INPLASY PROTOCOL

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None declared.

Efficacy and Safety of Extracorporeal shock wave therapy in Treatment of pathological burn scars: A Meta-Analysis of Randomized Controlled Trials

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Review question / Objective: **The objective of this systematic review and meta-analysis of randomized controlled trials is to evaluate quantitatively the efficacy and safety of extracorporeal shockwave therapies (ESWT) combined comprehensive treatments on hypertrophic scars and keloids compared with comprehensive treatments alone and provide clinicians with an evidence base for their clinical decision making.**
Information sources: **We will search all English and Chinese language articles indexed in PubMed, Medline, the Excerpta Medica database (Embase), Cochrane Central Register of Controlled Trials, the Cochrane Library, Physiotherapy Evidence Database(PEDro), Chinese biomedical literature service system(sinomed) before October 2021. In addition to these databases, Google Scholar and the lists of references will be used to carry out citation tracking of the selected studies for identifying any other eligible studies that could have been missed.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 07 November 2021 and was last updated on 10 December 2021 (registration number INPLASY2021110023).

INTRODUCTION

Review question / Objective: **The objective of this systematic review and meta-analysis of randomized controlled trials is to evaluate quantitatively the efficacy and safety of extracorporeal shockwave therapies (ESWT) combined comprehensive treatments on hypertrophic scars and keloids compared with comprehensive treatments alone and provide clinicians**

with an evidence base for their clinical decision making.

Condition being studied: Hypertrophic scars and keloids are fibroproliferative disorders that result from abnormal wound healing and may arise after any deep cutaneous injury caused by trauma, burns, surgery, and so on, which are labelled the substantial post-traumatic burden on numerous patients, their families, the healthcare system, and society in general, especially after burns. Currently, the classical treatments for hypertrophic scars and keloids comprise corticosteroid therapy to multimodal approaches such as injections, cryotherapy, laser, radiation, radiofrequency ablation, and so on, which is still unsatisfactory. The emerging physiotherapies such as shock wave therapy had been developed and offered more therapeutic options for clinicians. In recent years, a series of accumulating clinical studies were performed and concluded the positive effects of ESWT on scars with different etiologies. However, there hasn't been a systematic review and meta-analysis of the effects of ESWT on pathological scars. Based on the current clinical RCT studies, we try to perform a systematic review and meta-analysis to assess quantitatively the effectiveness and usefulness of ESWT combined comprehensive treatments in treating hypertrophic scars and keloids compared with comprehensive treatments alone, to provide clinicians with an evidence base for their clinical decision making.

METHODS

Search strategy: PubMed and MEDLINE Database Search Strategy # 1 trial [Title] | # 2 randomly [Title/Abstract] | # 3 clinical trials [MeSH Major Topic] | # 4 control [Title/Abstract]| # 5 randomized [Title/Abstract] | # 6 randomized controlled trial [Publication Type] | # 7 controlled clinical trial [Publication Type] | # 8 OR/#1-#7 | # 9 animals [mh] not humans [mh] | # 10 # 8 not # 9 | # 11 scars | # 12 hypertrophic scars | # 13 hyperplastic scar | # 14 hypertrophic cicatrices | # 15 hypertrophic cicatrix| # 16 keloids | # 17 OR/#11-16 | # 18 shock wave | # 19 shock wave therapy | # 20 radial shock wave therapy | # 21 focused shock wave therapy | # 22 defocused shock wave therapy | # 23 extracorporeal shock wave therapy | # 24 OR/#18-23 | # 25 #10 and #17 and #24.

Participant or population: Patients with hypertrophic scars or keloids will be included. Patients with cardiac arrhythmia or pacemaker, pregnancy, skeletal immaturity, patients with malignancy, and poor compliant patients with lacking complete follow-up data will be excluded.

Intervention: Extracorporeal shock wave therapy (ESWT) combined comprehensive treatments of hypertrophic scars and keloids will be the mail intervention in our meta-analysis.

Comparator: In this meta-analysis, comprehensive treatments of hypertrophic scars and keloids will be chosen as the control intervention and include medication such as pain drugs, moisturizing cream and silicone gel application, pressure therapy, stretching exercises, massage therapy, occupational therapy, physical therapy such as ultrasound therapy and audio frequency current therapy, and so on.

Study designs to be included: Randomized controlled trials (RCTS) published in both languages, English and Chinese, before October 2021 will be included.

Eligibility criteria: Studies will be deemed eligible to be included in our meta-analysis if they meet the following criteria: (1) participants were randomly allocated to intervention and control groups, (2) compared ESWT combined comprehensive treatments with comprehensive treatments alone, (3) primary outcomes indexes including size in terms of length, width or height/thickness, and pain symptoms of scars assessed at least before and after intervention during the entire trial; and adverse effects related ESWT involved, (4) at least 80% of participants completed the trial, and (5) published in both languages, English and Chinese, before October 2021.

Information sources: We will search all English and Chinese language articles indexed in PubMed, Medline, the Excerpta Medica database (Embase), Cochrane Central Register of Controlled Trials, the Cochrane Library, Physiotherapy Evidence Database(PEDro), Chinese biomedical literature service system(sinomed) before October 2021. In addition to these databases, Google Scholar and the lists of references will be used to carry out citation tracking of the selected studies for identifying any other eligible studies that could have been missed.

Main outcome(s): The primary outcomes will include the sizes and pain symptoms of scars.

Additional outcome(s): The Additional outcomes will include the pigmentation, elasticity/pliability of scars, and the related function. And adverse effects related ESWT will be involved.

Quality assessment / Risk of bias analysis: The methodological quality and the risk of bias of the selected articles will be assessed with the Cochrane Collaboration's 'risk of bias' tool. This tool addresses the six specific domains, which are discussed in detail in the chapter: sequence generation, allocation concealment, blinding, incomplete outcome data, selective outcome reporting and any other specific bias. The quality assessments will be accomplished independently by two reviewers and any inconsistencies of the results will be then verified.

Strategy of data synthesis: In this meta-analysis, the proper effect sizes and statistical analysis methods will be chosen according to different data types and evaluation purposes. For continuous variables, weighted mean difference (MD) and a 95% confidence interval (95% CI) will be used. For discontinuous variables, odds ratio (OR) and a 95% CI will be used. For the heterogeneity test between studies, both the χ^2 test (significant if $P < 0.05$) and the I^2 test (with substantial heterogeneity defined as values > 50%) will be used. The fixed effects model was used to calculate the pooled effect sizes when studies did not show heterogeneity ($p>0.05$, $I^2 \leq 50\%$). Otherwise, when studies showed significant heterogeneity($p<0.05$, $I^2 \geq 50\%$) and could not be explained, a random effects model was used to calculate the pooled effect sizes. The data that could not be analyzed will be described. The cumulative effect of ESWT on each outcome was illustrated by forest plots. A funnel plot was applied to evaluate the potential publication bias, and significance level was set at 0.05. REVIEW MANAGER (version 5.3.5, The Cochrane Collaboration 2014) was used for data analysis.

Subgroup analysis: In this meta-analysis, subgroup analyses on the etiologies and duration of scars, and ESWT protocol, may be conducted to explore the potential heterogeneity among the included studies.

Sensitivity analysis: A sensitivity analysis was conducted to assess the contribution of each study to the pooled treatment effect by excluding each study one at a time and recalculating the pooled treatment effect for the remaining studies.

Language: We will search all English and Chinese language articles.

Country(ies) involved: China.

Keywords: Extracorporeal shock wave therapy; shock wave; burn scars; burns; hypertrophic; keloids; physiotherapy; rehabilitation; meta-analysis.

Contributions of each author:

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