

Clinical Trial Protocol

Iranian Registry of Clinical Trials

12 Sep 2026

A comparison of the effects of six weeks of neuromuscular training and core stability training on dynamic balance, functional movement, and knee joint proprioception in young taekwondo athletes with patellofemoral pain syndrome (PFPS)

Protocol summary

Study aim

Effects of six weeks of neuromuscular training and core stability training on dynamic balance, functional movement, and knee joint proprioception in young taekwondo athletes with Patellofemoral Pain Syndrome

Design

Randomized, single-blind, parallel-group clinical trial in which participants are allocated to study groups using a simple randomization (drawing) method

Settings and conduct

Study location: Barsam Javaneh Taekwondo Academy, located at Molla Fathollah Street, Moshfegh Kashani Street, Kashan, Iran; Study population: young taekwondo athletes with patellofemoral pain syndrome; Blinding type: single-blind; Blinding method: the outcome assessor will be blinded to group allocation.

Participants/Inclusion and exclusion criteria

Inclusion criteria: Presence of anterior knee pain during at least two daily or sports-related activities; diagnosis of Patellofemoral Pain Syndrome (PFPS) by a physiotherapist or sports medicine specialist; no history of severe knee injury within the past six months; regular participation in taekwondo training at least three sessions per week. Exclusion criteria: History of lower-extremity surgery; history of severe knee injury (ligament, meniscus injury, or fracture) within the past six months

Intervention groups

Intervention group: Neuromuscular training and core stability exercises for 6 weeks, 3 sessions per week, aimed at improving dynamic balance, functional movement, and knee proprioception in taekwondo athletes with patellofemoral pain syndrome. Control group: No specific training intervention; participants will continue their usual taekwondo training during the 6-week study period

Main outcome variables

Dynamic Balance; Functional Movement Performance; Knee Joint Proprioception

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20260606069658N1**

Registration date: **2026-08-01, 1405/05/10**

Registration timing: **prospective**

Last update: **2026-08-01, 1405/05/10**

Update count: **0**

Registration date

2026-08-01, 1405/05/10

Registrant information

Name

Matin Zohrei

Name of organization / entity

The university of arak

Country

Iran (Islamic Republic of)

Phone

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Email address

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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2026-08-22, 1405/05/31

Expected recruitment end date

2026-08-25, 1405/06/03

Actual recruitment start date
empty

Actual recruitment end date
empty

Trial completion date
empty

Scientific title
A comparison of the effects of six weeks of neuromuscular training and core stability training on dynamic balance, functional movement, and knee joint proprioception in young taekwondo athletes with patellofemoral pain syndrome (PFPS)

Public title
The effect of neuromuscular training and core stability on patellofemoral pain syndrome

Purpose
Education/Guidance

Inclusion/Exclusion criteria
Inclusion criteria:
Presence of anterior knee pain during at least two daily or sports-related activities (e.g., squatting, running, stair climbing, or prolonged sitting). Diagnosis of Patellofemoral Pain Syndrome (PFPS) by a physiotherapist or sports medicine specialist. Regular participation in taekwondo training sessions at least three times per week
Exclusion criteria:
History of severe knee injury (e.g., ligament injury, meniscal injury, or fracture) within the previous six months History of lower-extremity surgery

Age
From **18 years** old to **25 years** old

Gender
Male

Phase
N/A

Groups that have been masked
No information

Sample size
Target sample size: **36**

Randomization (investigator's opinion)
Randomized

Randomization description
Block randomization will be used, with the individual participant as the unit of randomization. The random allocation sequence will be generated using a random number table, and following baseline assessments, participants will be assigned to one of three groups: the neuromuscular training group, the core stability training group, or the control group (no intervention or routine training). Allocation concealment will be ensured using sequentially numbered, opaque, sealed envelopes. Outcome assessors will be blinded to group allocation

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 Arak University

Street address

Sardasht Boulevard, Basij Square

City

Arak

Province

Markazi

Postal code

۳۸۱۸۱۷۵۸۴۶

Approval date

2026-03-16, 1404/12/25

Ethics committee reference number

IR.ARAKU.REC.1404.072

Health conditions studied

1

Description of health condition studied

Patellofemoral Pain Syndrome

ICD-10 code

M22.2

ICD-10 code description

Patellofemoral disorders

Primary outcomes

1

Description

Dynamic Balance:

Timepoint

Baseline (before the intervention) and after 6 weeks of intervention

Method of measurement

Dynamic balance will be assessed using the Y Balance Test (YBT)

2

Description

Functional Movement

Timepoint

Baseline (before the intervention) and after 6 weeks of intervention.

Method of measurement

using the Single-Leg Squat Test (SLST) and the Single-Leg Hop Test (SLH)

3

Description

Knee Joint Proprioception

Timepoint

Baseline (before the intervention) and after 6 weeks of intervention

Method of measurement

Knee joint proprioception will be assessed using the Joint Position Reproduction Test (JPRT)

Secondary outcomes

empty

Intervention groups

1

Description

Intervention group 1: Neuromuscular Training
.Participants in this group will perform a neuromuscular training program for 6 weeks, 3 sessions per week. Each session will last approximately 45-60 minutes and will include warm-up exercises, balance training, neuromuscular control exercises, proprioceptive exercises, lower-extremity functional exercises, and cool-down. All sessions will be supervised by the researcher

Category

Rehabilitation

2

Description

Intervention group 2: Core Stability Training,Participants in this group will perform a core stability training program for 6 weeks, 3 sessions per week. Each session will last approximately 45-60 minutes and will include warm-up exercises, core muscle strengthening exercises, trunk control exercises, balance exercises, and cool-down. All sessions will be supervised by the researcher

Category

Rehabilitation

3

Description

Control group: Participants in the control group will not receive either of the study interventions during the 6-week study period and will continue their routine taekwondo training. After completion of the study, the training program will be made available to them if requested

Category

N/A

Recruitment centers

1

Recruitment center

Name of recruitment center

Barsam javaneh taekwondo academy

Full name of responsible person

Matin Zohrei

Street address

Barsam Javaneh Taekwondo Academy, Moshfegh Kashani Street, Molla Fathollah Street

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Sponsors / Funding sources

1

Sponsor

Name of organization / entity

The University of Arak

Full name of responsible person

Dr. Shahnaz Shajrjerdi

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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 Arak

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 arak

Full name of responsible person

Matin Zohrei

Position

Master student

Latest degree

Bachelor

Other areas of specialty/work

Sport injury

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Fax**Email**

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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