INPLASY PROTOCOL

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Corresponding author:
Zhong Wang

wangzhong761@163.com

Author Affiliation:
The first affiliated hospital of soochow university, department of neurosurgery brain and nerve research laboratory.

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None declared.

Motor function improvement and acceptability of non-invasive brain stimulation in patients with Parkinson's disease: A Bayesian network analysis

Yin, ZQ[1]; Qiu, YJ[2]; Wang, MH[3]; Duan, AJ[4]; Xie, MJ[5]; Wang, Z[6]; Wu, J[7]; Chen, G[8].

Review question / Objective: **This organize meta-analysis (NMA) was conducted to comprehensively assess the ideal technique to utilize rTMS and tDCS to move forward engine indications in PD.This organize meta-analysis (NMA) was conducted to comprehensively assess the ideal technique to utilize rTMS and tDCS to move forward engine indications in PD. This organize meta-analysis (NMA) was conducted to comprehensively assess the ideal technique to utilize rTMS and tDCS to move forward engine indications in PD. This network meta-analysis (NMA) was conducted to comprehensively evaluate the optimal strategy to use rTMS and tDCS to improve motor symptoms in PD.**
Study designs to be included: **We conducted a network meta-analysis (NMA) for a comprehensive assessment efficacy and safety of different rTMS and tDCS regimens for the treatment of motor dysfunction observed in PD. The results of our NMA can provide evidence-based recommendations for decision.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 25 April 2023 and was last updated on 25 April 2023 (registration number INPLASY202340087).

INTRODUCTION

Review question / Objective: **This organize meta-analysis (NMA) was conducted to comprehensively assess the ideal technique to utilize rTMS and tDCS to move forward engine indications in PD.This organize meta-analysis (NMA) was conducted to comprehensively assess the ideal technique to utilize rTMS and tDCS to move forward engine indications in PD. This organize meta-analysis (NMA) was**

conducted to comprehensively assess the ideal technique to utilize rTMS and tDCS to move forward engine indications in PD. This network meta-analysis (NMA) was conducted to comprehensively evaluate the optimal strategy to use rTMS and tDCS to improve motor symptoms in PD.

Condition being studied: Parkinson's illness may be a common degenerative disease of the anxious framework, common within the elderly, with an normal age of onset of approximately 60 a long time, and less common in youthful individuals with PD beginning beneath the age of 40. The predominance of PD in individuals over 65 a long time of age in China is around 1.7%. Most patients with Parkinson's malady are spread cases, and less than 10% have a family history of the illness. The foremost imperative obsessive alter in Parkinson's illness is the degenerative passing of dopamine-ergic neurons within the midbrain substantia nigra, which leads to a critical diminish in striatal DA substance and causes the illness. The precise etiology of this obsessive alter remains vague, and hereditary components, natural components, maturing, and oxidative push may be included within the degenerative passing of dopaminergic neurons in PD.Parkinson's illness may be a common degenerative disease of the anxious framework, common within the elderly, with an normal age of onset of approximately 60 a long time, and less common in youthful individuals with PD beginning beneath the age of 40. The predominance of PD in individuals over 65 a long time of age in China is around 1.7%. Most patients with Parkinson's malady are spread cases, and less than 10% have a family history of the illness. The foremost imperative obsessive alter in Parkinson's illness is the degenerative passing of dopamine-ergic neurons within the midbrain substantia nigra, which leads to a critical diminish in striatal DA substance and causes the illness. The precise etiology of this obsessive alter remains vague, and hereditary components, natural components, maturing, and oxidative push may be included within the degenerative passing of dopaminergic neurons in PD. Parkinson's disease is a common degenerative disease of the nervous system, common in the elderly, with an average age of onset of about 60 years, and less common in young people with PD starting under the age of 40. The prevalence of PD in people over 65 years of age in China is about 1.7%. Most patients with Parkinson's disease are disseminated cases, and less than 10% have a family history of the disease. The most important pathological change in Parkinson's disease is the degenerative death of dopamine-ergic neurons in the midbrain substantia nigra, which leads to a significant decrease in striatal DA content and causes the disease. The exact etiology of this pathological change remains unclear, and genetic factors, environmental factors, ageing, and oxidative stress may be involved in the degenerative death of dopaminergic neurons in PD.

METHODS

Participant or population: Participants: patients with a diagnosis of idiopathic PD.

Intervention: Intervention: patients received interventional NIBS, such as rTMS and tDCS.

Comparator: Comparison: patients received Sham stimulation.

Study designs to be included: We conducted a network meta-analysis (NMA) for a comprehensive assessment efficacy and safety of different rTMS and tDCS regimens for the treatment of motor dysfunction observed in PD. The results of our NMA can provide evidence-based recommendations for decision.

Eligibility criteria: Studies matching at least one of the following were excluded: (1) Conference abstract, editorial, review, case report, single-arm clinical trial; (2) Studies not written in English; (3) Studies with incomplete or unreported data; (4) Studies that did not include any of the outcome measures.

Information sources: To perform the NMA, two commentators (YJQ and ZQY) efficiently looked PubMed, Embase, and Cochrane Library databases for significant considers distributed from January 1, 2013 to January 1, 2023. The database was looked concurring to the combination of restorative Work terms and common terms. We moreover looked into meta-analyses, audits, and the references of the included ponders to supplement the look. The point by point look procedure and comes about are portrayed within the supplementary materials.To perform the NMA, two commentators (YJQ and ZQY) efficiently looked PubMed, Embase, and Cochrane Library databases for significant considers distributed from January 1, 2013 to January 1, 2023. The database was looked concurring to the combination of restorative Work terms and common terms. We moreover looked into meta-analyses, audits, and the references of the included ponders to supplement the look. The point by point look procedure and comes about are portrayed within the supplementary materials. To perform the NMA, two reviewers (YJQ and ZQY) systematically searched PubMed, Embase, and Cochrane Library databases for relevant studies published from January 1, 2013 to January 1, 2023. The database was searched according to the combination of medical MeSH terms and general terms. We also reviewed meta-analyses, reviews, and the references of the included studies to supplement the search. The detailed search strategy and results are described in the supplementary materials.

Main outcome(s): We recruited 28 studies investigating different strategies, including high frequency repetitive transcranial magnetic stimulation (HFrTMS), low frequency repetitive transcranial magnetic stimulation (LFrTMS), Transcranial anodic direct current stimulation (AtDCS), AtDCS_cerebellar tDCS (CtDCS), HFrTMS_LFrTMS and sham Control Group. Both HFRTMS (short term: mean difference (MD) -5.21, 95% confidence interval (CIr) -9.26 to -1.23; long-term: MD -4.74, 95% CrI -6.45 to -3.05) and LFRTMS (long term: MD -4.83, 95% CrI -6.42 to -3.26) was effective in improving UPDRS-III score compared with Sham stimulation. For TUG time, HFrTMS (short term: MD -2.04, 95% CrI -3.26 to -0.8; long-term: MD -2.66, 95% CrI -3.55 to -1.77) and AtDCS (short term: MD -0.8, 95% CrI -1.26 to -0.34; long-term: MD -0.69, 95% CrI -1.31 to -0.08) resulted in a significant difference compared with Sham stimulation. However, no statistical difference was found in FOG scores between the different groups. According to the Under-Curve Area Rating Area (SUCRA), HFrTMS ranks first in UPDRS-III scores for short-term (0.77), short-term TUG (0.82), long-term TUG time (0.84) and short-term FOG Score (0.73). In terms of safety outcomes, all strategies show few AEs and are self-limiting.

Quality assessment / Risk of bias analysis: The quality of the evidence for each pairwise comparison was estimated according to the GRADE and Evaluation Working Group approach using the NMA confidence framework. Each study begins with a relatively high score estimate and will be downgraded considering the limitations of risk of bias, publication bias, inconsistency (heterogeneity), and inaccuracy. . The risk of bias for each accompanying manuscript was assessed using the Cochrane Collaboration tool. Two reviewers rated the studies by risk of bias (low, high, or unclear) using Review Manager 5.4. Any disagreement was resolved through discussion.

Strategy of data synthesis: Prior to NMA, we performed a live evidence pairwise meta-analysis using Review Manager 5.4. Relative risk (OR) and MD with 95% confidence interval (95% CI) were used for dichotomous and continuous variables. The Chi-square q statistic and the I2 statistic assess the statistical heterogeneity between trials. I250% are recognized as low, moderate and high heterogeneity, respectively. When the heterogeneity is >50%, we choose a random effects model to Analysis; on the other hand, we chose the fixed effects model. NMA is implemented using the Bayesian framework using the R 4.2. The dichotomy results were analyzed using a

logarithmic response rate with a 95% confidence interval (CIr). Continuous variables were diagnosed by mean difference (MD) with 95% CrI instead of standard mean difference because the rating scale used uniform units. NMA chart created with Stata 17.0. Each node represents a NIBS intervention; the size of the node indicates the number of participants, and the thickness of the edge indicates the number of trials comparing two NIBS interventions. Node split models are built to check the consistency and stability of the network topology. Model convergence was assessed using a follow-up and density plot as well as a Brooks-Gelman-Rubin diagnostic plot. In addition, to rank the effectiveness of various NIBS interventions, we created an Area Under the Rating Curve (SUCRA) plot with percentages ranging from 0 to 1. A higher SUCRA score indicates a better rating for each outcome. A test of chi-square q and I2

Statistics were used to assess heterogeneity in NMA. A sensitivity analysis was then performed by deleting studies with a high risk of bias. For all comments, the P-value was two-sided and the threshold of 0.05 was considered to be statistically significant. In addition, we used STATA 17.0 to generate a funnel chart to check for potential publication bias, and the asymmetrical distribution of the funnel shows significant publication bias. Prior to NMA, we performed a live evidence pairwise meta-analysis using Evaluation Manager 5.4. Relative risk (OR) and MD with 95% confidence interval (95% CI) were used for dichotomous and continuous variables. The Chi-square q statistic and the I2 statistic assess the statistical heterogeneity between trials. I250% are recognized as low, moderate and high heterogeneity, respectively. When the heterogeneity is >50%, we choose a random effects model to Analysis; on the other hand, we chose the fixed effects model. NMA is implemented using the Bayesian framework using the R 4.2. The dichotomy results were analyzed using a logarithmic response rate with a 95% confidence interval (CIr). Continuous variables were diagnosed by mean difference (MD) with 95% CrI instead of standard mean difference because the rating scale used uniform units. NMA chart created with Stata 17.0. Each node represents a NIBS intervention; the size of the node indicates the number of participants, and the thickness of the edge indicates the number of trials comparing two NIBS interventions. Node separation models have been built.

Subgroup analysis: Efficacy endpoints were pre-posted changes in the Unified Parkinson's Disease Evaluation scale part III (UPDRS-III), time to onset and onset (TUG), and gait obstruction score (FOG). In addition, we have divided these scales into short-term and long-term performance. Short-term efficacy was defined as the change in ratings measured immediately at the end of NIBS treatment and up to 1 week thereafter, while long-term efficacy was described as the change in score after 2 weeks. track and above. Efficacy outcomes were pre-posted changes in the Unified Parkinson's Disease Assessment section III (UPDRS-III), time to onset and onset (TUG), and gait obstruction score (FOG). In addition, we have divided these scales into short-term and long-term performance. Short-term efficacy was defined as the change in scale measured immediately at the end of NIBS treatment and up to 1 week thereafter, while long-term efficacy was defined as the change in scale after 2 weeks on track upwards.

Sensitivity analysis: The Chi-square q statistic and the I2 statistic assess the statistical heterogeneity between trials. I250% are recognized as low, moderate and high heterogeneity, respectively. When the heterogeneity is >50%, we chose a random effects model for analysis; on the other hand, we chose the fixed effects model. Statistical heterogeneity between trials was assessed by chi-square q test and I2 statistic. I250% are recognized as low, moderate and high heterogeneity, respectively. When the heterogeneity is >50%, we chose a random effects model for analysis; on the other hand, we chose the fixed effects model.The Chi-square q test and I2 statistics evaluated statistical

heterogeneity between trials. I2 < 30%, 30–50%, and > 50% were recognized as low, moderate, and high heterogeneity, respectively. When heterogeneity was > 50%, we selected the random effect model for analysis; otherwise, we chose the fixed effect model. Statistical heterogeneity between trials was evaluated with Chi-square q test and I2 statistics. I2 < 30%, 30–50%, and > 50% were recognized as low, moderate, and high heterogeneity, respectively. When heterogeneity was > 50%, we selected the random effect model for analysis; otherwise, we selected the fixed effect model.

Country(ies) involved: China.

Keywords: Parkinson's disease, repetitive transcranial magnetic stimulation, transcranial direct current stimulation, non-invasive brain stimulation, meta-analysis
Abstract.

Contributions of each author:

Author 1 - Ziqian Yin.
Email: sudayzq@163.com
Author 2 - Youjia Qiu.
Author 3 - Menghan Wang.
Author 4 - Aojie Duan.
Author 5 - Minjia Xie.
Author 6 - Zhong Wang.
Author 7 - Jiang Wu.
Author 8 - Gang Chen.