

INPLASY PROTOCOL

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None declared.

Effect of Extracorporeal Shockwave Therapy on Spasticity in Patients with Cerebral Palsy: A Meta-analysis of Timing of Outcome Measurement

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Review question / Objective: Extracorporeal shockwave therapy (ESWT) has recently been suggested as an alternative treatment for managing spasticity in children with cerebral palsy (CP). However, little is known about the duration of its effect on reducing spasticity in CP patients. Herein, we conducted a meta-analysis to evaluate the effect of ESWT in controlling spasticity in CP patients according to the follow-up periods.

Condition being studied: Recently, extracorporeal shockwave therapy (ESWT) has been suggested as an alternative treatment for managing spasticity in children with CP. ESWT has merits in that it can be applied easily and conveniently without significant procedural pain and rarely causes major complications. Previous clinical trials evaluated the effect of ESWT in reducing spasticity in CP patients. In a 2019 meta-analysis showed that ESWT has a positive spasticity-reducing effect; however, they evaluated only the effect immediately after the termination of ESWT. For the clinical use of ESWT, clinicians should be aware of the duration of the spasticity-reducing effect after ESWT completion. In the present meta-analysis, we evaluated the effect of ESWT on spasticity in CP patients according to the follow-up periods.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 17 August 2022 and was last updated on 17 August 2022 (registration number INPLASY202280066).

INTRODUCTION

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alternative treatment for managing spasticity in children with cerebral palsy (CP). However, little is known about the duration of its effect on reducing spasticity in CP patients. Herein, we conducted a

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METHODS

Participant or population: Patients with cerebral palsy.

Intervention: Extracorporeal shockwave therapy was used for managing spasticity in CP patients.

Comparator: Placebo extracorporeal shockwave therapy.

Study designs to be included: The design of the studies to be included in this study was not specific and a full range of designs was considered. However, review articles, case reports, or letters, as well as studies with insufficient data or results were excluded.

Eligibility criteria: Articles were included in the present study based on the following criteria: 1) ESWT was used for managing spasticity in CP patients; 2) the effectiveness of ESWT was measured at pre-treatment and post-treatment; and 3) the results of experiment and control groups were compared to evaluate the

effect of ESWT. The exclusion criteria were: 1) botulinum toxin injection or anti-spastic medications were administered to patients in the control group; 2) the timing of the effect of ESWT was not clearly described; and 3) previous history of orthopedic surgery or neurosurgery for managing spasticity. Review articles, case reports, or letters, as well as studies with insufficient data or results were excluded.

Information sources: We systematically searched for relevant articles using Pubmed, SCOPUS, Embase, and Cochrane Library databases, up until August 17, 2022. The following keywords were used in the search “cerebral palsy”, “cerebral palsies”, “spastic diplegia”, “spastic diplegias”, “spasticity”, “spastic”, “muscle hypertonia”, “shock wave”, “shock waves”, “extracorporeal shockwave therapy” and “ESWT”.

Main outcome(s): The main outcome is the effectiveness of ESWT. Modified Ashworth scale, passive ankle range of motion, and plantar surface area in the standing position were observed to evaluate the effectiveness of ESWT.

Quality assessment / Risk of bias analysis: The methodological qualities of the studies were assessed using the Cochrane risk-of-bias tool for randomized trials (RoB 2) and Newcastle–Ottawa scale.

Strategy of data synthesis: After eliminating duplicate publications, two independent reviewers (YJC and MCC) evaluated the potentially eligible studies for inclusion in the meta-analysis. Articles were screened for eligibility based on a review of their titles and abstracts and disagreements were resolved via consensus. After the primary screening, the two reviewers (YJC and MCC) independently scrutinized the full text of the eligible articles. Subsequently, data including the name of the first author, year of publication, sample size, demographic data, ESWT protocol, outcome measures [Modified Ashworth Scale (MAS), passive ankle range of motion (ROM), plantar surface area contacting the ground during

standing (mm2), and adverse effects] were collected.

Subgroup analysis: Not applicable.

Sensitivity analysis: The studies were excluded one by one, and then the meta-analysis was performed in the remaining studies.

Language restriction: English.

Country(ies) involved: Republic of Korea.

Keywords: Extracorporeal shockwave therapy; Cerebral palsy; Spasticity; Meta-analysis.

Contributions of each author:

Author 1 - Min Cheol Chang - Author 1 drafted the manuscript and approved the final manuscript.

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Author 4 - Kiyeun Nam - Author 4 drafted the manuscript and approved the final manuscript.

Author 5 - Sae Yoon Kim - Author 5 drafted the manuscript and approved the final manuscript.

Author 6 - Hee Jin Lee - Author 6 drafted the manuscript and approved the final manuscript.

Author 7 - Soyoung Kwak - Author 7 drafted the manuscript and approved the final manuscript.