INPLASY PROTOCOL

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Evaluation of Integrated Neuromuscular Training on the Recovery of Joint Injury: A Meta-Analysis and Systematic Review

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Review question / Objective: **This study will provide new evidence for the effect of integrated neuromuscular training on the recovery of joint injury.**
Information sources: **The search databases include the general library of online publishing of academic journals of China Knowledge Network (CNKI) and the full-text database of excellent doctoral theses of China Knowledge Network (CNKI). At the same time, the supplementary search is carried out through literature backtracking, Google Scholar.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 31 December 2021 and was last updated on 31 December 2021 (registration number INPLASY2021120136).

INTRODUCTION

Review question / Objective: **This study will provide new evidence for the effect of integrated neuromuscular training on the recovery of joint injury.**

Rationale: **Integrated neuromuscular training (INT) is a comprehensive and holistic training method. It combines general functional movement training with specialized strength, balance, speed, sensitivity, coordination, enhanced training or rapid telescopic compound training. From the existing research results, the mechanism of integrated neuromuscular training mainly lies in improving the proprioception of the human body And**

cognitive level to achieve the impact on the motor sensory system, so as to effectively prevent joint injury and promote the recovery after joint injury.

Condition being studied: Integrated Neuromuscular Training on the Recovery of Joint Injury. This article is assisted by the third and fourth authors to search the relevant literature. The search strategy is divided into two parts: English literature and Chinese literature. (1) English literature search: the keywords "integrated neurological training", "joint investigation" and "restoration" are jointly searched with "meta analysis" and "system evaluation" respectively. The search databases include PsycINFO, science direct, PubMed, Eric and Willey. (2) Chinese literature search: the key words "integrated neuromuscular training", "joint injury" and "recovery" are jointly searched with "meta analysis" and "system evaluation" respectively. The search databases include the general library of online publishing of academic journals of China Knowledge Network (CNKI) and the full-text database of excellent doctoral theses of China Knowledge Network (CNKI). At the same time, the supplementary search is carried out through literature backtracking, Google Scholar.

METHODS

Search strategy: The references of the retrieved literature are traced to supplement the relevant literature. The retrieval adopts the combination of subject words and free words. The Keywords are "integrated neuromuscular training", "joint injury" and "recovery" et al; Taking CNKI search library as an example. The specific search strategy of this study is shown in Box 1. The same strategies are used in other electronic databases. Box1 CNKI searching #1 Integrated neuromuscular training #2 Joint injury #3 Knee joint injury #4 Hip joint injury #5 Ankle joint injury #6 Shoulder joint injury #7 Elbow joint injury #8 Wrist joints injury #9 Thoracic vertebra injury #10 Lumbar vertebra injury #11 Cervical vertebra injury.

Participant or population: Patients with joint injury.

Intervention: The experimental group received medical treatments and INT intervention scheme after medical treatments. The control group only received the medical treatments.We will study the effect of integrated neuromuscular training on joint injury. The study will be selected according to the following criteria:(1) study type: Randomized controlled trial.

Comparator: Test the range of motion of the patient's joints.

Study designs to be included: We will study the effect of integrated neuromuscular training on joint injury. The study will be selected according to the following criteria: (1) study type: Randomized controlled trial.The experimental group received medical treatments and INT intervention scheme after medical treatments. The control group only received the medical treatments.

Eligibility criteria: Review and comment research or non Chinese and English literature; In the study, only the experimental group, no control group or the control group is the literature of blank control; Literature published in the form of abstracts, research that cannot obtain the full text, or literature with incomplete research data and unsuccessful contact with the author.

Information sources: The search databases include the general library of online publishing of academic journals of China Knowledge Network (CNKI) and the full-text database of excellent doctoral theses of China Knowledge Network (CNKI). At the same time, the supplementary search is carried out through literature backtracking, Google Scholar.

Main outcome(s): Study designs We will study the effect of integrated neuromuscular training on joint injury. The study will be selected according to the following criteria: Participants: The people

who were confirmed to have Joint injury. 2.2.3 Intervention measures: The experimental group received medical treatments and INT intervention scheme after medical treatments. The control group only received the medical treatments. 2.2.4 Outcome measures: Primary outcomes: Test the range of motion of the patient's joints. Secondary outcomes: Test the patient's sensitivity, physical stability, speed and strength of muscle completion. 2.2.5 Exclusion criteria: Review and comment research or non Chinese and English literature; In the study, only the experimental group, no control group or the control group is the literature of blank control; Literature published in the form of abstracts, research that cannot obtain the full text, or literature with incomplete research data and unsuccessful contact with the author.

Quality assessment / Risk of bias analysis: Publication bias means that the research results with statistical significance are easier to publish, while the research results without statistical significance are often rejected, which makes it difficult to collect the literature without statistical significance in the meta-analysis process, resulting in systematic errors between the included research and the actual research, and then affect the meta-analysis results. In order to ensure the quality and effectiveness of the included literature, the bias risk of the included literature was comprehensively evaluated according to the evaluation tool for the bias risk of randomized controlled trials in the Cochrane system evaluator manual. The study used Review Manager 5.3 software to evaluate the methodological quality of the sources of bias (Selective bias, implementation bias, measurement bias, loss of follow-up bias and other bias) included in the literature. The horizontal axis of funnel chart is the standardized mean difference (Effect quantity), and the vertical axis is its standard error. If the effect quantity of funnel diagram is evenly and symmetrically distributed on the left and right, it indicates that meta-analysis has no publication bias, on the contrary, it has publication bias. Rosenthal's loss of safety factor (Nfs), egger linear regression test and shear compensation method were further used to test publication bias. First, if NFS is less than the critical value 5K + 10 (K refers to the number of independent effects included in the meta-analysis), it indicates that there may be publication deviation. (Table 2)

Strategy of data synthesis: This study mainly introduces how to systematically analyze the prevention and recovery of joint injury from INT in the aspects of literature download process, screening and inclusion criteria, data collection and analysis, heterogeneity analysis, sensitivity analysis and subgroup analysis. Previous studies focused more on the recovery of ACL, while this study will discuss the recovery effect of joints with high probability of human injury, which is not limited to the recovery effect of ACL, However, the article has some limitations, such as no analysis of non-English literature, and the sample size of literature screening needs to be further expanded. Dealing with missing data. In order to ensure the integrity and accuracy of the article data, when the data is lost, we will contact the corresponding author to obtain complete data. If complete data cannot be obtained through this method, we will delete incomplete data for the sake of data integrity and accuracy.

Subgroup analysis: The random effect model was used for subgroup analysis to investigate the role of three regulatory variables: treatment mode, treatment time and disease cycle in the recovery effect of integrated neuromuscular training on joint injury.

Sensitivity analysis: Sensitivity analysis was used to analyze the research quality, intervention methods, publication types, etc. If the heterogeneity is large, the method of eliminating the literature one by one should be used for sensitivity analysis.

Country(ies) involved: China.

Keywords: Integrated neuromuscular training; Joint injury; Restoration; Meta analysis; System evaluation.

Conflicts of interest: This systematic review is funded by the Youth Foundation for Humanities and Social Sciences Research of the Ministry of Education(Funding reference number is 21XJC890001) supported by the foundation.

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