Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 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

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Name of organization / entity

The University of Isfahan

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Recruitment status

Recruitment complete

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
Age
From **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
City
Isfahan
Province
Isfehan
Postal code
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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 اندازه‌گیری‌شده 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 (cmH_2O), 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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Sponsors / Funding sources

1

Sponsor

Name of organization / entity
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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?
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