

INPLASY PROTOCOL

To cite: Li et al. A comprehensive appraisal of meta-analyses in exercise-based stroke rehabilitation with trial sequential analysis. Inplasy protocol 202280006. doi: 10.37766/inplasy2022.8.0006

Received: 02 August 2022

Published: 02 August 2022

Corresponding author:
Patrick Kwong

whkwong@polyu.edu.hk

Author Affiliation:
The Hong Kong Polytechnic University.

Support: The Hong Kong Polytechnic University.

Review Stage at time of this submission: Data extraction.

Conflicts of interest:
None declared.

A comprehensive appraisal of meta-analyses in exercise-based stroke rehabilitation with trial sequential analysis

Li, JQ¹; Kwong, PWH²; Sun, YW³; So, WS⁴; Sidarta, A⁵.

Review question / Objective: This study aims to use the trial sequential analysis (TSA) method to examine if the published meta-analyses concerning stroke rehabilitation reached the required information size and if the overall effect size is robust as well.

Condition being studied: Stroke rehabilitation.

Eligibility criteria: Studies were included if they 1) were meta-analyses of random control trials (RCTs) on people with stroke, 2) included meta-analyses results in gait speed (or 6MWT) or balance performance. Studies were excluded if they 1) were conference abstracts, letters to the editor 2) lack the statistical parameters such as mean, standard deviations (SD), and number value in the articles and raw data from the cited studies cannot be found.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 02 August 2022 and was last updated on 02 August 2022 (registration number INPLASY202280006).

INTRODUCTION

Review question / Objective: This study aims to use the trial sequential analysis (TSA) method to examine if the published meta-analyses concerning stroke rehabilitation reached the required information size and if the overall effect size is robust as well.

Rationale: An increasing number of meta-analyses have been conducted in the field of education, psychology and biomedical sciences, as well as rehabilitation. However, Meta-analyses work may also report false-positive results due to insufficient information [4] or random errors (repeated significance testing). Trial sequential analysis (TSA) evolved from the

group sequential analysis introduced by Armitage and Pocock as group sequential analysis in the 1960s, later continued to be developed by Lan and DeMets. Similar to that when calculating a sample size for a randomised controlled trial (RCT), TSA estimates the necessary quantity of randomized participants to achieve the statistical power in detecting the desired effect size. If the required sample size have not been reached, TSA would also provide an adjusted statistical threshold for evaluating the intervention effects. Although TSA has been used to evaluate the phenomenon of prematurely declaring of the superiority of interventions in other research areas [13], especially in neonatal conditions, it has not been systematically used to evaluate the meta-analyses in the field of stroke rehabilitation.

Condition being studied: Stroke rehabilitation.

METHODS

Search strategy: The searching procedure from 6 electronic databases namely CINAHL, PUBMED, Medline, Embase, Scopus and Cochrane, with no restriction on the earliest publication years but before May 2022. The keywords used included “stroke”, “exercise training”, “meta-analysis”, “gait” and “balance”.

Participant or population: Meta-analyses that evaluate the effects of exercise training on stroke rehabilitation.

Intervention: Exercise-based stroke rehabilitation.

Comparator: Nil.

Study designs to be included: systemic review and meta-analyses.

Eligibility criteria: Studies were included if they 1) were meta-analyses of random control trials (RCTs) on people with stroke, 2) included meta-analyses results in gait speed (or 6MWT) or balance performance. Studies were excluded if they 1) were conference abstracts, letters to the editor

2) lack the statistical parameters such as mean, standard deviations (SD), and number value in the articles and raw data from the cited studies cannot be found.

Information sources: Six electronic databases namely CINAHL, PUBMED, Medline, Embase, Scopus and Cochrane, with no restriction on the earliest publication years but before May 2022. The retrieved literature searching was performed by one reviewer (Li J), from the references lists of included studies (backward tracking) or included studies being cited in additional articles (forward tracking).

Main outcome(s): Effect of training on walking speed and balance performance in people with stroke.

Additional outcome(s): The required information size for each included meta-analysis and the Alpha-spending boundary that indicated the adjusted effect size threshold.

Quality assessment / Risk of bias analysis: Not applicable as this is a secondary analysis of the published systemic review and meta-analysis.

Strategy of data synthesis: The TSA programme was run once for each meta-analysis with a single specific out-come. Articles included both gait speed (or 6MWT) and balance were analyzed separately. The statistical analyses were performed in the TSA software (0.9.5.10 Beta version). The effect model is DerSimonian and Laird Random-effects (DL) [19] and measures the “Mean Difference”. Two boundaries were predefined for intervention effect: 1) Conventional test boundary, and 2) Alpha-spending boundary. Both boundary types were set for two-sided, type I error as 5% and power as 80% (1-20%β). For the Alpha-spending boundary, using the O’Brien-Fleming to adjust P-value, the diversity-adjusted RIS (required information sample) was automatically calculated according to the model and empirical data them-selves. Therefore, large heterogeneity will increase

RIS and lead to more restrictive monitoring boundaries. Meanwhile, Z-statistics of each trial constructed cumulative Z-curve, we mainly detect the relationship between Z-curve and statistical boundaries.

Subgroup analysis: Nil.

Sensitivity analysis: Nil.

Language restriction: Review written in English and Chinese will be included.

Country(ies) involved: Mainland China, HKSAR, Singapore.

Keywords: Stroke Rehabilitation, Trial Sequential Analysis, Meta-analysis, Exercise.

Dissemination plans: The review will be published in peer-reviewed journal.

Contributions of each author:

Author 1 - Jia-Qi Li - JQ LI performed the literature search, extracted data and drafted the manuscript.

Email: jqxajdyfy@163.com

Author 2 - PWH Kwong conceptualized the study, drafted the manuscript and supervised the review process.

Author 3 - YW Sun extracted data and drafted the manuscript.

Author 4 - WS So performed the literature search, extracted data and drafted the manuscript.

Author 5 - A Sidarta conceptualized the study, drafted the manuscript and reviewed the manuscript.