

The effect and mechanism of blood flow restriction on improving visceral fat in obese young people

Submission date 22/01/2025	Recruitment status No longer recruiting	<input type="checkbox"/> Prospectively registered <input type="checkbox"/> Protocol
Registration date 28/01/2025	Overall study status Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
Last Edited 28/01/2025	Condition category Other	<input type="checkbox"/> Individual participant data <input type="checkbox"/> Record updated in last year

Plain English summary of protocol

Background and study aims

Obesity, especially the increase in visceral fat, is a major health concern worldwide. Exercise is known to improve body composition and metabolic health. Traditional moderate-intensity continuous training (MICT) helps reduce visceral fat in obese youths, but its effectiveness depends on the amount of exercise. Blood flow restriction (BFR) training, which uses a compression device to restrict blood flow, may offer a more time-effective exercise option. This study aims to explore the effects of combining low-intensity MICT with BFR on abdominal visceral fat in obese young adults.

Who can participate?

- Individuals aged 18-25 years
- Body fat percentage greater than 30%
- No long-term medication, smoking, or excessive drinking habits
- No exercise-related contraindications (e.g., cardiovascular, cerebrovascular, or respiratory diseases)

What does the study involve?

Participants will be randomly assigned to one of three groups: a no-intervention control group, a MICT intervention group, or a MICT combined with BFR intervention group. Fasting blood samples will be collected before and after the intervention to analyze plasma metabolomics and proteomics data. Participants' aerobic capacity, body composition, and abdominal fat areas will also be evaluated. Daily dietary intake and physical activity will be recorded for three weeks before the intervention and during the 12-week intervention period.

What are the possible benefits and risks of participating?

Participants may lose weight and receive a personalized exercise prescription. The main risk is delayed muscle soreness after exercise. Researchers will ensure the safety of all participants.

Where is the study run from?

The study is conducted at Ocean University of China.

When is the study starting and how long is it expected to run for?
April 2023 to December 2025

Who is funding the study?
The study is initiated and funded by the investigator.

Who is the main contact?
Prof. Shiming Li, haiyanglishiming@163.com

Contact information

Type(s)
Public, Scientific, Principal investigator

Contact name
Prof Shiming Li

ORCID ID
<https://orcid.org/0000-0002-7149-5800>

Contact details
No.238 Songling Road
Qingdao
China
266100
+86 15731114483
haiyanglishiming@163.com

Additional identifiers

Protocol serial number
OUC-HM-2023005

Study information

Scientific Title
Effect of blood flow restriction training on improving visceral fat in obese youth based on multi-omics study

Study objectives
The effect of aerobic exercise combined with blood flow restriction is better than that without combined reduction of visceral fat.

Ethics approval required
Ethics approval required

Ethics approval(s)
approved 01/06/2023, Ocean University of China (No.238 Songling Road, Qingdao, 266100, China; +86 15231509262; 21211913076@ouc.edu.cn), ref: OUC-HM-2023005

Study design

Single-blind randomized controlled trial

Primary study design

Interventional

Study type(s)

Treatment

Health condition(s) or problem(s) studied

Exercise and weight loss for obese youth

Interventions

Participants were randomly assigned to two experimental groups (M and B) and one control group (C) by drawing lots. The intervention period lasted for a total of 12 weeks, with three sessions per week. Researchers monitored the heart rate (HR) and blood oxygen saturation during exercise to ensure the safety of participants. Initially, participants were required to perform a 10-minute warm-up activity at an intensity of 50W on an aerobic power bike. Following the warm-up, participants in all exercise groups engaged in continuous exercise at 60% of their maximal oxygen uptake (VO₂max) intensity, maintaining a speed of 60±5 revolutions per minute (RPM), until they overcame a mechanical work of 200kj. A 10-minute cool-down activity was required after the exercise. B group was required to apply a 60% limb occlusive pressure (LOP) using an inflatable cuff (Ariband, Australia) at the proximal inguinal region of both legs based on the exercise protocol of M group. During exercise, the participants' subjective perceived exertion (RPE) and heart rate (HR) were recorded every 5 minutes. The C group did not receive any exercise intervention throughout the entire intervention period.

Intervention Type

Behavioural

Primary outcome(s)

Measured at baseline and after the intervention:

1. Plasma non-targeted metabolomics data is measured using liquid chromatography-mass spectrometry (LC-MS).
2. Plasma proteomics data is measured using liquid chromatography-tandem mass spectrometry (LC-MS/MS).
3. Aerobic capacity is measured using cardiopulmonary exercise testing (CPET), typically with a cycle ergometer, to determine VO₂ max (maximal oxygen uptake).
4. Body composition is measured using bioelectrical impedance analysis (BIA).
5. Abdominal subcutaneous fat area is measured using computed tomography (CT) scans.
6. Visceral fat area is measured using computed tomography (CT) scans.

Key secondary outcome(s)

Measured 3 weeks before the start of the intervention and during the 12-week intervention period:

1. Daily dietary intake measured using questionnaire every weekend.
2. Physical activity measured using questionnaire every weekend.

Completion date

01/12/2025

Eligibility

Key inclusion criteria

1. Age: 18-25 years old
2. Body fat percentage greater than 30%
3. No long-term medication, smoking, or excessive drinking habits
4. No exercise-related contraindications, such as cardiovascular and cerebrovascular diseases, respiratory system diseases, etc.

Participant type(s)

Learner/student

Healthy volunteers allowed

No

Age group

Adult

Lower age limit

18 years

Upper age limit

26 years

Sex

All

Total final enrolment

36

Key exclusion criteria

Suffering from any illness that is not suitable for participating in sports.

Date of first enrolment

15/04/2023

Date of final enrolment

15/06/2023

Locations

Countries of recruitment

China

Study participating centre

Ocean university of China

No.238 Songling Road

Qingdao

China
266100

Sponsor information

Organisation

Ocean University of China

ROR

<https://ror.org/04rdtx186>

Funder(s)

Funder type

Other

Funder Name

Investigator initiated and funded

Results and Publications

Individual participant data (IPD) sharing plan

The datasets generated and analysed during the current study will be published as a supplement to the results publication.

IPD sharing plan summary

Published as a supplement to the results publication