

Clinical Trial Protocol

Iranian Registry of Clinical Trials

17 Sep 2026

The comparative effects of transcranial magnetic stimulation (TMS) over motor cortex and cerebellum on the motor learning in the elderly adults

Protocol summary

Study aim

The comparative effects of transcranial magnetic stimulation (TMS) over motor cortex and cerebellum on the motor learning in the elderly adults

Design

Clinical trial with parallel control group, double blind, randomized, single center trial, Sample size 75 people.

Settings and conduct

Neuromuscular Rehabilitation Research Center Semnan University of Medical Sciences. participants perform the serial task in the shortest possible time with their dominant right hand. People are not given prior information about the order of doing the task. Then, according to the treatment protocol, they are subjected to magnetic stimulation on the motor cortex area and cerebellum.

Participants/Inclusion and exclusion criteria

Inclusion criteria: Elderly people (60-75 years old); The dominant hand of people should be the right hand. Exclusion Criteria: History of neurological diseases such as Parkinson's, Alzheimer's, schizophrenia; Any symptoms of forgetfulness and depression; Having vision, hearing and dizziness disorders; Having symptoms of radiculopathy, carpal tunnel syndrome in the right hand; History of psychological diseases.

Intervention groups

In three group, participants perform the serial task in the shortest possible time with their dominant right hand. People are not given prior information about the order of doing the task. Intervention group 1: Each of the participants after completing the serial task, according to the treatment protocol, they are subjected to magnetic stimulation on the motor cortex area. Intervention group 2: Each of the participants after completing the serial task, according to the treatment protocol, they are subjected to magnetic stimulation on the cerebellum area. Control group: Only for comparison with intervention group, no treatment is performed.

Main outcome variables

Movement learning, Number of errors.

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20151228025732N73**

Registration date: **2022-10-10, 1401/07/18**

Registration timing: **prospective**

Last update: **2022-10-10, 1401/07/18**

Update count: **0**

Registration date

2022-10-10, 1401/07/18

Registrant information

Name

Alireza Emadi

Name of organization / entity

Semnan University of Medical Sciences, Semnan, Iran

Country

Iran (Islamic Republic of)

Phone

+98 23 3345 1336

Email address

are20935@semums.ac.ir

Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2022-10-12, 1401/07/20

Expected recruitment end date

2023-03-11, 1401/12/20

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

The comparative effects of transcranial magnetic stimulation (TMS) over motor cortex and cerebellum on the motor learning in the elderly adults

Public title

The comparative effects of transcranial magnetic stimulation (TMS) over motor cortex and cerebellum on the motor learning in the elderly adults

Purpose

Health service research

Inclusion/Exclusion criteria**Inclusion criteria:**

Elderly people (60-75 years old) The dominant hand of people should be the right hand

Exclusion criteria:

History of neurological diseases such as Parkinson's, Alzheimer's, schizophrenia Any symptoms of forgetfulness and depression Having vision, hearing and dizziness disorders Having symptoms of radiculopathy, carpal tunnel syndrome in the right hand History of psychological diseases

Age

From **60 years** old to **75 years** old

Gender

Both

Phase

N/A

Groups that have been masked

- Care provider
- Outcome assessor

Sample size

Target sample size: **75**

Randomization (investigator's opinion)

Randomized

Randomization description

We will construct 6 blocks in AABB, BBAA, ABAB, BABA, ABBA, and BAAB using four blocks. We will assign 1 to 6 for each block. Then, using the random number table, based on the sample size, 19 units of 4 blocks will be selected so that we consider having 25 people in the group (A), 25 people in the group (B) and 25 people in the group (C). Therefore, we will do block randomization.

Blinding (investigator's opinion)

Double blinded

Blinding description

This study is double blind. Researcher who complete questionnaire and analyzer and participant will be blind (double blind). Outcome assessor and analyzer and participants will not be aware from grouping. The person evaluating the outcome will be unaware of the grouping. Definition of groups A, B and C will be available to analyzer and outcome assessor.

Placebo

Not used

Assignment

Parallel

Other design features**Secondary Ids**

empty

Ethics committees**1****Ethics committee****Name of ethics committee**

Ethics committee of Semnan University of Medical Sciences

Street address

Semnan University of Medical Sciences, Basij Blvd, Semnan

City

Semnan

Province

Semnan

Postal code

3514799442

Approval date

2022-08-29, 1401/06/07

Ethics committee reference number

IR.SEMUMS.REC.1401.137

Health conditions studied**1****Description of health condition studied**

Movement disorder

ICD-10 code

F82

ICD-10 code description

Specific developmental disorder of motor function

Primary outcomes**1****Description**

Movement learning

Timepoint

Immediately and 72 hours after the intervention

Method of measurement

The Color Matching Test (CMT) software will record and measure the time of the homework.

2**Description**

Number of errors

Timepoint

Immediately and 48 hours after the intervention

Method of measurement

The Color Matching Test (CMT) software will record and measure the time of the homework.

Secondary outcomes

empty

Intervention groups

1

Description

Intervention group 1: In this group, participants perform the serial task in the shortest possible time with their dominant right hand. People are not given prior information about the order of doing the task. Then, according to the treatment protocol, they are subjected to magnetic stimulation on the motor cortex area.

Category

Treatment - Other

2

Description

Intervention group 2: In this group, participants perform the serial task in the shortest possible time with their dominant right hand. People are not given prior information about the order of doing the task. Then, according to the treatment protocol, they are subjected to magnetic stimulation on the cerebellum area.

Category

Treatment - Other

3

Description

Control group: Only for comparison with intervention group, no treatment is performed.

Category

Diagnosis

Recruitment centers

1

Recruitment center

Name of recruitment center

Neuromuscular Rehabilitation Research Center

Full name of responsible person

Fatemeh Ehsani

Street address

Neuromuscular Rehabilitation Research Center, Qods Blvd, Mashahir Aven.

City

Semnan

Province

Semnan

Postal code

3513138111

Phone

+98 23 3365 4180

Email

are20935@gmail.com

Sponsors / Funding sources

1

Sponsor

Name of organization / entity

Semnan University of Medical Sciences

Full name of responsible person

Majid Mirmohammadkhani

Street address

Semnan University of Medical Sciences, Basij Blvd, Semnan.

City

Semnan

Province

Semnan

Postal code

3514799442

Phone

+98 23 3345 1336

Email

majidmirmohammadkhani@yahoo.com

Grant name

Grant code / Reference number

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

Yes

Title of funding source

Semnan 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

Semnan University of Medical Sciences

Full name of responsible person

Fatemeh Ehsani

Position

Associate professor

Latest degree

Ph.D.

Other areas of specialty/work

Physiotherapy

Street address

Neuromuscular Rehabilitation Research Center, Qods Blvd, Mashahir Aven.

City

semnan

Province

Semnan

Postal code

3513138111

Phone

+98 23 3365 4180

Email

are20935@gmail.com

Person responsible for scientific inquiries

Contact

Name of organization / entity

Semnan University of Medical Sciences

Full name of responsible person

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Position

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Person responsible for updating data

Contact

Name of organization / entity

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Position

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Sharing plan

Deidentified Individual Participant Data Set (IPD)

Undecided - It is not yet known if there will be a plan to make this available

Study Protocol

Undecided - It is not yet known if there will be a plan to make this available

Statistical Analysis Plan

No - There is not a plan to make this available

Informed Consent Form

No - There is not a plan to make this available

Clinical Study Report

No - There is not a plan to make this available

Analytic Code

No - There is not a plan to make this available

Data Dictionary

No - There is not a plan to make this available