Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

A comparison of the effects of six weeks of Pilates exercises, corrective exercises, and Alexander's Technique on the upper cross syndrome in adolescent girls aged 13 to 16 years

Protocol summary

Study aim
The present study aims to address the question of whether six weeks of Pilates exercises, corrective exercises, and Alexander's Technique can have different effects on UCS in 13 to 16-year-old teenage girls. Which exercises are more effective?

Design
Clinical trial with three intervention groups, with parallel groups, single-blind, randomized, phase 1 on 45 students.

Settings and conduct
The samples were trained in the Corrective Exercise Clinic of the Education and Training Administration of Quchan. Each session lasted one hour, three sessions per week, and for a duration of six weeks. The samples were not aware of which exercise group they were in or which exercises they were performing, to assess the effect on their UCS (they were blinded). The examiner was fully aware of the exercise protocol (not blinded). Each exercise session for the different groups would begin with a 10-minute warm-up and end with a 5-minute cool-down. The remaining time would be allocated to the specific exercises of each group (Corrective Exercise group, Pilates group, and Alexander Technique group).

Participants/Inclusion and exclusion criteria
In order to be included in the study, participants had to have postural abnormalities such as kyphosis, FH, and RS simultaneously and express a willingness to participate. Observing any pathological symptoms, history of fractures, surgeries, joint diseases, and injuries in the cervical, thoracic, and lumbar spine region, skeletal-muscular imbalances, lower limb cross syndrome, having BMI outside the normal range, and having regular physical activity of at least 6 hours per week were considered as exclusion criteria from the study.

Intervention groups
Pilates exercises(N=15), corrective exercises (N=15), and Alexander's Technique (N=15).

Main outcome variables
Upper cross syndrome

General information

Reason for update

Acronym

IRCT registration information
IRCT registration number: **IRCT20230810059106N1**
Registration date: **2023-09-19, 1402/06/28**
Registration timing: **registered_while_recruiting**

Last update: **2023-09-19, 1402/06/28**
Update count: **0**

Registration date
2023-09-19, 1402/06/28

Registrant information

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Recruitment status
Recruitment complete

Funding source

Expected recruitment start date
2023-09-11, 1402/06/20

Expected recruitment end date
2023-10-27, 1402/08/05

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title

A comparison of the effects of six weeks of Pilates exercises, corrective exercises, and Alexander's Technique on the upper cross syndrome in adolescent girls aged 13 to 16 years

Public title

The effects of six weeks of Pilates exercises, corrective exercises, and Alexander's Technique on the upper cross syndrome in adolescent girls

Purpose

Supportive

Inclusion/Exclusion criteria

Inclusion criteria:

In order to be included in the study, participants had to have postural abnormalities such as kyphosis, FH, and RS simultaneously and express a willingness to participate.

Exclusion criteria:

Observing any pathological symptoms History of fractures, surgeries, joint diseases, and injuries in the cervical, thoracic, and lumbar spine region, skeletal-muscular imbalances, lower limb cross syndrome Having BMI outside the normal range Having regular physical activity of at least 6 hours per week

Age

From **13 years** old to **16 years** old

Gender

Female

Phase

N/A

Groups that have been masked

- Participant

Sample size

Target sample size: **45**

Randomization (investigator's opinion)

Randomized

Randomization description

All middle school students in the city of Quchan will undergo initial evaluation by the physical education teacher at their school. Students suspected of having Upper Crossed Syndrome (UCS) will undergo secondary evaluation by a researcher. Among those diagnosed with severe UCS, a total of 45 individuals will be randomly selected as simple random samples and divided into three 15-member groups: Corrective Exercises (PE) group (N=15), Pilates group (N=15), and Corrective Exercises group (N=15). When the population size is limited and homogeneous, simple random sampling is highly effective as it provides equal chance of selection to all individuals in the population. Therefore, simple random sampling (systematic) will be utilized. In this method, it is assumed that the individuals in the population are homogeneous, and each will be assigned a number or code from 1 to N. Then, the sample individuals will be selected with specific regularity.

Blinding (investigator's opinion)

Single blinded

Blinding description

Only the participants will be unaware of the study group assignment and the researchers will be informed of the exercises that each group will receive.

Placebo

Not used

Assignment

Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Ethics Committee of Sport Sciences Research Institute

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No. 3, 5th Alley, Miremad Street, Motahhari Street, Tehran, Iran.

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Approval date

2022-12-25, 1401/10/04

Ethics committee reference number

IR.SSRI.REC.1401.1724

Health conditions studied

1

Description of health condition studied

Upper cross syndrome

ICD-10 code

M95.8

ICD-10 code description

Other acquired deformities of musculoskeletal system and connective tissue

Primary outcomes

1

Description

Upper crossed syndrome (UCS)

Timepoint

At the beginning of the study (before the start of the intervention) and at the end of the study (6 weeks after the intervention)

Method of measurement

Assessment of Forward Head Posture and Rounded

Shoulders

Secondary outcomes

empty

Intervention groups

1

Description

Intervention group Pilates exercises: In the first session of PE, the basic principles of PE were explained to the group and an attempt was made to adhere to them in all sessions. The following steps were taken in each PE session, including checking the posture (pelvis and spinal column), controlling breathing and standing in class (about 5 minutes), performing Pilates breathing and stretching exercises with coach explanations (about 10 minutes), performing modified specific exercises (about 40 minutes), and returning to the initial state (5 minutes). The exercises started from low levels and gradually progressed until the participants were able to control their spinal column in various positions. The intensity of the exercises was determined for each participant based on their exercise tolerance threshold and pain. As a result, with continued exercise, the participants were able to do more repetitions without feeling pain or fatigue. The exercises started with 8 repetitions and ended with 16 repetitions. In each session, new exercises were added in addition to the previous session's exercises.

Category

Rehabilitation

2

Description

Intervention group corrective exercises:Selected CE was designed to correct posture and address the mentioned abnormalities through stretching exercises for shortened muscles and strengthening exercises for weak muscles for the individual. These exercises included a 5-10-minute warm-up followed by stretching exercises for the chest, hip-flexor-psoas, upper trapezius, intercostal muscles, upper neck extensors, and then strengthening exercises for the shoulder protractors, deep neck flexors, lower neck extensors, and thoracic spine extensors.

Category

Rehabilitation

3

Description

Intervention group Alexander's Technique: In the AT group, adolescents were taught the considerations and habits they should remember and focus on in their daily lives. These included teaching ergonomic considerations and individual postural habits during daily activities such as standing, walking, sitting, sleeping, reading, using a computer, and other repetitive and continuous activities performed during the day. These matters were taught and reminded to individuals in one to two sessions per week at school, and their implementation was reported to the researcher by parents. Parents played a fundamental role in this program and were responsible for reminding their children of correct postural habits and points through predetermined verbal instructions throughout the day. Additionally, correct postural habits of standing, sitting, and lying down were included in a poster with images and made available to individuals to be installed in a suitable location at home so that by observing it, students would always remember to maintain correct posture.

Category

Rehabilitation

Recruitment centers

1

Recruitment center

Name of recruitment center
Corrective Exercise clinic

Full name of responsible person
Karim Khalaghi

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Sponsors / Funding sources

1

Sponsor

Name of organization / entity
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Grant name

Grant code / Reference number

Is the source of funding the same sponsor

organization/entity?
No
Title of funding source
Supporting the master's thesis
Proportion provided by this source
100
Public or private sector
Private
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

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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
Not applicable
Informed Consent Form
Yes - There is a plan to make this available
Clinical Study Report
Not applicable
Analytic Code
Not applicable
Data Dictionary
Not applicable
Title and more details about the data/document
The data files will be available to researchers after the publication of the abstracted article
When the data will become available and for how long
After publication the article
To whom data/document is available
Other researchers
Under which criteria data/document could be used
There are no special conditions

From where data/document is obtainable

All researchers

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

Coordinate with the corresponding author

Comments