# Clinical Trial Protocol
# Iranian Registry of Clinical Trials

17 Sep 2026

## The Comparison of the Effect of Eccentric and Concentric Exercises to improve Function, Balance and Muscle Strength in Patients with Multiple Sclerosis

## Protocol summary


**Summary**

1) Objectives: As, physiological effects of eccentric exercise on the muscle performance has been shown in several studies in normal subjects, compared to concentric exercise, this study has been designed to investigate the special effect of these two type exercise in the patients with multiple sclerosis . 2) Design: Randomized clinical trial. 3) Setting and conduct: Concentric (walking on a treadmill with positive slope) and eccentric (walking on a treadmill with negative slope) exercise protocols were designed for experimental groups. 4) Participants including major eligibility criteria: 30 patients with multiple sclerosis will be participated according to the inclusion criteria including; ability to walk 10 meter in a less than 1 minute (with or without aim) and exclusion criteria including; sever decrease of functional ability during last year, Pregnancy, Corticosteroid treatment during last month, Sever Psychological condition, Any conditions cause to prevent mild or moderate sport activities, regular sport activity twice a week for more than 10 minutes in each session, simultaneously present another medical condition such as diabetic, lower limb arthritis, unstable cardiovascular conditions. 5) Intervention: The exercise protocol (concentric or eccentric exercise) included 30 minutes walking on treadmill within 55% of Maximum Heart rate which progressively increase to 85% Maximum Heart rate , for 12 sessions, 3 times a week. 6) Main outcome: a) Functional activity evaluations: including Two-Minute Walk، Timed 25 Foot Walk and Timed Get-up and Go, b) Static and dynamic balance indexes, c) Maximum isometric Torque of the left and right quadriceps and hamstring muscles, d) Disability and Ability index by completing Guy’s Neurological Disability Scale and Rivermead Mobility Index.


## General information

**Acronym**

**IRCT registration information**

IRCT registration number: **IRCT201107261254N7**
Registration date: **2011-11-05, 1390/08/14**
Registration timing: **registered_while_recruiting**

Last update:
Update count: **0**

**Registration date**

2011-11-05, 1390/08/14

**Registrant information**


**Name**
Amir Hoshang Bakhtiary Davijani

**Name of organization / entity**
Semnan University of Medical Sciences

**Country**
Iran (Islamic Republic of)

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**Recruitment status**

**Recruitment complete**


**Funding source**

Vice chancellor for research, Semnan University of Medical Sciences


**Expected recruitment start date**

2011-09-20, 1390/06/29

**Expected recruitment end date**

2012-09-20, 1391/06/30

**Actual recruitment start date**

empty

**Actual recruitment end date**

empty

**Trial completion date**
empty

**Scientific title**
The Comparison of the Effect of Eccentric and Concentric Exercises to improve Function, Balance and Muscle Strength in Patients with Multiple Sclerosis

**Public title**
The Comparison of the Effect of Eccentric and Concentric Exercises to improve Function, Balance and Muscle Strength in Patients with Multiple Sclerosis

**Purpose**
Treatment

**Inclusion/Exclusion criteria**
Inclusion Criteria: Multiple Sclerosis patients with ability to walk 10 meter in a less than 1 minute (with or without aim) exclusion Criteria: Sever decrease of functional ability during last year; Pregnancy; Corticosteroid treatment during last month, Sever Psychological condition, Any conditions cause to prevent mild or moderate sport activities; regular sport activity twice a week for more than 10 minutes in each session; simultaneously present another medical condition such as diabetic; lower limb arthritis; unstable cardiovascular conditions that cause noncooperation of subject during intervention

**Age**
From **18 years** old to **50 years** old

**Gender**
Both

**Phase**
N/A

**Groups that have been masked**
*No information*

**Sample size**
Target sample size: **15**

**Randomization (investigator's opinion)**
Randomized

**Randomization description**

**Blinding (investigator's opinion)**
Single blinded

**Blinding description**

**Placebo**
Not used

**Assignment**
Parallel

**Other design features**

## Secondary Ids

empty

## Ethics committees

**1**

**Ethics committee**

**Name of ethics committee**
Ethical Committee of Semnan University of Medical Sciences

**Street address**
Semnan University of Medical Sciences, Blv Basij

**City**
Semnan

**Postal code**

**Approval date**
2011-10-26, 1390/08/04

**Ethics committee reference number**
90/111350

## Health conditions studied

**1**

**Description of health condition studied**
Multiple sclerosis

**ICD-10 code**
G35

**ICD-10 code description**
Demyelinating diseases of the central nervous system

## Primary outcomes

**1**

**Description**
Two-Minute Walk

**Timepoint**
Before and after intervention and also after 4 weeks follow-up

**Method of measurement**
By meter

**2**

**Description**
Timed 25 Foot Walk

**Timepoint**
Before and after intervention and also after 4 weeks follow-up

**Method of measurement**
By chronometer

**3**

**Description**
Timed Get-up and Go

**Timepoint**
Before and after intervention and also after 4 weeks follow-up

**Method of measurement**
By Chronometer

**4**

**Description**
Static Balance Index

**Timepoint**
Before and after intervention and also after 4 weeks follow-up

**Method of measurement**
By Biodex Balance System

**5**

**Description**
Dynamic Balance Index
**Timepoint**
Before and after intervention and also after 4 weeks follow-up
**Method of measurement**
By Biodex Balance System

**6**

**Description**
Maximum isometric torque of quadriceps muscles
**Timepoint**
Before and after intervention and also after 4 weeks follow-up
**Method of measurement**
By Biodex Isokinetic Device 4Pro

**7**

**Description**
Maximum isometric torque of hamstring muscles
**Timepoint**
Before and after intervention and also after 4 weeks follow-up
**Method of measurement**
By Biodex Isokinetic Device 4Pro

## Secondary outcomes

**1**

**Description**
Disability Rate
**Timepoint**
Before and after intervention and also after 4 weeks follow-up
**Method of measurement**
Guy’s Neurological Disability Scale

**2**

**Description**
Ability rate
**Timepoint**
Before and after intervention and aslo after 4 weeks follow-up
**Method of measurement**
Rivermead Mobility Index (RMI)

## Intervention groups

**1**

**Description**
30 minutes walking on treadmill with Positive slope (Concentric group), 3 times in a week, 4 weeks
**Category**
Rehabilitation

**2**

**Description**
30 minutes walking on treadmill with negative slope (Eccentric group), 3 times a week, 4 weeks
**Category**
Rehabilitation

## Recruitment centers

**1**

**Recruitment center**
**Name of recruitment center**
Neuromuscular Rehabilitation Research Centre
**Full name of responsible person**
Dr Amir H Bakhtiary
**Street address**
Neuromuscular Rehabilitation Research Center, Ghods Blv.
**City**
Semnan

## Sponsors / Funding sources

**1**

**Sponsor**
**Name of organization / entity**
Vice chancellor for research, Semnan University of Medical Sciences
**Full name of responsible person**
Dr Raheb Ghorbani
**Street address**
Semnan University of Medical Sciences, Basij Blv.
**City**
Semnan
**Grant name**
**Grant code / Reference number**
**Is the source of funding the same sponsor organization/entity?**
Yes
**Title of funding source**
Vice chancellor for research, Semnan University of Medical Sciences
**Proportion provided by this source**
100
**Public or private sector**
*empty*
**Domestic or foreign origin**
*empty*
**Category of foreign source of funding**
*empty*
**Country of origin**
**Type of organization providing the funding**
*empty*

## Person responsible for general inquiries

**Contact**
**Name of organization / entity**
Semnan University of Medical Sciences

**Full name of responsible person**
Amir Hoshang Bakhtiary
**Position**
PhD in Physiotherapy/ Associate Professor
**Other areas of specialty/work**
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## Person responsible for scientific inquiries

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## Person responsible for updating data

**Contact**

## Sharing plan

**Deidentified Individual Participant Data Set (IPD)**
*empty*
**Study Protocol**
*empty*
**Statistical Analysis Plan**
*empty*
**Informed Consent Form**
*empty*
**Clinical Study Report**
*empty*
**Analytic Code**
*empty*
**Data Dictionary**
*empty*