Clinical Trial Protocol
Iranian Registry of Clinical Trials

08 Nov 2026

The Effect of Neuromuscular Training on The Mechanical Response of The Lumbo-Pelvic-Hip Complex and Lower Extremities in Athletes with Hamstring Injuries And/or Low Back Pain During Functional Tasks

Protocol summary

Study aim

This study aims to address the lack of comparative evidence on neuromuscular training modalities by evaluating how dynamic neuromuscular stabilization (DNS), Nordic hamstring exercises (NHE), and askling training differentially modulate lumbopelvic-hip mechanics and lower limb coordination in athletes with hamstring injuries and/or low back pain during functional tasks.

Design

A controlled, parallel-group, randomized clinical trial with pre-post testing on 45 patients and 15 healthy individuals. Randomization uses Excel’s RAND function.

Settings and conduct

Following initial preparation, electromyographic activity, ground reaction forces, and plantar pressure are measured. Intervention groups receive an 8-week training program and are reassessed post-intervention.

Participants/Inclusion and exclusion criteria

Inclusion criteria: History of hamstring injury (past 6 months) and/or low back pain, no other lower extremity injuries, regular sports activity (≥3 sessions/week), and Aged 18–40 years. Exclusion criteria: New injuries during the study, incomplete participation in training sessions, use of neuromuscular-affecting medications, and chronic musculoskeletal/neurological disorders.

Intervention groups

Intervention Groups: Athletes with hamstring injuries and/or low back pain undergo an 8-week training program (3 groups: Dynamic Neuromuscular Stabilization (DNS), Nordic Hamstring Exercises (NHE), Askling Training) at a sports club. Control Group: Will not receive training intervention.

Main outcome variables

The amplitude, Free moment, and frequency spectrum of the ground reaction force; Amplitude and frequency spectrum of muscle electrical activity; and Onset and offset of the lower limb muscles

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20240917063072N2**
Registration date: **2025-05-29, 1404/03/08**
Registration timing: **prospective**

Last update: **2025-05-29, 1404/03/08**
Update count: **0**

Registration date

2025-05-29, 1404/03/08

Registrant information

Name
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The university of mohaghegh ardabili
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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2025-05-31, 1404/03/10

Expected recruitment end date

2025-08-15, 1404/05/24

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

The Effect of Neuromuscular Training on The Mechanical Response of The Lumbo-Pelvic-Hip Complex and Lower Extremities in Athletes with Hamstring Injuries And/or Low Back Pain During Functional Tasks

Public title

The Impact of Neuromuscular Training on Athletes with Hamstring Injuries and Low Back Pain

Purpose

Treatment

Inclusion/Exclusion criteria

Inclusion criteria:

History of hamstring injury within the past 6 months Current low back pain Absence of concurrent lower extremity injuries Regular sports participation (minimum of 3 training sessions per week) Aged between 18 and 40 years

Exclusion criteria:

Occurrence of any new injuries during the study period Incomplete attendance in training sessions (missing >20% of sessions) Use of medications affecting neuromuscular function (e.g., muscle relaxants, antispasmodics) Diagnosed neurological disorders (e.g., cerebral palsy, Parkinson’s disease)

Age

From **18 years** old to **40 years** old

Gender

Both

Phase

N/A

Groups that have been masked

- Participant

Sample size

Target sample size: **60**

Randomization (investigator's opinion)

Randomized

Randomization description

Participants will be randomly assigned to one of four intervention groups—dynamic neuromuscular stabilization (DNS), Nordic hamstring exercises (NHE), Askling training, and control group—using a computer-generated randomization sequence via the RAND function in Microsoft Excel. Allocation concealment will be ensured by an independent researcher who is blinded to group assignments. The randomization ratio will be 1:1:1:1, and assignments will be securely stored in password-protected files until the completion of data collection.

Blinding (investigator's opinion)

Single blinded

Blinding description

This study includes three intervention groups and one control group. Participants, therapists, and assessors are blinded to group allocation. Participants are informed of trial participation but not group details. Randomization uses concealed computer-generated codes managed by an independent researcher.

Placebo

Not used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Research Ethics Committees of University of Mohaghegh Ardabili

Street address

Ardabil, end of University street, University of Mohaghegh Ardabili

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Province

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Postal code

5619911367

Approval date

2025-04-30, 1404/02/10

Ethics committee reference number

IR.UMA.REC.1404.029

Health conditions studied

1

Description of health condition studied

Athletes with hamstring injuries and/or back pain

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description

Walking – Running – Planned Directional Change Running – Reactive Directional Change Running – Counter movement Jump (CMJ) – Squat Jump (SJ) – Y-Balance Test

Timepoint

Primary outcomes will be assessed at the following two time points: Baseline: Before the initiation of the 8-week training intervention (pre-test). Post-intervention: Immediately following the completion of the 8-week training program (post-test).

Method of measurement

Bertec forceplate, Biometric Electromyography (EMG) System, RSScan Footscan® System, Visual Analogue Scale

Secondary outcomes

empty

Intervention groups

1

Description

Intervention group: Dynamic Neuromuscular Stabilization (DNS) Group, DNS exercises aim to improve postural control and core stability and include movements such as Baby Position, Rolling, Side-Lying, Tripod, Squat, and Czech Get-Up. The exercises emphasize diaphragmatic breathing and intra-abdominal pressure (IAP) regulation. The intervention will be conducted three times per week for eight weeks, with each session lasting between 45 and 60 minutes.

Category

Treatment - Other

2

Description

Intervention group: Nordic Hamstring Exercise (NHE) Group, Nordic exercises aim to eccentrically strengthen the hamstring muscles to prevent injury. They involve a controlled forward descent from a kneeling position with assistance from a partner or a support strap, following the protocol developed by Petersen et al. (2011). The intervention will be conducted three times per week for eight weeks, with each session lasting between 45 and 60 minutes.

Category

Treatment - Other

3

Description

Intervention group: Askling Training Group, This group performs eccentric hamstring exercises based on the L-protocol developed by Askling et al., which includes lunge exercises, dynamic stretching, and controlled running drills. The intervention will be conducted three times per week for eight weeks, with each session lasting between 45 and 60 minutes.

Category

Treatment - Other

4

Description

Control group: Participants in this group will receive no structured exercise intervention during the eight-week period and will continue their normal daily activities without any change.

Category

Other

Recruitment centers

1

Recruitment center

Name of recruitment center
Mohaghegh Ardabili University Health and Wellness Center

Full name of responsible person
Farhad Rezazadeh

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Sponsors / Funding sources

1

Sponsor

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Grant name

Grant code / Reference number

Is the source of funding the same sponsor organization/entity?
No

Title of funding source
The University of Mohaghegh Ardabili

Proportion provided by this source
100

Public or private sector
Private

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
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Assistant professor
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Sharing plan

Deidentified Individual Participant Data Set (IPD)
Undecided - It is not yet known if there will be 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
No - There is not a plan to make this available
Clinical Study Report
Undecided - It is not yet known if there will be 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
Collected data will be made available to the public as articles and the thesis after analysis.
When the data will become available and for how long
Access period is 2 months after printing the results
To whom data/document is available
The instructor and the examiner
Under which criteria data/document could be used
Article and thesis
From where data/document is obtainable
Supervisor
What processes are involved for a request to access data/document
Raw data cannot be published.
Comments