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Aging-Related Changes in Calf Muscle Function: Implications for Venous Hemodynamic and the Role of External Mechanical Activation

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Abstract : Context: Resistance training with blood flow restriction (BFR) has increased in clinical rehabilitation due to the substantial benefits observed in augmenting muscle mass and strength using low loads. However, there is a great variability of training pressures for clinical populations as well as methods to estimate it. The aim of this study was to estimate the percentage of maximal BFR that could result by applying different methodologies based on arbitrary or individual occlusion levels using a cuff width between 9 and 13 cm. Design: A secondary analysis was performed on the combined databases of 2 previous larger studies using BFR training. Methods: To estimate these percentages, the occlusion values needed to reach complete BFR (100% limb occlusion pressure [LOP]) were estimated by Doppler ultrasound. Seventy-five participants (age 24.32 [4.86] y; weight: 78.51 [14.74] kg; height: 1.77 [0.09] m) were enrolled in the laboratory study for measuring LOP in the thigh, arm, or calf. Results: When arbitrary values of restriction are applied, a supra-occlusive LOP between 120% and 190% LOP may result. Furthermore, the application of 130% resting brachial systolic blood pressure creates a similar occlusive stimulus as 100% LOP. Conclusions: Methods using 100 mm Hg and the resting brachial systolic blood pressure could represent the safest application prescriptions as they resulted in applied pressures between 60% and 80% LOP. One hundred thirty percent of the resting brachial systolic blood pressure could be used to indirectly estimate 100% LOP at cuff widths between 9 and 13 cm. Finally, methodologies that use standard values of 200 and, 300 mm Hg far exceed LOP and may carry additional risk during BFR exercise.

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