

**A critical appraisal of “The Effects of a 7-week Practical Blood Flow
Restriction Program on Well-trained Collegiate Athletes”**

By

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**In partial fulfillment of the
requirements for the course:**

PT 7240 Evidence-Based Practice in Physical Therapy

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November 7, 2021

Abstract

Luebbers et al. researched the effectiveness of blood flow restriction (BFR) with respect to muscular strength and size development. This paper evaluates the effectiveness of the study and its associated presentation. Resistance training and BFR are both shown to help increase muscular strength and hypertrophy, but they occur by different means. Using keywords associated with resistance training and BFR articles on the databases of Pubmed and SPORTDiscus 14 articles were found and evaluated. The Effects of a 7-week Practical Blood Flow Restriction Program on Well-trained Collegiate Athletes was chosen as the article because the study compared the effects of BFR to non-BFR resistance training. The study allocated a football team into four random groups with different interventions to see the effect of supplemental BFR training compared to a traditional resistance training program alone. The article presented gave adequate background as a basis to the research project. The methods in the study tried to limit errors but constraints effected the group allocation negatively. The results were clearly stated and showed that BFR in addition to a resistance program could yield greater muscular strength and hypertrophy. Discussions made related the findings appropriately to the current knowledge of BFR. The findings from this study indicate ways BFR can be utilized to help more patients with muscular development. Using this research as a foundation there can be better implementation and further investigation into the effects of BFR.

Key words

Blood flow restriction, resistance training, muscular strength, muscle hypertrophy.

Introduction

Resistance training is commonly used to help improve muscle strength and resistance in a variety of populations. Standard resistance training can expose individuals to loads of 50-100% of their 1 repetition maximum [1RM] to achieve muscular improvement. These loads expose body tissues to high strain and compression which can be beneficial for anatomical adaptations, but it can also lead to increased wear and pain. Thus, it can be problematic for individuals recovering from injury or experiencing high levels of pain to participate in a normal resistance training program.

BFR is a modality that exposes muscular tissue to higher levels of recruitment and activation, at lower levels of resistance. BFR reduces the amount of oxidized blood that diffuses from the arteries to the target muscular tissue. BFR also prevents blood from returning to the veins from the muscles. This low oxygen availability is considered to be the mechanism as to why BFR has higher motor unit activation. This low availability is also why the affected muscles experience higher levels of activation and hypertrophy compared to lower resistance without BFR.

With the potential muscular improvements using BFR it begs the question, what impact can BFR training have in the rehabilitation process and strength training programs for college athletes?

Investigating the impact that BFR has supplementary to standard resistance training can help us understand its applications for training athletes. Using standard resistance training as a control, the muscular increases observed can be compared to that of a standard program enhanced with additional BFR training. The changes in muscle size and power can be evaluated to determine the validity of BFR training compared to the control. Thus, understanding the research performed by Luebbers et al. can help influence the application of BFR in areas outside of traditional physical therapy.

Methods

In my literature search for research utilizing BFR with college athletes I used the Pubmed and SPORTDiscus databases. I used the keywords of blood flow restriction, resistance training, college athlete(s), rehabilitation, strength training, and sport(s). With the small number of articles, I only used one limitation on my search. I chose to review English articles only, as I am unable to interpret other languages. I also only investigated articles that compared BFR to traditional resistance training. With these parameters I only had 14 articles that met the criteria. I reviewed these articles until I found one that piqued my interest.

I came to the decision to use the article [The Effects of a 7-Week Practical Blood Flow Restriction Program on Well-Trained Collegiate Athletes.](#) Published in the Journal of Strength and Conditioning Research in 2014. Authored by Luebbers, P. Fry, A. Kriley, L. and Butler, M. The study was conducted in Kansas at Emporia State University. I chose this study because it investigated the impact of BFR in addition to a standard resistance training program. It also appealed to me because they used a method to create BFR that could be easily implemented in many settings.

Results

Summary of the study

Luebbers et al. research consisted of evaluating the hypertrophic and strength effect of BFR. They split a football team into four random groups for their offseason workout program. The standard group had a normal workout program. The next group had a normal workout program while also having a supplemental program where they would lift additionally under the same conditions. The next group had a normal program with a supplemental program that used BFR with lighter weight. The last group had a modified workout program that used lighter weight and

BFR, but no supplemental program. They found that the group that had a normal program with the supplemental program that utilized BFR experienced a greater 1RM for squats and increased lower limb hypertrophy compared to other groups.

Appraisal of the study introduction

The introduction provides a comprehensive analysis of BFR and presents findings from prior BFR research. Each key word or focus of the paper was thoroughly covered in the introduction. It sets the stage for the rest of the paper; it is clear and concise in the way information is presented without the presence of unnecessary filler. The message from the literature review presented in the introduction, established comprehension of BFR and its comparison to traditional resistance training.

A weakness of the introduction is prevalent as a focus is KAATSU and the failure to discuss it later in the paper. It is also limited in the discussion of elastic knee wraps as it lists its sources but fails to discuss findings from those sources. The hypothesis that BFR used supplementally to a resistance program could have been better presented if the authors described why this could lead to enhanced muscle gains, previously in the introduction.

Appraisal of the study methods

The different groups showed the effect of BFR in conjunction to the resistance program and even presented a way where BFR is the primary program. This allowed them to identify the exact effect that BFR had on the subjects of the study. The programs used were standardized minimizing limitations due to the lack of differentiation in administration. The use of the same equipment and personnel helped to prevent errors in data collection.

The non-blinded nature of the study for both researchers and subjects could be a limitation in data interpretation. With the subjects in close contact throughout the study there is no doubt they

had opportunity to discuss the different programs they were in, which could alter the amount of effort given by them. A glaring issue highlighted in the methods is the group assignment. Due to coaches concerns with BFR training, the two strongest groups on the football team weren't allowed to be allocated to the group that had a modified program. Which can present an error in the data collected as the groups weren't able to be directly comparable in their potential for strength increase.

Appraisal of the study results

The results section is clear in its presentation of the data collected and statistical interpretation of the data. The use of the tests for the statistical analysis was appropriate for the data obtained, the conclusions of significance are correct according to the confidence level referenced. The data that was statistically significant was clearly indicated and any limitations for data interpretation were promptly addressed.

Although all the data and test conducted were discussed in the section the organization thereof was less than stellar. They presented information on the table and would address it in an order that didn't coincide, which made it difficult to follow along accurately. The initial portion of the section stated the tests but failed to state why each test was to be used, causing confusion of why additional tests needed to be ran on the same data.

Appraisal of the study discussion

The discussions often related the literature referenced in the introduction and the interpretation of the obtained results helping the reader to understand the significance of the findings. The provided conclusions were coherent, and limitations of the study were acknowledged. Ways were suggested where future research could be oriented to make further discoveries. Due to the

nature of the research Luebbers et al. were able to discuss future implications of BFR to make it more utilized and available.

They failed to discuss how the division of the participants and non-blinded nature could've impacted the results from the study. With respect to the failure to achieve significant results, ways could've been discussed to alter data collection to isolate the muscle groups they wanted to investigate. There was a lack of ways in which the data can be utilized for clinical application.

Discussion

This study can help coaches and medical teams develop programs to help athletes increase strength in alternate ways. The use of elastic wraps can impact the availability of BFR to different levels of athletes reducing the cost to employ BFR. The study also provides data for other researchers to investigate the effectiveness of BFR, as it applies to other athletes with different training programs. This study indicates that BFR training can help athletes to improve in muscular strength and size. BFR may be utilized in different ways to help athletes to reach their goals both in rehabilitation and strength training.

Utilizing BFR in the training process can help athletes develop strength in a way that isn't as likely to cause injury. Using the elastic wraps to create BFR could help patients in the clinic experience hypertrophic and strength increases in the intended musculature. Although if a patient or clinician is unfamiliar with the tension of the elastic wraps, they may do the wraps too tight or not tight enough negating the positive outcomes of BFR. In the clinic using BFR would be more beneficial than risky as it allows patients to experience greater muscle activation at lower loads. Decreasing the chance of injury because of the smaller forces acting over muscles and joints. Proper training and understanding of the elastic tension versus the BFR effects and being able to adjust them to each patient would increase its implementation success.

Using BFR effectively depends on the amount of blood flowing to and from the intended muscle group. In order to apply BFR appropriately it must be placed closer to the heart than the targeted muscle group. The evidence shows that the restriction of blood allows the muscle to experience higher levels of activation and fatigue at lower levels of resistance. Based on the current evidence I would have the confidence to use this modality in the clinic. Given the time to receive proper training and evaluating what works the best for each patient I am confident BFR could be applied safely and effectively on patients.

From the research conducted by Luebbers et al. BFR can be considered a valid modality to help increase muscular hypertrophy and strength. In the proper conditions BFR in conjunction with traditional methods can produce significant increases in strength and hypertrophy compared to the traditional method alone. This information can be vital for helping college athletes obtain the best programs and witness the greatest results in their training.