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## The Effects of Blood Flow Restriction Training on Strength and Hypertrophy; Is it Worth it?

David Donovan  
*University of Southern Maine*

Clarissa El-Hajj  
*University of Southern Maine*

Ryan Koenig  
*University of Southern Maine*

Seth Wing  
*University of Southern Maine*

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# The Effects of Blood Flow Restriction Training on Strength and Hypertrophy; Is it Worth it?

Authors: David Donovan, Clarissa El-Hajj, Ryan Koenig, Seth Wing

Exercise, Health & Sport Science

## Abstract

We examined the effects of Blood Flow Restriction Training on Strength and Hypertrophy involving 3 female and 5 male subjects. Participants came in to train twice a week for 3 weeks and were randomly assigned to either the BFR or non-BFR group. Resistance exercise included lifting a weight to muscular fatigue or wearing blood flow restriction cuffs during resistance training to muscular fatigue performed on the smith machine. Squat exercises were performed on different days, lifting a weight at 50% of a 1 repetition maximum for a total of 3 sets with a 90 second recovery after the 1st and 2nd sets. The combined data for both groups show that the change in 1RM from pre-post was  $17.0 \pm 5.7$  pounds.

## Introduction

Resistance training is known to induce muscular hypertrophy as well as increase strength especially when training at higher intensities typically above 70% of a 1 repetition maximum(1RM). However in recent years blood flow restriction training (BFR), also known as occlusion training has been shown to produce similar improvements in both hypertrophy and strength when training at much lower intensities (20-50% 1RM). BFR cuffs are used to occlude venous blood flow from either the upper or lower extremities. The pooling of blood allows for patients or athletes to reach muscular fatigue with minimal loads. We will be comparing the strength benefits of BFR vs. non-BFR training to muscular fatigue.

## Methods

Before weight lifting protocols were assigned and implemented we tested each subject for their 1 repetition maximum. The protocols consisted of being randomly assigned to lifting to fatigue and lifting to fatigue with BFR both using the smith machine and squat exercise. Subjects were then asked to return to the lab twice per week for 3 weeks for training. Each visit to the lab was directly supervised by study investigators in order to ensure consistency and safety. The protocol for each group involved 3 sets of squats to muscular fatigue with a 90 second rest between sets at 50% of the subjects previously tested 1 RM.



## Average Repetitions Per Set

Set	Set 1	Set 2	Set 3	Average of 3 total sets
Reps	$35.2 \pm 6.6$	$13 \pm 3.6$	$9.4 \pm 3.5$	$57.6 \pm 9.9$

## Results/Discussion

Set 1 is significantly larger than sets 2 and 3 ( $p < 0.0001$ ). There was no significant difference between sets 2 and 3 ( $p = 0.55$ ). 1RM data was only recorded for 5 subjects (of 8). The change in 1RM from pre-post was  $17.0 \pm 5.7$  pounds. There is no significant difference in average total reps between the BFR and non-BFR group: BFR:  $57.9 \pm 11.4$  and non-BFR:  $57.0 \pm 8.0$  ( $p=0.593$ ). During the period of the study subjects experienced several minor discomforts. This included fainting, nausea, back pain, and leg pain. Is this new training method really worth it.

Not enough data was provided to show a significant difference between BFR and non-BFR groups. Similarly, we were not able to compare male to female due to lack of participants.



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