Clinical Trial Protocol
Iranian Registry of Clinical Trials

28 Jul 2026

Comparison of the effect of 12 weeks of plyometric and HICT training on serum levels of FGF23, KLOTHO, and Some markers related to bone metabolism in adolescent boy

Protocol summary

Study aim
comparing the effect of 12 weeks of plyometric and HICT exercises on FGF23, αKlotho, GH/IGF-1, calcitriol, serum phosphate, serum calcium and BMD and BMC and some marker related to bone in male adolescents.

Design
The current research is semi-experimental with a pre-test-post-test design along with a control group, with parallel groups, unblinded, on 66 patients, randomized by a simple lottery method, and in terms of the purpose, it is an applied-fundamental research type.

Settings and conduct
The statistical population of this study is adolescent boys of educational schools in Yazd city, 66 of them are selected based on the study entry criteria and then randomly divided into two experimental groups and one control group.

Participants/Inclusion and exclusion criteria
Written consent of students' parents for participating in this plan; Adolescent boys aged 13-15 years old. Exclusion criteria: any chronic disease; any drug use; participating in regular sports activities.

Intervention groups
intervention1: Plyometric training group - three days a week - for 12 weeks intervention2: HICT training group - three days a week - for 12 weeks intervention3: The control group does not receive any training.

Main outcome variables
Serum level of fgf23, aklotho, gh/igf-1 and calsitriol

General information

Reason for update

Acronym

IRCT registration information
IRCT registration number: **IRCT20221102056381N1**
Registration date: **2023-06-24, 1402/04/03**
Registration timing: **retrospective**

Last update: **2023-06-24, 1402/04/03**
Update count: **0**

Registration date
2023-06-24, 1402/04/03

Registrant information

Name
reyhane shokoohi

Name of organization / entity
The university of Shahrekord

Country
Iran (Islamic Republic of)

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Recruitment status
Recruitment complete

Funding source

Expected recruitment start date
2023-04-30, 1402/02/10

Expected recruitment end date
2023-05-10, 1402/02/20

Actual recruitment start date
empty

Actual recruitment end date
empty

Trial completion date
empty

Scientific title
Comparison of the effect of 12 weeks of plyometric and HICT training on serum levels of FGF23, KLOTHO, and Some markers related to bone metabolism in adolescent boy

Public title
Comparison of the effect of exercise training on bone metabolism in adolescent boy
Purpose
Prevention
Inclusion/Exclusion criteria
Inclusion criteria:
Male teenagers Aged 13-15 years
Exclusion criteria:
Any type of disease such as anemia, obesity, diabetes, heart disease Using any type of special medicine Participating in regular sports activities in the last 6 months
Age
From **13 years** old to **15 years** old
Gender
Male

Phase
N/A
Groups that have been masked
No information
Sample size
Target sample size: **63**
Randomization (investigator's opinion)
Randomized
Randomization description
To reduce the influence of maturity, and to maximize the balance and homogenization of the groups, 63 selected subjects of this research (selected based on the inclusion criteria) were also examined in terms of biological maturity status. Considering the importance of biological maturity in the present research and with the aim of relatively balanced distribution of the subjects in groups, first we stratified the subjects based on the status of biological maturity and using the age of peak height velocity (aPHV) formula. Random allocation software is also used for randomization. In addition to simple randomization, these random sequence generation softwares are capable of generating a random sequence using the block method,that from each block, three subjects were placed in the control group, three subjects in the intervention group 1, and three subjects in the intervention group 2, so that the number of subjects Each group reached 21 people.The advantage of this method is that the distribution of the subjects is done in a more balanced and favorable manner, and it will not be the case that most of the subjects of one group have a significantly higher biological age than other groups.
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
Ethics Committee of Shahrekord University
Street address
Shahrekord University, Shahrekord, Iran
City
Shahrekord
Province
Chahar-Mahal-va-Bakhtiari
Postal code
۸۸۱۸۶۳۴۱۴۱
Approval date
2023-04-30, 1402/02/10
Ethics committee reference number
IR.SKU.REC.1402.007

Health conditions studied

1

Description of health condition studied
Bone Density
ICD-10 code
ICD-10 code description

Primary outcomes

1

Description
Serum level of FGF23
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
Eliza kit (BioSwamp Company, NY, USA)

2

Description
Serum level of αKlotho
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
Using the ELISA kit

3

Description
Serum level of GH
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
radium kit

4

Description
SERUM LEVEL OF IGF-1
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
DRG IGF-11600 enzyme immunoassay kit

5

Description
BMD
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
Dual-energy X-ray absorptiometry (DEXA)

6

Description
BMC
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
Dual-energy X-ray absorptiometry (DEXA)

Secondary outcomes

1

Description
SERUM LEVEL OF CALSITERIOL
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
ELISA TEST

2

Description
SERUN LEVEL OF PHOSPHATE
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
ELISA TEST

3

Description
SERUM LEVEL OF CALSIUM
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
ELISA TEST

4

Description
serum level of PHEX
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
ELISA TEST

5

Description
serun level of PTH
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
ELISA TEST

6

Description
seruM level of vitamin D
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
Elisa test

7

Description
serum level of DMP1
Timepoint
Before and after 12 weeks of plyometric and HICT training
Method of measurement
Elisa test

Intervention groups

1

Description
Intervention group 1: HICT exercise protocol is performed three days a week for 12 weeks. The intensity of the exercises will be gradually increased by using the methods of increasing the training pressure.
Category
Other

2

Description
Intervention group 2: plyometric exercise protocol is performed three days a week for 12 weeks. The intensity of the exercises will be gradually increased by using the methods of increasing the training pressure.
Category
Other

3

Description
Control group: They do not receive any kind of training
Category
Other

Recruitment centers

1

Recruitment center
Name of recruitment center
Shahid Mehdizade School
Full name of responsible person
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Sponsors / Funding sources

1

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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
Shahrekord University
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
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Person responsible for updating data

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Latest degree

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Other areas of specialty/work

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Sharing plan

Deidentified Individual Participant Data Set (IPD)

No - There is not a plan to make this available

Justification/reason for indecision/not sharing IPD

There is no further information

Study Protocol

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

Statistical Analysis Plan

No - There is not a plan to make this available

Informed Consent Form

No - There is not 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

No - There is not a plan to make this available

Data Dictionary

No - There is not a plan to make this available