

Title

The use of “Whole Body Electro-myostimulation” in musculoskeletal and neurological rehabilitation settings: a scoping review protocol

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Introduction

Electro-myostimulation (EMS) has been used for physical therapy practice as a method to rehabilitate muscles after an injury or surgery. In the 1960s, for instance, EMS was often used to prevent the atrophy that occurs when skeletal muscle is denervated (Jee, 2018).

Whole Body Electro-myostimulation (WB-EMS) provides the possibility to carry out multiple applications on the human body. WB-EMS allows to obtain a synchronous application of electric current in a large number of muscular groups, thus making possible to train the whole kinetic chains in unison and perform exercises with whole body positions and movements during the electrical stimulus itself (Pano-Rodriguez et al., 2019).

Review Question:

This scoping review aims to answer these specific questions:

- 1) Actually, is WB-EMS used in musculoskeletal and neurological rehabilitation settings?
 - a) If true, how has WB-EMS been reported to change the rehabilitation process?
 - b) On what population has WB-EMS been applied and which settings and workout methodologies have been used?

Eligibility Criteria

Participants

In this review, we will include studies reporting the WB-EMS application to subjects affected by musculoskeletal disorders or neurological disorders, who attended a period of rehabilitation

Concept

Key concepts were pre-defined, in order to facilitate the identification of specific parameters, in phase of analysis of included studies.

First: WB-EMS, which is also called global-body electrical myo-stimulation, is a novel technological solution that has been emerging as the evolution of traditional local electrical muscle stimulation, addressing the possibility to synchronously activate several muscular groups (Pano-Rodriguez et al., 2019)

Second: Rehabilitation is defined as “a set of interventions designed to optimize functioning and reduce disability in individuals with health conditions in interaction with their environment” (*Rehabilitation*, s.d.)

Context

For the purpose of this review, the use of WB-EMS will be explored concerning only musculoskeletal and neurological rehabilitation settings.

Type of Source

This analysis will consider peer-reviewed empirical research studies (e.g., experimental, and quasi-experimental study designs, mixed-methods, observational studies, cohort studies, case-control studies, cross-sectional studies, and qualitative studies) for inclusion.

Scientific papers will be included if WB-EMS has been examined as a determinant, mediator, and/or outcome of the rehabilitation process.

Non-empirical research (e.g., reviews, opinion papers, knowledge translation papers, applied papers) will be excluded since they focus – in general - more on theories, methods, and implications and they are not based on a data-driven approach. Moreover, articles in any language except English, unpublished articles, dissertations, theses or conference papers and proceedings will be excluded.

Methods

The proposed scoping review will be conducted in accordance with the JBI methodology for scoping reviews (Peters et al., 2015) (Peters et al., 2020).

Search Strategy

The search strategy will aim to locate studies that match within the eligibility criteria. An initial search in PubMed will be made, in order to identify the indexed terms.

Once identified the entire search strategy, a full search will be run in 3 selected electronic databases: PubMed, Scopus and Web of Science.

The search strategy, including all identified keywords and index terms, will be adapted for each included database and/or information source.

Only papers written in English published from January 2000 to February 2022 will be included.

Appendix 1 will include all search strategies.

Study/Source of Evidence Selection

Titles and abstracts will be screened by two or more independent reviewers for assessment with respect to the inclusion criteria.

Potentially relevant sources will be retrieved in full, and their citation details imported into a collaborative web application, Rayyan (Ouzzani et al., 2016) and duplicates removed. This online app will facilitate the assessment process concerning inclusion/exclusion criteria.

The full text of selected citations will be assessed in detail with respect to the inclusion criteria by two or more independent reviewers.

The results of the search and the study inclusion process will be reported in full in the final scoping review and presented in a “Preferred Reporting Items for Systematic Reviews and Meta analyses extension for scoping review” (PRISMA-ScR) flow diagram (Tricco et al., 2018).

Data Extraction

Data will be extracted from papers included in the scoping review using a data extraction procedure, including any supporting tools, developed by the reviewers. The data extracted will include specific details about the participants, concept, context, study methods and key findings relevant to the review questions (See Appendix 2).

This process and tools will be modified and revised as necessary during the process of extracting data from each included evidence source. Modifications will be detailed in the scoping review. Two independent researchers will extract data from the first five to ten studies using the developed data charting form to ensure consistency.

Data Analysis and Presentation

This section will identify the number of studies that were identified and selected.

A narrative description of the search decision process will be provided along with a flow chart to illustrate this process.

The data will be presented in tabular form and will be classified under main conceptual categories (e.g., study characteristics, aims, demographic characteristics, methodology adopted, and key findings).

A narrative summary will accompany the tabulated/charted results and will describe how the results relate to the review objective and research question/s.

Funding Source

No funding.

Conflicts of Interest

No conflicts of interest to declare.

Date and location of protocol registration

May 2022, Brescia, Italy

Stage of review at time of registration

Search strategy is being finalised.

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Appendix 1: Search strategy

((("Rehabilitation"[Mesh]) OR "Physical and Rehabilitation Medicine"[Mesh]) OR "Rehabilitation Research"[Mesh]) AND "whole body electromyostimulation"

Appendix 2: Draft Data Extraction Tool

The draft data extraction form will include the following key information:

1. Year
2. Author(s)
3. Title
4. Name of journal
5. Country of origin (where the study was published or conducted)
6. Aim/purpose
7. Study population and sample size
8. Demographic characteristics (e.g., gender, age, work position, working experience)
9. Methodology
 - a. Study type and design
 - b. Data collection/measurements
 - c. Data analysis
 - d. Intervention and comparator
 - e. Duration of intervention
10. Outcomes
11. Key findings that relate with the review question