INPLASY PROTOCOL

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Cognitive and motor performance effects of non-invasive brain stimulation in patients with traumatic brain injury: A meta-analysis of randomised controlled trials

Lara-Plaza, O[1]; Solís-Navarro, L[2]; Rivera-Lillo, G[3]; Torres-Castro, R[4].

Review question / Objective: To evaluate the cognitive and motor performance effects of non-invasive brain stimulation in patients with traumatic brain injury.

Condition being studied: Traumatic brain injury (TBI). The condition is defined as a brain trauma with specific characteristics that include at least one of the following: loss of consciousness, posttraumatic amnesia, disorientation and confusion, or, in more severe cases, neurological signs (e.g., positive neuroimaging, new onset of seizures or a marked worsening of a pre-existing seizure disorder, visual field cuts, anosmia, hemiparesis). In addition, difficulties in the domains of complex attention, executive ability, learning, and memory are common and slow in the speed of information processing and disturbances in social cognition.

Information sources: We will review the PubMed/Medline, Web of Science, EMBASE, Cochrane Library, Scopus and CINAHL databases.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 April 2022 and was last updated on 12 April 2022 (registration number INPLASY202240067).

INTRODUCTION

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METHODS

Participant or population: Patients with traumatic Brain Injury (TBI). Traumatic brain injury (TBI). The condition is defined as a brain trauma with specific characteristics that include at least one of the following: loss of consciousness, posttraumatic amnesia, disorientation and confusion, or, in more severe cases, neurological signs (e.g., positive neuroimaging, new onset of seizures or a marked worsening of a pre-existing seizure disorder, visual field cuts, anosmia, hemiparesis). In addition, difficulties in the domains of complex attention, executive ability, learning, and memory are common and slow in the speed of information processing and disturbances in social cognition.

Intervention: Non-invasive brain stimulation (NIBS).

Comparator: Placebo, sham, non-intervention.

Study designs to be included: We will include randomised controlled trials (RCTs). All observational studies, case series, case reports, editorials, letters, review articles and systematic review studies will be excluded.

Eligibility criteria: We will include studies published until April 2022. The population studied must be adults (> 18 years) with a medical diagnosis of TBI that received a structured program NIBS.

Information sources: We will review the PubMed/Medline, Web of Science, EMBASE, Cochrane Library, Scopus and CINAHL databases.

Main outcome(s): Cognitive performance: a) Memory, b)Speed processing, c) Attention, d)Executive Function. Continuous data will be presented as the mean difference with standard deviations, or median and interquartile range, as appropriate. In addition, dichotomous categorical data will be reported in the population's overall mean proportion (%).

Additional outcome(s): Motor performance: a) Upper extremities function, b) Gait, c) ADL. Continuous data will be presented as the mean difference with standard deviations, or median and interquartile range, as appropriate. In addition, dichotomous categorical data will be reported in the population's overall mean proportion (%).

Quality assessment / Risk of bias analysis: The methodological quality assessment framework for CTs developed by the Cochrane Collaboration´s tool for assessing the risk of bias in randomised trials (Higgins and Green 2009) will be used to assess the risk of bias with regards to sequence generation, allocation concealment, blinding (participants, study personnel and outcome assessors), incomplete outcome data, selective outcome reporting, and others potential bias not covered by the framework. The studies will be graded independently by two reviewers (OL-LSN) to minimise bias. The scoring will be compared, and a third reviewer (GRL) will sort the discrepancies.

Strategy of data synthesis: Studies will be selected for inclusion using the predefined and explicit eligibility criteria. The entire literature search results will be screened independently by two reviewers (OL-LSN) to identify all citations that may meet the inclusion criteria. The full manuscripts of all selected citations will then be retrieved and

assessed by two reviewers (OL-LSN) against the inclusion criteria. Any disagreements over study inclusion will be resolved by consensus or, if necessary, by arbitration by a third reviewer (GRL). Study characteristics (design, country), baseline patient characteristics (age, demographic and anthropometric characteristics), outcomes (cognitive and motor performance), will then be extracted from the studies selected for inclusion by two reviewers (OL-LSN) using a pre-designed and piloted data extraction form to avoid any errors. Any disagreements between the reviewers will be resolved by consensus or, if necessary, through arbitration by a third reviewer (GRL). Authors may be contacted to request the provision of missing data on a case-by-case basis, considering the importance and relevance of the missing data. If a meta-analysis is appropriate, we will estimate pooled measures of association using a random-effect meta-analysis and calculate 95% confidence intervals for each outcome. A forest plot will be created to display results so that the direction and magnitude of effects can be analysed and the overlap between confidence intervals. Statistical heterogeneity will be assessed by using Cochran's Q value and the I^2 statistic from the standard χ^2 test. If $I^2 > 50\%$ this will be considered to reflect significant statistical heterogeneity. When $I^2 > 50\%$ the random-effects model using the inverse variance heterogeneity method will be used. To locate the origin of the heterogeneity, sensitivity analysis excluding one study at a time will also be undertaken. Funnel plots will be constructed.

Subgroup analysis: By age, by NIBS type.

Sensitivity analysis: We will perform sensitivity analysis based on sample size, heterogeneity, methodological quality, and statistical model. We will exclude studies with low quality, and ensure the stability of analysis results.

Language: English.

Country(ies) involved: Chile and Spain.

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