

Effects of Blood Flow Restriction Paired with Low-Intensity Resistance Training on Muscle Hypertrophy and Strength Gains in Division III Soccer Athletes

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Abstract

Introduction: Blood flow restriction training (BFRT) uses a pneumatic cuff to reduce arterial blood flow and venous return, causing muscles to enter an ischemic state, imposing a greater metabolic stress on working muscles. BFRT is paired with low-intensity resistance training, but causes similar muscle hypertrophy and strength gains compared to those of high-intensity training.

Purpose: The purpose of this study is to investigate the effects of adding blood flow restriction training to the athletes' high-intensity resistance training regimen, on muscle size and strength in healthy Division III soccer players.

Hypothesis: It was hypothesized that similar gains in muscle hypertrophy and strength would occur for blood flow restriction paired with low-intensity resistance training and high intensity resistance training, respectively.

Methods: Participants ($n=17$) were recruited via emails to Skidmore's men's and women's soccer teams, and randomly assigned to the blood flow restriction (BFR) or control group (Control). Training sessions occurred twice a week following each team's regularly scheduled high-intensity lift, and separate evaluation sessions took place after Week 3 (males and females) and Week 6 (males only), on rest days.

Results: There was no significant interaction between time and condition (BFR vs Control) for male bicep circumference score (BCS) ($p=0.861$). There was a significant effect of condition (BFR vs Control, $p=0.025$) and of time ($p=0.024$) on male BCS. There was no significant interaction between time and condition (BFR vs Control, $p=0.765$) or of condition ($p=0.971$) for female BCS. There was a significant effect of time on female BCS ($p=0.045$). There was no significant interaction between time and condition (BFR vs Control, $p=0.067$) or of condition ($p=0.598$) for male 1RM. There was a significant effect of time on male 1 RM ($p=0.004$). There was no significant interaction between time and condition (BFR vs Control, $p=0.227$) or of condition ($p=0.741$) for female 1 RM. There was a significant effect of time on female 1 RM ($p=0.018$). Similar increases were found in bicep curl 1RM and BCS measures between the BFR and control groups for both males and females.

Discussion: BFR creates a slight occlusion of arterial and venous blood flow resulting in muscle tissue hypoxia, increased fatigue, and decreased production of force; factors that lead to greater motor unit recruitment without high-intensity exercise.