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LETTER TO THE EDITOR

Letter to the Editor about the article ''The addition of blood flow restriction to resistance exercise in individuals with knee pain: a systematic review and meta-analysis''

We recently read with great interest the systematic review and meta-analysis by Cuyul-Vásquez et al.[1] on the effects of blood flow restriction (BFR) exercise in individuals with knee pain and would like to congratulate them for their impressive work. The authors report there is low quality evidence regarding the addition of BFR to resistance exercise to reduce pain and improve knee function when compared to resistance exercise with free blood flow. We agree with them that current evidence on this topic is of low quality; however, we would like to contribute to the discussion on the possible benefits of combining BFR and exercise for the treatment of knee pain.

A concern with the conclusions reached in the review by Cuyul-Vásquez et al.[1] is that the meta-analysis combined studies comparing BFR exercise (30% one-repetition maximum [1-RM]) with both high (70% 1-RM)[2,3] and low (30% 1-RM)[4–6] intensity exercises without BFR. Considering that previous meta-analyses[7,8] have reported different results when low intensity BFR exercise is compared to high or low intensity exercise with free blood flow, it is reasonable to consider that grouping the two exercise intensities in the meta-analyses may have affected the results reported by Cuyul-Vásquez et al.[1] For instance, Centner et al.[7] showed that BFR exercise was superior to low intensity exercise without BFR to improve muscular strength in the elderly, while BFR was not superior to the effects of high intensity exercise without BFR. Similarly, Hughes et al.[8] showed that, in patients with musculoskeletal conditions, BFR exercise was able to induce greater gains in muscular strength when compared to low intensity exercise with free blood flow, but not when compared to high intensity exercise without BFR.

Although Centner et al.[7] and Hughes et al.[8] evaluated a different outcome (muscle strength) than Cuyul-Vásquez et al.[1] (knee pain and function), taken together the findings of these previous systematic reviews[7,8] suggest that low intensity BFR exercise does not generate superior effects when compared to high intensity exercise. Conversely, in those individuals who are unable to perform high load exercise due to joint pain, the addition of BFR can be suitable to potentiate the low intensity exercise effects. Consistent with this notion, Giles et al.[2] showed that patients with higher levels of patellofemoral pain were those who most benefited from low intensity BFR exercise.

We recognize that the review by Cuyul-Vásquez et al.[1] has many merits in summarizing the literature and pointing out the low quality of evidence on BFR exercise for the treatment of knee pain. However, based on the above information, it seems reasonable to consider that a stratified analysis (i.e. low intensity BFR *versus* low intensity exercise with free blood flow; low intensity BFR *versus* high intensity exercise with free blood flow) would have made the results of Cuyul-Vásquez et al.[1] more accurate and consistent with the current literature. Moreover, we have recently suggested[9] that in addition to the load, the total exercise volume (load x repetitions x sets), should be considered in BFR exercise prescription. Because in many studies[2,3,10] the total exercise volume of BFR training is similar or greater than the comparison intervention, it seems paramount that future clinical trials and systematic reviews consider both the load (intensity) as well as the total volume delivered in their study design and analyses.

Conflicts of interest

The authors declare no conflicts of interest.

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Reply to letter to the Editor about the article ''The addition of blood flow restriction to resistance exercise in individuals with knee pain: a systematic review and meta-analysis''

Dear Editor

We appreciate the comments on our article ''The addition of blood flow restriction to resistance exercise in individuals with knee pain: a systematic review and meta-analysis'' (Cuyul-Vásquez et al.[1]). We would like to take the opportunity to address several points raised in these comments.

First, it is important to consider that performing subgroup analyses for meta-analysis with less than 10 studies and with high heterogeneity among the included studies, is not recommended.[2,3] In our meta-analysis for pain intensity, the small number of included clinical trials (n = 5), the considerable heterogeneity (i^2 = 76%) of these trials, and the lack of plausible interaction, justify our decision not to report a subgroup analysis. We understand how the contrast between the results of previous investigations and the findings of our study could be questioned. For this reason, in response to your letter, we performed a subgroup analysis for pain intensity, independently combining studies that used high intensity versus low intensity resistance exercises in the control group.

The comparison between low intensity resistance exercise (30%-1RM) combined with blood flow restriction (BFR) versus high intensity resistance exercise (70% -1RM),[4–6] showed no benefits of BFR for pain relief (pooled SMD = -0.08, 95% CI = -0.41, 0.26, p = 0.66, I^2: 0%). For the comparison between low intensity resistance exercise (30%-1RM) with or without BFR,[4,7,8] the pooled SMD also showed no added effectiveness of BFR on pain relief (SMD= -0.51, 95% CI = -1.57, 0.55, p = 0.34, I^2: 87%). Therefore, both comparisons are not statistically and clinically significant.[9] While this subgroup analysis is affected by the limitations described in the first point of this letter, these findings support the conclusions of our systematic review with meta-analysis, that adding BFR to resistance exercise does not provide additional benefits to decrease knee pain.[1]

Conflicts of interest

The authors declare no conflicts of interest.

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