Clinical Trial Protocol
Iranian Registry of Clinical Trials

08 Nov 2026

Evaluation of the effects of repetitive transcranial magnetic stimulation on working memory performance in patients with multiple sclerosis by source localization with EEG and MRI

Protocol summary

Study aim

Evaluation of the effects of repetitive transcranial magnetic stimulation on working memory performance in patients with multiple sclerosis by source localization with EEG and MRI

Design

Phase 2-3 clinical trials are performed on 60 patients in parallel groups to evaluate the effect of repetitive brain stimulation on working memory.

Settings and conduct

This study is performed in Kashani Hospital. Patients with MS will be treated for brain stimulation in two ways, and the amount of working memory before and after treatment will be compared.

Participants/Inclusion and exclusion criteria

Inclusion criteria: diagnosis of MS by a neurologist, age 18 to 65 years, informed consent to participate in the study and have a minimum literacy Exclusion criteria: Existence of serious suicide plan or thoughts, use of anti-depressant and anti-anxiety drugs, pregnancy or breastfeeding, and contraindications to using the device

Intervention groups

Intervention group 1: Patients in this group undergo brain waves and brain anatomy in areas related to working memory before interventions. They will then undergo 5 sessions of treatment by repeated transcranial magnetic stimulation with routine location (method 10-20). Intervention group 2: Patients in this group undergo brain waves and brain anatomy in areas related to working memory before interventions. They will then undergo 5 therapeutic sessions by repeated transcranial magnetic stimulation using location-based mapping. At the end of the last session, the MRI and MRI will be re-examined, and the brain waves and anatomy of the working memory-related areas will be examined. Control group: In this group, only healthy people will be examined by MRI and brain anatomy by MRI, and brain waves and anatomy of areas related to their working memory will be examined.

Main outcome variables

Electroencephalogram signals, brain anatomy in memory-related areas

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20210614051574N11**
Registration date: **2022-04-27, 1401/02/07**
Registration timing: **prospective**

Last update: **2022-04-27, 1401/02/07**
Update count: **0**

Registration date

2022-04-27, 1401/02/07

Registrant information

Name

Ghasem Mohammadsharifi

Name of organization / entity

Country

Iran (Islamic Republic of)

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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2022-06-21, 1401/03/31

Expected recruitment end date

2022-07-20, 1401/04/29

Actual recruitment start date
empty
Actual recruitment end date
empty
Trial completion date
empty

Scientific title
Evaluation of the effects of repetitive transcranial magnetic stimulation on working memory performance in patients with multiple sclerosis by source localization with EEG and MRI

Public title
Repetitive transcranial magnetic stimulation and working memory
Purpose
Treatment
Inclusion/Exclusion criteria
Inclusion criteria:
Diagnosis of MS by a neurologist Age 18 to 65 years Informed consent to participate in the study Have a minimum literacy
Exclusion criteria:
Existence of a suicidal plan or serious thoughts Taking antidepressants and anti-anxiety drugs Pregnancy or breastfeeding Contraindications to the use of the device
Age
From **18 years** old to **65 years** old
Gender
Both

Phase
N/A
Groups that have been masked
No information
Sample size
Target sample size: **60**
Randomization (investigator's opinion)
Not randomized
Randomization description
Blinding (investigator's opinion)
Not blinded
Blinding description
Placebo
Not used
Assignment
Parallel
Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee
Name of ethics committee
Ethics committee of Esfahan University of Medical Sciences
Street address
Esfahan University of Medical Sciences, Hezar Jarib Ave., Esfahan
City
Isfahan
Province
Isfehan
Postal code
8174673461
Approval date
2021-05-20, 1400/02/30
Ethics committee reference number
IR.MUI.MED.REC.1400.126

Health conditions studied

1

Description of health condition studied
Multiple sclerosis
ICD-10 code
G35
ICD-10 code description
Multiple sclerosis

Primary outcomes

1

Description
Electroencephalogram signals
Timepoint
Before starting treatment and after the last session of brain stimulation
Method of measurement
By electroencephalogram

2

Description
Anatomy of the brain in areas related to memory
Timepoint
Before starting treatment and after the last session of brain stimulation
Method of measurement
MRI machine

Secondary outcomes

empty

Intervention groups

1

Description
Intervention group 1: Patients in this group undergo brain waves and brain anatomy in areas related to working memory before interventions. They will then undergo 5 sessions of treatment by repeated transcranial magnetic stimulation with routine location (method 10-20). After the last session, they will be re-examined on MRI and MRI and brain waves and anatomy

Work memory related will be examined.

Category

Treatment - Devices

2

Description

Intervention group 2: Patients in this group undergo brain waves and brain anatomy in areas related to working memory before interventions. They will then undergo 5 therapeutic sessions by repeated transcranial magnetic stimulation using location-based mapping. At the end of the last session, the MRI and MRI will be re-examined, and the brain waves and anatomy of the working memory-related areas will be examined.

Category

Treatment - Other

3

Description

Control group: In this group, only healthy people will be examined by MRI and brain anatomy by MRI, and brain waves and anatomy of areas related to their working memory will be examined.

Category

N/A

Recruitment centers

1

Recruitment center

Name of recruitment center
Kashani hospital

Full name of responsible person
Majid Barakatin

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Sponsors / Funding sources

1

Sponsor

Name of organization / entity
Esfahan University of Medical Sciences

Full name of responsible person
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Grant name

Grant code / Reference number

Is the source of funding the same sponsor organization/entity?
Yes

Title of funding source
Esfahan University of Medical Sciences

Proportion provided by this source
100

Public or private sector
Public

Domestic or foreign origin
Domestic

Category of foreign source of funding
empty

Country of origin

Type of organization providing the funding
Academic

Person responsible for general inquiries

Contact

Name of organization / entity
Esfahan University of Medical Sciences

Full name of responsible person
Majid Barakatin

Position
Specialist

Latest degree
Specialist

Other areas of specialty/work
Neuroscience

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Sharing plan

Deidentified Individual Participant Data Set (IPD)
Yes - There is a plan to make this available
Study Protocol
Yes - There is a plan to make this available
Statistical Analysis Plan
Yes - There is a plan to make this available
Informed Consent Form
Yes - There is a plan to make this available
Clinical Study Report
Yes - There is a plan to make this available
Analytic Code
Yes - There is a plan to make this available
Data Dictionary
Yes - There is a plan to make this available
Title and more details about the data/document
All data can be shared after people have requested.
When the data will become available and for how long
Six months after publishing the results.
To whom data/document is available
Academic researchers
Under which criteria data/document could be used
Scientific uses
From where data/document is obtainable
Website of the Research Committee of Isfahan University of Medical Sciences
What processes are involved for a request to access data/document
Clear request on the site to access the data by the individual and then review the request by the research assistant within 2 weeks and then allow access to the data.
Comments