Clinical Trial Protocol
Iranian Registry of Clinical Trials

10 Jun 2026

Amplifying Comprehensive exercise with Pre-Exercise Interaction for Patients with Knee Osteoarthritis: Protocol for A Randomized Controlled Trial

Protocol summary

Study aim

To investigate the effects of Comprehensive exercise with different Pre-Exercise Interaction on clinical and functional outcomes in individuals with knee osteoarthritis.

Design

Randomized Controlled Trial

Settings and conduct

This study will be conducted in the physiotherapy department of a university-affiliated rehabilitation center in Iran. The facility includes private treatment rooms and standardized exercise equipment. Data will be collected using standardized procedures and securely recorded in a digital case report system.

Participants/Inclusion and exclusion criteria

Inclusion Criteria - Adults ≥40 years (men and women) - Clinical diagnosis of knee OA (pain >3 months, morning stiffness, crepitus, bony tenderness, no warmth) - Radiographic grade 2 or 3 (Kellgren-Lawrence scale) - NPRS pain score 3–7 in at least one knee during the past week - Fluent in Persian (reading and writing) Exclusion Criteria - History of lower limb joint replacement - Pregnancy - Structured exercise >30 min/week or rehab in past 3 months - KL grade 4 in either knee - Infectious, vascular, neurological, or inflammatory conditions - Severe patellofemoral OA - New medication started within 6 weeks - Fibromyalgia or any condition interfering with study outcomes

Intervention groups

Group1: positive pre-exercise interaction + Comprehensive knee exercise program Group 2: negative pre-exercise interaction + Comprehensive knee exercise program Group 3: neutral pre-exercise interaction + Comprehensive knee exercise program

Main outcome variables

Pain intensity: Numerical Pain Rating Scale (NPRS) , disability: The Western Ontario and McMaster Universities Arthritis Index (WOMAC)

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20250811066819N1**
Registration date: **2025-08-13, 1404/05/22**
Registration timing: **prospective**

Last update: **2025-08-13, 1404/05/22**
Update count: **0**

Registration date

2025-08-13, 1404/05/22

Registrant information

Name
Maryam Bagheri Mahmoudi
Name of organization / entity
Kharazmi University
Country
Iran (Islamic Republic of)
Phone
+98 937 814 7398
Email address
maryambagherimahmudi@khu.ac.ir

Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2025-10-01, 1404/07/09

Expected recruitment end date

2026-01-29, 1404/11/09

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

Amplifying Comprehensive exercise with Pre-Exercise Interaction for Patients with Knee Osteoarthritis: Protocol for A Randomized Controlled Trial

Public title

Amplifying Comprehensive exercise with Pre-Exercise Interaction for Patients with Knee Osteoarthritis: Protocol for A Randomized Controlled Trial

Purpose

Supportive

Inclusion/Exclusion criteria

Inclusion criteria:

Men and women aged 40 years or older a clinical diagnosis of knee Osteoarthritis (defined as knee pain for >3 months, early morning stiffness, crepitus, bony tenderness and no palpable warmth) in at least one knee radiographic grade 2 or 3 scored by the Kellgren and Lawrence (KL) scale in at least one knee pain from 3 to 7 on the Numerical Pain Rating Scale (NPRS) in at least one knee in the last week fluent in Persian (written and spoken)

Exclusion criteria:

Age

From **40 years** old

Gender

Both

Phase

N/A

Groups that have been masked

- Participant
- Outcome assessor
- Data analyser

Sample size

Target sample size: **90**

Randomization (investigator's opinion)

Randomized

Randomization description

Simple randomization will be performed in a 1:1:1 ratio using a computer-generated sequence (Random.org). Allocation will be concealed via sequentially numbered, opaque, sealed envelopes prepared by an independent researcher. Allocation will occur after baseline assessments.

Blinding (investigator's opinion)

Double blinded

Blinding description

Participants will be blinded to the interaction style (positive, negative, neutral), which is the main experimental variable. Outcome assessors and the statistician will also be blinded to group allocation. Treating clinicians won’t be blinded due to the nature of the intervention.

Placebo

Not used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Kharazmi University

Street address

13th Floor, Block A, Central Headquarters of the Ministry of Health and Medical Education, Simaye Iran Street, between South Felamak and Zarafshan Streets, Qods Town (West), Tehran, Iran

City

Tehran

Province

Tehran

Postal code

۱۴۹۱۱-۱۵۷۱۹

Approval date

2025-03-05, 1403/12/15

Ethics committee reference number

IR.KHU.REC.1403.187

Health conditions studied

1

Description of health condition studied

knee Osteoarthritis

ICD-10 code

M17

ICD-10 code description

Osteoarthritis of knee

Primary outcomes

1

Description

Pain: Perceived average pain

Timepoint

Baseline (T0), post-intervention (T1, 6 weeks), follow-up (T2, 3 months)

Method of measurement

Numerical Pain Rating Scale (NPRS) is a valid and reliable in middle-aged adults with knee osteoarthritis. Participants will rate their average pain over the past week on an 11-point numeric scale ranging from: 0 = “No pain” and 10 = “Worst imaginable pain”. Following exercise therapy, a reduction of ≥1.5 points on the NPRS is considered clinically meaningful (MCID), with excellent test–retest reliability (ICC = 0.95) and strong construct validity (r ≥ 0.93) compared to other pain scales.

2

Description
Disability
Timepoint
Baseline (T0), post-intervention (T1, 6 weeks), follow-up (T2, 3 months)
Method of measurement
The persian version of the WOMAC index (The Western Ontario and McMaster Universities Arthritis Index) is used to assess pain, stiffness and physical activity as a reliable tool (ICC=0.99). It included 24 items: 5 questions about pain, 2 about stiffness and 17 about the level of physical activity in daily life. The score using an ordinal Likert scale of possible answers (0=strongly agree to 4=totally disagree). Higher scores on the WOMAC indicate worse pain, stiffness, and functional limitations. MCID ≈ 5.3, and ICC ≥ 0.76 for WOMAC subscales

Secondary outcomes

1

Description
Treatment Expectations
Timepoint
Baseline (T0), post-clinician interaction (T0.1, manipulation check), post-intervention (T1, 6 weeks), follow-up (T2, 3 months)
Method of measurement
Treatment expectations regarding anticipated changes in pain will be assessed using a modified version of the Global Rating of Change (GROC) scale adapted for expectations. At baseline and immediately after the expectation modulation, participants will be asked: “After completing the assigned treatment, how much do you expect your pain to change?” Responses will be recorded on a 15-point scale, ranging from −7 (“much worse”) to 0 (“no change”) to +7 (“much better”).

2

Description
Electromyographic (EMG)
Timepoint
Muscle activity Baseline (T0), post-intervention (T1, 6 weeks), follow-up (T2, 3 months)
Method of measurement
Electromyographic (EMG) assessment of muscle activity will be performed using an 8-channel system. active surface electrodes, Double differential, preamplifier electrodes will be placed over the belly of the following muscles of the leading foot of the lower extremity as per the recommended guidelines. EMG data will be collected during the three step-up trials performed as part of the kinematic assessment, and the EMG signals will be synchronized with the motion capture system and collected at 1080 Hz.A standing calibration trial will be used to define joint centers and create a segment coordinate system. Markers’ trajectories will be low-pass filtered at 6 Hz. EMG signals will be DC corrected and then band-pass, rectified, and adjusted for baseline noise by subtracting the mean of the rectified signal during the quiet period from the rectified signal. EMG amplitude will be normalized to the maximal activity from the dynamic trials, with the highest activity used for normalization.

3

Description
knee kinematics
Timepoint
Muscle activity Baseline (T0), post-intervention (T1, 6 weeks), follow-up (T2, 3 months)
Method of measurement
Knee kinematics will be quantified during a step-up task using a three-dimensional marker-based motion analysis system (Motion Analysis Corp., Santa Rosa, CA). The system comprises eight high-resolution digital cameras, configured within a calibrated laboratory environment. Kinematic data will be captured at a sampling frequency of 120 Hz. Reflective markers (30 mm in diameter) will be bilaterally positioned at the following anatomical landmarks: Pelvis (ASIS), Thigh, Knee, Shank, Ankle, and Foot. Participants will perform a step-up task onto a standardized platform (20 cm). The 3D position of each marker at a high sampling frequency (e.g., 100–200 Hz) will be recorded by the motion capture system. Joint angles will be calculated from the relative orientation of adjacent body segments using inverse kinematics.

4

Description
Kinsiophobia
Timepoint
Baseline (T0), post-intervention (T1, 6 weeks), follow-up (T2, 3 months)
Method of measurement
The Tampa Scale of Kinesiophobia (TSK) measures “fear of movement” or “kinesiophobia” in the patient. The total score on this scale is between, 17 to 68. For example, a score of 68 showed severe fear of movement, 37 indicates there is fear of movement and where 17 means no fear. It is translated and validated into Persian and has been reported (ICC test-retest = 0.86) (Cronbach’s Alpha was 0.796 in 17 items). The least clinically significant difference (MCD) is 0.18).also, in chronic pain cohorts suggest that a change of approximately ≥6 points on the TSK total score may correspond to a minimally important clinical improvement.

5

Description
Self-efficacy
Timepoint
Baseline (T0), post-intervention (T1, 6 weeks), follow-up (T2, 3 months)
Method of measurement
The Persian version of the Pain Self-Efficacy Questionnaire (PSEQ) will be used to assess self-efficacy. The questionnaire has been found to be a valid and reliable (ICC= 0.92) measure of pain self-efficacy beliefs). The PSEQ is a 10-item questionnaire ranging

from 0 to 60 to assess patients' confidence about their ability to perform a range of activities despite pain. For example: "I can do most of the household chores (e.g., tidying up, washing dishes), despite the pain" and "I can gradually increase my activity level, despite the pain. Lower scores for the PSEQ indicate lower levels of confidence. The least clinically significant difference (MCD) is 5.5-8.5.

Intervention groups

1

Description
Intervention group: Group 1: Comprehensive exercise + clinician's positive pre-exercise interaction Group. group1 will receive 6-week Comprehensive exercise program. Prior to the first session, each participant receives a one-time, group-specific clinician positive interaction designed to influence expectations. The exercises are designed to rehabilitate the knee muscles and are delivered by trained clinicians. Communication during sessions remains neutral to avoid bias.

Category
Rehabilitation

2

Description
Intervention group: Group 2: Comprehensive exercise + clinician's negative pre-exercise interaction Group. group 2 will receive 6-week Comprehensive exercise program. Prior to the first session, each participant receives a one-time, group-specific clinician negative interaction designed to influence expectations. The exercises are designed to rehabilitate the knee muscles and are delivered by trained clinicians. Communication during sessions remains neutral to avoid bias.

Category
Rehabilitation

3

Description
Control group: Group 3: Comprehensive exercise + clinician's neutral pre-exercise interaction Group. group 3 will receive 6-week Comprehensive exercise program. Prior to the first session, each participant receives a one-time, group-specific clinician neutral interaction designed to influence expectations. The exercises are designed to rehabilitate the knee muscles and are delivered by trained clinicians. Communication during sessions remains neutral to avoid bias.

Category
Rehabilitation

Recruitment centers

1

Recruitment center

Name of recruitment center
Kharazmi University

Full name of responsible person
Maryam Bagheri Mahmoudi

Street address
Unit 1, Floor 7, No. 18, Danesh-Pajouhan Complex, opposite Gilas Garden, Yasaman Square, Daneshjoo Boulevard, Evin, Tehran

City
Tehran

Province
Tehran

Postal code
1984845497

Phone
+98 937 814 7398

Email
maryambagherimahmudi@khu.ac.ir

Sponsors / Funding sources

1

Sponsor

Name of organization / entity
Kharazmi University

Full name of responsible person
Amir Letafatkar

Street address
Kharazmi University, Kharazmi Street, Shahid Mofatteh Avenue, Tehran 15719-14911, Iran

City
Tehran

Province
Tehran

Postal code
۱۵۷۱۹-۱۴۹۱۱

Phone
+98 21 8880 3300

Email
info@khu.ac.ir

Grant name

Grant code / Reference number

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

Title of funding source
Kharazmi University

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
دانشگاه خوارزمی
Full name of responsible person
Maryam Bagheri Mahmoudi
Position
PhD Candidate
Latest degree
Master
Other areas of specialty/work
sport injury
Street address
Unit 1, Floor 7, No. 18, Danesh-Pajouhan Complex, opposite Gilas Garden, Yasaman Square, Daneshjoo Boulevard, Evin, Tehran
City
Tehran
Province
Tehran
Postal code
1984845497
Phone
+98 937 814 7398
Email
maryambagherimahmoudi@gmail.com

Person responsible for scientific inquiries

Contact
Name of organization / entity
دانشگاه خوارزمی
Full name of responsible person
Maryam Bagheri Mahmoudi
Position
PhD Candidate
Latest degree
Master
Other areas of specialty/work
sport injury
Street address
Unit 1, Floor 7, No. 18, Danesh-Pajouhan Complex, opposite Gilas Garden, Yasaman Square, Daneshjoo Boulevard, Evin, Tehran
City
Tehran
Province
Tehran
Postal code
1984845497
Phone
+98 937 814 7398
Fax
Email
maryambagherimahmoudi@gmail.com
Web page address

Person responsible for updating data

Contact
Name of organization / entity
Kharazmi University
Full name of responsible person
Maryam Bagheri Mahmoudi
Position
PhD Candidate
Latest degree
Master
Other areas of specialty/work
Sport injury
Street address
Floor 7/1, No 18, Daneshpajoohan Complex, Daneshjoo Blv., Evin St.
City
Tehran
Province
Tehran
Postal code
1984845497
Phone
+98 937 814 7398
Fax
Email
maryambagherimahmoudi@khu.ac.ir
Web page address

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
De-identified individual participant data (IPD), including primary outcomes measures (VAS and WOMAC), and secondary outcomes will be available upon formal request after study completion. Supporting documents such as the study protocol, statistical analysis plan, and consent forms may also be shared if necessary.
When the data will become available and for how long
Data will be available starting 1 month after publication of the final study results.
To whom data/document is available
Researchers affiliated with academic institutions, recognized research centers, and professionals in the orthopedic and rehabilitation industry may submit data access requests.
Under which criteria data/document could be used
Data may only be used for research purposes and statistical analyses aligned with the original study objectives. Any secondary publication must cite the original source and obtain written approval from the research team.
From where data/document is obtainable

Requests should be directed to Dr. Maryam Bagheri Mahmoudi, principal investigator of the study, via official university email: maryambagherimahmudi@khu.ac.ir

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

Upon receiving a formal request, the research team will review it within two weeks. If approved, a data sharing agreement will be sent. Once signed, the data will be transferred through a secure platform.

Comments