# 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**

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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**

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

**City**

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**Province**

Isfehan

**Postal code**

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**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

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https://research.ui.ac.ir/%D9%85%D8%B9%D8%A7%D9%88%D9%86-%D9%BE%DA%98%D9%88%D9%87%D8%B4-%D9%88-%D9%81%D9%86%D8%A7%D9%88%D8%B1%DB%8C

**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**
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Ph.D. Candidate

**Latest degree**
Master

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Sport Medicine

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## Person responsible for updating data

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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**