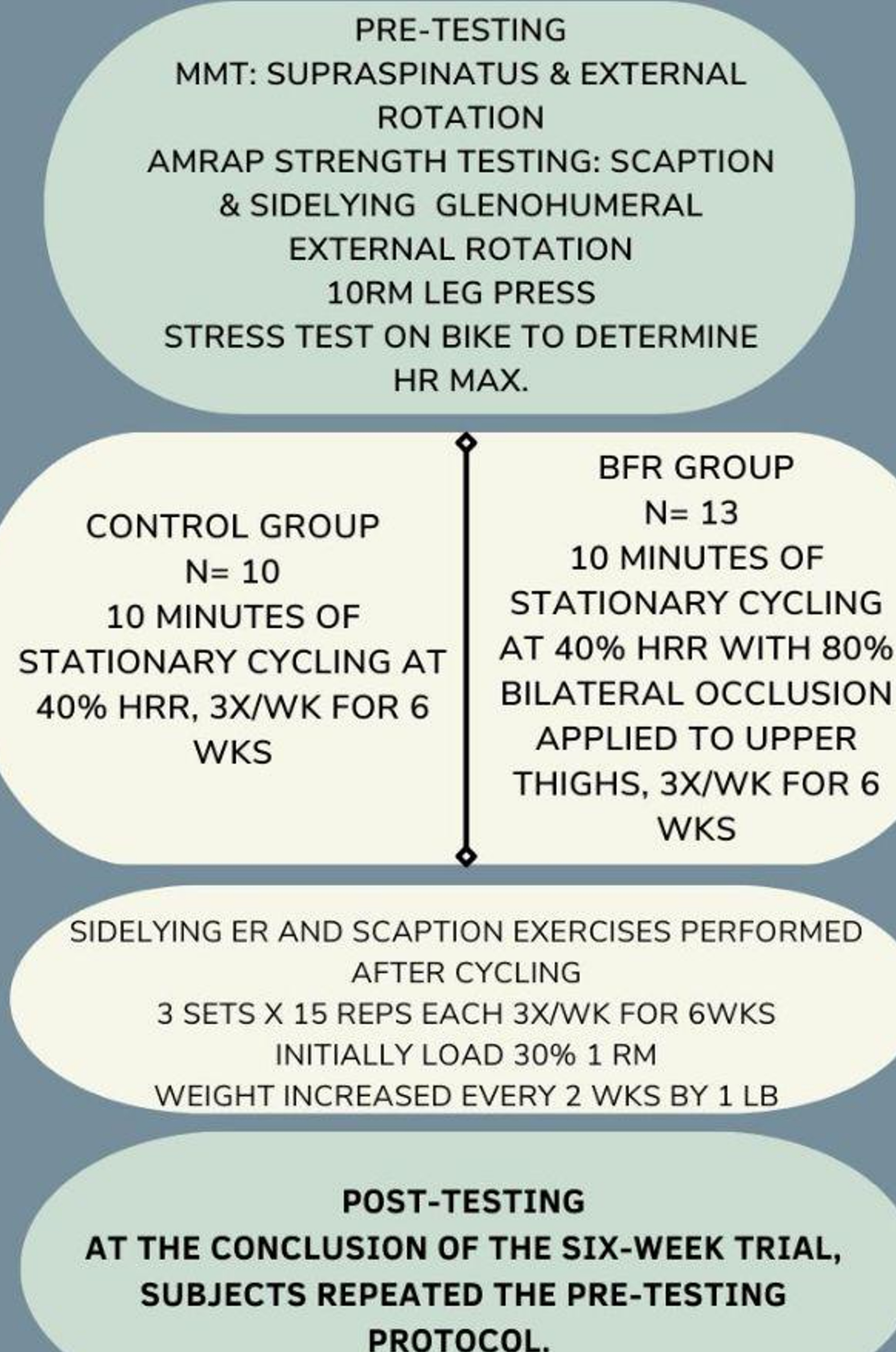
INTRODUCTION

- Blood flow restriction: uses a pneumatic tourniquet proximally on a limb to occlude arterial inflow and venous outflow as an individual exercises.
- BFR forces the **switch from aerobic to anaerobic metabolism** at low loads by limiting oxygen supply to working muscles
- Research demonstrates BFR training with low loads (e.g., 30% 1RM) increases strength and cross-sectional area of muscles distal to cuff application.
- Muscles proximal to cuff application may also experience a training effect (1,4)
- Previous studies demonstrate greater strength gains with low-load exercise with BFR
- Previous research utilizing BFR training has failed to demonstrate increases in rotator cuff strength (2,3)

PURPOSE

To compare strength gains in the supraspinatus and shoulder external rotators in subjects who performed 10 minutes of stationary cycling with or without bilateral occlusion.

METHODS



REFERENCES



RESULTS

Supraspinatus strength: BFR > non-BFR

Non-BFR had significant decrease
BFR did not have significant improvement

Shoulder External Rotation Strength: BFR > non-BFR

Non-BFR did not change at all

10 RM unilateral leg press: BFR > non-BFR

Both made significant improvement

Group	Pre-Test	Post-Test	Within Group p-value	% Change	Between Group p-value
Scaption					
BFR	51.77	61.84	0.001	19%	0.05
Non-BFR	48.56	45.6	0.034	-0.06%	
External Rotation					
BFR	42.08	55.3	0.001	31%	0.006
Non-BFR	35.46	37.81	0.074	6.6%	
10RM Unilateral Leg Press					
BFR	171.5	247.7	0.001	44.4%	0.023
Non-BFR	168.0	210	0.05	25%	

CONCLUSION & DISCUSSION

- Difference between groups: significant difference between the experimental and control group regarding ER strength (between group p-value = 0.006), scaption scores (between group p-value= 0.05), and lower extremity 10 rep max (between group p-value = 0.023).
- Bilateral application of BFR did augment upper extremity strength gains (of external rotator cuff muscles) and lower extremity strength gains.
- Limitations include: 1) Convenience sample, 2) Demographics of sample population (age and small sample size), 3) Did not limit participation of exercise outside of study.

- 1) Bowman et al. Upper-extremity blood flow restriction: The proximal, distal, and contralateral effects—a randomized controlled trial. *Sports Health*. 2020; 29(6); 1267-1274.
- 2) Brumitt et al. Blood flow restriction training for the rotator cuff: A randomized controlled trial. *Int J Sports Physiol Perform*. 2020; 15(8): 1175-1180.
- 3) Brumitt et al. Rotator cuff strength is not augmented by blood flow restriction training. *Phys Ther Sport*. 2021; 52: 305-311.
- 4) Madarama et al. Cross-transfer effects of resistance training with blood flow restriction. *Med Sci Sports Exerc*. 2008; 40(2): 258-263.