

Clinical Trial Protocol

Iranian Registry of Clinical Trials

10 Jun 2026

The comparison of effectiveness of open kinetic chain and close kinetic chain neuromuscular training in patients with patellofemoral pain syndrome

Protocol summary

Study aim

To compare the outcome of open kinetic chain and close kinetic chain neuromuscular training to reduce pain and improve functional status in patients with patellofemoral pain syndrome

Design

Two arms parallel-group randomized controlled trial in which 60 patients (30 in each group) will be assigned into two groups

Settings and conduct

The sampling frame formed for all the diagnosed patients with patellofemoral pain syndrome, presenting to the physiotherapy department of Mayo Hospital, Lahore, and through a simple random sampling technique sample will be drawn. After taking consent from the patients, the patients fulfilling the inclusion and exclusion criteria will be selected for the study. Patients and assessors will be blind regarding the treatment groups.

Participants/Inclusion and exclusion criteria

All patients between the age of 18 to 30 years, diagnosed cases of Patellofemoral pain syndrome on the basis of history and physical examination will be included in this study. Patients with a history of surgery, trauma, dislocation of patella, degenerative joint disease, cardiac or locomotor disorders documented in history or history of any instability of knee due to meniscal or ligament injury confirmed by physical examination will be excluded.

Intervention groups

Intervention group 1: neuromuscular close kinetic chain group. Intervention group 2: neuromuscular open kinetic chain

Main outcome variables

Pain; severity of symptoms; functional status; Kaujala anterior knee pain scale; Q-angle

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20181023041432N1**

Registration date: **2021-05-25, 1400/03/04**

Registration timing: **registered_while_recruiting**

Last update: **2021-05-25, 1400/03/04**

Update count: **0**

Registration date

2021-05-25, 1400/03/04

Registrant information

Name

Amna Zia

Name of organization / entity

Mayo Hospital, Lahore

Country

Pakistan

Phone

+92 42 35454986

Email address

amna_zia_17@live.com

Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2021-05-05, 1400/02/15

Expected recruitment end date

2021-08-05, 1400/05/14

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

The comparison of effectiveness of open kinetic chain and close kinetic chain neuromuscular training in patients with patellofemoral pain syndrome

Public title

Effect of exercises in Anterior Knee Pain

Purpose

Treatment

Inclusion/Exclusion criteria

Inclusion criteria:

Diagnose cases of Patellofemoral pain syndrome on the basis of history and physical examination as anterior knee pain from more than 2 months during at least two of the following activities: remaining seated for a prolonged time; going up or down stairs; squatting; running and jumping . Positive findings in any of the test: i: Patellar grind test, ii: Resisted isometric quadriceps femoris muscle contraction test (pain in 2 out of 3 contraction is consider positive), iii: Eccentric step testing, iv: Increase in Q- angle, v: Ischiotibial muscles shortening, defined as a loss of more than 30 degrees of leg extension with thigh positioned at 90 degrees of flexion , vi: Positive patellar compression test

Exclusion criteria:

History of surgery, trauma, dislocation of patella, degenerative joint disease, cardiac or locomotor disorders documented in history Chronic instability of the knee Disorders associated with meniscal and/or ligamentous injuries confirmed by physical examination.

Age

From **18 years** old to **30 years** old

Gender

Both

Phase

2-3

Groups that have been masked

- Participant
- Outcome assessor
- Data analyser

Sample size

Target sample size: **60**

Randomization (investigator's opinion)

Randomized

Randomization description

A sampling frame will be formed for all the diagnosed patients with patellofemoral pain syndrome, presenting to the physiotherapy department of Mayo Hospital through simple random sampling technique sample will be drawn and patients will be randomized blindly and assigned through a computer-generated random number table via opaque concealed envelopes into two groups i.e. group 1 (neuromuscular close kinetic chain group), group 2 (neuromuscular close kinetic chain).

Blinding (investigator's opinion)

Double blinded

Blinding description

Clinical parameters like pain, functional status and Quadriceps angle will be collected through VAS ,Kujala

anterior knee pain scale and Q-angle measurement, and will be noted before and after the treatment by different assessor than the one who apply the treatment. Patients in both groups will be blind regarding the treatment in other group

Placebo

Not used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Institution review board committee of King Edward Medical University, Lahore

Street address

Nelagumbad, Anarkali

City

Lahore

Postal code

54000

Approval date

2019-08-21, 1398/05/30

Ethics committee reference number

1036/RC/KEMU

Health conditions studied

1

Description of health condition studied

Patellofemoral Pain syndrome

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description

Pain

Timepoint

before intervention and 4 weeks after the intervention

Method of measurement

Visual Analogue scale

2

Description

Functional status

Timepoint

before intervention and 4 weeks after the intervention

Method of measurement

Kujala Anterior knee pain scale

3

Description

Q angle

Timepoint

before intervention and 4 weeks after the intervention

Method of measurement

Goniometer

Secondary outcomes

empty

Intervention groups

1

Description

Intervention group 1: neuromuscular closed kinetic chain group
Week 1: Setting Exercises for Co-Contraction: :2 sets of 10 repetition with 3 second hold in each repetition and 1 minute interval between the each set , Alternating Isometrics and Rhythmic Stabilization: 2 sets of 10 repetition with 3 second hold in each repetition and 1 minute interval between the each set, Scooting on a Wheeled Stool: :2 sets of 10 repetition and 1 minute interval between the each set, Partial Squats: 2 sets of 10 repetition without hold and 1 minute interval between the each set ,Week 2: Setting Exercises for Co-Contraction: :2 sets of 10 repetition with 5 second hold in each repetition and 1 minute interval between the each set, Alternating Isometrics and Rhythmic Stabilization: :2 sets of 10 repetition with 5 second hold in each repetition and 1 minute interval between the each set, Scooting on a Wheeled Stool: :3 sets of 10 repetition and 1 minute interval between the each set, Partial Squats :2 sets of 10 repetition with 3 second hold and 1 minute interval between the each set, Closed-Chain Isometrics against Elastic Resistance: 2 sets of 10 repetition and 1 minute interval between the each set , Unilateral Closed-Chain Terminal Knee Extension: 2 sets of 10 repetition and 1 minute interval between the each set , Close chain hip abduction: 2 sets of 10 repetition and 1 minute interval between the each set , Week 3: Setting Exercises for Co-Contraction: :3 sets of 10 repetition with 5 second hold in each repetition and 1 minute interval between the each set ,Alternating Isometrics and Rhythmic Stabilization: :3 sets of 10 repetition with 5 second hold in each repetition and 1 minute interval between the each set. Partial Squats :3 sets of 10 repetition with 5 second hold and 1 minute interval between the each set, Closed-Chain Isometrics against Elastic Resistance: 3 sets of 10 repetition and 1 minute interval between the each set, Unilateral Closed-Chain Terminal Knee Extension: 3 sets of 10 repetition and 1 minute interval between the each set , Forward, Backward, and Lateral Step-Ups and Step-Downs: 2 sets of 10 repetition and 1 minute interval between the each set , Partial Lunges: 2 sets of 10 repetition and 1 minute interval between the each set, Close chain hip abduction: 3 sets of 10 repetition with 5 second hold and 1 minute interval between the each set , Week 4:Setting Exercises for Co-Contraction: :3 sets of 10 repetition with 10

second hold in each repetition and 1 minute interval between the each set, Alternating Isometrics and Rhythmic Stabilization: :3 sets of 10 repetition with 10 second hold in each repetition and 1 minute interval between the each set ,Full Squats :3 sets of 10 repetition with 5 second hold and 1 minute interval between the each set Closed-Chain Isometrics against Elastic Resistance: 3 sets of 15 repetition and 1 minute interval between the each set , Unilateral Closed-Chain Terminal Knee Extension: 3 sets of 15 repetition and 1 minute interval between the each set , Forward, Backward, and Lateral Step-Ups and Step-Downs: 3 sets of 10 repetition and 1 minute interval between the each set, Full Lunges: 3 sets of 10 repetition and 1 minute interval between the each set, Close chain hip abduction: 3 sets of 10 repetition with 10 second hold and 1 minute interval between the each set

Category

Rehabilitation

2

Description

Intervention group 2: neuromuscular open kinetic chain ,
Week 1: Quadriceps Setting (Quad Sets) :2 sets of 10 repetition with 5 second hold in each repetition and 1 minute interval between the each set , Straight-Leg Raise: 1 sets of 10 repetition without hold, Hamstring Setting (Hamstring Sets): 2 sets of 10 repetition with 5 second hold in each repetition and 1 minute interval between the each set , Side lying hip abduction: 1 sets of 10 repetition without hold, Prone hip extension: 1 sets of 10 repetition without hold
Week 2: Straight-Leg Raise: 2 sets of 10 repetition with 5 second hold and 1 minute interval between the each set, Side lying hip abduction: 2 sets of 10 repetition with 5 second hold and 1 minute interval between the each set, Prone hip extension: 2 sets of 10 repetition with 5 second hold in each repetition hold and 1 minute interval between the each set, Straight-Leg Lowering: 2 sets of 10 repetition without hold and 1 minute interval between the each set, Multiple-Angle Isometric Exercises (quadriceps and hamstrings) 2 sets of 10 repetition with 10 second hold and 1 minute interval between the each set, Short-Arc Terminal Knee Extension : 2 sets of 10 repetition with 5 second hold and 1 minute interval between the each set
Week 3: Straight-Leg Raise: 2 sets of 10 repetition with 5 second hold and 1 minute interval between the each set (with cuff weight around the ankle), Side lying hip abduction: 2 sets of 10 repetition with 5 second hold and 1 minute interval between the each set (with cuff weight around the ankle), Prone hip extension: 2 sets of 10 repetition with 5 second hold in each repetition hold and 1 minute interval between the each set (with cuff weight around the ankle), Straight-Leg Lowering: 2 sets of 10 repetition and 1 minute interval between the each set (with cuff weight around the ankle), Short-Arc Terminal Knee Extension : 2 sets of 10 repetition with 5 second hold and 1 minute interval between the each set (with cuff weight around the ankle), Hamstring Curls: 2 sets of 10 repetition and 1 minute interval between the each set (with cuff weight around the ankle), Standing hip abduction and extension: 2 sets of 10 repetition and 1

minute interval between the each set (with cuff weight around the ankle)• Full-Arc Extension: 2 sets of 10 repetition with 5 second hold in each repetition hold and 1 minute interval between the each set (with cuff weight around the ankle) Week 4: Straight-Leg Raise: 3 sets of 10 repetition with 10 second hold and 1 minute interval between the each set (with cuff weight around the ankle) , Side lying hip abduction: 3 sets of 10 repetition with 10 second hold and 1 minute interval between the each set (with cuff weight around the ankle), Prone hip extension: 3 sets of 10 repetition with 10 second hold in each repetition hold and 1 minute interval between the each set (with cuff weight around the ankle), Straight-Leg Lowering: 3 sets of 10 repetition and 1 minute interval between the each set (with cuff weight around the ankle), Short-Arc Terminal Knee Extension : 3 sets of 10 repetition with 10 second hold and 1 minute interval between the each set (with cuff weight around the ankle), Hamstring Curls: 3 sets of 10 repetition and 1 minute interval between the each set (with cuff weight around the ankle), Standing hip abduction and extension: 3 sets of 10 repetition and 1 minute interval between the each set (with cuff weight around the ankle), Full-Arc Extension: 3 sets of 10 repetition with 10 second hold in each repetition hold and 1 minute interval between the each set (with cuff weight around the ankle)

Category

Rehabilitation

Recruitment centers

1

Recruitment center

Name of recruitment center

Mayo Hospital, Lahore

Full name of responsible person

Muhammad Saleem Nawaz

Street address

Nelagumbad, Anarkali

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Phone

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Email

saleem.nawaz1@yahoo.com

Sponsors / Funding sources

1

Sponsor

Name of organization / entity

King Edward Medical University, Lahore

Full name of responsible person

Dr Riasat Ali

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54000

Phone

+92 42 99213063

Email

registrar@kemu.edu.pk

Grant name

Grant code / Reference number

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

Yes

Title of funding source

King Edward Medical University, Lahore

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

Mayo Hospital

Full name of responsible person

Amna Zia

Position

Physiotherapist

Latest degree

Specialist

Other areas of specialty/work

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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

data sets will be available on scientist demand , wishing to use them for non-commercial purposes

When the data will become available and for how long

after the completion of the study

To whom data/document is available

to people working in academic institutions

Under which criteria data/document could be used

on scientist demand, wishing to use them for non-commercial purposes

From where data/document is obtainable

Amna Zia , email Id: amna_zia_17@live.com

What processes are involved for a request to access data/document

Applicant can email to contact person and request the data set

Comments