

# Clinical Trial Protocol

## Iranian Registry of Clinical Trials

27 Jul 2026

### Comparison of the effects of transcranial direct current stimulation and stretching exercises on mental fatigue using electroencephalographic parameters in people with slump posture

#### Protocol summary

##### Study aim

The aim of this study is to investigate the effect of slump posture on performance and mental fatigue using electroencephalography and compare the effect of TDCS and stretching exercises on these variables.

##### Design

Sixty volunteers will participate in two groups of 30 people with correct posture and slump posture. These people will be evaluated for the variables of study. It is a cross-sectional study in first phase. To reduce mental fatigue symptoms in people with slump posture, stretching exercises and TDCS will be used. It is a quasi-experimental study.

##### Settings and conduct

The study will be conducted in the laboratory of the Faculty of Rehabilitation of Tehran University of Medical Sciences. During 60 minutes of continuous typing, these people were evaluated for mental fatigue, task difficulty, kinematic behavior of the head, neck, trunk, and pelvis along with central indicators (quantitative electroencephalography) in the first and last three minutes. To reduce mental fatigue symptoms in people with slump posture, stretching exercises and transcortical stimulation were used in two separate sessions.

##### Participants/Inclusion and exclusion criteria

Age between 20 and 40 years old; craniovertebral angle more than 50 degrees and kyphosis between 20 and 40 degrees for the correct posture group and craniovertebral angle less than 50 degrees and kyphosis more than 40 degrees for the slump posture group; fluency in Persian language; computer typing experience; not taking any drugs affecting motor and cognitive function.

##### Intervention groups

TDCS on the F3 point and stretching exercises will be used as intervention in two separate sessions with an

interval of one week for the slump posture group. The effect of these two interventions is compared with each other and also with the condition without intervention of this group

##### Main outcome variables

Performance; mental fatigue; musculoskeletal discomfort; entropy

#### General information

##### Reason for update

##### Acronym

##### IRCT registration information

IRCT registration number: **IRCT20161026030516N2**

Registration date: **2022-09-21, 1401/06/30**

Registration timing: **prospective**

Last update: **2022-09-21, 1401/06/30**

Update count: **0**

##### Registration date

2022-09-21, 1401/06/30

##### Registrant information

##### Name

Zahra Abdollahzade

##### Name of organization / entity

Tehran university of medical science

##### Country

Iran (Islamic Republic of)

##### Phone

+98 901 183 8848

##### Email address

z-abdollahzade@razi.tums.ac.ir

##### Recruitment status

**Recruitment complete**

##### Funding source

##### Expected recruitment start date

2022-10-12, 1401/07/20  
**Expected recruitment end date**  
 2023-01-10, 1401/10/20  
**Actual recruitment start date**  
 empty  
**Actual recruitment end date**  
 empty  
**Trial completion date**  
 empty

**Scientific title**  
 Comparison of the effects of transcranial direct current stimulation and stretching exercises on mental fatigue using electroencephalographic parameters in people with slump posture

**Public title**  
 Comparison of transcranial stimulation and stretching exercises on mental fatigue in slump posture

**Purpose**  
 Diagnostic

**Inclusion/Exclusion criteria**  
**Inclusion criteria:**  
 Age between 20 and 40 years old Not having visual impairments Craniovertebral angle more than 50 degrees and kyphosis between 20 and 40 degrees for the correct posture group and craniovertebral angle less than 50 degrees and kyphosis more than 40 degrees for the slump posture group Having at least a diploma Fluency in Persian language Computer typing experience and lack of ten-finger typing skills No history of chronic or acute diseases such as neurological, cardiac or metabolic diseases No history of mental illnesses scoring 24 or higher on the Short Mental Status Examination (MMSE) musculoskeletal discomfort less than 7.5 based on the visual analog scale, due to the prevention of its impact on cognitive function no history of shoulder and spine surgery No history of fractures or spinal diseases Absence of obvious scoliosis BMI less than 30 kg/m2 Not taking any drugs affecting motor and cognitive function Not consuming stimulant drinks such as coffee and alcohol 48 hours before participating in the study  
**Exclusion criteria:**  
 Unwillingness to continue the test or confusion and inability to continue the test. Pregnancy

**Age**  
 From **20 years** old to **40 years** old

**Gender**  
 Both

**Phase**  
 N/A

**Groups that have been masked**  
*No information*

**Sample size**  
 Target sample size: **60**

**Randomization (investigator's opinion)**  
 N/A

**Randomization description**  
**Blinding (investigator's opinion)**  
 Not blinded

**Blinding description**  
**Placebo**

Not used  
**Assignment**  
 Crossover  
**Other design features**

## Secondary Ids

empty

## Ethics committees

### 1

#### Ethics committee

##### Name of ethics committee

Ethics Committee of Tehran university of medical science

##### Street address

Central office of TUMS, Ghods St., Keshavarz blvd., Tehran

##### City

Tehran

##### Province

Tehran

##### Postal code

1417613151

#### Approval date

2022-08-20, 1401/05/29

#### Ethics committee reference number

IR.TUMS.FNM.REC.1401.069

## Health conditions studied

### 1

#### Description of health condition studied

Slump posture

#### ICD-10 code

R29.3

#### ICD-10 code description

Abnormal posture

## Primary outcomes

### 1

#### Description

Mental fatigue

#### Timepoint

Before and after of typing

#### Method of measurement

visual analog scale-fatigue

### 2

#### Description

Musculoskeletal discomfort

#### Timepoint

Before and after typing

#### Method of measurement

visual analog scale

### 3

**Description**

Number of typing errors

**Timepoint**

After typing

**Method of measurement**

Counting by the examiner

### 4

**Description**

Typing speed

**Timepoint**

After typing

**Method of measurement**

It is calculated by the examiner as the number of words per minute

### 5

**Description**

Entropy of the head, neck, trunk and pelvis

**Timepoint**

The first and last three minutes of typing

**Method of measurement**

Marker and filming

### 6

**Description**

The relative power of the frequency spectrum

**Timepoint**

The first and last three minutes of typing

**Method of measurement**

Electroencephalography device

### 7

**Description**

ERD/ERS

**Timepoint**

The first and last three minutes of typing

**Method of measurement**

Loretta software

## Secondary outcomes

empty

## Intervention groups

### 1

**Description**

First intervention group: in the present study, stretching exercises for trunk, neck and upper limb muscles are selected and taught to people. In total, it takes 10 minutes to do the exercises. This intervention is for the slump posture group to do before typing in one session. The interval between each session is considered to be one week, and the order of people's attendance in these sessions is follows: It randomly.

**Category**

Treatment - Other

### 2

**Description**

Intervention group 2: Another intervention is the use of transcranial direct stimulation. In the current study, the NEUROSTIM2 device produced by Medina Medicine Company of Iran will be used to provide electrical stimulation. The intervention is carried out using 3 x 5 cm square carbon plate electrodes with wet sponge coating. According to previous studies, stimulation of the left posterior lateral prefrontal cortex improves cognitive functions such as decision making, attention and working memory. Therefore, to stimulate this area, the anode electrode is placed on the F3 point according to the international 10-20 system, and the cathode electrode is placed on the opposite supraorbital area. To reduce skin resistance, the desired area is cleaned with cotton and alcohol as much as possible. The intensity of the stimulation will be 2 mA and its duration will be 10 minutes. The current first increased during the first 30 seconds to reach 2 mA and this value is maintained during 10 minutes until the last 30 s, that it reduces to 0. During the application of the current and also after its completion, the physical and mental conditions of the patient will be checked and if any side effects or discomfort are reported, the application of the current will be stopped if necessary. People in the posture slump group receive it in one of the three sessions of participating in the study, before typing.

**Category**

Treatment - Other

## Recruitment centers

### 1

**Recruitment center****Name of recruitment center**

Tehran university of medical science

**Full name of responsible person**

Zahra Abdollahzade

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Biomechanics Laboratory, school of Rehabilitation,  
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Elkhebal St., Tehran

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## Sponsors / Funding sources

## 1

### Sponsor

**Name of organization / entity**

Tehran University of Medical Sciences

**Full name of responsible person**

Dr. Mohammad Reza Hadian

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Central office of TUMS, corner of Ghods st., Keshavarz blvd.,Tehran

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rehabilitation@tums.ac.ir

**Grant name****Grant code / Reference number****Is the source of funding the same sponsor organization/entity?**

Yes

**Title of funding source**

Tehran 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**

Tehran University of Medical Sciences

**Full name of responsible person**

Zahra Abdollahzade

**Position**

PhD student

**Latest degree**

Master

**Other areas of specialty/work**

Physiotherapy

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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**

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

**Informed Consent Form**

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

**Clinical Study Report**

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

**Analytic Code**

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

**Data Dictionary**

Not applicable