

# Clinical Trial Protocol

## Iranian Registry of Clinical Trials

11 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

+98 86 3262 0000

##### Email address

m.zohrei.03@msc.araku.ac.ir

##### 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

##### **City**

Kashan

##### **Province**

Isfahan

##### **Postal code**

8715956313

##### **Phone**

+98 31 5562 0728

##### **Email**

matin.zohrei@gmail.com

### **Sponsors / Funding sources**

#### 1

##### **Sponsor**

###### **Name of organization / entity**

The University of Arak

###### **Full name of responsible person**

Dr. Shahnaz Shajrjerdi

###### **Street address**

University of Arak, Sardasht Boulevard, Basij Square, Arak

###### **City**

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###### **Province**

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###### **Postal code**

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###### **Phone**

+98 86 3262 0000

###### **Email**

Shahrjerdi.shahnaz@gmail.com

##### **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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**Person responsible for scientific inquiries****Contact****Name of organization / entity**

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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