Clinical Trial Protocol
Iranian Registry of Clinical Trials

07 Nov 2026

The effect of daily resistance training scheduling and caffeine supplementation on training-induced adaptations in men who perform recreational resistance training

Protocol summary

Study aim

The primary aim of this study is to determine the independent and interactive effects of training time of day and caffeine supplementation on resistance training-induced changes in skeletal muscle hypertrophy, body composition, maximal strength, muscular endurance, and neuromuscular performance.

Design

A randomized, double-blind, placebo-controlled, parallel-group, phase 3 study on 100 men. The RAND function of Excel will be used for randomization.

Settings and conduct

One hundred caffeine-naive, recreationally resistance-trained men will be randomly assigned to CAFRTm, PLARTm, CAFRTe, or PLARTe. Following a familiarization session, participants will complete 12 weeks of supervised resistance training (3 sessions/week; 70–85% 1RM). The study will be conducted in Ankara, Turkey.

Participants/Inclusion and exclusion criteria

Inclusion criteria: recreationally resistance-trained men with 6-12 months of experience; aged between 18 and 35 years; naïve-caffeine consumers. Exclusion criteria: suffering from pathology or injury, using medications, supplements, or ergogenic aids, and missing >5% of training trials.

Intervention groups

1. caffeine (4 mg/kg) plus resistance training in the morning (CAFRTm); 2. placebo plus resistance training in the morning (PLARTm); 3. caffeine (4 mg/kg) plus resistance training in the evening (CAFRTe); or 4. placebo plus resistance training in the evening (PLARTe).

Main outcome variables

Body composition, muscle morphology, and muscular strength will be assessed at pre-test and post-test.

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20231004059615N10**
Registration date: **2026-08-23, 1405/06/01**
Registration timing: **prospective**

Last update: **2026-08-23, 1405/06/01**
Update count: **0**

Registration date

2026-08-23, 1405/06/01

Registrant information

Name

Davar Khodadadi

Name of organization / entity

Country

Iran (Islamic Republic of)

Phone

+98 21 2263 3583

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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2026-09-01, 1405/06/10

Expected recruitment end date

2026-09-10, 1405/06/19

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title
The effect of daily resistance training scheduling and caffeine supplementation on training-induced adaptations in men who perform recreational resistance training

Public title
The effect of daily resistance training scheduling and caffeine supplementation on training-induced adaptations

Purpose
Basic scienece

Inclusion/Exclusion criteria

Inclusion criteria:
Recreationally resistance-trained men; Resistance-training experience ≥6 months and ≤1 year; BMI 18.5–25 kg/m²; Naive caffeine consumers (<25 mg/day).

Exclusion criteria:
Suffering from pathology or injury; Taking any medications or nutritional supplements within the past three months; Missing > 5% of the training trials; A history of caffeine intolerance.

Age
From **18 years** old to **35 years** old

Gender
Male

Phase
3

Groups that have been masked

- Participant
- Investigator
- Outcome assessor
- Data analyser

Sample size
Target sample size: **100**

Randomization (investigator's opinion)
Randomized

Randomization description
To minimize potential differences between groups, participants will first be grouped based on their average 1-rep maximum strength in the back squat and bench press. The names of the subjects in each group will be entered into an Excel column; each subject will be randomly assigned a number using the RAND function; then, the numbers will be sorted from smallest to largest. Subjects in each group will then be randomly assigned to one of four groups in a 1:1:1:1 ratio: caffeine plus exercise in the morning, placebo plus exercise in the morning, caffeine plus exercise in the evening, or placebo plus exercise in the evening.

Blinding (investigator's opinion)
Double blinded

Blinding description
Someone outside the study will prepare the supplement and placebo and will not be known to the participants or researchers until after the data analysis. Also, subjects will receive the supplement and placebo in an opaque capsule with a completely similar appearance and weight, and at the same time of day.

Placebo
Used

Assignment
Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee
Ethics Committee of the International Science and Technology University

Street address
F Block Office, Metromal Business , Dumlupinar 30 Agustos Cad No:2, Tunahan Neighborhood

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Ankara

Postal code
21,06824

Approval date
2026-08-12, 1405/05/21

Ethics committee reference number
202608-03

Health conditions studied

1

Description of health condition studied
Resistance Training Adaptations

ICD-10 code

ICD-10 code description

2

Description of health condition studied
Circadian Rhythm

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description
Skeletal muscle hypertrophy

Timepoint
Pre-test and post-test

Method of measurement
By an ultrasound instrument

2

Description
Body composition

Timepoint
Pre-test and post-test

Method of measurement

By dual-energy X-ray absorptiometry

3

Description
Mascular strength
Timepoint
Pre-test and post-test
Method of measurement
By one repetition maximum (1RM) test

Secondary outcomes

1

Description
Muscular endurance
Timepoint
Pre-test and post-test
Method of measurement
By a repetitions-to-failure test on the back squat using a load corresponding to 60% of 1RM

2

Description
Serum concentrations of total testosterone
Timepoint
Pre-test and post-test
Method of measurement
By enzyme-linked immunosorbent assay (ELISA) kits

3

Description
Cumulative training volume-load
Timepoint
During the intervention period (all training sessions)
Method of measurement
Calculated as the sum of lifted load using the formula (kilograms × repetitions × sets) accumulated during each training session.

4

Description
Serum concentrations of free testosterone
Timepoint
Pre-test and post-test
Method of measurement
By enzyme-linked immunosorbent assay (ELISA) kits

5

Description
Serum concentrations of IGF-1
Timepoint
Pre-test and post-test
Method of measurement
By enzyme-linked immunosorbent assay (ELISA) kits

6

Description
Serum concentrations of cortisol
Timepoint
Pre-test and post-test
Method of measurement
By enzyme-linked immunosorbent assay (ELISA) kits

7

Description
Serum concentrations of Insulin
Timepoint
Pre-test and post-test
Method of measurement
By enzyme-linked immunosorbent assay (ELISA) kits

8

Description
Serum concentrations of IL-6
Timepoint
Pre-test and post-test
Method of measurement
By enzyme-linked immunosorbent assay (ELISA) kits

9

Description
Serum concentrations of C-reactive protein
Timepoint
Pre-test and post-test
Method of measurement
By enzyme-linked immunosorbent assay (ELISA) kits

10

Description
Serum glucose
Timepoint
Pre-test and post-test
Method of measurement
Will be quantified by the enzymatic hexokinase method.

11

Description
Catecholamine response to caffeine and exercise
Timepoint
Pre-test and post-test
Method of measurement
By enzyme-linked immunosorbent assay (ELISA) kits

Intervention groups

1

Description
First intervention group: caffeine (4 mg/kg) plus resistance training (3 sessions/week) in the morning (CAFRTm);
Category

Lifestyle

2

Description
Control group: placebo plus resistance training (3 sessions/week) in the morning (PLARTm);
Category
Placebo

3

Description
Second intervention group: caffeine (4 mg/kg) plus resistance training (3 sessions/week) in the evening (CAFRTe);
Category
Lifestyle

4

Description
Third intervention group: placebo plus resistance training (3 sessions/week) in the evening (PLARTe).
Category
Placebo

Recruitment centers

1

Recruitment center
Name of recruitment center
International University of Science and Technology
Full name of responsible person
Heidar Sajedi
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F Block Office, Metromal Business , Dumlupinar 30 Agustos Cad No:2, Tunahan Neighborhood
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Sponsors / Funding sources

1

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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
International University of Science and Technology
Proportion provided by this source
100
Public or private sector
Private
Domestic or foreign origin
Foreign
Category of foreign source of funding
Sponsor: country of origin
Country of origin
IR
Type of organization providing the funding
Academic

Person responsible for general inquiries

Contact
Name of organization / entity
Islamic Azad University
Full name of responsible person
Davar Khodadadi
Position
Assistant professor
Latest degree
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Physiology
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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
Not applicable

Informed Consent Form
No - There is not a plan to make this available

Clinical Study Report
Not applicable

Analytic Code
Not applicable

Data Dictionary
Not applicable

Title and more details about the data/document
All data collected during the study will be shareable after de-identifying the subjects.

When the data will become available and for how long
The data will be published after the extracted articles are accepted.

To whom data/document is available
All people

Under which criteria data/document could be used
All data collected during the study will be shareable after de-identifying the subjects. The requester will only be permitted to use the data for meta-analysis reviews.

From where data/document is obtainable
Corresponding author: Davar Khodadadi, Faculty of Physical Education and Sports Sciences, Islamic Azad University Central Tehran Branch, Tehran, Iran. Email: davar.khodadadi@yahoo.com

What processes are involved for a request to access data/document
Sending an email request to the corresponding author: Davar Khodadadi, Email: davar.khodadadi@yahoo.com

Comments