Clinical Trial Protocol
Iranian Registry of Clinical Trials

07 Nov 2026

Comparing the effect of eight weeks motor control and postural restoration exercises on pain, disability, motor control, and gait kinetics in women with chronic nonspecific low back pain

Protocol summary

Study aim

To compare the effects of eight weeks of motor control and postural restoration exercises on pain, disability, motor control, and gait kinetics in women with chronic nonspecific low back pain.

Design

Randomized controlled trial with three parallel groups, pretest, posttest, and two month follow up; 45 participants, 15 per group; pain matched triplet randomization using RV.UNIFORM in SPSS; participants and outcome assessor blinded to group allocation. Trial phase: not applicable.

Settings and conduct

Participants will be recruited through social media and selected corrective exercise and physiotherapy centers in Mashhad, Iran. Pain will be screened using the Visual Analogue Scale; disability, motor control, and gait kinetics will be assessed using the Oswestry Disability Index, Luomajoki tests, and a Kistler force plate.

Participants/Inclusion and exclusion criteria

Women aged 35 to 55 with chronic nonspecific low back pain for at least three months, confirmed by a specialist, and pain scores of 3 to 5 on the Visual Analogue Scale; no menopausal symptoms, analgesic use, or other treatment; informed consent and exercise readiness; excluding disc herniation, spondylolisthesis, lumbar osteoarthritis, osteoporosis, inflammatory rheumatic disease, spinal surgery or structural abnormalities, and medical contraindications to exercise.

Intervention groups

Motor control exercises based on Kolar's approach; postural restoration exercises approved by specialists; control: abdominal drawing in exercises. All groups: eight weeks, three sessions weekly, 40 to 60 minutes per session.

Main outcome variables

Pain; disability; motor control; gait kinetics, including vertical, anterior posterior, and medial lateral ground reaction forces.

General information

Reason for update

Acronym

MCE-PRE Trial برگرفته از - MCE: Motor Control Exercises- PRE: Postural Restoration Exercises

IRCT registration information

IRCT registration number: **IRCT20261011071387N1**
Registration date: **2026-11-06, 1405/08/15**
Registration timing: **retrospective**

Last update: **2026-11-06, 1405/08/15**
Update count: **0**

Registration date

2026-11-06, 1405/08/15

Registrant information

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Isfahan university

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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2026-05-22, 1405/03/01

Expected recruitment end date

2026-09-06, 1405/06/15

Actual recruitment start date
2026-05-22, 1405/03/01
Actual recruitment end date
2026-09-06, 1405/06/15
Trial completion date
empty

Scientific title
Comparing the effect of eight weeks motor control and postural restoration exercises on pain, disability, motor control, and gait kinetics in women with chronic nonspecific low back pain

Public title
Comparing Motor Control and Postural Restoration Exercises for Pain, Daily Function, Movement Control, and Walking in Women with Chronic Non-Specific Low Back Pain
Purpose
Treatment
Inclusion/Exclusion criteria
Inclusion criteria:
Women aged 35 to 55 years Absence of menopausal symptoms according to the Menopause Rating Scale (MRS) History of chronic nonspecific low back pain for at least three months confirmed by a specialist physician Pain intensity between 3 and 5 based on the Visual Analog Scale (VAS) Provision of informed consent to participate in the study No use of analgesic medications or other treatment methods Meeting the requirements of the PAR-Q questionnaire
Exclusion criteria:
History of disc herniation History of spondylolisthesis History of lumbar osteoarthritis History of osteoporosis History of inflammatory rheumatic diseases History of spinal surgery Presence of any structural spinal abnormalities Presence of medical or ethical contraindications to exercise participation, including visual or hearing impairments, cardiopulmonary disorders, communication difficulties, balance disorders, or similar conditions
Age
From **35 years** old to **55 years** old
Gender
Female

Phase
N/A
Groups that have been masked

- Participant
- Outcome assessor

Sample size
Target sample size: **45**
Actual sample size reached: **45**
Randomization (investigator's opinion)
Randomized
Randomization description
In this randomized controlled clinical trial, 45 eligible women with chronic nonspecific low back pain will be allocated to three groups of 15 participants each using matched randomization based on baseline pain intensity. The unit of randomization will be the individual participant. Participants will first be ranked according to their baseline pain intensity scores and then arranged into groups of three with similar pain levels. Within each matched triplet, participants will be randomly assigned to one of three groups: motor control exercises, postural restoration exercises, or the control group receiving abdominal drawing-in maneuver exercises. The random allocation will be performed using random numbers generated by the RV.UNIFORM function in SPSS statistical software. This procedure aims to balance baseline pain intensity across the three study groups and minimize its potential confounding effect. The study protocol does not specify a separate allocation concealment procedure.
Blinding (investigator's opinion)
Double blinded
Blinding description
In this randomized controlled clinical trial, blinding of participants and the outcome assessor is planned. A total of 45 eligible women will be randomly allocated to three groups: motor control exercises, postural restoration exercises, and a control group receiving abdominal drawing-in maneuver exercises. To facilitate participant blinding, the control group will also receive an exercise intervention to maintain comparable conditions across all three groups. Participants will not be informed about the group allocation procedures or the exercise protocols assigned to the other groups. The outcome assessor will remain unaware of participants' group assignments and the specific exercises performed in each group. Participants will be instructed not to discuss their exercise protocols with participants from other groups or with the outcome assessor. The study protocol does not explicitly specify blinding of the principal investigator, exercise supervisors, or data analysts.
Placebo
Not used
Assignment
Parallel
Other design features
This study is a three-arm, parallel-group randomized controlled clinical trial with a pretest-posttest design and a two-month follow-up. Forty-five eligible women with chronic nonspecific low back pain will be randomly allocated to three equal groups of 15 participants: motor control exercises, postural restoration exercises, and a control group receiving abdominal drawing-in maneuver exercises. The intervention period will last eight weeks, with three exercise sessions per week, each lasting approximately 40 to 60 minutes. Outcome measurements will be performed before the intervention, immediately after the intervention, and two months later to evaluate the maintenance of intervention effects.

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee
Bioethics Committee of the University of Isfahan

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Isfahan

Province
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Postal code
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Approval date
2026-02-23, 1404/12/04

Ethics committee reference number
IR.UI.REC.1404.277

Health conditions studied

1

Description of health condition studied
Chronic nonspecific low back pain

ICD-10 code
M54.5

ICD-10 code description
Low back pain

Primary outcomes

1

Description
Low back pain intensity

Timepoint
During the screening phase, before randomization and the start of the intervention

Method of measurement
A 10 cm horizontal Visual Analogue Scale ranging from 0 (no pain) to 10 (worst possible pain). Participants mark their perceived low back pain intensity on the scale.

Secondary outcomes

1

Description
Functional disability due to low back pain

Timepoint
48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement
Using the Oswestry Disability Questionnaire, consisting of 10 sections, each with six response options scored from 0 to 5. The sum of the scores is multiplied by two to obtain the final disability score, ranging from 0 to 100.

2

Description
Spinal movement control impairment score

Timepoint
48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement
Using the Luomajoki movement control test, consisting of six tests. Each test is performed three times and photographed. Three specialists evaluate the photographs and assign scores of 1 (no impairment), 2 (mild impairment), or 3 (severe impairment) to each performance. The mean of the nine ratings is calculated for each test.

3

Description
Percentage of total foot pressure during static standing

Timepoint
48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement
Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant stands barefoot on the platform with both feet positioned naturally at hip width and body weight evenly distributed between both lower limbs. The percentage of total foot pressure is recorded and extracted by the system software.

4

Description
Percentage of forefoot pressure during static standing

Timepoint
48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement
Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant stands barefoot with body weight evenly distributed between both lower limbs. The software divides the foot into anatomical regions and records the percentage of pressure applied to the forefoot.

5

Description
Percentage of rearfoot pressure during static standing

Timepoint
48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement
Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant stands barefoot with body weight evenly distributed between both lower limbs. The software

divides the foot into anatomical regions and records the percentage of pressure applied to the rearfoot.

6

Description

Mean total foot pressure during static standing

Timepoint

48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement

Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant stands barefoot with body weight evenly distributed between both lower limbs. Mean total foot pressure is calculated and extracted by the system software.

7

Description

Mean forefoot pressure during static standing

Timepoint

48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement

Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant stands barefoot with body weight evenly distributed between both lower limbs. Mean forefoot pressure is calculated and extracted by the system software.

8

Description

Mean rearfoot pressure during static standing

Timepoint

48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement

Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant stands barefoot with body weight evenly distributed between both lower limbs. Mean rearfoot pressure is calculated and extracted by the system software.

9

Description

Total foot contact area during dynamic walking

Timepoint

48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement

Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant walks barefoot across the platform at their preferred natural speed. Total foot contact area during the stance phase of the gait cycle is recorded. Each test is repeated three times, and the mean of valid trials is calculated.

10

Description

Forefoot contact area during dynamic walking

Timepoint

48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement

Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant walks barefoot across the platform at their preferred natural speed. Forefoot contact area during the stance phase of the gait cycle is recorded. Each test is repeated three times, and the mean of valid trials is calculated.

11

Description

Midfoot contact area during dynamic walking

Timepoint

48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement

Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant walks barefoot across the platform at their preferred natural speed. Midfoot contact area during the stance phase of the gait cycle is recorded. Each test is repeated three times, and the mean of valid trials is calculated.

12

Description

Rearfoot contact area during dynamic walking

Timepoint

48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement

Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant walks barefoot across the platform at their preferred natural speed. Rearfoot contact area during the stance phase of the gait cycle is recorded. Each test is repeated three times, and the mean of valid trials is calculated.

13

Description

Percentage of forefoot pressure during dynamic walking

Timepoint

48 hours before the start of training, immediately after completion of the eight-week training program, and two

months after the intervention

Method of measurement

Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant walks barefoot across the platform at their preferred natural speed. The percentage of forefoot pressure during the stance phase of the gait cycle is recorded. Each test is repeated three times, and the mean of valid trials is calculated.

14

Description

Percentage of rearfoot pressure during dynamic walking

Timepoint

48 hours before the start of training, immediately after completion of the eight-week training program, and two months after the intervention

Method of measurement

Using the Payatek Gait Analysis System equipped with a pressure platform and dedicated software. The participant walks barefoot across the platform at their preferred natural speed. The percentage of rearfoot pressure during the stance phase of the gait cycle is recorded. Each test is repeated three times, and the mean of valid trials is calculated.

Intervention groups

1

Description

Intervention Group 1: Motor control exercises based on Kolar's approach, focusing on the interaction between the central nervous system and the musculoskeletal system during movement. The selected exercises aim to improve joint control and coordination between joints and their supporting muscles. The intervention will last eight weeks, with three sessions per week, each lasting 40 to 60 minutes. Each session will include 10 minutes of warm-up, 25 to 45 minutes of exercises, and 5 minutes of cool-down. Exercise intensity will be monitored using the Borg Rating of Perceived Exertion Scale after each session. The selected exercises are described in Appendix 6 of the study protocol.

Category

Rehabilitation

2

Description

Intervention Group 2: Postural restoration exercises based on the Postural Restoration Institute approach. The program aims to normalize musculoskeletal asymmetries, restore muscle balance, and improve movement patterns. The selected exercises, approved by specialists, include left side lying trunk lift, right straight leg raise with crossover movement, 90/90 hip lift with tilt, left side lying hip adduction with simultaneous activation of the left abdominal muscles, right gluteus maximus activation in left side lying, left leg posterior pulling in right side lying, hip lift with right arm reach and balloon, standing right gluteus maximus activation with resistance against the proximal left hamstring and left knee flexion, reverse step-up with the left leg, quadruped hand and foot walking with abdominal lift, supported left acetabular femoral internal rotation with right acetabular femoral adduction, resisted trunk rotation with left hip internal rotation, and paraspinal muscle release with left hamstring stretching. The intervention will last eight weeks, with three sessions per week, each lasting 40 to 60 minutes, including 10 minutes of warm-up, 25 to 45 minutes of main exercises, and 5 minutes of cool-down. Exercise intensity will be monitored using the Borg Rating of Perceived Exertion Scale.

Category

Rehabilitation

3

Description

Control Group: Abdominal drawing-in maneuver. A corrective exercise specialist will provide an instructional session to explain the technique. Participants will slowly draw the lower abdominal region inward, below the navel, while avoiding movement of the upper abdomen, pelvis, and back. The exercises will be performed in four positions: supine with knees extended and flexed, prone, quadruped, and standing. Initially, the exercise will be performed in the supine position with verbal and tactile feedback. After correct breathing and performance are established, the exercise will progress to the other positions. The intervention will last eight weeks, with three sessions per week, each lasting 40 to 60 minutes. Each session will include 10 minutes of warm-up, 25 to 45 minutes of exercises, and 5 minutes of cool-down. Exercise intensity will be monitored using the Borg Rating of Perceived Exertion Scale.

Category

Rehabilitation

Recruitment centers

1

Recruitment center

Name of recruitment center

Ferdowsi University of Mashhad

Full name of responsible person

Reza Mahdavinejad

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Sponsors / Funding sources

1

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Grant name
Grant code / Reference number
Is the source of funding the same sponsor organization/entity?
Yes
Title of funding source
- University of Isfahan
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
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Person responsible for scientific inquiries

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Person responsible for updating data

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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
Undecided - It is not yet known if there will be 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
Undecided - It is not yet known if there will be a plan to make this available
Data Dictionary
Not applicable
Title and more details about the data/document
Not applicable. No separate data dictionary or coding manual is defined for this study.
When the data will become available and for how long
Not applicable. No data dictionary is planned for sharing.
To whom data/document is available
Not applicable. No data dictionary is designated for sharing.
Under which criteria data/document could be used
Not applicable. No separate data dictionary is defined for this study.
From where data/document is obtainable
Not applicable. No document is designated for sharing under this category.
What processes are involved for a request to access data/document
Not applicable. No access request procedure is defined because no data dictionary is planned for sharing.
Comments
No separate data dictionary is specified for sharing in the study protocol.