Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

Comparative effect of six-weeks static stretch, PNF, Graston technique, muscle energy technique and foam roller on the flexibility of hamstring muscle youth football players

Protocol summary

Study aim
Comparative effect of static stretching, PNF, Graston technique, muscle energy technique and foam roller on the flexibility of hamstring muscle in young football players.

Design
The clinical trial has a control group, with parallel groups of static stretching, PNF, Graston technique, muscle energy technique and foam roller. The sample size includes 90 football players who will be placed in 6 groups randomly (using Excel software).

Settings and conduct
The pre-test and post-test will be done in Shahid Beheshti University Sports Science Laboratory and the intervention will be done on the lawn on Khordad 15.

Participants/Inclusion and exclusion criteria
The age range of 12 to 15 years, Having a history of participating in football for 2 years, at least 3 training sessions per week and no history of hamstring and knee joint injuries. Exclusion criteria: Dissatisfaction with continuing cooperation in the research, having any neurological or orthopedic disease that affects the lower limbs.

Intervention groups
Static stretching, PNF stretching, Graston technique, muscle energy technique and foam roller are each performed for six weeks, 3 sessions per week. Control group: they continue their normal activities without intervention

Main outcome variables
Hamstring flexibility, active knee extension test

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20240306061185N2**
Registration date: **2024-03-08, 1402/12/18**
Registration timing: **prospective**

Last update: **2024-03-08, 1402/12/18**
Update count: **0**

Registration date
2024-03-08, 1402/12/18

Registrant information

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Name of organization / entity
The University of Shahid Beheshti

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Recruitment status
Recruitment complete

Funding source

Expected recruitment start date
2024-03-29, 1403/01/10

Expected recruitment end date
2024-04-05, 1403/01/17

Actual recruitment start date
empty

Actual recruitment end date
empty

Trial completion date
empty

Scientific title
Comparative effect of six-weeks static stretch, PNF, Graston technique, muscle energy technique and foam

roller on the flexibility of hamstring muscle youth football players

Public title
Flexibility of hamstring muscles
Purpose
Supportive
Inclusion/Exclusion criteria
Inclusion criteria:
Age range from 12 to 15 years Have a history of sports activity in the field of football during the last 2 years Having at least 3 training sessions per week Do not have a history of hamstring and knee joint injuries
Exclusion criteria:
Older and younger ages Unwillingness to participate in research Having damage to the organs
Age
From **12 years** old to **15 years** old
Gender
Male

Phase
N/A
Groups that have been masked
No information
Sample size
Target sample size: **90**
Randomization (investigator's opinion)
Randomized
Randomization description
Simple randomization method, Unit: individually, Randomization tool: To determine the group of people by a simple random method, first we list the names of the people in Excel, then we select a random number for each person using the RAND function, and finally we group the people using the MOD ROW function.
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
Sport Sciences Research
Street address
Mir Emad Ave., Tehran
City
Tehran
Province
Tehran
Postal code
1411713116
Approval date
2023-09-20, 1402/06/29
Ethics committee reference number
IR.SSRC.REC.1402.152

Health conditions studied

1

Description of health condition studied
healthy people
ICD-10 code
ICD-10 code description

Primary outcomes

1

Description
Hamstring flexibility
Timepoint
Before the intervention and eight weeks later
Method of measurement
goniometer, Active knee extension test

Secondary outcomes

empty

Intervention groups

1

Description
Intervention group: Static stretch, Eight weeks, three sessions a week, Each of the participants to perform static stretching, first by keeping the spine in a neutral position, we ask the person to bend forward from the hip joint, and each subject is instructed to avoid bending the neck and only from the hip joint. move the hips, as a result of which the spine is kept in a neutral position. Subjects will actively flex the hip joint until the hamstring muscle is stretched with mild and tolerable pain, and will maintain this stretch for 30 seconds and repeat 4 times, resting 20 seconds between each repetition.
Category
Prevention

2

Description
Intervention group: PNF stretch, Eight weeks, three sessions a week, PNF Hold-Relax method will be used for PNF stretching. With subjects lying on their back while the opposite lower limb is fixed, the hamstring muscle tester performs passive hip abduction while the knee is fully extended. During the execution, it should be noted that the hip joint does not rotate, the subject's leg is placed on the examiner's shoulder, and the hamstring muscle is stretched until the subject first reports a slight stretching sensation, this position is maintained for 7

seconds, then the subject isometrically stretches the muscle Contracts the hamstrings by pressing the leg down against the tester's resistance for 3 seconds, after which the subject is asked to rest for 5 seconds, then the tester passively stretches the muscle until it feels a slight stretch. . This stretch will be performed for 7 seconds. This protocol will be repeated 4 times with an interval of 20 seconds

Category

Prevention

3

Description

Intervention group: Graston technique, Eight weeks, three sessions a week, Each participant in the GT group bends his knee 30 to 60 degrees with tool #1 after applying massage oil to the desired position, then the examiner will perform the movement from the posterior gluteal line to the popliteal cavity 30 times in 1 minute in 3 sets.

Category

Prevention

4

Description

Intervention group: muscle energy technique, Eight weeks, three sessions a week, Participants in the MET group will first lie on their backs and place their ankles on the examiner's shoulder. A MET cycle consists of 3 phases of rest, contraction (including a quadriceps muscle contraction at 15% of its maximal contraction force) and stretching, performed sequentially for 10 seconds each. This protocol is repeated 4 times with a 20 second rest between each repetition.

Category

Prevention

5

Description

Intervention group: Foam roller, Eight weeks, three sessions a week, Subjects sit on the floor of the foam roller and place their ischial ridge and leg stretched. Subjects are instructed to support their body weight with their hands placed on the floor. The exercise consisted of 3 repetitions of 1 minute with a 10-second rest between repetitions. The subject placed the legs together while using a foam roller while keeping the back of the thighs in a relaxed position.

Category

Prevention

6

Description

Control group: Control group, No intervention, They will do their normal exercises

Category

Prevention

Recruitment centers

1

Recruitment center

Name of recruitment center

Sports Science Laboratory of Shahid Beheshti University

Full name of responsible person

Sirus Sheikhi

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Shahid Beheshti University, Shahriari square, Volanjek Town, Tehran

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Sponsors / Funding sources

1

Sponsor

Name of organization / entity

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Full name of responsible person

Seyed Mohammad Hosseini

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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

The University of Shahid Beheshti

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
The University of Shahid Beheshti
Full name of responsible person
Hossein Rezaei
Position
Masters student
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Bachelor
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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