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Effects of blood flow restriction training on muscle function and balance in chronic ankle instability : a systematic review

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 26 September 2024 and was last updated on 26 September 2024.

INTRODUCTION

Review question / Objective The purpose of this study was to investigate the intervention effect of blood flow restriction training on muscle function and balance ability in patients with chronic ankle instability. The study population was patients with chronic ankle instability. The intervention method was to impose blood flow restriction on the lower limbs of the patients during routine rehabilitation training. The differences in muscle strength, muscle cross-sectional area, muscle activation and balance ability between the blood flow restriction group and the routine rehabilitation training group after intervention were mainly compared.

Condition being studied The condition being studied in this systematic review is chronic ankle instability (CAI), a common musculoskeletal disorder characterized by recurrent ankle sprains, persistent joint instability, and deficits in muscle function and balance. CAI often leads to impaired physical performance and an increased risk of re-injury. This review aims to evaluate the effects of blood flow restriction training (BFRT) on muscle function and balance in individuals with CAI, with the goal of assessing BFR as a potential rehabilitation strategy to improve joint stability, enhance muscle strength, and reduce the likelihood of future injuries.

METHODS

Participant or population This systematic review was conducted in patients with chronic ankle instability (CAI), which includes mechanical ankle instability (MAI) and functional ankle instability (FAI). Mechanical instability refers to structural damage or laxity of the ankle joint, while functional instability involves deficits in neuromuscular control or coordination. This study will include

individuals diagnosed with MAI or FAI with the goal of evaluating the effects of blood flow restriction training on muscle function and balance in this population.

Intervention During routine rehabilitation training for patients with chronic ankle instability, cuffs that restrict blood flow are used to pressurize their thighs.

Comparator The control group was treated with routine rehabilitation without restricting blood flow in patients with chronic ankle instability. The experimental group was treated with blood flow-restricted cuffs to pressurize the thighs of patients during routine rehabilitation training for patients with chronic ankle instability. The main comparisons were the effects on muscle strength, muscle activation, muscle cross-sectional area, and balance in chronic ankle instability after the intervention.

Study designs to be included Randomized controlled trial.

Eligibility criteria Inclusion criteria: (1) the study subjects were patients with chronic ankle instability; (2) the intervention was conventional rehabilitation training in the control group and BFRT in the experimental group; (3) the study design was a randomized controlled trial; (4) the language was Chinese or English.
Exclusion criteria: ① surgical treatment and all kinds of non-exercise treatment related interventions; ② review articles; ③ animal experiments; ④ master's and doctoral dissertations, conference papers, and other non-empirical research literature; ⑤ the full text of the study could not be obtained or the effective information could not be extracted.

Information sources The following databases were used: Web of Science, PubMed, China National Knowledge Infrastructure (CNKI), EBSCOhost.

Main outcome(s) At least one outcome metric in the study that included muscle strength, muscle activation, muscle cross-sectional area, and balance.

Quality assessment / Risk of bias analysis The Physiotherapy Evidence Database (PEDro) scale was used to assess the quality of the studies.

Strategy of data synthesis According to the research purpose and inclusion and exclusion criteria, two researchers independently screened the literature. The extracted data included : 1 the first author, the time of publication, the country of publication, the sample size, the information of the research object, the place of intervention ; 2 Experimental design, intervention measures (intervention method, intensity, frequency, cycle), BFRT parameters (instrument type, blood flow restriction degree) and outcome indicators. If the two researchers have differences in methodological quality evaluation, the final score is determined through group discussion.

Subgroup analysis Subgroup analysis of muscle strength, muscle cross-sectional area, muscle activation, and balance based on the effectiveness of interventions on muscle function and balance in patients with chronic ankle instability.

Sensitivity analysis Due to the nature of this systematic review and the available data, a sensitivity analysis will not be performed. The review aims to include high-quality studies that meet pre-defined inclusion criteria, and any variation in results will be discussed in terms of study quality, heterogeneity, and potential biases.

Country(ies) involved China.

Keywords chronic ankle instability, blood flow restriction training, muscle function, balance, systematic review.

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