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Modulatory Effects of Blood Flow Restriction Training and Resistance Training on Perceived Exertion and Psychosomatic Wellness in Male Athletes with Hip and Groin Pain

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Abstract

Aim: The aim of the present study was to observe modulatory effects of blood flow restriction training (BFRT) and resistance training (RT) on perceived exertion and psychosomatic wellness in male athletes with hip and groin pain. **Materials and Methods**: Thirsty two male athletes of different sports with diagnosed hip and groin pain were randomly assigned into two groups: BFR training (n= 16) and RT (n= 16). Both the groups performed the respective interventions for 4-weeks. Key outcomes comprised of perceived exertion through Borg CR10 scale and psychosomatic wellness form Subjective Wellbeing Questionnaire. Pre and post intervention scores were assessed with the help of paired and independent t-test. **Results**: Both groups showed statistically significant enhancements in perceived exertion and psychosomatic wellness ($p< 0.001$). However, the BFR group indicated greater reduction in perceived exertion ($\Delta= -2.18$) and a more noticeable improvement in wellness score ($\Delta= +3.68$) compared to RT group ($p< .001$). **Conclusion:** BFR training is an effective and well- abided exercise protocol for better recovery perception and wellness signs in athletes suffering from hip and groin pain. In comparison to traditional RT, BFRT results is more beneficial in decreasing subjective fatigue and improving overall wellness, making it a valuable adjunct to rehabilitation program in this population.

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Key words: Blood Flow Restriction, Perceived Exertion, Subjective Wellbeing, Hip and Groin Pain, Resistance Training

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Introduction

In the field of sports, it is very difficult to manage sports injuries and rehabilitation without the loss of training capacity of the player. Hip and Groin pain is a common problem in sports specifically in those which require rapid change of direction, sudden acceleration or deceleration and kicking

activities (Weir et al., 2015). These injuries can result in functional impairments in the long run and can affect the performance of the player. Compeer methods such as Blood Flow Restriction Training offer an innovative strategy to provide good rehabilitation of the player without the inclusion of any heavy training or heavy exercise, it offers the injured athlete to do training with low loads but giving the same effects as a high load training would give (Hughes et al., 2017). BFR training involves the application of outside compression to nearby areas of the extremities during the mild training. This technique reduces the blood supply and occludes blood outflow, which leads to energy strain and tissue adjustment similar to vigorous strength training (Loenneke et al., 2012). BFRT is especially advantageous to the individuals that cannot do exercise with the heavy loads which includes athletes with articular discomfort, connective tissue strain, recent surgery an elderly individual. Its use in pelvic girdle issues or inguinal discomfort is still not thoroughly studied yet it has a potential to offer risk free and secure conditioning without worsening discomfort (Counts et al., 2016). In addition to somatic changes, perceived exertion is a critical measure in monitoring work capacity and rest response. The Rate of Perceived Exertion (RPE) scale is widely used to assess an individual's personal perception of training demand and has been linked to systemic strain effects (Gearhart et al., 2002). Treatments that adjust effort perception may contribute to better exercise adherence and reduce cognitive exhaustion. Given that BFR can cause strong cellular stress, induce major energy depletion at low loads, its impact on RPE requires careful analysis particularly in injured groups. Subjective Wellbeing encompasses both mental and physical balance; it is another dimension of athletic enhancement. Athletes often experience accumulated pressure due to discomfort, stress of achievement and training demands, affecting mental condition, recovery and adaptability (Pseudo & Andrade 2005). As blood flow restriction training (BFRT) can modulate hormonal output such as feel good chemical flow and mental exhaustion signal (Wilson et al., 2013), it has a potential to improve not only muscle strength but also it can help to improve holistic wellbeing of the individual. Therefore, this study aim to observe modulatory effects of BFR training on perceived exertion and subjective wellbeing of the athletes with Hip and Groin Pain.

Materials & Methods

It is a randomized control trial design to observe the influence of blood flow restriction (BFR) training and resistance training (RT) on perceived exertion and psychosomatic wellness in male athletes experiencing hip and groin pain. The protocol comprised of 4-week training period, during this time participants were allocated into either a BFR training group or control resistance-training group. Thirty-two male athletes (n=32) of different sports with (16 in each Group) aged ranged between 18 to 24 years, with hip and groin pain as investigated by HAGOS (Hip and Groin Outcome Score), were enrolled from university sports teams. Participants were randomly assigned to one of the following two groups.

Group A: BFR Training + Conventional Rehabilitation

Group B: Resistance training + Conventional Rehabilitation

Inclusion criteria was comprised of male players with active participation, mild to moderate hip and groin pain and no history of surgery. Exclusion criteria involved cardiovascular conditions, any recent fracture or non-cooperative athlete.

Training Protocol

BFR Training: Participants performed lower limb exercises three times a week with 30-40% 1RM. BFR cuffs were placed on the lower one third of the proximal part of thigh with perceived tightness of 7.

Resistance Training: Participants performed same exercises at 60-70% 1 RM without BFR.

Each session included lower extremity exercises such as squats, hamstrings curl and leg extension exercise.

Outcome Measures

1. Perceived Exertion – Measured using the Borg CR 10 scale (Borg, 1998)
2. Psychosomatic Wellness – measures using Subjective Wellbeing Questionnaire including- Fatigue, Sleep Quality, Muscle Soreness, Mood and Stress (Hooper & Mackinnon, 1995)

Results

An aggregate of thirty-two (n=32) male athlete suffering from hip and groin pain were included in the study. The participants were divided into two groups Group A- Blood Flow Restriction Training (BFRT) and Group B- Resistance Training. Each group was comprised of sixteen (n=16) participants. Pre and Post protocol examination was carried out to evaluate the changes in perceived exertion and subjective wellbeing of the male athletes.

Table 1. Comparison of Perceived Exertion and Well-being Measures (BFR vs RT)

Variable	BFR Pre (Mean±SD)	BFR Post (Mean±SD)	RT Pre (Mean±SD)	RT Post (Mean±SD)	Within BFR *p*	Within RT *p*	Between Groups *p*
Borg CR10	6.19 ± 0.47	4.01 ± 0.48	5.93 ± 0.43	4.98 ± 0.46	< .001	< .001	< .001
Well-being	13.72±1.9	17.40 ± 1.78	13.20 ± 1.21	14.79 ± 1.35	< .001	< .001	< .001

Perceived Exertion

A significant decrease in perceived exertion was observed in both groups post-exercise. The BFR group exhibited mean reduction from 6.19 ± 0.47 to 4.01 ±0.48 ($p < .001$), while RT group reduced from 5.93 ± 0.43 to 4.98 ± 0.46 ($p < .001$). Between group analysis, it was found that the BFR group accomplished a statistical significantly higher decrease in perceived exertion in contrast to RT group ($p< .001$).

Subjective Wellbeing

The subjective wellbeing scores got better significantly in both the groups. The BFR group improved from 13.72 ± 1.69 to 17.40 ± 1.78 ($p < .001$), while RT group improved from13.20 ± 1.21 to 14.79 ± 1.35 ($p < .001$). The between group comparison showed that athletes in BFR group demonstrated statistical significantly higher enhancement in subjective wellbeing than those in RT group ($p < 0.001$).

Overall, the results of the present study specify that while both protocols contributed to enhancement in perceived exertion and subjective wellbeing, the BFR training protocol generated significantly superior outcomes in all measured domains.

Discussion

The aim of the present study was to observe the modulatory effects of Blood Flow Restriction Training (BFRT) in comparison with traditional Resistance Training (RT) on perceived exertion and psychosomatic wellness in male athletes with hip and groin pain. The results of the present study showed that both the training programmes have positive results in making the perceived exertion and wellness better in the male athlete. However, the results of the BFRT was proven better intervention than RT in both the criteria. In recent years BFRT has evolved and gained much attention because in BFRT athlete doesn't have to lift heavy weights to gain power and strength and specifically the players suffering from injury or those who have gone through surgeries can continue with their training with BFRT due to use of less loads, but the benefit that we get from BFRT is similar as the tradition training (Scott et al., 2012). It was also reported in the previous studies that BFRT could result in lower subjective fatigue during and after exercise (Loenneke et al., 2012). This would be beneficial for athletes with groin pain or inguinal discomfort. Moreover,

the better wellbeing results, as demonstrated by the improved scores of the subjective wellbeing questionnaire, line up with the concept that small load, metabolic demanding training shams positive hormonal and neurological reactions (Pearson & Hussain, 2015). These results of the present study shows that better mood, sleep quality and decreased stress, which are critical components of complete athletic recovery. It is noteworthy that higher improvements in the psychosomatic scores can be due to novelty and better safety of the protocol. The athletes may have experienced a placebo effect, that they have performed the whole intervention, which was not much demanding and was comparatively easier to perform (Hughes et al., 2017). This proposes a need to further explore psychological mechanisms testing BFRT mechanism.

Conclusion: In conclusion, the results of the present study showed that BFRT is an efficacious mechanism to improve perceived recovery and psychosomatic wellbeing in male athletes with hip and groin pain. It is an encouraging alternative, especially in individuals who are not able to perform exercise with the heavy loads. Future studies should analyze the permanence of these improvements and assess the neuropsychological factors contributing to better subjective wellbeing.

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Conflict of Interest: None declared