

Clinical Trial Protocol

Iranian Registry of Clinical Trials

11 Sep 2026

Effect of Eight-Week Dynamic Neuromuscular Stabilization (DNS) Training With and Without Abdominal Drawing-In Maneuver (ADIM) on Balance, Pulmonary Function Indices, Motor Performance, and Quality of Life in Individuals with Incomplete Paraplegic Spinal Cord Injury

Protocol summary

Study aim

To compare the effect of eight weeks of dynamic neuromuscular stability training (DNS) with no abdominal maneuver (ADIM) on balance, pulmonary indices, performance, and lifestyle in people with spinal cord injury.

Design

The target population of this study includes individuals aged 20 to 45 years with spinal cord injury (SCI) with incomplete paraplegia (ASIA classification C or D) at the lumbar levels (L1-L5) who have had at least 6 months of injury (chronic). Purposeful sampling will be performed among individuals with spinal cord injury (SCI) with incomplete paraplegia (ASIA classification) at the lumbar levels (L1-L5).

Settings and conduct

These individuals are selected from the Hana Rehabilitation Center of Isfahan. The selection of this age group and level of injury is due to their relative ability to perform seated exercises and their potential for functional improvement.

Participants/Inclusion and exclusion criteria

Inclusion criteria: • Diagnosis of SCI (paraplegia-incomplete) by a specialist doctor • Voluntary consent to participate in the study • Absence of other neurological diseases such as MS and ... • Ability to perform ADIM and DNS exercises (modified) • Ability to sit independently
Exclusion criteria: • Absence of more than 3 consecutive sessions or 5 alternating sessions • Pain or any problem that makes the subject's presence in the study impossible • Voluntary withdrawal from the study • Chest deformity and respiratory problems

Intervention groups

A minimum of 30 subjects (15 subjects per group: DNS with ADIM and DNS without ADIM) was required. Considering a 15% probability of attrition, the final

sample size was increased to 34 subjects (17 subjects per group) to maintain statistical accuracy.

Main outcome variables

sitting balance; pulmonary function; the strength of the core muscles of the trunk; Endurance of central trunk muscles; Pasteur stability; quality of life

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20260128068685N1**

Registration date: **2026-08-06, 1405/05/15**

Registration timing: **prospective**

Last update: **2026-08-06, 1405/05/15**

Update count: **0**

Registration date

2026-08-06, 1405/05/15

Registrant information

Name

Mohammad Hossein Jafari

Name of organization / entity

The University of Isfahan

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Recruitment status

recruiting

Funding source

Expected recruitment start date

2026-08-09, 1405/05/18

Expected recruitment end date

2026-10-12, 1405/07/20

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

Effect of Eight-Week Dynamic Neuromuscular Stabilization (DNS) Training With and Without Abdominal Drawing-In Maneuver (ADIM) on Balance, Pulmonary Function Indices, Motor Performance, and Quality of Life in Individuals with Incomplete Paraplegic Spinal Cord Injury

Public title

The effect of dynamic neuromuscular stability (DNS) exercises with and without abdominal maneuver (ADIM)

Purpose

Supportive

Inclusion/Exclusion criteria**Inclusion criteria:**

Diagnosis of SCI (paraplegia-incomplete) by a specialist
 doctor
 Voluntary consent to participate in the research
 Absence of other neurological diseases such as MS and ...
 Ability to perform ADIM and DNS exercises (modified)
 Ability to sit independently
 Minimum 20 years and maximum 45 years

Exclusion criteria:

Absence of more than 3 consecutive sessions or 5 alternate sessions
 Pain or any problem that makes the subject's presence in the study impossible
 Voluntary withdrawal from the study
 History of spinal surgery or hip fracture
 Chest deformity and respiratory problems
 Failure to complete the tests
 Minimum 20 years and maximum 45 years

AgeFrom **20 years** old to **45 years** old**Gender**

Both

Phase

N/A

Groups that have been masked*No information***Sample size**Target sample size: **30****Randomization (investigator's opinion)**

Randomized

Randomization description

Participants were assigned to two intervention groups (DNS with ADIM and DNS without ADIM) using a paired random allocation method based on the ASIA scale using Randomizer.org software. This method maintains balance between groups and reduces selection bias.

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**

Ethics Committee of the University of Isfahan

Street address

No. 24, West Baharan Alley 1, Kheradmand Street,
 Gharazi Street, Isfahan

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Isfahan

Province

Isfahan

Postal code

08196353191

Approval date

2026-02-21, 1404/12/02

Ethics committee reference number

IR.UI.REC.1404.279

Health conditions studied**1****Description of health condition studied**

Incomplete Paraplegic Spinal Cord Injury

ICD-10 code

S34

ICD-10 code description

Injury of lumbar and sacral spinal cord and nerves at
 abdomen, lower back and pelvis level

Primary outcomes**1****Description**

Maximum functional reach distance in the Modified Functional Reach Test (MFRT) in centimeters, measured before the start of the intervention and immediately after the end of the 8-week intervention.

Timepoint

Measurements were taken at two time points, including before the start of the intervention (pre-test) and immediately after the end of the 8-week intervention period (post-test).

Method of measurement

Modified Functional Reach Test

2**Description**

Forced expiratory volume in one second (FEV1) measured by digital spirometry in liters, before the start of the intervention and immediately after the end of the 8-week intervention.

Timepoint

Measurements were taken at two time points, including before the start of the intervention (pre-test) and immediately after the end of the 8-week intervention period (post-test).

Method of measurement

Digital spirometer device

3

Description

Forced vital capacity (FVC) measured by digital spirometry in liters, before the start of the intervention and immediately after the end of the 8-week intervention.

Timepoint

Measurements were taken at two time points, including before the start of the intervention (pre-test) and immediately after the end of the 8-week intervention period (post-test).

Method of measurement

Digital spirometer device

4

Description

Core trunk muscle endurance based on the duration of maintaining the position in the modified Planck test, in seconds, measured before the start of the intervention and immediately after the end of the 8-week intervention.

Timepoint

Measurements were taken at two time points, including before the start of the intervention (pre-test) and immediately after the end of the 8-week intervention period (post-test).

Method of measurement

Modified Plank test

5

Description

قدرت عضلات فلکسور تنه اندازه‌گیری شده با دینامومتر، بر حسب نیوتن، پیش از شروع مداخله و بلافاصله پس از پایان مداخله ۸ هفته‌ای.

Timepoint

Measurements were taken at two time points, including before the start of the intervention (pre-test) and immediately after the end of the 8-week intervention period (post-test).

Method of measurement

Dynamometer device

6

Description

Trunk extensor muscle strength measured with a dynamometer, in Newtons, before the start of the intervention and immediately after the end of the 8-week intervention.

Timepoint

Measurements were taken at two time points, including before the start of the intervention (pre-test) and immediately after the end of the 8-week intervention period (post-test).

Method of measurement

Dynamometer device

7

Description

Intra-abdominal pressure measured with a manometer, in centimeters of water (cmH₂O), before the start of the intervention and immediately after the end of the 8-week intervention.

Timepoint

Measurements were taken at two time points, including before the start of the intervention (pre-test) and immediately after the end of the 8-week intervention period (post-test).

Method of measurement

Manometer (intra-abdominal pressure gauge)

8

Description

The kyphosis angle of the back region measured with a kyphometer, in degrees, before the start of the intervention and immediately after the end of the 8-week intervention.

Timepoint

Measurements were taken at two time points, including before the start of the intervention (pre-test) and immediately after the end of the 8-week intervention period (post-test).

Method of measurement

Kyphometer device

9

Description

Quality of Life Index (QLI) score, measured before the start of the intervention and immediately after the end of the 8-week intervention.

Timepoint

Measurements were taken at two time points, including before the start of the intervention (pre-test) and immediately after the end of the 8-week intervention period (post-test).

Method of measurement

Quality of Life Index

Secondary outcomes

1

Description

Quality of life index score, measured before the start of the intervention and immediately after the end of the 8-week intervention.

Timepoint

Measurements were taken at two time points, including before the start of the intervention (pre-test) and

immediately after the end of the 8-week intervention period (post-test).

Method of measurement

Quality of Life Index

Intervention groups

1

Description

Intervention group: Participants will perform dynamic neuromuscular stability exercises with abdominal drawing-in maneuvers under the supervision of a therapist for 8 weeks, 3 sessions per week, 45 minutes each session. The exercise program includes modified core stability patterns in seated functional positions appropriate to the ability of individuals with spinal cord injury, and the intensity and progression of the exercises will gradually increase over the course. All sessions will be performed with the same protocol and under the supervision of the researcher.

Category

Rehabilitation

2

Description

Control group: Participants will receive the same dynamic neuromuscular stability exercises with the same order, duration, intensity, and number of sessions for 8 weeks, 3 sessions per week, each session lasting 45 minutes, except that the abdominal drawing-in maneuver is not performed during the exercises. All sessions will be supervised by the researcher and will follow the same protocol.

Category

Rehabilitation

Recruitment centers

1

Recruitment center

Name of recruitment center

Isfahan Spinal Cord Injury Patients Support Charity (Hana)

Full name of responsible person

Dr. Gholamreza Pistei

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Alley of Timurid Martyrs, next to Atashgah Mountain, Atashgah Street, Isfahan

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<https://hana-charity.org/>

Sponsors / Funding sources

1

Sponsor

Name of organization / entity

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Full name of responsible person

Dr. Mohammadreza Abedi

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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

Name of organization / entity

The University of Isfahan

Full name of responsible person

Mohammad Hossein Jafari

Position

Master's student

Latest degree

Bachelor

Other areas of specialty/work

Sports pathology and corrective movements

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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

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