Clinical Trial Protocol
Iranian Registry of Clinical Trials

02 Nov 2026

Comparison of the effect of 8 weeks of endurance and resistance training on fibroblast growth factor 21 (FGF21) and insulin resistance in type 2 diabetic women.

Protocol summary

Study aim

Comparison of the effect of 8 weeks of endurance and resistance training on fibroblast growth factor 21(FGF21) and insulin resistance in type 2 diabetic women.

Design

Clinical practice with endurance group, resistance group and community-based control group, with parallel and random groups.

Settings and conduct

Before the beginning of the practice protocol, a session was organized for the subjects to familiarize with the exercises. Each training session starts with 10 minutes warming and ends up cooling for 10 minutes. The first group received aerobic exercise in the first two weeks for 20 minutes and with 50% heart rate, at the third and fourth week for 30 minutes with 50% heart rate, fifth and sixth weeks for 30 minutes with 60% heart rate and performs at 7th and 8th week for 35 minutes and with 60% heart rate. Resistance exercises are performed using bodybuilding machines in the first and second weeks in two sets and from the third week to the end of the course in three sets with 75% intensity of one maximum repetition.

Participants/Inclusion and exclusion criteria

Inclusion criteria: Having diabetes for more than a year; Having a low life; Use of hypoglycemic drugs; Non-compliance criteria: Having secondary complications of diabetes such as ocular complications, kidney problems; Having cardiovascular and inflammatory diseases; Having physical impairment.

Intervention groups

The endurance group, performs aerobic exercises for 8 weeks and three sessions per week. In the resistance group, the exercises perform with 75% intensity of one maximum repetition using bodybuilding machines. The control group does not have any training.

Main outcome variables

Insulin; Glucose; Insulin resistance; Fibroblast growth factor 21; Body fat percentage; Maximum Oxygen Consumption; Body composition (BMI);

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20180721040542N1**
Registration date: **2018-10-15, 1397/07/23**
Registration timing: **retrospective**

Last update: **2018-10-15, 1397/07/23**
Update count: **0**

Registration date

2018-10-15, 1397/07/23

Registrant information

Name

Mahbobe Khorsand

Name of organization / entity

Country

Iran (Islamic Republic of)

Phone

+98 51 5525 8277

Email address

M_khorsand2012@shahroodut.ac.ir

Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2016-12-30, 1395/10/10

Expected recruitment end date

2017-02-28, 1395/12/10

Actual recruitment start date

empty

Actual recruitment end date
empty
Trial completion date
empty

Scientific title
Comparison of the effect of 8 weeks of endurance and resistance training on fibroblast growth factor 21 (FGF21) and insulin resistance in type 2 diabetic women.

Public title
The effect of endurance and resistance training on diabetes
Purpose
Supportive
Inclusion/Exclusion criteria
Inclusion criteria:
According to a physician's diagnosis, they have more than one year of type 2 Diabetes Have a low mobility Use only Glucose-lowering drugs (Metformin)
Exclusion criteria:
Have be Secondary complications of diabetes, such as ocular, kidney complications Have be cardiovascular and inflammatory diseases Have a physical injury
Age
From **40 years** old to **60 years** old
Gender
Female

Phase
N/A
Groups that have been masked
No information
Sample size
Target sample size: **45**
Randomization (investigator's opinion)
Randomized
Randomization description
The randomization is that people based on finger blood glucose are divided into three groups. So that the average blood glucose in each group is similar.
Blinding (investigator's opinion)
Not blinded
Blinding description
Placebo
Not used
Assignment
Parallel
Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee
Name of ethics committee
Shahroud University of Medical Sciences
Street address
Shahroud, Seventh Tir Square, Shahrood University of Medical Sciences
City
Shahroud
Province
Semnan
Postal code
36147-73947
Approval date
2018-07-02, 1397/04/11
Ethics committee reference number
IR.SHMU.REC.1397.071

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
Fibroblast growth factor 21
Timepoint
Blood samples were taken at once in the first stage(pre-test) and secondly(post-test) after 8 weeks of exercise.
Method of measurement
Fibroblast growth factor factor 21 kit

2

Description
Insulin resistance
Timepoint
Blood samples were taken once in the first stage(pre-test) and the second time(post-test) after 8 weeks of training.
Method of measurement
Formula for evaluation of insulin resistance homeostasis model(HOMA-IR)

Secondary outcomes

1

Description
Glucose
Timepoint
Blood samples were taken once in the first stage (pre-test) and the second time (post-test) after 8 weeks of training.
Method of measurement
Glucose Kit and Colorimetric Enzymatic Method

2

Description
Insulin
Timepoint
Blood samples were taken once in the first stage (pre-test) and the second time (post-test) after 8 weeks of training.
Method of measurement
Insulin kit and Elisa method

Intervention groups

1

Description
The endurance group performed aerobic exercises in the first two weeks for 20 minutes at 50% heart rate, and at 3rd and 4th weeks for 30 minutes with 50% heart rate, and fifth and sixth weeks for 30 minutes with 60% heart rate and In the last two weeks, they perform for 35 minutes with 60% heart rate. To determine the intensity of exercise, the maximum heart rate was calculated with the formula of 220 - age. Resilience group performed at the first session of resistance training for proper learning of movements, subjects with minimum weight and several sub-maximal repetitions Then, resistance exercises were performed using bodybuilding machines in the first and second weeks in two sets, from the third week to the end The course is carried out in three sets with a intensity of 75% one maximum repetition.
Category
Other

Recruitment centers

1

Recruitment center
Name of recruitment center
Shahrood Diabetes Center
Full name of responsible person
Ali Hassani
Street address
Shahrood, 22 Bahman Avenue, Shahid Madani Alley, in front of Rasoul Akram Doctors' Building
City
Shahrood
Province
Semnan
Postal code
1355936735
Phone
+98 23 3224 0535
Email
info@shahroodut.ac.ir

Sponsors / Funding sources

1

Sponsor
Name of organization / entity
Shahrood University of Technology
Full name of responsible person
Mohammad Mehdi Fateh
Street address
Shahroud Square, Haft-e-Tir Square, Shahrood University of Technology
City
Shahroud
Province
Semnan
Postal code
3619995161
Phone
+98 23 3239 2204
Fax
+98 23 3239 2204
Email
info@shahroodut.ac.ir
Grant name
Grant code / Reference number
Is the source of funding the same sponsor organization/entity?
Yes
Title of funding source
Shahrood University of Technology
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
Shahroud University of Medical Sciences
Full name of responsible person
Mahbobe Khorsand
Position
Student
Latest degree
Master
Other areas of specialty/work
Physiology
Street address
Units2, number5, Khordad1 avenue
City
Kashmar
Province
Razavi Khorasan
Postal code
96719-98144
Phone
+98 51 5525 8277
Fax

Email
mahbobekhorsand@gmail.com

Person responsible for scientific inquiries

Contact
Name of organization / entity
Shahroud University of Medical Sciences
Full name of responsible person
Mahbobe Khorsand
Position
Student
Latest degree
Master
Other areas of specialty/work
Physiology
Street address
Units2, number5, Khordad1 avenue
City
Kashmar
Province
Razavi Khorasan
Postal code
96719-98144
Phone
+98 51 5525 8277
Fax
Email
mahbobekhorsand@gmail.com

Person responsible for updating data

Contact
Name of organization / entity
Shahroud University of Medical Sciences
Full name of responsible person
Mahbobe Khorsand
Position
Student
Latest degree
Master
Other areas of specialty/work
Physiology
Street address
Units2, number5, Khordad1 avenue
City
Kashmar
Province
Razavi Khorasan
Postal code
96719-98144
Phone
+98 51 5525 8277
Fax
Email
mahbobekhorsand@gmail.com

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
Undecided - It is not yet known if there will be a plan to make this available