# Clinical Trial Protocol
# Iranian Registry of Clinical Trials

08 Nov 2026

## Effect of Different Intensities of Aerobic Exercise Combined with Resistance Exercise and Cinnamon Consumption on Meteorin-like protein (Metrnl), Irisin and Inflammatory Factors in Diabetic Women

## Protocol summary

**Study aim**

This study aimed to investigate the impact of varying intensities of aerobic exercise, resistance exercise, and cinnamon consumption on Metrn-like protein (Metrnl), irisin, and inflammatory markers in diabetic women.

**Design**

54 women with type 2 diabetes from Nowshahr were randomly divided into six groups: Control+placebo, moderate intensity aerobic exercise + resistance exercise, high intensity aerobic exercise + resistance exercise, cinnamon, moderate intensity aerobic exercise + resistance exercise + cinnamon and high intensity aerobic exercise + resistance training + cinnamon. Training groups do aerobic-resistance exercises five times a week for eight weeks. The cinnamon supplement consuming groups took 1000 mg daily for eight weeks after breakfast and lunch.

**Settings and conduct**

Intervention Research, Noshahr City, the research site is Takhti Sports Club, which has already been coordinated. In this research, people who work with subjects are blinded.

**Participants/Inclusion and exclusion criteria**

Having type 2 diabetes (people who had a history of fasting glucose higher than 126 mg/dL with HbA1c higher than 6.5% and were under the supervision of a doctor at the time of the research). Not having cardiovascular diseases. Not having musculoskeletal diseases. Not having metabolic diseases limiting sports activity. Not suffering from high blood pressure disease. Not having a history of regular sports activity in the last six months. They did not use insulin. Age range in the range of 50-65 years.

**Intervention groups**

Different Intensities of Aerobic Exercise Combined with Resistance Exercise and Cinnamon Consumption

**Main outcome variables**

Effect of training with cinnamon on indexes such as: Metrnl, Irisin, PGC-1α, TNF-α,TGF-β , IL-2 , IL-10 , HbA1C.

## General information

**Reason for update**

**Acronym**

**IRCT registration information**

IRCT registration number: **IRCT20140415017288N12**
Registration date: **2024-09-07, 1403/06/17**
Registration timing: **registered_while_recruiting**

Last update: **2024-09-07, 1403/06/17**
Update count: **0**

**Registration date**

2024-09-07, 1403/06/17

**Registrant information**

**Name**
Ahmad Abdi

**Name of organization / entity**
Ayatollah Amoli Branch, Islamic Azad University

**Country**
Iran (Islamic Republic of)

**Phone**
+98 11 4321 7126

**Email address**
a.abdi@iauamol.ac.ir

**Recruitment status**

**Recruitment complete**

**Funding source**

**Expected recruitment start date**

2024-08-15, 1403/05/25

**Expected recruitment end date**

2024-09-15, 1403/06/25

**Actual recruitment start date**

empty

**Actual recruitment end date**
empty
**Trial completion date**
empty

**Scientific title**
Effect of Different Intensities of Aerobic Exercise Combined with Resistance Exercise and Cinnamon Consumption on Meteorin-like protein (Metrnl), Irisin and Inflammatory Factors in Diabetic Women

**Public title**
Effect of Exercise and Cinnamon on Diabetic Women
**Purpose**
Health service research
**Inclusion/Exclusion criteria**
**Inclusion criteria:**
Type 2 diabetes (people with a history of more than twice the fasting glucose above 126 mg / dL with HbA1c above 6.5% and under the supervision of a physician at the time of the study). Subjects were asked to complete a questionnaire of readiness to start sports. Lack of cardiovascular, Lack of musculoskeletal, Lack of metabolic diseases limited exercise, lack of high blood pressure, lack of a history of regular exercise during the past six months, lack of insulin. Age range in the range of 35-50 years. Inactive lifestyle (exercise less than 1 hour per week). Consent to participate in the study.
**Exclusion criteria:**
Use of drugs that lower blood pressure and blood lipids Exclusion criteria included a history of serious diabetic complications (such as proliferative diabetic retinopathy, stage 3 or subsequent overt nephropathy, diabetic ketoacidosis or severe diabetic neuropathy). fasting glucose above 270 mg / dL malaise Hereditary absorption of glucose and galactose or renal glycosuria. Detection of other underlying diseases during the implementation of the protocol, such as cardiopulmonary problems and musculoskeletal disorders during exercise that prevent the performance of the activity.
**Age**
From **35 years** old to **50 years** old
**Gender**
Female

**Phase**
3
**Groups that have been masked**

- Participant

**Sample size**
Target sample size: **54**
**Randomization (investigator's opinion)**
Randomized
**Randomization description**
In this research, subjects are selected Simple randomization by random allocation rule. After determining the sample size, they will be equally divided into 6 groups (Control, moderate-intensity aerobic training + resistance training, high-intensity aerobic training + resistance training, cinnamon, moderate-intensity aerobic training + resistance training + cinnamon and high-intensity aerobic training + resistance training + cinnamon). Using the lottery method, the names of the subjects are written on separate papers and placed in a container, then the names of the subjects are randomly taken out and placed in the intervention groups or placebo, respectively.
**Blinding (investigator's opinion)**
Single blinded
**Blinding description**
Each capsule will contain 500 mg of cinnamon powder, and each subject will receive one capsule in the morning immediately after breakfast and one capsule after lunch, and the control and exercise groups will receive the same amount of placebo. Starch is used as a placebo.
**Placebo**
Used
**Assignment**
Parallel
**Other design features**

## Secondary Ids

empty

## Ethics committees

### 1

**Ethics committee**
**Name of ethics committee**
Ethics Committee of Islamic Azad University - Ayatollah Amoli Branch
**Street address**
Islamic Azad University, Ayatollah Amoli branch, Komdareh village, km 5 of the old Amol-Babol road.
**City**
Amol
**Province**
Mazandaran
**Postal code**
3358-461514
**Approval date**
2024-07-12, 1403/04/22
**Ethics committee reference number**
IR.IAU.AMOL.REC.1403.099

## Health conditions studied

### 1

**Description of health condition studied**
Type 2 Diabetes
**ICD-10 code**
E11
**ICD-10 code description**
Type 2 diabetes mellitus

## Primary outcomes

### 1

**Description**

Effect of training and cinnamon supplementation on Metrnl

**Timepoint**

Before and after the protocol

**Method of measurement**

Biochemical and laboratory methods

**2**

**Description**

Effect of training and cinnamon supplementation on Irisin

**Timepoint**

Before and after the protocol

**Method of measurement**

Biochemical and laboratory methods

**3**

**Description**

Effect of training and cinnamon supplementation on PGC-1α

**Timepoint**

Before and after the protocol

**Method of measurement**

Biochemical and laboratory methods

**4**

**Description**

Effect of training and cinnamon supplementation on TNF-α

**Timepoint**

Before and after the protocol

**Method of measurement**

Biochemical and laboratory methods

**5**

**Description**

Effect of training and cinnamon supplementation on TGF-β

**Timepoint**

Before and after the protocol

**Method of measurement**

Biochemical and laboratory methods

**6**

**Description**

Effect of training and cinnamon supplementation on IL-2

**Timepoint**

Before and after the protocol

**Method of measurement**

Biochemical and laboratory methods

**7**

**Description**

Effect of training and cinnamon supplementation on IL-10

**Timepoint**

Before and after the protocol

**Method of measurement**

Biochemical and laboratory methods

## Secondary outcomes

empty

## Intervention groups

**1**

**Description**

Intervention group 1: We will consider this group as the control group.

**Category**

Placebo

**2**

**Description**

Intervention group 2: Moderate-intensity aerobic training+resistance training group (In this group, for 8 weeks, five session/weeks, the training start with 10 minutes of warm-up. Aerobic exercise with an intensity of 50% VO2max is performed along with TRX exercise. The total energy of exercise is about 400 kcal).

**Category**

Treatment - Other

**3**

**Description**

Intervention group 3: High-intensity aerobic training+resistance training group (In this group, for 8 weeks, five session/weeks, the training start with 10 minutes of warm-up. Aerobic exercise with an intensity of 80% VO2max is performed along with TRX exercise. The total energy of exercise is about 400 kcal).

**Category**

Treatment - Other

**4**

**Description**

Intervention group 4: Cinnamon supplementation group (in this group eat 1000 mg of cinnamon supplementation for eight weeks Twice a day after breakfast and lunch)

**Category**

Treatment - Other

**5**

**Description**

Intervention group 5: Moderate-intensity aerobic training+resistance training+cinnamon group (In this group the Simultaneous intervention, moderate-intensity aerobic training+resistance training+cinnamon, will treat with the same protocol that describe at the previous part).

**Category**

Treatment - Other

**6**

**Description**

Intervention group 6: High-intensity aerobic

training+resistance training+cinnamon group (In this group the Simultaneous intervention, high-intensity aerobic training+resistance training+cinnamon, will treat with the same protocol that describe at the previous part).

**Category**
Treatment - Other

## Recruitment centers

**1**

**Recruitment center**

**Name of recruitment center**
Noshahr Diabetes Association
**Full name of responsible person**
Ahmad Abdi
**Street address**
Ayatollah Amoli Branch, Islamic Azad University
**City**
Amol
**Province**
Mazandaran
**Postal code**
4616716187
**Phone**
+98 11 4321 7126
**Fax**
+98 11 4321 7009
**Email**
a.abdi58@gmail.com

## Sponsors / Funding sources

**1**

**Sponsor**

**Name of organization / entity**
Islamic Azad University
**Full name of responsible person**
AsiehAbbassi Daloii
**Street address**
Ayatollah Amoli Branch, Islamic Azad University
**City**
Amol
**Province**
Mazandaran
**Postal code**
4616716187
**Phone**
+98 11 4321 7126
**Email**
abbasi.daloii@gmail.com

**Grant name**
**Grant code / Reference number**
**Is the source of funding the same sponsor organization/entity?**
Yes
**Title of funding source**
Islamic Azad University
**Proportion provided by this source**
100
**Public or private sector**
Private
**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**
Islamic Azad University
**Full name of responsible person**
Ahmad Abdi
**Position**
Associate Professor
**Latest degree**
Ph.D.
**Other areas of specialty/work**
Sport Medicine
**Street address**
Ayatollah Amoli Branch, Islamic Azad University
**City**
Amol
**Province**
Mazandaran
**Postal code**
461671618
**Phone**
+98 11 4321 7126
**Email**
A.abdi@iauamol.ac.ir

## Person responsible for scientific inquiries

**Contact**

**Name of organization / entity**
Islamic Azad University
**Full name of responsible person**
Alireza Barari
**Position**
Associate Professor
**Latest degree**
Ph.D.
**Other areas of specialty/work**
Sport Medicine
**Street address**
Ayatollah Amoli Branch, Islamic Azad University
**City**
Amol
**Province**
Mazandaran
**Postal code**
4616716187
**Phone**
+98 11 4321 7126
**Email**
Alireza54.barari@gmail.com

## Person responsible for updating data

**Contact**

**Name of organization / entity**
Islamic Azad University

**Full name of responsible person**
Ahmad Abdi

**Position**
Associate Professor

**Latest degree**
Ph.D.

**Other areas of specialty/work**
Sport Medicine

**Street address**
Ayatollah Amoli Branch, Islamic Azad University

**City**
Amol

**Province**
Mazandaran

**Postal code**
4616716187

**Phone**
+98 11 4321 7126

**Email**
A.abdi@iauamol.ac.ir

## Sharing plan

**Deidentified Individual Participant Data Set (IPD)**
Yes - There is 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**
Not applicable

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

**Clinical Study Report**
No - There is not a plan to make this available

**Analytic Code**
Not applicable

**Data Dictionary**
Not applicable

**Title and more details about the data/document**
The report is submitted to the research department of the university. Also published as a paper.

**When the data will become available and for how long**
Since 2025

**To whom data/document is available**
All researchers

**Under which criteria data/document could be used**
Citing references

**From where data/document is obtainable**
Scientific bases and Ayatollah Amoli Branch, Islamic Azad University, amol, Iran

**What processes are involved for a request to access data/document**
Maximum one week

**Comments**