Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

Comparison of the Effects of 8 Weeks of DNS and Ai Chi Exercises on Balance, Quality of Life, Motor Function, Strength, and Endurance of Core Muscles in Elderly Women

Protocol summary

Study aim
The aim of this study is to compare the effects of 8 weeks of DNS and Ai Chi aquatic exercises on balance, quality of life, functional performance, and core muscle strength and endurance in older women aged 65–75 years.

Design
This study is a three-arm, randomized, open-label clinical trial with a pretest–posttest design, involving 45 participants

Settings and conduct
This study will be conducted in Sabzevar. After identification and screening of eligible participants and obtaining informed consent, 45 participants will be randomly allocated to three groups: DNS, Ai Chi, and control. Pretest assessments will be performed before the intervention, and posttest assessments will be conducted after 8 weeks. The DNS and Ai Chi groups will participate in exercise sessions twice a week for 8 weeks, with each session lasting 45–60 minutes. The control group will continue their usual daily activities during the study period.

Participants/Inclusion and exclusion criteria
45 older women aged 65–75 years living in Sabzevar. Inclusion criteria: Age 65–75 years, BMI 25–30 kg/m², informed consent, ability to perform daily activities, no severe spinal, lower back, or hip disorders, and no participation in similar exercise programs during the previous 3 months. Exclusion criteria: Severe physical or spinal disorders, history of spinal fracture or surgery, inability to perform daily activities, significant fear of water, or failure to meet the inclusion criteria

Intervention groups
DNS Exercise group(15) AiChi Exercise group(15) Control group(15)

Main outcome variables
Balance; quality of life; functional performance; core muscle strength, and core muscle endurance

General information

Reason for update

Acronym

IRCT registration information
IRCT registration number: **IRCT20260905070921N1**
Registration date: **2026-09-25, 1405/07/03**
Registration timing: **prospective**

Last update: **2026-09-25, 1405/07/03**
Update count: **0**

Registration date
2026-09-25, 1405/07/03

Registrant information

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Name of organization / entity
The university of Guilan

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Recruitment status
Recruitment complete

Funding source

Expected recruitment start date
2026-10-07, 1405/07/15

Expected recruitment end date
2026-11-06, 1405/08/15

Actual recruitment start date
2026-10-12, 1405/07/20

Actual recruitment end date

2026-11-06, 1405/08/15

Trial completion date

2026-12-01, 1405/09/10

Scientific title

Comparison of the Effects of 8 Weeks of DNS and Ai Chi Exercises on Balance, Quality of Life, Motor Function, Strength, and Endurance of Core Muscles in Elderly Women

Public title

Comparison of the effects of 8 Weeks of DNS and Ai chi Exercises on physical Abilities and Quality of Life in Older Women

Purpose

Supportive

Inclusion/Exclusion criteria

Inclusion criteria:

Women aged 65–75 years. Voluntary willingness to participate in the study and completion of the informed consent form Completion of the health and physical fitness assessment form, including the Washburn Physical Activity Questionnaire for Older Adults Body mass index (BMI) between 25 and 30 kg/m No participation in exercise or rehabilitation programs similar to DNS or Tai Chi during the previous 3 months. No severe spinal pathology, including Grade 2 or 3 disc herniation No history of spinal fracture or spinal surgery Ability to sit, stand, and walk without assistive devices and perform activities of daily living No severe disorders of the lower back or hip, including hyperlordosis or scoliosis, as confirmed by a specialist physician No significant fear of water, based on verbal assessment during the initial screening session.

Exclusion criteria:

Presence of severe spinal pathology, including Grade 2 or 3 disc herniation or severe neurological symptoms Presence of severe disorders of the lower back or hip, including severe hyperlordosis or scoliosis History of spinal fracture or spinal surgery Inability to sit, stand, or walk without assistive devices Significant fear or anxiety related to water Any medical condition that, according to the specialist physician, makes participation in the exercise program unsafe Failure to meet any of the other inclusion criteria

Age

From **65 years** old to **75 years** old

Gender

Female

Phase

N/A

Groups that have been masked

No information

Sample size

Target sample size: **65**

Actual sample size reached: **45**

Randomization (investigator's opinion)

Randomized

Randomization description

After eligibility criteria are confirmed and informed consent is obtained, 45 participants will be randomly allocated into three groups of 15 participants each: the DNS exercise group, the Tai Chi exercise group, and the control group. For randomization, each participant will be assigned a unique identification code, and allocation to the three study groups will be performed using a random number generation method. Thus, each participant will have an equal probability of being assigned to any of the three study groups

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 Hakim Sabzevari University

Street address

Khorasan Razavi – Sabzevar – Tohid Shahr – Hakim Sabzevari University Campus

City

Sabzevar

Province

Razavi Khorasan

Postal code

۹۶۱۷۹۷۶۴۸۷

Approval date

2026-04-28, 1405/02/08

Ethics committee reference number

IR.HSU.REC.1405.002

Health conditions studied

1

Description of health condition studied

None (the study will be conducted in healthy older women)

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description

Core Muscle Endurance, assessed in all three groups during the pre-test and post-test phases, before and after the 8-week intervention.

Timepoint

Outcome measures will be assessed at two time points:Pretest: Before the intervention begins.Posttest:

Immediately after completion of the 8-week intervention

Method of measurement

Core Muscle Endurance: McGill Test_These tests are used to assess the endurance of the muscles of the core region. The tests employed include the side plank, trunk extension test, and trunk flexion test at a 60-degree angle. For assessing the endurance of the trunk flexor muscles, the participant sits on a bench and maintains the trunk at a 60-degree angle relative to the horizontal surface. The arms are crossed over the chest, the knees are fully flexed, and the feet are placed on the bench. To stabilize the position, the toes are secured in place using tape. At the beginning of the test, the participant's back support is pulled backward by 10 cm to ensure that the participant does not rely on it to maintain the body position. The participant is then instructed to maintain this position for as long as possible. The time is measured from the moment the trunk separates from the back support until it makes contact with the support again and is recorded as an indicator of individual performance.The endurance of the trunk extensor muscles is assessed according to a standardized protocol. In this test, the participant lies prone with the palms facing downward and the pelvis positioned precisely at the upper edge of the bench. The pelvis and lower limbs are then firmly stabilized using straps attached beneath the bench. A chair is placed adjacent to the upper edge of the bench to support the trunk and upper limbs. The test begins with the arms crossed over the chest. The participant then lifts the trunk from the chair and attempts to maintain it in a horizontal position for as long as possible. The duration of the test is measured and recorded from the moment the trunk reaches the horizontal position until the hands make contact with the surface of the chair again. This procedure is used as a valid measure of trunk extensor muscle endurance.To assess the endurance of the lateral trunk muscles, including the external and internal oblique abdominal muscles and the quadratus lumborum, the participant lies on their side on a flat, firm surface, such as a bench or firm mat. The elbow of the supporting side is placed on the floor or bench directly beneath the shoulder, with the angle between the arm and trunk approximately 90 degrees. The legs are fully extended and positioned on top of each other, with the upper leg resting on the lower leg. The free hand is generally placed on the hip or across the chest. The participant is instructed to lift the trunk and pelvis off the surface so that the body forms a straight line from head to feet, similar to a rigid plank or side bridge. Using a stopwatch, the examiner measures the length of time the participant is able to maintain this position without dropping the pelvis or bending the body. If the pelvis drops toward the surface or the participant is unable to maintain a straight-body position, the test is terminated and the duration is recorded.

2

Description

Core Muscle Strength, assessed in all three groups during the pre-test and post-test phases, before and after the 8-week intervention.

Timepoint

Outcome variables will be measured at two time points:Pre-test: Before the intervention begins.Post-test: Immediately after the completion of the 8-week intervention.

Method of measurement

The isometric trunk muscle strength test is a valid and reliable method for measuring the maximum isometric strength of the core muscles, including the trunk flexor (abdominal) and extensor (lower back) muscles. In this test, the participant exerts maximal muscular force without joint movement, providing an indication of core muscle strength and the ability of these muscles to maintain stability and motor control.The test is typically performed using a handheld dynamometer positioned at specific points on the body. To measure trunk flexor strength, the dynamometer is placed against the anterior chest or upper abdominal region, and the participant exerts force against the device by attempting to flex the trunk forward. To measure trunk extensor strength, the dynamometer is positioned against the lower back or posterior shoulder region, and the participant exerts force by attempting to extend the trunk backward. Each maximal effort generally lasts 3–5 seconds, and the test is repeated 2–3 times to obtain the maximum or mean force value. Results are typically reported in Newtons (N) or kilograms-force (kgf). Due to its safety, simplicity, and minimal need for bulky equipment, this method is particularly suitable for older adults.

3

Description

Trunk balance will be assessed in all three groups at two time points: during the pre-test, before the intervention begins, and during the post-test, after the completion of the 8-week intervention.

Timepoint

Outcome variables will be measured at two time points:Pre-test: Before the intervention begins.Post-test: Immediately after the completion of the 8-week intervention.

Method of measurement

Static Balance TestTo assess static balance, the Stork Test will be used. This test is one of the commonly used tools for evaluating static balance. The test is performed under two conditions: with the eyes open and with the eyes closed. In this test, the participant stands on one leg with both hands placed on the waist. The sole of the non-supporting foot is positioned against the medial aspect of the knee of the supporting leg. The duration for which the participant is able to maintain this position is measured using a stopwatch and recorded in seconds. The test is terminated if any of the following conditions occurs: the heel of the supporting foot touches the ground, the hands are removed from the waist, or the free foot loses contact with the knee of the supporting leg. The test is performed three times, and the longest recorded time is considered the final score. The reliability of this test has been reported as 0.66.Dynamic Balance TestTo assess dynamic balance, the Y-Balance Test will be used. This test consists of three different movement directions: anterior, posteromedial, and posterolateral,

all performed on a central platform with a three-directional configuration. The correlation coefficient of this test has been reported to range from 0.86 to 0.98, indicating high reliability and appropriate validity across various studies. To determine the dominant leg, the falling-start test will be used. If the right leg is the dominant limb, the test will be performed in a counterclockwise direction, whereas if the left leg is dominant, the test will be performed in a clockwise direction.During the test, the participant begins by standing on the dominant leg at the intersection of the three branches of the platform. The participant is allowed to continue the movement as long as no performance errors occur, including moving the supporting foot from its initial position, using the moving leg for support to maintain balance, or losing balance and falling. If the participant is unable to complete the movement, they return to the starting position, and the distance reached by the indicator with the moving leg is recorded as the reach distance. The participant performs three trials in each of the three directions. Finally, the mean reach distance is normalized to the participant's lower-limb length and expressed as a percentage, which is used as the final outcome for analysis.

4

Description

Motor Performance, assessed in all three groups at two time points: during the pre-test and post-test phases, before and after the 8-week intervention

Timepoint

Outcome variables will be measured at two time points:Pre-test: Before the intervention begins.Post-test: Immediately after the completion of the 8-week intervention.

Method of measurement

Functional Movement Screen (FMS) TestThe Functional Movement Screen (FMS) is a standardized assessment consisting of seven fundamental movement patterns designed to evaluate movement quality and identify movement limitations or asymmetries prior to participation in physical or sports activities.1. Deep Squat:The participant stands with the feet approximately shoulder-width apart, holds a barbell or keeps the hands overhead, and slowly performs a squat until the thighs are at least parallel to the ground. The participant then returns to the starting position.2. Hurdle Step:The participant stands on a flat surface with a hurdle, typically a bar or stick, positioned at a predetermined height. The participant steps over the hurdle with the designated leg and then returns to the starting position.3. In-Line Lunge:The participant places one leg forward and positions the opposite leg directly behind it in a straight line. The participant then slowly lowers the body and returns to the starting position.4. Shoulder Mobility:The participant reaches one hand over the shoulder and behind the head while bringing the other hand upward from behind the back. The distance between the hands is measured.5. Active Straight-Leg Raise:The participant lies supine and actively raises one leg as high as possible while keeping the leg straight. The opposite leg remains extended and in contact with the ground.6. Trunk Stability Push-Up:The participant assumes a push-up position and performs one complete push-up while maintaining the trunk in a straight and stable position.7. Rotary Stability:The participant assumes a quadruped position and simultaneously lifts one arm and the contralateral leg, maintaining the position with control.ScoringEach movement is scored on a scale of 0 to 3:3: The movement is performed completely and without any apparent limitation.2: The movement is performed with a modification or compensatory movement.1: The participant is unable to perform the movement correctly.0: A score of zero is recorded if pain occurs at any stage of the movement.The scores for all seven movements are summed to obtain the total FMS score, with a maximum possible score of 21.

5

Description

Quality of Life, assessed in all three groups at two time points: during the pre-test and post-test phases, before and after the 8-week intervention.

Timepoint

Outcome variables will be measured at two time points:Pre-test: Before the intervention begins.Post-test: Immediately after the completion of the 8-week intervention

Method of measurement

Quality of Life AssessmentThe quality of life assessment consists of 26 questions, two of which address overall health and quality of life, while the remaining questions assess physical health, psychological health, social relationships, and environmental health. Responses are recorded using a five-point Likert scale (1–5), reflecting the intensity, capacity, frequency, or evaluation of each item.Participants can complete the questionnaire through self-administration. If a participant is unable to read or write, the questions may be administered verbally by the researcher or therapist. A quiet environment free from distractions should preferably be provided to ensure accurate responses.Scores are calculated separately for each domain. Some items are reverse-scored, particularly those with negatively worded content. The raw scores for each domain are standardized to a 0–100 scale, with higher scores indicating a better quality of life.

Secondary outcomes

empty

Intervention groups

1

Description

activitiesIntervention Group: DNS (Dynamic Neuromuscular Stabilization) group will participate in the relevant DNS exercises for 8 weeks, with two sessions per week, and each session lasting 45–60 minutes. Before the beginning of the intervention, participants will undergo the balance tests, McGill test, trunk muscle

strength test, and Functional Movement Screen (FMS) and will complete the Quality of Life questionnaire. After completion of the 8-week intervention, all tests and the questionnaire will be administered again to assess changes following the intervention

Category

Rehabilitation

2

Description

Intervention group: Ai Chi(The Ai Chi group)will participate in the relevant Ai Chi exercises for 8 weeks, with two sessions per week, and each session lasting 45–60 minutes. Before the beginning of the intervention, participants will undergo the balance tests, McGill test, trunk muscle strength test, and Functional Movement Screen (FMS) and will complete the Quality of Life questionnaire. After completion of the 8-week intervention, all tests and the questionnaire will be administered again to assess changes following the intervention.

Category

Rehabilitation

3

Description

Control group: At the beginning of the study, participants in the control group underwent the balance tests, McGill test, Functional Movement Screen (FMS), and trunk muscle strength test, and completed the Quality of Life questionnaire. Throughout the 8-week study period, participants in this group received no intervention. After 8 weeks, all tests and the Quality of Life questionnaire were administered again to assess changes over the study period

Category

Rehabilitation

Recruitment centers

1

Recruitment center

Name of recruitment center

Sabzevar Nursing Home

Full name of responsible person

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Sponsors / Funding sources

1

Sponsor

Name of organization / entity

Research Vice-Chancellor of the University of Guilan

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

Research Vice-Chancellor of the University of Guilan

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

Research Vice-Chancellor of the University of Guilan

Full name of responsible person

Sara eghlimi

Position

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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