Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

The Effects of Nordic Walking and Resistance Training on Balance and Functional Performance in Postmenopausal Women with Osteoporosis

Protocol summary

Study aim
The Effects of Nordic Walking and Resistance Training on Balance and Functional Performance in Postmenopausal Women with Osteoporosis

Design
Randomized clinical trial (RCT) with pretest-posttest and control group.

Settings and conduct
The study will be conducted at the Sports Sciences Research Institute and will be carried out without blinding.

Participants/Inclusion and exclusion criteria
Study inclusion criteria: Women aged 45 to 60 years Postmenopausal status (at least 12 months of amenorrhea) Diagnosed with osteoporosis Ability to perform exercises and participate in training sessions Referral to healthcare centers in Tehran and Karaj Exclusion criteria: Missing more than 3 training sessions Occurrence of severe pain, injury, or medical complications during exercise Initiation of new treatment or medication affecting bone metabolism during the study Development of diseases or conditions that prevent continuation of exercise participation

Intervention groups
This study included three groups: two intervention groups and one control group. The first group was the Nordic walking group, which performed Nordic walking exercises using specialized poles for eight weeks, three sessions per week, with each session lasting 60 minutes at an intensity of 50–70% of maximum heart rate. The second group was the resistance training group, which, over the same eight-week period, performed strength training exercises three times per week at an intensity of 40–60% of one-repetition maximum (1RM), targeting the lower-limb muscles (including leg flexion and extension, rowing, butterfly, leg press, and crunch exercises). The third group was the control group, which received no exercise intervention during the study period and continued their usual daily activities.

Main outcome variables
Static balance, dynamic balance, and motor function.

General information

Reason for update

Acronym

IRCT registration information
IRCT registration number: **IRCT20221231056996N2**
Registration date: **2026-06-29, 1405/04/08**
Registration timing: **prospective**

Last update: **2026-06-29, 1405/04/08**
Update count: **0**

Registration date
2026-06-29, 1405/04/08

Registrant information

Name
Mohammadreza Seyedi

Name of organization / entity
Sport Sciences Research Institute

Country
Iran (Islamic Republic of)

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+98 21 8874 7884

Email address
seyedi@ssrc.ac.ir

Recruitment status
Recruitment complete

Funding source

Expected recruitment start date
2026-07-23, 1405/05/01

Expected recruitment end date
2026-09-23, 1405/07/01

Actual recruitment start date
empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

The Effects of Nordic Walking and Resistance Training on Balance and Functional Performance in Postmenopausal Women with Osteoporosis

Public title

The Effects of Nordic Walking and Resistance Training on Balance and Functional Performance in Postmenopausal Women with Osteoporosis

Purpose

Supportive

Inclusion/Exclusion criteria

Inclusion criteria:

Age range: 45 to 60 years old Being menopausal (at least 12 months without menstruation) Having osteoporosis (based on a DEXA T-score of less than −2.5 and confirmed by a specialist physician) Ability to perform exercises and participate in training sessions Participants referring to healthcare centers in the cities of Tehran and Karaj

Exclusion criteria:

Not missing more than 3 training sessions Occurrence of severe pain, injury, or medical complications during exercise Initiation of a new treatment or medication affecting bone during the study Having diseases or medical conditions that prevent continuation of the exercise program

Age

From **45 years** old to **60 years** old

Gender

Female

Phase

N/A

Groups that have been masked

No information

Sample size

Target sample size: **39**

Randomization (investigator's opinion)

Randomized

Randomization description

In this three-group study, after confirming the eligibility criteria, participants will be randomly assigned to three groups (two experimental groups and one control group) using simple randomization with an online random number generation software (such as Random Allocation Software or Sealed Envelope). To ensure allocation concealment, the randomization results will be placed in opaque, sealed envelopes, and until the intervention begins, neither the researcher nor the participants will be aware of the group assignments.

Blinding (investigator's opinion)

Not blinded

Blinding description

Placebo

Not used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Research Ethics Committee of the Sport Sciences Research Institute

Street address

Motahhari st. MirEmad 5th

City

Tehran

Province

Tehran

Postal code

1587958711

Approval date

2026-05-20, 1405/02/30

Ethics committee reference number

IR.SSRC.REC.1405.033

Health conditions studied

1

Description of health condition studied

Osteoporosis

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description

Static Balance

Timepoint

pre and post test evaluation

Method of measurement

Romberg Test

2

Description

Dynamic Balance

Timepoint

pre and post test evaluation

Method of measurement

Timed Up and Go Test (TUG)

3

Description

Physical Performance:

Timepoint

pre and post test evaluation

Method of measurement

Senior Fitness Tests

Secondary outcomes

empty

Intervention groups

1

Description
Nordic Walking Intervention Group: Participants in this group will perform Nordic walking exercises using specialized walking poles. This exercise includes coordination of arm and leg movements, maintaining proper body posture, and walking at moderate intensity, accompanied by warm-up and cool-down sessions. This group will perform Nordic walking training for 8 weeks, 3 sessions per week, with each session lasting 45 to 60 minutes.
Category
Rehabilitation

2

Description
Resistance Training Intervention Group: Participants in this group will perform strength training exercises using weights, resistance bands, and body weight. The exercises include strengthening the lower, upper, and core body muscles, such as squats, calf exercises, and exercises for the hips, arms, and shoulders. This group will perform resistance training for 8 weeks, 3 sessions per week. Each session will last 45 to 60 minutes. The exercise intensity will be approximately 50 to 70% of one-repetition maximum (1RM).
Category
Rehabilitation

3

Description
Control group: Participants in this group will not receive any exercise program and will continue their usual daily activities throughout the study period.
Category
Rehabilitation

Recruitment centers

1

Recruitment center
Name of recruitment center
Sports Science Research Institute
Full name of responsible person
Mohammadreza Seyedi
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No. 3، 5th Alley، Mir Emad Street، Motahari Avenue، Tehran، Iran
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Sponsors / Funding sources

1

Sponsor
Name of organization / entity
Islamic Azad University
Full name of responsible person
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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
Islamic Azad University
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
Sport Sciences Research Institute
Full name of responsible person
Mohammadreza Seyedi
Position
Assistant professor in Sport Sciences Research Institute of IRAN
Latest degree
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Other areas of specialty/work
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Sharing plan

Deidentified Individual Participant Data Set (IPD)
No - There is not a plan to make this available
Justification/reason for indecision/not sharing IPD
Data information will be published only in the form of articles and statistical results.
Study Protocol
Undecided - It is not yet known if there will be 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
Undecided - It is not yet known if there will be 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
Undecided - It is not yet known if there will be a plan to make this available
Data Dictionary
Undecided - It is not yet known if there will be a plan to make this available