

Clinical Trial Protocol

Iranian Registry of Clinical Trials

10 Jun 2026

The effect of corrective exercises with a systematic approach on brain oscillations, muscle activity, posture, range of motion, and balance in people with upper crossed syndrome.

Protocol summary

Study aim

The aim of the present study is to investigate the effect of corrective exercises with a systematic approach on the symptoms and complications of Upper Crossed Syndrome. (UCS).

Design

A randomized, single-blind, controlled clinical trial was conducted on 36 individuals

Settings and conduct

The measurements will be conducted in the Sports Science Laboratory of Arak University, and the training sessions will be carried out at the Diaphragm Corrective Exercises Center in Arak. Participants will be assessed during a pretest, a posttest, and a follow-up test over an approximate period of four months. The data collector and the statistical assessor will be blinded (single-blind).

Participants/Inclusion and exclusion criteria

The study participants will be 18-28 year-olds residing in Arak with Upper Crossed Syndrome and similar occupational characteristics. After initial screening and meeting the eligibility criteria, they will enroll in the study by providing written informed consent.

Intervention groups

The intervention group will perform a 12-week corrective exercise program using a systematic approach, three sessions per week, 60 minutes each. Sessions include warm-up, corrective, and cool-down phases. Based on Lederman's neuromuscular adaptation theory and a stepwise model, the program targets dysfunctions in postural and movement control. Exercises will use Pilates balls, resistance bands, steps, weights, and Swedish ladders, under the supervision of a corrective exercise specialist following progressive overload principles. The control group will only engage in their usual daily activities.

Main outcome variables

Forward Head Angle, Forward Shoulder Angle, Thoracic

Kyphosis Angle, Brain Electrical Activity, Muscle Electrical Activity, Range of Motion of Shoulder and Neck Joints, Static and Dynamic Balance

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20250921067305N1**

Registration date: **2025-11-12, 1404/08/21**

Registration timing: **retrospective**

Last update: **2025-11-12, 1404/08/21**

Update count: **0**

Registration date

2025-11-12, 1404/08/21

Registrant information

Name

Mohamad Khorami Moghadam

Name of organization / entity

The University of Isfahan

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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2025-10-23, 1404/08/01

Expected recruitment end date

2025-11-01, 1404/08/10

Actual recruitment start date

empty
Actual recruitment end date
empty
Trial completion date
empty

Scientific title
The effect of corrective exercises with a systematic approach on brain oscillations, muscle activity, posture, range of motion, and balance in people with upper crossed syndrome.

Public title
Systematic approach in correction of upper crossed syndrome

Purpose
Supportive

Inclusion/Exclusion criteria

Inclusion criteria:

Individuals with upper crossed syndrome. Individuals with similar occupational characteristics. Individuals aged between 18–30 years. Having a Body Mass Index (BMI) between 18 and 25 kg/m². Eligibility for female participants requires regular menstruation and the absence of any menstrual conditions that may disrupt the research process.

Exclusion criteria:

Presence of any obvious malalignment in the pelvis or lower limbs, or any other musculoskeletal deformity. History of diseases related to the joints of the spine, shoulder, or pelvis. History of fracture or surgery. History of neurological or psychiatric disorders. Use of any medication affecting the central nervous system. Participation in any type of physical activity or sports that may influence the study outcomes. Having an angle greater than 5 degrees in the Adam's test due to the possibility of scoliosis.

Age
From **18 years** old to **28 years** old

Gender
Both

Phase
N/A

Groups that have been masked

- Outcome assessor
- Data analyser

Sample size
Target sample size: **36**

Randomization (investigator's opinion)
Randomized

Randomization description
The random allocation sequence will be generated using a block randomization method with an equal allocation ratio (1:1) and variable block sizes of 4 and 6. The random sequence will be created through a validated online randomization system (Sealed Envelope) under the supervision of an independent statistician. Both the block sizes and allocation sequence will remain concealed from the research team until the completion of participant enrollment to prevent allocation predictability. Allocation concealment will be achieved

using sequentially numbered, opaque, and sealed envelopes. Each envelope will contain the code of the assigned group and will be stored in numerical order within a locked box. At enrollment, the registration officer, who is blinded to the randomization sequence, will open the next envelope in sequence and record the participant's assigned group. The random sequence generation and envelope preparation will be carried out by an independent statistician, while participant enrollment and assignment will be performed by a separate researcher unaware of the allocation codes. Thus, the procedures for sequence generation, allocation concealment, and implementation are designed in accordance with CONSORT guidelines to minimize the risk of selection bias.

Blinding (investigator's opinion)

Single blinded

Blinding description

In this study, the following practical measures will be implemented to ensure effective blinding and minimize bias: Participants will be allocated to either the intervention or control group. The outcome assessor and the data analyst will remain blinded to the group allocation of the participants until the final analysis stage is fully completed. To guarantee this, the researcher administering the intervention, who is aware of the group assignments, will have no role in baseline data collection or outcome assessment. The collected raw data will be fully anonymized and coded before being handed over to the analyst, with group labels such as 1 and 2 replacing the actual group names.

Placebo

Not used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

research Ethics Committees of University of Isfahan

Street address

Isfahan University, Azadi Square, Isfahan

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Isfahan

Postal code

81174673441

Approval date

2025-05-31, 1404/03/10

Ethics committee reference number

IR.UI.REC.1404.053

Health conditions studied

1

Description of health condition studied

Upper Crossed Syndrome

ICD-10 code

R29.3

ICD-10 code description

Abnormal posture

Primary outcomes

1

Description

Forward head angle.

Timepoint

Outcome measure assessments will be conducted at three time points: before the initiation of the intervention, immediately following the 12-week intervention period, and finally, at a 4-week follow-up after the intervention concludes.

Method of measurement

The forward head will be measured using photogrammetry.

2

Description

Forward shoulder angle

Timepoint

Outcome measure assessments will be conducted at three time points: before the initiation of the intervention, immediately following the 12-week intervention period, and finally, at a 4-week follow-up after the intervention concludes.

Method of measurement

Forward shoulder angles will be measured using photogrammetry.

3

Description

Thoracic kyphosis angle.

Timepoint

Outcome measure assessments will be conducted at three time points: before the initiation of the intervention, immediately following the 12-week intervention period, and finally, at a 4-week follow-up after the intervention concludes.

Method of measurement

Kyphosis angle will be measured using a flexible ruler and the Formetric device.

4

Description

Brain electrical activity

Timepoint

Outcome measure assessments will be conducted at three time points: before the initiation of the

intervention, immediately following the 12-week intervention period, and finally, at a 4-week follow-up after the intervention concludes.

Method of measurement

Brain activity will be recorded using an electroencephalography device.

5

Description

Trapezius muscles electrical activity

Timepoint

Outcome measure assessments will be conducted at three time points: before the initiation of the intervention, immediately following the 12-week intervention period, and finally, at a 4-week follow-up after the intervention concludes.

Method of measurement

The electrical activity of the muscles will be recorded using an electromyography device.

6

Description

Shoulder external rotation range of motion

Timepoint

Outcome measure assessments will be conducted at three time points: before the initiation of the intervention, immediately following the 12-week intervention period, and finally, at a 4-week follow-up after the intervention concludes.

Method of measurement

Range of motion will be assessed using a universal goniometer.

7

Description

Shoulder flexion range of motion

Timepoint

Outcome measure assessments will be conducted at three time points: before the initiation of the intervention, immediately following the 12-week intervention period, and finally, at a 4-week follow-up after the intervention concludes.

Method of measurement

Range of motion will be assessed using a universal goniometer.

8

Description

Neck flexion range of motion

Timepoint

Outcome measure assessments will be conducted at three time points: before the initiation of the intervention, immediately following the 12-week intervention period, and finally, at a 4-week follow-up after the intervention concludes.

Method of measurement

Range of motion will be assessed using a universal goniometer.

9

Description

Static balance

Timepoint

Outcome measure assessments will be conducted at three time points: before the initiation of the intervention, immediately following the 12-week intervention period, and finally, at a 4-week follow-up after the intervention concludes.

Method of measurement

Static balance will be assessed using a pressure distribution platform.

10

Description

Dynamic balance

Timepoint

Outcome measure assessments will be conducted at three time points: before the initiation of the intervention, immediately following the 12-week intervention period, and finally, at a 4-week follow-up after the intervention concludes.

Method of measurement

Dynamic balance will be measured using the Y Balance Test.

Secondary outcomes

empty

Intervention groups

1

Description

Intervention Group: The experimental group will participate in a 12-week corrective exercise program based on a systematic approach. The training will be conducted three times per week, with each session lasting 60 minutes. Each session will consist of a 10-minute warm-up, 45 minutes of corrective exercises, and a 5-minute cool-down phase involving stretching and manual techniques performed by a corrective exercise specialist. In this approach, the human body is considered an integrated system, aiming to correct the underlying causes of dysfunction across the subsystems involved in posture and movement control, either simultaneously or sequentially. In this study, to address upper crossed syndrome, 144 diverse exercise patterns with a unified purpose will be employed, grounded in Lederman's neuromuscular adaptation theory and implemented through a stepwise model. The training model will progress through the following stages: Correction of breathing pattern and core stability, Correction of range of motion, Correction of muscle activation patterns, Correction of basic movements, Correction of fundamental movement patterns, Correction of functional movement patterns, And finally, maintenance of the achieved posture through exercises aimed at improving physical fitness and motor performance. During the sessions, equipment such as

Pilates balls, resistance bands, steps, weights, and Swedish ladders will be utilized. All exercises will be performed under the direct supervision of a corrective exercise specialist, following the principles of progressive overload and individualized training.

Category

Lifestyle

2

Description

Control Group: Participants in the control group will be instructed to refrain from participating in any structured exercise programs and to maintain their usual daily physical activities throughout the study duration.

Category

N/A

Recruitment centers

1

Recruitment center

Name of recruitment center

Arak university

Full name of responsible person

Zohreh Babaei

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Sponsors / Funding sources

1

Sponsor

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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

The 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

Mohamad Khorami Moghadam

Position

Ph.D. Candidate

Latest degree

Master

Other areas of specialty/work

Sport Medicine

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Person responsible for scientific inquiries**Contact****Name of organization / entity**

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Sharing plan**Deidentified Individual Participant Data Set (IPD)**

Yes - There is a plan to make this available

Study Protocol

Yes - There is a plan to make this available

Statistical Analysis Plan

Yes - There is a plan to make this available

Informed Consent Form

Yes - There is a plan to make this available

Clinical Study Report

Yes - There is a plan to make this available

Analytic Code

Not applicable

Data Dictionary

Not applicable

Title and more details about the data/document

Individual-level data will be made available after de-identifying the study participants. This data will include demographic characteristics, recorded EEG data, electromyographic (EMG) data, as well as data related to posture measurement, balance, and range of motion. It is noteworthy that all data will be made available after applying the necessary statistical adjustments.

When the data will become available and for how long

The data access period will commence six months after the publication of the study's results.

To whom data/document is available

Access to the research data will be restricted to researchers affiliated with academic and scientific institutions.

Under which criteria data/document could be used

Performing statistical analyses within the scope of

published articles related to the present research is permissible. However, the misuse of data to extract new findings is strictly prohibited.

From where data/document is obtainable

Applicants can submit their requests via the Telegram application to the postal address and contact number provided below. Postal Email: M.khorami@hotmail.com
Telegram: +98 936 360 8888

What processes are involved for a request to access data/document

The applicant must provide a compelling and specific justification for requesting the data. Upon receipt of the request, they will be notified that their application is under review. Following approval by the research team, the data will be made available to the applicant within one month from the start of the request review.

Comments