

Blood Flow Restriction Training in Post-Operative Orthopedic Rehabilitation: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

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Abstract:

Blood flow restriction training (BFRT) is increasingly used after orthopedic surgery. Previous systematic reviews have examined the effects of BFRT, but most have focused solely on strength and growth. This systematic review and meta-analysis aimed to evaluate the effectiveness of BFRT compared to traditional rehabilitation for improving muscle strength, size, pain, and balance in patients recovering from orthopedic surgery. A thorough search of PubMed, Web of Science, Embase, Cochrane Central, and Google Scholar yielded 11 randomized controlled trials (RCTs) involving 293 participants, and risk of bias (ROB) was assessed using the RoB 2 tool. Out of the 11 studies, nine reported on muscle strength, six on muscle size, six on pain, and three on balance. Seven out of nine studies showed improvements in muscle strength, and four out of six indicated increases in muscle size with BFRT. The combined estimates revealed significant benefits for strength (standardized mean difference [SMD] = 0.90; 95% confidence interval [CI]: 0.44, 1.35; I squared statistic [I²] = 77%) and muscle size (SMD = 0.74; 95% CI: 0.34, 1.14; I² = 46%). Pain (SMD = 0.33; 95% CI: -1.16–1.82; I² = 94%) and balance (SMD = -0.07; 95% CI: -0.77–0.63; I² = 71%) were not significantly different. BFRT was generally safe and demonstrated superiority over standard rehabilitation for improving muscle strength and size. For pain and balance