

Clinical Trial Protocol

Iranian Registry of Clinical Trials

18 Sep 2026

Comparison of the effects of forward and reverse serratus anterior muscle therapeutic exercises on electromyographic activity and static and dynamic position of scapula in scapular dyskinesis

Protocol summary

Study aim

Comparison of the effect of forward and reverse therapeutic exercises of the serratus anterior muscle on the position of the scapula electromyographic activity of this muscle

Design

Clinical trial with two intervention groups, parallel groups, single-blind, randomized, 24 participants, randomization is done using concealed envelopes. Each of the participants is required to choose randomly from two concealed envelopes (forward group or reverse group). According to the selected envelope, the group of people is determined.

Settings and conduct

The location of the study is the Motion Analysis Laboratory of Tarbiat Modares University. In order to record the electrical activity of the muscles and the position of the scapula, the Mayon electromyography device and the Vicon motion analysis device are used. The study is a randomized single-blind. In this way, the participants choose one of the closed envelopes and hand it to the researcher without looking inside. The researcher is not blind and is aware of the groupings and interventions. The participants are evaluated at the beginning and in the next stage they are treated for 3 weeks according to the program. Finally, in order to check the effects of the intervention, they are re-evaluated.

Participants/Inclusion and exclusion criteria

Inclusion criteria: Positive lateral scapular slide test
Diagnosis of type 1 and 2 scapular dyskinesis based on Kibler's division
Exclusion criteria: History of surgery and traumatic events of shoulder girdle in the last 6 months
Received scapula or shoulder treatment in the past 6 months

Intervention groups

The participants of the first group are given the reverse

Serratus anterior exercise and the participants of the second group are given the forward Serratus anterior exercises.

Main outcome variables

Position of the scapula; Shoulder girdle pain

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20230215057431N1**

Registration date: **2023-05-07, 1402/02/17**

Registration timing: **prospective**

Last update: **2023-05-07, 1402/02/17**

Update count: **0**

Registration date

2023-05-07, 1402/02/17

Registrant information

Name

Omid Abouzari Rayhani

Name of organization / entity

Tarbiat Modares University

Country

Iran (Islamic Republic of)

Phone

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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2023-06-10, 1402/03/20

Expected recruitment end date

2023-11-22, 1402/09/01

Actual recruitment start date
empty

Actual recruitment end date
empty

Trial completion date
empty

Scientific title
Comparison of the effects of forward and reverse serratus anterior muscle therapeutic exercises on electromyographic activity and static and dynamic position of scapula in scapular dyskinesia

Public title
Comparison of the effects of forward and reverse therapeutic exercises of the serratus anterior muscle in the treatment of scapula dyskinesia

Purpose
Treatment

Inclusion/Exclusion criteria
Inclusion criteria:
Men between the ages of 20 and 40 Body mass index between 18.5 and 24.9 Presence of pain between 3 and 5 based on VAS in the scapula region Muscle strength of at least 4 for the serratus anterior, upper trapezius, middle trapezius, lower trapezius and deltoid muscles based on Kendall's criteria Positive lateral scapular slide test Diagnosis of type 1 and 2 scapular dyskinesia based on Kibler's division (inferior angle prominence - medial border prominence)
Exclusion criteria:
Missing one of the inclusion criteria Patients with rheumatoid arthritis Patients with neurological disorders Patients with scoliosis History of surgery and traumatic events of shoulder girdle in the last 6 months Rotator cuff tear Received scapula or shoulder treatment in the past 6 months Individuals with pectoralis minor shortness Other serious musculoskeletal disorders such as cervical disc herniation Reluctance of people to participate and continue treatment for any reasons

Age
From **20 years** old to **40 years** old

Gender
Male

Phase
N/A

Groups that have been masked

- Participant

Sample size
Target sample size: **24**

Randomization (investigator's opinion)
Randomized

Randomization description
Randomization method: Simple Randomization Unit: Individual Randomization tool: Concealed envelope This study is single-blind and individuals are not aware of the group they are in.

Blinding (investigator's opinion)
Single blinded

Blinding description

Study participants are blinded. In this way, they are placed in one of the two groups through the selection of the concealed envelope, and they are not aware of which of the intervention groups they are in.

Placebo
Not used

Assignment
Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee
Name of ethics committee
Ethics Committee in Biomedical Research, Tarbiat Modares University
Street address
Tehran, Jalale Alahmad, Nasr bridge
City
Tehran
Province
Tehran
Postal code
331-14115
Approval date
2023-04-29, 1402/02/09
Ethics committee reference number
IR.MODARES.REC.1402.009

Health conditions studied

1

Description of health condition studied
Scapular dyskinesia
ICD-10 code
ICD-10 code description

Primary outcomes

1

Description
Internal rotation of the scapula in degrees
Timepoint
Before the start of the intervention and 2 days after the end of the intervention
Method of measurement
Vicon motion analysis device

Secondary outcomes

1

Description

Pain based on Visual Analog Scale

Timepoint

Before the intervention and 2 days after the intervention

Method of measurement

Visual Analogue Scale

2

Description

Anterior tilt of the scapula in degrees

Timepoint

Before the intervention and 2 days after the intervention

Method of measurement

Vicon motion analysis device

3

Description

Electromyographic activity of the serratus anterior muscle in terms of RMS and Peak RMS

Timepoint

Before the intervention and 2 days after the intervention

Method of measurement

Mayon electromyography device

Intervention groups

1

Description

Intervention group: Participants in the first group are given reverse serratus anterior exercises. The exercises in the first group are performed without applying any external forces, such as weights, Thera bands, etc. The progress of the exercises in the first group will happen by increasing the repetition of the exercises and increasing the hold time. At the beginning of the exercises, the number of repetitions of each exercise is 6 times per session and hold for 2 seconds each time, which eventually reaches 10 times and holds for 10 seconds each time with the progress of the treatment program. Training sessions start with 3 sets, and in order to comply with the principle of overload, 2 sets are added to the number of previous sets at the beginning of each week. The number of training sessions is 3 times a day and the duration of the treatment period is 3 weeks. How to perform exercise 1: To perform this exercise, we ask the person to place the upper limb in 90 degrees of abduction and 45 degrees posterior to the frontal plane and take fixed surface. After ensuring the correct positioning of the upper limb, the person is taught to rotate the trunk to the involved side while keeping the head and neck stable and looking at a fixed point at eye level on the opposite wall. Move sternum upwards and do a deep inhale and exhale at the same time. How to perform exercise 2: To perform this exercise, while the upper limb is placed next to the body and in anatomical position, both upper limbs should be extended by 30 degrees and take a fixed surface, and at the same time, while the head and neck are fixed and He looks at the opposite wall at a fixed point at the level of the eyes, moves the sternum upwards and simultaneously inhales

and exhales deeply. How to do exercise 3: To do this exercise, the person is taught to keep his head and neck fixed when the upper limb is at 130 degrees of abduction and take a fixed surface and look at a fixed point at the level of the eyes. Then while moving the sternum upwards and rotating the trunk to the affected side, inhale and exhale deeply at the same time.

Category

Rehabilitation

2

Description

Intervention group: Participants in the second group are given Forward Serratus Anterior exercises. The exercises in the second group are performed without applying any external forces, such as weights, Thera bands, etc. The progress of the exercises in the second group will happen by increasing the repetition of the exercises and increasing the hold time. At the beginning of the exercises, the number of repetitions of each exercise is 6 times per session and hold for 2 seconds each time, which eventually reaches 10 times and holds for 10 seconds each time with the progress of the treatment program. Training sessions start with 3 sets, and in order to comply with the principle of overload, 2 sets are added to the number of previous sets at the beginning of each week. The number of daily training sessions is 3 times and the duration of the treatment period is 3 weeks. How to perform the Dynamic hug plus exercise: To perform this exercise, the shoulders should be in 60 degrees of abduction and the elbows should be in 45 degrees of flexion. Then the arms are moved forward and inward. When the arms are straight in the midline, the person is asked to move their arms further forward with an additional force. How to perform Wall slide exercise: To perform this exercise, a person must stand facing the wall and put his forearm and elbow in contact with the wall while the upper limbs are shoulder width apart. Then the person is asked to raise his hands slowly with the help of the wall up to about 150 degrees and bring them back. How to perform Side-lying forward flexion: To perform this exercise, the person is side-lying and raises his arm from the side of the trunk to the end of the flexion range of motion.

Category

Rehabilitation

Recruitment centers

1

Recruitment center

Name of recruitment center

Tarbiat Modares University

Full name of responsible person

Omid Abouzari Rayhani

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Sponsors / Funding sources

1

Sponsor

Name of organization / entity
Tarbiat Modares University
Full name of responsible person
Omid Abouzari Rayhani
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Block Five West, Noor One complex, Saadi street,
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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
Tarbiat Modares University
Proportion provided by this source
20
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
Tarbiat Modares University
Full name of responsible person
Omid Abouzari Rayhani
Position
Student
Latest degree
Bachelor

Other areas of specialty/work

Physiotherapy

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Person responsible for updating data

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

No - There is not a plan to make this available

Justification/reason for indecision/not sharing IPD

"There is no further information"

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

No - There is not a plan to make this available

Data Dictionary

No - There is not a plan to make this available

Title and more details about the data/document

Only part of the data can be shared, such as the position of the scapula, the electromyographic activity of the muscles, and the amount of pain.

When the data will become available and for how long

The access period starts 6 months after the results are published. Unlimited period of access.

To whom data/document is available

All researchers and people working in the field of treatment.

Under which criteria data/document could be used

There are no other special criteria.

From where data/document is obtainable

oar1377@gmail.com

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

Examining the mentioned conditions for a maximum length of one month.

Comments