Clinical Trial Protocol
Iranian Registry of Clinical Trials

10 Jun 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 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-exprimental 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)

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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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Sponsors / Funding sources

1

Sponsor

Name of organization / entity
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Full name of responsible person
Dr. Mohammad Reza Hadian

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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
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
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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