INPLASY PROTOCOL

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Support: No support

Review Stage at time of this submission: Piloting of the study selection process.

Conflicts of interest:
I hereby declare that there are no conflicts of interest and no one or organization.

Effects of blood flow restriction training on muscle strength and pain in patients with knee injuries: a meta-analysis

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Review question / Objective: The main purpose of this review was to assess the efficacy of blood flow restriction training in improving muscle strength and reducing pain among knee injuries patients. Also, we aim to compare the effectiveness of blood flow restriction training with other resistance training without blood flow restriction. Based on the results, we will propose a safe and effective implementation of BFR training in musculoskeletal rehabilitation.
Condition being studied: Exercise rehabilitation of knee pain.
Information sources: Three electronic databases (Web of Science, PubMed and EBSCO) will be searched. Contact the author via email if necessary. Does not include trial registers, or grey literature.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 05 June 2020 and was last updated on 05 June 2020 (registration number INPLASY202060021).

INTRODUCTION

Review question / Objective: The main purpose of this review was to assess the efficacy of blood flow restriction training in improving muscle strength and reducing pain among knee injuries patients. Also, we aim to compare the effectiveness of blood flow restriction training with other resistance training without blood flow restriction. Based on the results, we will propose a safe and effective

implementation of BFR training in musculoskeletal rehabilitation.

Condition being studied: Exercise rehabilitation of knee pain.

METHODS

Search strategy: Three electronic databases (Web of Science, PubMed and EBSCO) were searched from January 2000 to January 2020 with the last retrieval date is January 23, 2020. The terms used were "KAATSU", "blood flow restriction training", "BFRT" and "Occlusion training". Appendix A describes the search strategy for each database and the results. Two investigators independently screened titles and abstracts from databases. Further information of the papers were obtained such as the name of the first author, the year of publication, study population, sample size, experimental design, duration of intervention and study outcomes. For unclear information, the corresponding author was contacted through e-mail. #1: "KAATSU" or "Blood flow" or "BFR" or "Occlusion" #2: "Osteoarthritis" or "arthritis" or "KOA" or "OA" or "Knee" #3: "exercise" or "train" or "training" #4: #1 and #2 and #3.

Participant or population: Interventional studies that involved with blood flow restriction training in knee injuries patients were included. The intervention must occur for at least 2 days. The studies that fit these criteria also had to report data on at least 1 variable of muscle strength and/or pain score.

Intervention: Low-load resistance training with blood flow restriction.

Comparator: High-load resistance training; low-load resistance training group.

Study designs to be included: Only randomized controlled trials written in English were included, whereas abstracts or presentation were excluded.

Eligibility criteria: Patients with knee pain. And all studies are subject to ethical review.

Information sources: Three electronic databases (Web of Science, PubMed and EBSCO) will be searched. Contact the author via email if necessary. Does not include trial registers, or grey literature.

Main outcome(s): Pain score(The current pain level is assessed by questionnaire); Maximal muscle strength (The maximum muscle strength of the extensor muscles of the lower limbs is obtained through the muscle strength test).

Quality assessment / Risk of bias analysis: The methodological quality of the included studies will be evaluated based on Cochrane risk bias assessment tool which assesse random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting and other bias. Items will be scored as "yes", "no" or "unclear".

Strategy of data synthesis: Review Manager (Version 5.3.5 (Java 6 64 bit), Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration, 2014) wil be used for the meta-analysis by entering all relevant outcome variables. The outcomes of the included literatures are continuous outcome variables, and the test units and methods were somewhat different. Therefore, standardized mean difference (SMD) will be selected as the index of effect scale. The I^2 statistic will be used to test for heterogeneity between studies. If $I^2 < 50\%$, it means there is no heterogeneity between studies hence a fixed effect model is used for analysis. On the other hand, if $I^2 > 50\%$, it means that there is heterogeneity between studies thus a random effect model is used for analysis. Study biases are checked with funnel plot while SMD was determined by a Forest plot.

Subgroup analysis: Subgroup analysis will be used to find and determine the

heterogeneity. If there is no heterogeneity, no subgroups.

Sensibility analysis: Sensitivity analysis will be conducted by alteration of the analysis model, selection of effect size, and exclusion of individual articles.

Language: English.

Other relevant information: Someone recently conducted a similar meta-analysis, but the included studies did not include the latest studies, and the main indicators of the study are pain and function, which are different from this study. Cuyul-Vásquez I, Leiva-Sepúlveda A, Catalán-Medalla O, et al. The addition of blood flow restriction to resistance exercise in individuals with knee pain: A systematic review and meta-analysis[J]. Brazilian Journal of Physical Therapy, 2020.

Keywords: Blood flow restriction; pain; rehabilitation.

Contributions of each author:
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