# Clinical Trial Protocol
# Iranian Registry of Clinical Trials

22 Nov 2026

## Comparing the effects of Proprioceptive neuromuscular facilitation stretches(PNF) and Muscle energy technique(MET) techniques on strength, balance, and flexibility in athletes with hamstring shortness.

## Protocol summary


**Study aim**
The aim of the present study was to compare the effects of two active stretching techniques, namely proprioceptive neuromuscular facilitation (PNF) and muscle energy (MET), on flexibility, strength, and dynamic balance in athletes with hamstring shortening.

**Design**
This study was a quasi-experimental study with a pre-test-post-test design and two experimental groups. A total of 38 athletes with hamstring tightness were randomly assigned to two PNF and control groups.

**Settings and conduct**
Corrective Exercise and Pathology Laboratory, Allameh Tabatabaei University

**Participants/Inclusion and exclusion criteria**
Inclusion criteria were hamstring shortening confirmed by active and passive knee extension angle testing (angle greater than 20 degrees), no history of severe injury, surgery, back pain, or leg pain in the past six months, no neuromuscular problems affecting balance, no use of medications affecting muscle function and balance, and willingness and ability to participate in all phases of the research protocol. Exclusion criteria included no confirmation of hamstring shortening on active testing, new acute or chronic lower extremity injuries, symptoms of paralysis or tingling in the lower extremity, presence of neurological or musculoskeletal disorders that would alter balance or strength, and inability to complete all phases of the stretching protocol or voluntary withdrawal.

**Intervention groups**
The present study is a quasi-experimental study with a pretest-posttest design and two experimental groups. The effect of the type of stretching program as an independent variable (at two levels: PNF technique and MET technique) on the dependent variables of the study including flexibility, strength, and dynamic balance of the hamstring muscles will be investigated.

**Main outcome variables**
Improvements in balance, flexibility, and strength and comparison of changes between stretching methods


## General information

**Reason for update**

**Acronym**

**IRCT registration information**
IRCT registration number: **IRCT20260801070478N1**
Registration date: **2026-08-05, 1405/05/14**
Registration timing: **prospective**

Last update: **2026-08-05, 1405/05/14**
Update count: **0**

**Registration date**
2026-08-05, 1405/05/14


**Registrant information**

**Name**
Armin Afifi

**Name of organization / entity**
Allameh tabatabai university

**Country**
Iran (Islamic Republic of)

**Phone**
+98 44 3365 9843

**Email address**
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**Recruitment status**
**Recruitment complete**

**Funding source**

**Expected recruitment start date**
2026-08-11, 1405/05/20

**Expected recruitment end date**
2026-09-21, 1405/06/30

**Actual recruitment start date**
empty
**Actual recruitment end date**
empty
**Trial completion date**
empty

**Scientific title**
Comparing the effects of Proprioceptive neuromuscular facilitation stretches(PNF) and Muscle energy technique(MET) techniques on strength, balance, and flexibility in athletes with hamstring shortness.

**Public title**
Comparing the effects of two stretching techniques on strength, balance, and flexibility in athletes with hamstring shortness.
**Purpose**
Supportive
**Inclusion/Exclusion criteria**
**Inclusion criteria:**
Having hamstring shortening confirmed using active and passive knee extension angle testing (angle greater than 20 degrees) No severe injury, history of surgery, back pain, or leg pain in the past six months, no neuromuscular problems affecting balance Avoid using medications that affect muscle function, balance, and fitness. Willingness and ability to participate in all stages of the research protocol
**Exclusion criteria:**
**Age**
From **18 years** old to **29 years** old
**Gender**
Male

**Phase**
N/A
**Groups that have been masked**
*No information*
**Sample size**
Target sample size: **38**
**Randomization (investigator's opinion)**
N/A
**Randomization description**
**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**
Allameh Tabatabaei University Research Ethics Committee
**Street address**
Shahid Hemmat Student Dormitory, Susan Ave, Sattarkhan Blvd
**City**
Tehran
**Province**
Tehran
**Postal code**
1452654861
**Approval date**
2025-06-09, 1404/03/19
**Ethics committee reference number**
IR/ethics.2025.85999.1312

## Health conditions studied

**1**

**Description of health condition studied**
hamstring shortness
**ICD-10 code**
**ICD-10 code description**

## Primary outcomes

**1**

**Description**
People with hamstring tightness
**Timepoint**
Before and after interventions
**Method of measurement**
Active and passive knee extension test

## Secondary outcomes

empty

## Intervention groups

**1**

**Description**
Intervention group: Receive PNF stretching for two weeks, two sessions per week
**Category**
Rehabilitation

**2**

**Description**
Intervention group: Receive MET stretching for two weeks, two sessions per week
**Category**
Rehabilitation

## Recruitment centers

**1**

**Recruitment center**

**Name of recruitment center**
Faculty of Sport Sciences, Allameh Tabatabaei University

**Full name of responsible person**
Armin Afifi

**Street address**
Shahid Hemmat Student Dormitory, Susan Ave, Sattarkhan Blv

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afifiarmin@gmail.com

## Sponsors / Funding sources

**1**

**Sponsor**

**Name of organization / entity**
Allameh Tabatabai university

**Full name of responsible person**
Farideh Babakhani

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**Grant name**

**Grant code / Reference number**

**Is the source of funding the same sponsor organization/entity?**
No

**Title of funding source**
Allameh Tabatabai 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**

**Name of organization / entity**
Allameh Tabatabai university

**Full name of responsible person**
Armin Afifi

**Position**
master student

**Latest degree**
Master

**Other areas of specialty/work**
corrective exercises

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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**
Some data, such as information related to the main outcome or the like, can be shared.
**When the data will become available and for how long**
Access period starts 6 months after results are published.
**To whom data/document is available**
The data will only be available to researchers working in academic and scientific institutions.
**Under which criteria data/document could be used**
Can be used in all conditions.
**From where data/document is obtainable**
Responsible email: afifiarmin@gmail.com
**What processes are involved for a request to access data/document**
The request will be answered within three business days of receiving the email.
**Comments**