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Corresponding author:
Xiangjuan Sun

hot285@163.com

Author Affiliation:
Chengdu University of traditional Chinese Medicine/ Hospital of Chengdu University of traditional Chinese Medicine.

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None declared.

Deep brain stimulation in the treatment of Tourette's syndrome: a Meta analysis

Zeng, YJ[1]; Guo, ZY[2]; Yang, KJ[3]; Lei, J[4]; Guo, ZD[5]; Sun, XJ[6].

Review question / Objective: **Patients who meet the clinical diagnostic criteria of Gilles de la Tourette syndrome (DSM-IV/ DSM-V) are included, regardless of race, sex, age, etc. Deep brain electrical stimulation for the treatment of Tourette's syndrome, with no limit on the specific procedure and duration of stimulation. Randomized controlled trials were selected, the language was limited to Chinese and English, and there were no restrictions on race, age, sex and so on. The main outcome indicators were the Yale Global tic severity scale score. Other outcome indicators included the Modified Rush Video Rating Scale score, Beck's Depression Inventory score, State-Trait Anxiety Inventory score, Gilles de la Tourette Syndrome-Quality of Life Scale score and Yale Brown Obsessive Compulsive Scale score.**
Information sources: **The Cochrane Library, Embase, Web of Science, MEDLINE and four Chinese electronic databases: China Biomedical Literature Database (CBM), China knowledge Network (CNKI), VIP Chinese Technical Journals Database (VIP), Wanfang Digital Database.The search time limit is from the self-built database to July 03, 2022.**

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 15 September 2022 and was last updated on 15 September 2022 (registration number INPLASY202290065).

INTRODUCTION

Review question / Objective: **Patients who meet the clinical diagnostic criteria of Gilles de la Tourette syndrome (DSM-IV/ DSM-V) are included, regardless of race, sex, age, etc. Deep brain electrical stimulation for the treatment of Tourette's syndrome, with no limit on the specific procedure and duration of stimulation. Randomized controlled trials were selected, the language was limited to Chinese and English, and there were no restrictions on race, age, sex and so on. The main outcome indicators were the Yale Global tic severity scale score. Other outcome indicators included the Modified**

Rush Video Rating Scale score, Beck's Depression Inventory score, State-Trait Anxiety Inventory score, Gilles de la Tourette Syndrome-Quality of Life Scale score and Yale Brown Obsessive Compulsive Scale score.

Condition being studied: Tic disorder (TicDisorders) is a neuropsychiatric disorder that begins in children or adolescence. It is characterized by involuntary, recurrent, sudden, rapid, repetitive and irregular movement and / or vocal tic of one or more parts. Tourette syndrome (TouretteSyndrome,TS) is one of them. TS refers to the simultaneous existence of multiple motor twitches and one or more vocal twitches in a certain period of time of the disease, which does not necessarily occur at the same time and lasts more than a year, and is not caused by the physiological effects of certain substances or other diseases. At present, the clinical descriptive diagnosis method is mainly selected, which is diagnosed according to the tic symptoms and accompanying mental and behavioral disorders. According to data, in the past 20 years, the prevalence rate of TS in the population abroad is estimated to be 0.52%, and that of domestic children is estimated to be 0.3% to 0.9%. Boys are more sick than girls, and the ratio of boys to girls ranges from 2.17 to 10.6, which is higher in urban areas than in rural areas. The average age of onset is about 5 years old. A few children can be relieved by puberty, and some can continue to adults. 85.7% of the children were accompanied by other mental disorders, obsessive-compulsive disorder and attention deficit / hyperactivity disorder were the most common, and others included anxiety, emotional disorder and destructive behavior. The 2021 European Clinical guidelines for tic Disorders and other tic Disorders (version 2.0) recommend drugs and psychological and behavioral interventions for the treatment of TS. However, the clinical effects of the above treatments are not good for some children with TS. For this part of patients, some people propose deep brain stimulation as an alternative therapy. Deep brain stimulation (DeepBrainStimulation,DBS) is a mild, high-frequency electrical stimulation that can be turned off and turned on by implanted electrodes in the brain and batteries implanted under the clavicle to stimulate specific areas of the thalamus, globus pallidus or subthalamic nucleus. This electrical signal blocks signals sent by the brain that lead to tremors and other related disorders; this method is used to treat motor disorders, including Parkinson's disease, idiopathic tremors and dystonia. Although the specific mechanism of DBS is still unclear, it is clinically effective. In recent years, the treatment indications of DBS have been extended to epilepsy, tic disorder, other mental diseases (such as depression, obsessive-compulsive disorder), some types of headache and eating disorders. Although DBS has been introduced into TS treatment since 1999, the DBS data in TS treatment are still insufficient, most of them are open case studies, lack of a large number of randomized controlled trials to support its efficacy, and lack of specific criteria, so the clinical choice of deep brain stimulation to treat TS is still controversial and needs more evidence-based medical evidence to support it. Therefore, it is necessary to systematically evaluate the efficacy and safety of deep brain stimulation in the treatment of Gilles de la Tourette syndrome.

METHODS

Search strategy: Cochrane Library, Embase, WebofScience, MEDLINE and four Chinese electronic databases: China Biomedical Literature Database (CBM), China knowledge Network (CNKI), VIP Chinese Technical Journals Database (VIP) and Wanfang Digital Database were searched by computer. The search time limit is from the self-built database to July 03, 2022. The Chinese search words are "tic", "deep brain stimulation", "DBS" and so on. The English search takes PubMed as an example.

#1 "Tourette Syndrome"[MeSH Terms]
#2 "Tic Disorder"[Title/Abstract] OR "tourette*"[Title/Abstract]
#3 #1 OR #2

#4 "Deep Brain Stimulation"[MeSH Terms]
#5 "Deep Brain Stimulation"[Title/Abstract] OR "Deep Brain Stimulations"[Title/Abstract] OR "stimulation deep brain"[Title/Abstract] OR "brain stimulation deep"[Title/Abstract] OR "Electrical Stimulation of the Brain"[Title/Abstract]
#6 #4 OR #5
#7 #3 AND #6.

Participant or population: Patients who meet the clinical diagnostic criteria of Gilles de la Tourette syndrome (DSM-IV/DSM-V) are included, regardless of race, sex, age, etc.

Intervention: Deep brain electrical stimulation for the treatment of Tourette's syndrome, with no limit on the specific procedure and duration of stimulation.

Comparator: A single group of continuous variables before and after self-selection.

Study designs to be included: Randomized controlled trials were selected, the language was limited to Chinese and English, and there were no restrictions on race, age, sex and so on.

Eligibility criteria: Inclusion criteria: 1 for patients who meet the clinical diagnostic criteria of Tourette syndrome (DSM-IV/DSM-V), there are no restrictions on race, sex, age, region, etc.Exclusion criteria: 1 non-Chinese and English literature; 2 repeatedly published literature; 3 incomplete or missing data, literature not available to the author; 4 case reports, reviews, newspapers, letters, conference abstracts, etc.; 5 animal experiments; 6 non-randomized controlled trials.

Information sources: The Cochrane Library, Embase, Web of Science, MEDLINE and four Chinese electronic databases: China Biomedical Literature Database (CBM), China knowledge Network (CNKI), VIP Chinese Technical Journals Database (VIP), Wanfang Digital Database.The search time limit is from the self-built database to July 03, 2022.

Main outcome(s): The main outcome indicators were the Yale Global tic severity scale score.

Additional outcome(s): Other outcome indicators included the Modified Rush Video Rating Scale score, Beck's Depression Inventory score, State-Trait Anxiety Inventory score, Gilles de la Tourette Syndrome-Quality of Life Scale score and Yale Brown Obsessive Compulsive Scale score.

Quality assessment / Risk of bias analysis: The bias risk assessment included in the study was evaluated by the bias risk assessment tool for RCT recommended by the Cochrane systematic Review Manual: (1) whether the random method is correct; (2) whether the assignment is hidden; (3) whether the subjects and researchers are blind; (4) the integrity of the data; (5) whether there is a selective report of the research results; (6) other sources of bias. Two evaluators independently evaluate the bias risk and cross-check the results. If there are differences, discuss and resolve them.

Strategy of data synthesis: RevMan5.4 and Stata15.1 statistical software were used for Meta analysis. The standardized mean difference (SMD) was selected as the effect index for single group continuity variables, and the relative risk (RR) was selected as the effect index for single group rate variables. All the effect indicators gave point estimates and 95% CI,P <0.05,The results showed that the index had statistical difference. Random effect model was selected for analysis. When the heterogeneity is large (I Square $>50\%$), the source of heterogeneity of main outcome indicators is discussed by subgroup analysis or sensitivity analysis. If more than 10 articles were included, Stata15.1 statistical software was selected to draw funnel chart to evaluate publication bias.

Subgroup analysis: No Subgroups have been made yet.

Sensitivity analysis: The sensitivity analysis is carried out by using the method of eliminating individual studies one by one. If there is no directional change in the results after excluding the single study, it suggests that the results are relatively stable.

Language restriction: The language is limited to Chinese and English.

Country(ies) involved: China.

Keywords: Tourette syndrome; Deep brain electrical stimulation; Meta analysis.

Contributions of each author:

Author 1 - Yongjian Zeng.
Email: zengyongjian@stu.cdutcm.edu.cn
Author 2 - Zhiyi Guo.
Author 3 - Kejia Yang.
Author 4 - Jing Lei.
Author 5 - Zhidong Guo.
Author 6 - Xianjuan Sun.
Email: hot285@163.com