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The Influence of Cognitive Motor Training on Functional Outcomes in Individuals with Chronic Ankle Sprain: A Systematic Review Protocol

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ABSTRACT

Background: A very common ailment that inhibits both functionality and balance is Chronic Ankle Sprain (CAS). One potential way to treat such condition seems to be cognitive-motor training (CMT) that combines motor as well as cognitive tasks during rehabilitation.

Objectives: This protocol described the proposed systematic review that aims to evaluate the effectiveness of CMT in improving proprioception, functional recovery, and reducing recurrence rates in CAS patients.

Methods: An effective systematic review will be following PRISMA guidelines. These will be the database sources searched: PubMed, Scopus, Web of Science, and the Cochrane Library. Studies subjected to eligibility criteria were randomized controlled trials and quasi-experimental studies concerning CAS, which included CMT interventions. Data extraction and analysis will include quantitative and narrative synthesis as appropriate.

Conclusion: Findings would shed light on the role of CMT in CAS management and provide implications for future rehabilitation practices.

Keywords: *Chronic Ankle Sprain, Cognitive Motor Training, Functional Recovery, Proprioception, Balance Deficits*.

1. INTRODUCTION

Chronic ankle sprain (CAS) has been an often encountered musculoskeletal condition that presents with recurrent occurrence of ankle instability over time and subsequently leads to decreased proprioception, balance deficits, and greater chances of subsequent sprains. [1] This condition may result from incomplete rehabilitation from acute sprains, leaving future repercussions for physical function and quality of life. Individuals with CAS often have difficulties in both static and dynamic postural stability as well as reduced performance in activities such as walking, running, or jumping. [2]

Cognitive motor training (CMT) is one form of even more promising intervention for the deficits mentioned earlier. [3] CMT intends to improve the input of proprioception, neuromuscular control, and functional recovery through motor tasks completion and cognitive challenge through dual-task exercises. [4] Balance exercises for either cognitive tasks, like counting backward or responding to stimuli, and proprioception training under cognitively demanding conditions are all part of CMT. [5]

Thus, the systematic review drafts the study to analyze the efficacy of CMT in improving proprioception, functional recovery, and recurrence rates among individuals with CAS. This healthy endeavor will add to the body of evidence for maybe, in turn, influencing how clinical practices are done and outcomes for patients treated.

2. METHODS

An effective systematic review using the population, intervention, comparator, outcomes (PICO) approach will be conducted. [6] The protocol was registered on International Prospective Register of Systematic Reviews [PROSPERO] and received the following reference number: CRD42024601833.

Eligibility Criteria:

- **Population:** Individuals aged 18 years and older diagnosed with chronic ankle sprain.
- **Intervention:** Studies employing cognitive motor training techniques, including dual-task exercises or proprioception training.
- **Comparator:** Standard care, placebo, or alternative interventions.
- **Outcomes:** Static and dynamic postural stability, functional recovery measures (e.g., FAAM, FADI, or CAIT), and recurrence rates of ankle sprain.
- **Study Design:** Randomized controlled trials (RCTs) and quasi-experimental studies.

Exclusion Criteria: Observational studies, case series, reviews, and studies without a comparator group or those involving animal models.

Search Strategy:

Databases: The literature search will be conducted systematically by five main databases: PubMed, Scopus, Web of Science, Cochrane Library, and pertinent clinical trial registries. The reason for this selection is collection extended miles covering biomedical and rehabilitation research including indexed studies on chronic ankle sprains or cognitive motor training.

Additional Sources: Reference lists from the eligible studies, core journals in rehabilitation and sports medicine, and conference proceedings will supplement the database searching. This approach intends to ensure that as any relevant studies are captured that were not indexed in the primary databases, the search is sufficiently thorough.

Search Terms: The search strategy will utilize specific keywords and controlled vocabulary terms, including "chronic ankle sprain," "cognitive motor training," "dual-task training," "proprioception," and "functional recovery." Boolean operators (AND/OR) and truncation will be used to refine the search and optimize results.

Language Restriction: Only studies published in English will be considered for inclusion. This restriction is applied to ensure the accuracy of interpretation and analysis of study findings.

Date Range: The search will focus on studies published from 2000 to the present. This timeframe was selected to capture contemporary research and methodologies, reflecting current practices and advancements in the field of rehabilitation.

Study Selection:

The selection process of studies will be conducted rigorously through a multistage approach. In the initial phase, two independent reviewers read the titles and abstracts of all identified citations against the predefined inclusion and exclusion criteria. This ensures that only the studies that are relevant for review objectives proceed further into the process. From the studies that may be eligible, it is expected that the full-text articles be retrieved for detailed evaluation. The full-text articles will then be reviewed for eligibility according to the criteria established by the reviewers independently. Any discrepancies or disagreements between the reviewers will be addressed through a discussion towards reaching a consensus. If disagreements persist, a third reviewer will be consulted to arbitrate and make the final decision. This systematic process, therefore, intends to enhance the objectivity and reliability of study selection thereby ensuring that the studies included are relevant and of sufficient quality. The resultant search and study selection and inclusion procedure will be reported fully in the final systematic review and presented in a PRISMA flow diagram. [7]

Data Extraction:

It involves the process of detailed data extraction on the studies included. This will include study characteristics, such as author names, year of publication, country of origin, and study design. The participant's demographics will be collected; age, gender, baseline characteristics, and chronic ankle sprain diagnosis details will also be harvested. The intervention details would include duration, frequency, intensity, and the specific components of the cognitive-motor training (CMT) used for that particular intervention. Information will also be collected regarding comparator interventions, including

standard care, placebo, or alternative treatments, so they can be documented. Primary and secondary outcomes, including postural stability, static and dynamic, recovery measures, recurrences ankle sprains, and study results, will be comprehensively documented.

Two independent reviewers will extract data using standardized templates to minimize errors, ensuring that they are rigorous in their definition. Any discrepancies or disagreements that arise during the process will be resolved through discussion and mutual consensus. If the two cannot reach a consensus, a third reviewer will be consulted to provide an objective resolution to the issue. This rigorous approach aims to maintain the accuracy and reliability of the extracted data, forming a robust base for subsequent analysis.

3. RISK OF BIAS ASSESSMENT:

- **RCTs:** Cochrane Risk of Bias Tool will be used to evaluate randomization, blinding, incomplete data, and selective reporting. [8]
- **Quasi-Experimental Studies:** ROBINS-I tool will assess biases related to confounding, participant selection, and outcome measurement. [9]

Data Synthesis:

A narrative synthesis will summarize findings from included studies. Where possible, meta-analyses will be conducted using a random-effects model. Effect sizes will be expressed as mean differences for continuous outcomes and odds ratios for dichotomous outcomes. Subgroup analyses will explore variations based on intervention type, duration, and study quality.

4. RESULTS

The results of the systematic review will be presented in terms of primary outcomes (postural stability, functional recovery) and secondary outcomes (recurrence rates). Tables and figures will summarize key findings, and a PRISMA flowchart will depict the study selection process.

5. DISCUSSION

The discussion will contextualize findings within existing literature, highlight methodological strengths and limitations, and propose implications for clinical practice. Recommendations for future research will focus on addressing gaps in evidence, optimizing CMT protocols, and exploring long-term outcomes.

Ethical Considerations: As this review involves secondary data analysis, ethical approval is not required. However, ethical considerations regarding transparency, data integrity, and reporting will be upheld throughout the review process.

Funding and Conflicts of Interest: No funding was received for this review. The authors declare no conflicts of interest.

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