

Clinical Trial Protocol

Iranian Registry of Clinical Trials

10 Jun 2026

Assessment of performance in elite athletes (bodybuilders) through transcranial direct current stimulation; A quantitative electroencephalography and surface electromyography included investigation

Protocol summary

Study aim

Assessment of performance in elite athletes (bodybuilders) through transcranial direct current stimulation; A quantitative electroencephalography and surface electromyography included investigation

Design

Two arm parallel group randomised trial with blinded postoperative care and outcome assessment.

Settings and conduct

40 professional bodybuilders were randomly assigned to two arms receiving either sham or real tDCS for 13 minutes in the first session. After 72 hours, both groups received the inverse stimulation. After the brain stimulation, cerebral hemodynamic response (using frontopolar hemoencephalography) was examined upon taking three computer-based cognitive tasks i.e. reasoning, memory and verbal ability using the Cambridge Brain Science-Cognitive Platform. Subsequently, the bodybuilders performed knee extension exercise while performance indicators including maximal muscular strength (1RM), muscular endurance (SEI), heart rate (ECG), motivation (VAS), surface electromyography over quadriceps femoris muscle (sEMG) and perceived exertion (RPE) were evaluated.

Participants/Inclusion and exclusion criteria

Those who enrolled in the study were males aging 18 to 40 with weight between 60 to 120 kg who were regularly training weightlifting exercise (at least 3 times a week) not on doping drugs for at least 3 months prior to enrollment.

Intervention groups

Sham and tDCS

Main outcome variables

Investigation of Transcranial Direct Current Stimulation in athletes

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20181104041543N1**

Registration date: **2018-12-23, 1397/10/02**

Registration timing: **retrospective**

Last update: **2018-12-23, 1397/10/02**

Update count: **0**

Registration date

2018-12-23, 1397/10/02

Registrant information

Name

Ali-Mohammad Kamali

Name of organization / entity

Country

Iran (Islamic Republic of)

Phone

+98 71 3628 8814

Email address

ali.kamali321@gmail.com

Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2017-04-03, 1396/01/14

Expected recruitment end date

2018-10-22, 1397/07/30

Actual recruitment start date

2017-04-03, 1396/01/14

Actual recruitment end date

2018-11-04, 1397/08/13

Trial completion date

2018-11-04, 1397/08/13

Scientific title

Assessment of performance in elite athletes (bodybuilders) through transcranial direct current stimulation; A quantitative electroencephalography and surface electromyography included investigation

Public title

Assessment of performance in elite athletes through transcranial direct current stimulation

Purpose

Supportive

Inclusion/Exclusion criteria

Inclusion criteria:

males aging 18 to 40 not on doping drugs for at least 3 months prior to enrollment. Weight between 60 to 120 kg who were regularly training weightlifting exercise (at least 3 times a week) The participants were assured not to have psychological or neurological disorders or a history of alcohol or drug use.

Exclusion criteria:

Age

From **18 years** old to **40 years** old

Gender

Male

Phase

N/A

Groups that have been masked

- Participant
- Investigator
- Outcome assessor
- Data analyser

Sample size

Target sample size: **40**

Actual sample size reached: **40**

Randomization (investigator's opinion)

Randomized

Randomization description

A researcher who was blinded to data collection process randomly assigned the participants to sham and real tDCS arms using consecutive randomization.

Blinding (investigator's opinion)

Double blinded

Blinding description

A researcher who was blinded to data collection process randomly assigned the participants to sham and real tDCS arms using consecutive randomization.

Placebo

Used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Ethics committee of Shiraz University of Medical Sciences

Street address

School of Medicine, Imam Hussain Square, Zand St., Shiraz, Iran

City

Shiraz

Province

Fars

Postal code

7184737798

Approval date

2017-04-03, 1396/01/14

Ethics committee reference number

IR.SUMS.REC.1396.147

Health conditions studied

1

Description of health condition studied

Transcranial Direct Current Stimulation to Enhance Athletic Performance Outcome in Professional Bodybuilders

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description

One-Repetition Maximum (1RM)

Timepoint

Data were obtained over two sessions with the interval of 72 hours

Method of measurement

Epley formula

2

Description

Surface Electromyography (sEMG)

Timepoint

Data were obtained over two sessions with the interval of 72 hours

Method of measurement

Electromyography device

3

Description

Heart Rate (HR) recording

Timepoint

Data were obtained over two sessions with the interval of 72 hours

Method of measurement

Electrocardiography

4

Description

Cognitive performance

Timepoint

Data were obtained over two sessions with the interval of 72 hours

Method of measurement

Cambridge Brain Science Cognitive Platform

5

Description

Brain map

Timepoint

Data were obtained over two sessions with the interval of 72 hours

Method of measurement

Quantitative electroencephalography

Secondary outcomes

empty

Intervention groups

1

Description

Intervention group: Transcranial Direct Current Stimulation

Category

Rehabilitation

2

Description

Control group: Placebo stimulants

Category

Placebo

Recruitment centers

1

Recruitment center

Name of recruitment center

Bodybuilding gyms across the city of Shiraz

Full name of responsible person

Mohammad Nami

Street address

School of Medicine, Imam Hussain Square, Zand St., Shiraz, Iran

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71348-14336

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Sponsors / Funding sources

1

Sponsor

Name of organization / entity

Shiraz University of Medical Sciences

Full name of responsible person

Younes Ghasemi

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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

Shiraz 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

Shiraz University of Medical Sciences

Full name of responsible person

Ali-Mohammad Kamali

Position

PhD candidate

Latest degree

Master

Other areas of specialty/work

Neuroscience

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Person responsible for scientific inquiries

Contact

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Full name of responsible person
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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

The all potential data can be shared after unidentifiable people

When the data will become available and for how long

Six months after the publication of the article

To whom data/document is available

Only for researchers

Under which criteria data/document could be used

For research

From where data/document is obtainable

ali.kamali321@gmail.com

What processes are involved for a request to access data/document

10 Day

Comments