

# Clinical Trial Protocol

## Iranian Registry of Clinical Trials

10 Jun 2026

### Comparison of the Effects of Knee Exercises and Knee Exercises with Additional Hip Strengthening Exercises on Landing Kinematics in Females with Patellofemoral Pain Syndrome

#### Protocol summary

##### Summary

The aim of this study is to investigate the effects of knee and hip muscle strength training on the knee and hip kinematics in subjects with Patellofemoral Pain Syndrome. This study is a double - blind (subjects and examiners), randomized controlled trial. Seventy six females with PFPS will be included in this study if, they have a history of anterior or retropatellar knee pain with a severity of at least 30 on a 100 visual analogue scale (VAS) for at least the past 3 months subjects will be excluded if they have a history of patellar dislocation; surgery involving the patellofemoral joint; or signs or symptoms of meniscal pathology or other intra-articular conditions. Patients will be randomly assigned into 2 treatment groups of the knee exercises and the knee and hip exercises. The first group receives a conventional treatment with focus of the knee musculature strengthening and stretching exercises and the second group performs hip strengthening exercises in addition to the exercises of the knee group. The treatment period will be 3 days a week and lasts for 4 weeks. A motion analysis system will be used to record the kinematic data while subjects perform a jump-landing task, a handheld dynamometer and a gyroscope will be used to access hip and knee isometric muscle strength and flexibility before and after treatment interventions. Main outcome measures such as: Hip adduction and internal rotation angles, Knee dynamic Valgus, Maximal isometric strength of Quadriceps, Hamstring, Hip external Rotators and Abductors will be reported.

#### General information

##### Acronym

##### IRCT registration information

IRCT registration number: **IRCT2014070518362N1**  
Registration date: **2015-12-26, 1394/10/05**

Registration timing: **retrospective**

Last update:

Update count: **0**

##### Registration date

2015-12-26, 1394/10/05

##### Registrant information

###### Name

Fateme Esfandiarpour

###### Name of organization / entity

School of Rehabilitation Sciences, Ahvaz Jundishapur University of Medical Sciences

###### Country

Iran (Islamic Republic of)

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##### Recruitment status

**Recruitment complete**

##### Funding source

University Research Grant,

##### Expected recruitment start date

2014-12-01, 1393/09/10

##### Expected recruitment end date

2015-12-01, 1394/09/10

##### Actual recruitment start date

empty

##### Actual recruitment end date

empty

##### Trial completion date

empty

##### Scientific title

Comparison of the Effects of Knee Exercises and Knee Exercises with Additional Hip Strengthening Exercises on

## Public title

Comparison of the Effects of Knee and Hip Muscle Exercises and Isolated Knee Muscle Exercises in Treatment of Anterior Knee Pain

## Purpose

Treatment

## Inclusion/Exclusion criteria

Inclusion Criteria: Females with PFPS in the age range of 18-45 years will be included in this study if they have a history of anterior or retropatellar knee pain with a severity of at least 30 on a 100 visual analogue scale (VAS) for at least the past 3 months, in 2 or more daily activities including: ascending and descending stairs, squatting, kneeling, jumping, long sitting, isometric knee extension, quadriceps contraction at 60° of knee flexion, and pain on palpation of the medial and/or lateral facet of the patella. Exclusion Criteria: Subjects will be excluded if they have more than trace knee effusion, a history of patellar dislocation; surgery involving the patellofemoral joint; or signs or symptoms of meniscal pathology or other intra-articular conditions; cruciate or collateral ligament involvement; tenderness of the patellar tendon, the iliotibial band, and/or the pes anserinus tendon; positive patellar apprehension sign; Osgood-Schlatter or Sinding-Larsen-Johansson syndrome; hip pain, back pain, or sacroiliac joint pain. Subjects who have been diagnosed with any neuromuscular disorder of the lower extremity will also be excluded in this study.

## Age

From **18 years** old to **45 years** old

## Gender

Female

## Phase

N/A

## Groups that have been masked

*No information*

## Sample size

Target sample size: **76**

## Randomization (investigator's opinion)

Randomized

## Randomization description

## Blinding (investigator's opinion)

Double blinded

## Blinding description

## Placebo

Not used

## Assignment

Parallel

## Other design features

Table of random numbers will be used to simply assign the subjects in two groups of treatment. The examiner will not be aware of which intervention will be administered to which subject. The patients are aware of the existence of two different groups, but do not know about their groups (treatment or control).

## Secondary Ids

empty

## Ethics committees

### 1

#### Ethics committee

##### Name of ethics committee

Ethics Committee of Ahvaz Jundishapur University of Medical Sciences

##### Street address

Central Office, University Campus, Golestan

##### City

Ahvaz

##### Postal code

##### Approval date

2015-04-29, 1394/02/09

##### Ethics committee reference number

IR,JUMS,REC.1394.25

## Health conditions studied

### 1

#### Description of health condition studied

Patellofemoral Pain Syndrome

#### ICD-10 code

M22.2

#### ICD-10 code description

Chondromalacia patellae

## Primary outcomes

### 1

#### Description

Hip adduction and internal rotation angles

#### Timepoint

Before and after treatment interventions

#### Method of measurement

Motion Analysis System

### 2

#### Description

Maximal Isometric Strength of Quadriceps Muscles

#### Timepoint

Before and after treatment interventions

#### Method of measurement

Handheld Dynamometer

### 3

#### Description

Maximal Isometric Strength of Hamstring Muscles

#### Timepoint

Before and after treatment interventions

#### Method of measurement

Handheld Dynamometer

### 4

#### Description

Maximal Isometric Strength of Hip External Rotator and

Abductor Muscles

**Timepoint**

Before and after treatment interventions

**Method of measurement**

Handheld Dynamometer

**5**

**Description**

Knee dynamic valgus

**Timepoint**

Before and after treatment interventions

**Method of measurement**

Motion Analysis System

**Secondary outcomes**

**1**

**Description**

Pain and Functional ability of lower extremity

**Timepoint**

Before and post treatment intervention

**Method of measurement**

Visual Analog Scale, Kujala Questionnaire

**Intervention groups**

**1**

**Description**

Intervention 1 : The treatment for the individuals in the knee exercise group includes stretching and strengthening of the knee musculature. Each individual will receive 12 sessions of treatment with the frequency of three sessions per week for 45 minutes. For strengthening exercises, the amount of load will be standardized to 70% of the 1-repetition maximum with no pain. For exercises using elastic band, the resistance will be standardized to the maximum resistance that each individual can use to complete 10 repetitions of the exercise. The maximum load and resistance will be determined in the first session, and will be evaluated weekly for any required adjustments. Stretching of the hamstrings and ankle plantar flexors, quadriceps, and iliotibial band will consist of three 30-second stretches, assisted by therapist.

**Category**

Rehabilitation

**2**

**Description**

Intervention 2 : Individuals in the knee and hip exercise group will perform the hip abductor and lateral rotator muscles strengthening exercises in addition to knee musculature stretching and strengthening exercises. Each individual will receive 12 sessions of treatment with the frequency of three sessions per week for 45 minutes. For strengthening exercises, the amount of load will be standardized to 70% of the 1-repetition maximum with no pain. For exercises using elastic band, the resistance

will be standardized to the maximum resistance that each individual can use to complete 10 repetitions of the exercise. The maximum load and resistance will be determined in the first session, and will be evaluated weekly for any required adjustments. Stretching of the hamstrings and ankle plantar flexors, quadriceps, and iliotibial band will consist of three 30-second stretches, assisted by therapist.

**Category**

Rehabilitation

**Recruitment centers**

**1**

**Recruitment center**

**Name of recruitment center**

Rehabilitation Clinics of School of Rehabilitation Sciences, Ahvaz Jundishapur University of Medical

**Full name of responsible person**

Dr. Fateme Esfandiarpour

**Street address**

School of Rehabilitation Sciences, University Campus, Golestan

**City**

Ahvaz

**Sponsors / Funding sources**

**1**

**Sponsor**

**Name of organization / entity**

Ahvaz Jundishapur University of Medical Sciences, Vice Chancellor for Research Development and Techn

**Full name of responsible person**

Dr. Nader Saki

**Street address**

The office of Vice Chancellor for Research Development and Technology, University Campus, Golestan

**City**

Ahvaz

**Grant name**

**Grant code / Reference number**

1394-25

**Is the source of funding the same sponsor organization/entity?**

Yes

**Title of funding source**

Ahvaz Jundishapur University of Medical Sciences, Vice Chancellor for Research Development and Techn

**Proportion provided by this source**

100

**Public or private sector**

empty

**Domestic or foreign origin**

empty

**Category of foreign source of funding**

empty

**Country of origin**

**Type of organization providing the funding**

*empty*

## Person responsible for general inquiries

### Contact

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## Person responsible for scientific inquiries

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**Postal code**

## Sharing plan

**Deidentified Individual Participant Data Set (IPD)**

*empty*

**Study Protocol**

*empty*

**Statistical Analysis Plan**

*empty*

**Informed Consent Form**

*empty*

**Clinical Study Report**

*empty*

**Analytic Code**

*empty*

**Data Dictionary**

*empty*