Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 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 envelops 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 Quadricep 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 accessor 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
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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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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 avaible 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