Important methodological concern regarding the article "effect of leg half-squat training with blood flow restriction under different external loads on strength and vertical jumping performance in well-trained volleyball players": a letter to the editor

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We would like to commend Wang et al. (2022) on their investigation into the 8-week chronic training effects of blood flow restriction (BFR) on trained volleyball players. Novel to the field was the comparison between low-load BFR (30% 1-repetition maximum, RM) and heavy loads (70% 1-RM) (HL) with- and without BFR applied at an estimated 50% arterial occlusion pressure (AOP). BFR was prescribed in a commonly recommended fixed scheme (30 repetitions followed by 3 sets of 15)[1] while HL strength training was performed for 4 sets of 8 repetitions. Results indicate that HL strength training with BFR performed better in thigh muscle strength and jumping performance than low-load BFR exercise and in some measures, exhibited non-significant improvements over HL strength training. The results are surprising given previous research has indicated no additional benefit with the addition of BFR to HL on muscle strength measures[2] although one study did show improvements of performance in rugby athletes[3]. Nonetheless, the results of this study provide preliminary support for the use of BFR during HL strength training to elicit significant gains in strength and jumping performance – factors thought to be important in improving volleyball performance.

However, we want to highlight a significant methodological limitation that impacts the interpretation of the study. While we agree that utilizing a limb circumference equation is an appropriate surrogate for determining AOP, the devices used in that study are single-chambered bladder systems (5-cm elastic and 13.5-cm wide nylon cuffs) capable of achieving full arterial occlusion[4]. However, Wang et al. (2022) implemented B-Strong™, a multi-chambered bladder system [5]. These devices are designed to reduce the potential for full arterial occlusion[6] and are not an appropriate device for integrating the AOP equation. Citherlet et al. (2022) showed that femoral blood flow was unaltered from resting conditions at pressures as high as 300 mm Hg, a pressure that is almost double to that used in the current study (180 mm Hg). This is important as there appears to be a minimum amount of applied pressure (~50% AOP) needed to induce fatigue accumulation during BFR exercise[7]. The pressures used in this study likely did not alter resting blood flow to induce any effect related to the BFR stimulus and therefore the results should be viewed with caution. Our opinion is that the results align closer with supporting the benefits of limb compression on athletic performance rather than BFR *per se*. As prior research has shown that limb compression enhances maximal strength to a greater degree than when performed without[8], it is plausible to hypothesize that the bilateral stimulus applied to the legs during exercise enhanced some form of stretch reflex in the working muscles beyond that of HL strength training alone. Unfortunately, as muscle activation and velocity were not measured, it leaves many questions unanswered. As BFR continues to gain more popularity, it is important to understand device features and characteristics that may impact the BFR stimulus. We hope that highlighting this important methodological concern shapes future research endeavors on the topic.

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