Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 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 divice

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
Street address
Central building of Shiraz University of Medical Sciences Zand St., Shiraz, Iran
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vcrdep@sums.ac.ir
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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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