Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

The effect of resistance exercise with blood flow restriction and aerobic exercise order on post-exercise hypotension, cardiovascular parameters, plasma Lactate and nitric oxide in overweight and obese postmenopausal women

Protocol summary

Study aim

The aim of the present study is to investigate the effect of resistance exercise with blood flow restriction and aerobic exercise order on post-exercise hypotension, some cardiovascular parameters, plasma Lactate and nitric oxide and perceived responses in overweight and obese postmenopausal women.

Design

Twelve postmenopausal women with overweight or obesity will participate in a randomized crossover study and complete three intervention sessions, with a 7-day washout period between sessions.

Settings and conduct

The intervention sessions will be conducted at the Exercise Physiology Laboratory of the University of Guilan.

Participants/Inclusion and exclusion criteria

Women aged 50 to 65 years Postmenopausal status, defined as more than 12 months since the last menstrual period, and not receiving hormone therapy Body mass index (BMI) between 25 and 34 kg/m² No smoking or alcohol consumption Physically inactive, with no participation in regular physical activity during the previous 6 months, according to the International Physical Activity Questionnaire (IPAQ) No cardiovascular, pulmonary, or metabolic diseases, or musculoskeletal or joint problems that limit movement, such as knee osteoarthritis or spinal injuries No hypertension, defined as systolic blood pressure >140 mmHg and/or diastolic blood pressure >90 mmHg No use of medications affecting blood pressure or heart rate, such as beta-blockers or calcium antagonists

Intervention groups

1. Resistance exercise with BFR following aerobic exercise 2. Aerobic exercise following resistance exercise with BFR 3. Control session consisting seated in rest

Main outcome variables

post-exercise hypotension; mean arterial pressure, double product, heart rate variability, plasma lactate, plasma nitric oxide

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20260509069308N2**
Registration date: **2026-09-14, 1405/06/23**
Registration timing: **retrospective**

Last update: **2026-09-14, 1405/06/23**
Update count: **0**

Registration date

2026-09-14, 1405/06/23

Registrant information

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Abuzar Jorbonian
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University of guilan
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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2026-05-22, 1405/03/01

Expected recruitment end date
2026-06-21, 1405/03/31
Actual recruitment start date
2026-05-22, 1405/03/01
Actual recruitment end date
2026-06-21, 1405/03/31
Trial completion date
empty

Scientific title
The effect of resistance exercise with blood flow restriction and aerobic exercise order on post-exercise hypotension, cardiovascular parameters, plasma Lactate and nitric oxide in overweight and obese postmenopausal women

Public title
The effect of resistance exercise with blood flow restriction and aerobic exercise order on blood pressure and cardiovascular parameters in overweight and obese postmenopausal women
Purpose
Other
Inclusion/Exclusion criteria
Inclusion criteria:
Women aged 50–65 years Being postmenopausal (more than 12 months since the last menstrual period) and not receiving hormone therapy Body mass index (BMI) between 25 and 34 kg/m² Physical inactivity and no participation in regular physical activity during the previous 6 months, according to the International Physical Activity Questionnaire (IPAQ)
Exclusion criteria:
Smoking and alcohol consumption Presence of cardiovascular, pulmonary, or metabolic diseases, or musculoskeletal or joint problems that limit movement, such as knee osteoarthritis or spinal injuries Diagnosis of hypertension (systolic blood pressure >140 mmHg and/or diastolic blood pressure >90 mmHg) Use of medications that affect blood pressure and heart rate, such as beta-blockers and calcium antagonists
Age
From **50 years** old to **65 years** old
Gender
Female

Phase
N/A
Groups that have been masked
No information
Sample size
Target sample size: **12**
More than 1 sample in each individual
Number of samples in each individual: **3**
This This study will be conducted using a crossover design, in which each participant will undergo all three interventions.
Actual sample size reached: **12**
Randomization (investigator's opinion)
Randomized
Randomization description
Participants were individually allocated using simple randomization to different sequences of the three experimental sessions. The session sequences were determined using numbered, opaque, sealed envelopes. The unit of randomization was the individual participant, and no stratified or cluster randomization was used. Allocation concealment was maintained using opaque, sealed envelopes until allocation of each participant.
Blinding (investigator's opinion)
Not blinded
Blinding description
Placebo
Not used
Assignment
Crossover
Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee
Name of ethics committee
Ethics committee of guilan university of medical sciences
Street address
Shahrak-e Qods (Gharb), between Felamk-e Jonoubi and Zarafshan, Simaye Iran Street, Central Headquarters of the Ministry of Health and Medical Education
City
Tehran
Province
Tehran
Postal code
4199613776
Approval date
2026-05-25, 1405/03/04
Ethics committee reference number
IR.GUILAN.REC.1405.046

Health conditions studied

1

Description of health condition studied
Healthy women- no disease
ICD-10 code
ICD-10 code description

Primary outcomes

1

Description
Blood pressure
Timepoint
pre and post intervention, at 0, 10, 20, 30, 40, 50, 60, 70, 80, and 90 minutes
Method of measurement

Digital blood pressure monitor (Omron HBP-1120)

2

Description
Mean arterial pressure
Timepoint
pre and post intervention, at 0, 10, 20, 30, 40, 50, 60, 70, 80, and 90 minutes
Method of measurement
Indirectly, using the formula: DBP + ⅓(SBP − DBP)

3

Description
Double product
Timepoint
pre and post intervention, at 0, 10, 20, 30, 40, 50, 60, 70, 80, and 90 minutes
Method of measurement
Indirectly calculated by multiplying heart rate by systolic blood pressure

4

Description
Heart rate variability
Timepoint
pre and post intervention, at 0-5، 5-10، 15-20، 25-30، 35-40، 45-50، 55-60، 65-70، 75-80، 85-90 minutes
Method of measurement
Polar H10 heart rate monitor belt

5

Description
Plasma lactate
Timepoint
Pre and 4 minutes post intervention
Method of measurement
biochemical kit based on the enzymatic method

6

Description
Plasma nitric oxide
Timepoint
Pre and 4 minutes post intervention
Method of measurement
NatrixTM kit based on the Griess method

Secondary outcomes

empty

Intervention groups

1

Description
Intervention group 1: Resistance exercise with blood flow restriction following aerobic exercise
Category
Other

2

Description
Intervention group 2: Aerobic exercise following resistance exercise with blood flow restriction
Category
Other

3

Description
Control group: seated rest
Category
Other

Recruitment centers

1

Recruitment center
Name of recruitment center
دانشکده تربیت بدنی و علوم ورزشی دانشگاه گیلان
Full name of responsible person
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Web page address

Sponsors / Funding sources

1

Sponsor
Name of organization / entity
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Full name of responsible person
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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
University of Guilan
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
دانشگاه گیلان
Full name of responsible person
Abuzar Jorbonian
Position
Assistant professor
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Other areas of specialty/work
Exercise physiology
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Person responsible for updating data

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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
All measured variable data will be made available upon request after anonymization
When the data will become available and for how long
6 months after publication the results
To whom data/document is available
academic researchers and university students
Under which criteria data/document could be used
scientific use for improvement and comparison with other studies is permitted

From where data/document is obtainable

Email address for contacting the researcher to request additional information: yasamiinahmadii@gmail.com

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

the requester must send the reason for using the documents to the following email address, so that after being reviewed by the researcher, a response will be provided at the earliest opportunity: yasamiinahmadii@gmail.com

Comments