THE EFFECTS OF BLOOD FLOW RESTRICTION TRAINING ON MUSCULAR SIZE, STRENGTH AND ENDURANCE

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Introduction

Blood flow restriction training, has been utilized by individuals interested in inducing hypertrophic conditions without the use of heavy weight loads. This application has been used by young weight lifters to those with limited function due to genetic muscular dystrophies, or from other orthopedic conditions. The idea is to apply enough pressure around a limb to restrict venous return while still allowing arterial blood flow into the muscles being occluded. The metabolites built up would then cause an increase in anaerobic conditions producing lactic acid, fatiguing slow twitch fibers and utilizing fast twitch fibers. With the increased percentage of fast twitch fibers and forcing the muscles to work within periods of anaerobic conditions, an increase in fast fatigue resistant motor units would be expected to occur. The purpose of this study was to compare the effects of blood flow restriction versus standard exercise for hypertrophy, muscular size, strength, and endurance were expected to increase over a 6 week training period.

Methods (cont’d)

Each subject had initial anthropometric data collected along with resting blood pressure and heart rate. Subjects were then assessed to determine a 1 repetition max (1RM) and 10 repetition max (10RM) on their dominant and non-dominant arms during baseline week. For the next 4 weeks, participants were scheduled to meet 2 days/wk on non-consecutive days for training. The training consisted of 5 sets of 10 repetitions 40-50% of their 10RM for their dominant arm, and 5 sets of 10 repetitions of 75-85% of their 10RM for their non-dominant arm. The dominant arm was the arm being occluded at 1:1 times their resting diastolic blood pressure. A 60-second rest period was allowed, with heart rate being measured by using a Polar heart rate monitor every 30 seconds. During the second rest period was allowed, with heart rate being measured at the Polar heart rate monitor every 30 seconds. During the study by face to face contact. Each subject had initial anthropometric data collected along with resting blood pressure and heart rate. A total of 5 subjects including three males (Age: 23 ± 0.71yrs, Wt: 58.88 ± 2.87lbs) and two females (Age: 22.5 ± 0.85yrs, Wt: 63.85 ± 2.59lbs) were enrolled. Resting BP (mmHg) was 130.3 ± 4.64 (systolic) and 67 ± 5.8 (diastolic) for males, and 130.4 ± 6.36 (systolic) and 67.6 ± 4.5 (diastolic) for females. Resting heart rate was 95.8 ± 4.6 BPM for males and 89.5 ± 5.9 BPM for females. Non-occluded, dominant arm showed no significance (p = 0.18). Repetitions until failure with their initial 10RM to determine changes in muscle endurance. Statistical analysis was done using ANOVA with alpha level set at p ≤ 0.05.

Results (cont’d)

1RM of the non-occluded, non-dominant arm showed no significance (p = 0.18). Repetitions until failure of the subjects’ non-dominant 10RM showed significance (p = 0.01) from pre-training (10) to post-training (17.5 ± 4.12 reps). Lasts, changes in non-dominant arm circumpferences from pre-training (28.58 ± 5.5cm) to post-training (29.5 ± 5.8cm) barely escaped significance (p = 0.078). Exercise heart rate for the was 88.87 ± 15.76 bpm (occluded) and 102.52 ± 15.17 bpm (non-occluded) which demonstrated a strong significant difference (p = 0.00). Differences in pre-1RM (38.75 ± 15.48lbs) and post-1RM (41.25 ± 14.91lbs) of the occluded arm approached, but did not reach significance (p = 0.07). However, there was a significance in pre-10RM (10) to failure versus post-10RM (17 ± 5.48 reps) to failure of the occluded arm (p = 0.026). Arm circumference of the dominant arm also showed significance (p = 0.025) from pre- (28.05 ± 4.48cm) to post-training (29.3 ± 5.4cm) occlusion.

Conclusions

The results of this study indicate that blood flow restriction training can produce similar or even greater changes in muscular strength, endurance, and mass in healthy populations. Additional research directed to those with similar cases such as Duchenne muscular dystrophy should be further considered (Dowas et al, 2013).