# Clinical Trial Protocol
# Iranian Registry of Clinical Trials

16 Sep 2026

## The effect of specific exercises based on movement fault control on pain intensity, disability, ROM and strength in people with chronic subacromial pain syndrome

## Protocol summary

**Study aim**

The effect of specific exercises based on movement fault control on pain intensity, disability, range of motion and strength in patients with chronic subacromial pain syndrome

**Design**

A clinical trial with a control group, with parallel groups, single-blinded (patient), randomized (using a simple randomization method by creating blocks of 4 or 6 and randomization website) on 38 patients and follow-up one and three months after completion treatment.

**Settings and conduct**

After receiving the code of ethics and registering the proposal in the IRCT system, the study will be conducted in the rehabilitation faculty of iran University of Medical Sciences and Shafaihiyayan hospital.Then, the people who are eligible to enter the study signed the informed consent form and were randomly placed in two groups of specific exercises based on movement fault control and scapula stabilization exercises through block classification.The person who created the random sequence, will not be involved in any other phase of the research. patient blinding will be used; patients will not know about the grouping (treatment or control) before and after the intervention.

**Participants/Inclusion and exclusion criteria**

Male or female aged 25 to 65 with shoulder pain greater than 6 months with or without limitation of shoulder movements and diagnosis of subacromial pain syndrome that meets the inclusion criteria and does not meet the exclusion criteria. Subjects with movement limitations of shoulder movements more than 50% of normal range and those with no movement faults when evaluating shoulder movements are not included in the study.

**Intervention groups**

The main treatment group will receive 8 sessions of specific exercises based on movement fault control and the control group will receive 8 sessions of scapula stabilization exercises.

**Main outcome variables**

pain, functional disability, range of movement , muscle strength

## General information

**Reason for update**

**Acronym**

**IRCT registration information**

IRCT registration number: **IRCT20221126056621N1**
Registration date: **2022-12-19, 1401/09/28**
Registration timing: **registered_while_recruiting**

Last update: **2022-12-19, 1401/09/28**
Update count: **0**

**Registration date**

2022-12-19, 1401/09/28

**Registrant information**

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**Recruitment status**

**Recruitment complete**

**Funding source**

**Expected recruitment start date**

2022-12-11, 1401/09/20

**Expected recruitment end date**

2023-06-20, 1402/03/30

**Actual recruitment start date**
empty
**Actual recruitment end date**
empty
**Trial completion date**
empty

**Scientific title**
The effect of specific exercises based on movement fault control on pain intensity, disability, ROM and strength in people with chronic subacromial pain syndrome

**Public title**
The effect of specific exercises on improving people with shoulder pain
**Purpose**
Supportive
**Inclusion/Exclusion criteria**
**Inclusion criteria:**
Male or female 25 to 65 years old Shoulder pain greater than 6 months with or without limitation of shoulder movements People with diagnosis of shoulder subacromial pain syndrome that at least 2 of the following cases are positive: painful arch (with or without limitation) in flexion or abduction, Neer or Hawkins test positive, pain during resistance and isometric contraction of shoulder external rotation or internal rotation or flexion or abduction, positive infraspinatus muscle strength test
**Exclusion criteria:**
Limitation of movement of shoulder movements more than 50% of normal range History of surgery or fractures or dislocations in the neck and upper limbs Traumatic shoulder pain Complete rupture of the rotator cuff or biceps tendon (confirmed by a doctor) Degenerative changes of the joint or labrum damage Rheumatology and Systemic Diseases Neuromuscular disorders such as cervical radiculopathy or referred neck pain (confirmed by spurling test). Sensitivity reported this test 30% and its specificity 93% Patients with choracoid bone appendages, acromion spines, lower angle of scapula and arm bone head are not known and may impair evaluation (obesity) Pregnant Women History of steroid injections in the past 3 months No movement fault when evaluating shoulder movements
**Age**
From **25 years** old to **65 years** old
**Gender**
Both

**Phase**
N/A
**Groups that have been masked**

- Participant

**Sample size**
Target sample size: **38**
**Randomization (investigator's opinion)**
Randomized
**Randomization description**
After initial evaluations, samples that meet the inclusion criteria and do not meet the exclusion criteria will be divided into two groups of intervention (treatment based on movement fault, 19 persons) and active control (scapula stability treatment, 19 persons) through simple randomization method and creation of 4 or 6 random blocks. Randomization will be created using the Randomization website. The person who creates the random sequence will not be involved in any other stage of the investigation.
**Blinding (investigator's opinion)**
Single blinded
**Blinding description**
Blinding: In this study, the patient's blinding method will be used, so the present study will be single-blind. In this way, the participants will not know which treatment group they entered. Sufficient explanations will be given to the participants about how to perform the intervention in each group, which is in the form of exercise therapy, but the participants will not know in which training group (specific exercise therapy based on movement fault control or scapula stabilization exercises) they will be placed.
**Placebo**
Not used
**Assignment**
Parallel
**Other design features**

## Secondary Ids

empty

## Ethics committees

**1**

**Ethics committee**
**Name of ethics committee**
Ethics committee of Iran university of medical sciences
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Iran university of medical sciences, next to Milad tower, Hemmat highway
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**Approval date**
2022-09-06, 1401/06/15
**Ethics committee reference number**
IR.IUMS.REC.1401.477

## Health conditions studied

**1**

**Description of health condition studied**
subacromial shoulder pain syndrome, shoulder impingement
**ICD-10 code**
M75.4
**ICD-10 code description**

Impingement syndrome of shoulder

**2**

**Description of health condition studied**
Rotator cuff tendonitis
**ICD-10 code**
M75.11
**ICD-10 code description**
Incomplete rotator cuff tear or rupture not specified as traumatic

**3**

**Description of health condition studied**
Shoulder bursitis
**ICD-10 code**
M75.5
**ICD-10 code description**
Bursitis of shoulder

**4**

**Description of health condition studied**
Calcific tendinitis of shoulder
**ICD-10 code**
M75.3
**ICD-10 code description**
Calcific tendinitis of shoulder

**5**

**Description of health condition studied**
Bicipital tendinitis
**ICD-10 code**
M75.2
**ICD-10 code description**
Bicipital tendinitis

## Primary outcomes

**1**

**Description**
pain
**Timepoint**
The first session before starting the treatment, the eighth session after the end of the treatment, one month after the eighth session, 3 months after the eighth session.
**Method of measurement**
Visual Analogue Scale

## Secondary outcomes

**1**

**Description**
range of movement
**Timepoint**
The first session before starting the treatment, the eighth session after the end of the treatment
**Method of measurement**
Clinometer application on smartphone (plaincode)

**2**

**Description**
strength
**Timepoint**
The first session before starting the treatment, the eighth session after the end of the treatment
**Method of measurement**
manual dynamometer

**3**

**Description**
functional disability
**Timepoint**
The first session before the treatment, the eighth session after the end of the treatment, one month after the eighth session, three months after the eighth session.
**Method of measurement**
Disabilities of the Arm, Shoulder, and Hand Questionnaire, Shoulder Pain and Disability Index

## Intervention groups

**1**

**Description**
The intervention group: this group will receive specific exercises based on controlling the movement fault of the shoulder. Training sessions will be held two days a week for eight sessions. First, based on the observational evaluation, the type of movement fault when performing shoulder movements will be determined for each patient. If a person does not have any movement fault while performing shoulder movements, he is excluded from the study. After determining the type of movement fault, dissociation test will be performed. Dissociation test means performing a movement in a joint in a specific direction while the adjacent joint is in a neutral position or opposite to the movement fault. In fact, in the dissociation test, the ability to actively control movement is evaluated.Dissociation tests are not normal movements, so the therapist will teach the patient how to perform the test with verbal, visual and tactile guidance before performing the dissociation test and assessing the quality of movement control, and then the test will be performed. If the person cannot perform the dissociation test (--) or performs the dissociation test with difficulty and holding his breath (+-), the test will be positive, and the basis of performing the same test will be the basis of therapeutic exercise, and the therapist will provide guidance Verbally, visually and tactilely, the patient will be taught how to control the movement fault and specific therapeutic exercises will be performed based on the control of the movement fault. If the person can perform the dissociation test easily and without maximal effort (+), the test will be negative. It means that the patient knows how to control the movement fault, but cannot control the movement fault functionally

and automatically. Here, with repetition, we will improve the person's motor control pattern, and then with some factors of training progress, including situations without support and without feedback, repeating and increasing the training dose, using proprioceptive stimuli, therapeutic training based on movement fault control will be done. So the treatment in this group will consist of 2 parts: 1- detection of movement fault in each of the shoulder movements in people with chronic subacromial pain syndrome 2- dissociation test and specific exercises based on movement fault control Detection of movement fault: To check the movement fault, the type of movement fault will be evaluated in each person when performing each of the shoulder movements. The standard of the normal pattern of shoulder movements, along with the movement faults, will be known to the examiner.) Internal rotation movement: 1-1 ) the criterion of the correctness of the movement for visual or tactile assessment of internal rotation of the shoulder: in the supine or standing position, with the shoulder positioned at 90 degrees of abduction in the scapular plane, without significant movement in the scapulothoracic joint or forward sliding of the humerus in the glenohumeral joint. There is 60 degrees of internal rotation of the arm. 1-2) Criteria for diagnosing movement fault during visual or tactile assessment of shoulder internal rotation: If any of the following compensatory movements occur, it will indicate a movement fault when performing internal shoulder rotation in a person: 1) anterior tilt of the scapula 2) scapula downward rotation 3) scapula elevation 4) anterior glenohumeral displacement (excessive sliding of humeral head anteriorly). Dissociation test and specific exercise based on movement fault control: patient in supine position while the humerus is in 90 degrees of abduction and in the scapular plane will be supported. Therapist will touch the coracoid process and humeral head during the testing process. 60 degrees of internal rotation of the humerus should occur without compensatory movement in the scapula or glenohumeral . If the patient is unable to perform the test (-- or -+), the therapist will introduce the person with visual, verbal and tactile guidance to internal rotation of the shoulder at the glenohumeral joint up to 60 degrees without scapula movement or glenohumeral slip (usually 20 to 30 slow repetition). And after improving the movement control, the training will be progressed. And if the individual was able to perform the dissociation test (++), movement control training would be progressed to unsupported and standing training.2) External rotation movement: 2-1) The criterion of the correctness of the movement for visual or tactile evaluation of shoulder external rotation: the appropriate pattern of shoulder external rotation will be evaluated in standing or supine position. To start the movement, while the elbow joint is bent at 90 degrees, the humerus will be in the scapular plane and next to the body. In a normal state, the approximate range of external rotation of the shoulder in this position will be 60 degrees, so that the first 45 degrees of movement in The glenohumeral joint occurs and then at the end of the movement, it will be accompanied by 15 degrees of scapula retraction. The cause of movement fault in the external rotation of the arm in the person will be: 1) if the movement of external rotation of the shoulder is accompanied by the movement of the scapula (retraction) from the beginning, or if it occurs earlier than the last 1/3 of the movement. 2) Placing the scapula in the position of downward rotation during the movement 3) Placing the scapula in the anterior tilt position during the movement4) Excessive glenohumeral displacement to the front (excessive sliding of the humerus head to the front). Dissociation test and specific exercise based on movement control: The patient will be placed in a standing position while the elbow is bent at 90 degrees and the humerus is in the scapular plane next to the body.The therapist will touch the coracoid or acromion process or the inferior angle of the scapula and the head of the humerus during the testing process. Then we will ask the patient to maintain the neutral position of the scapula and move the arm to the external rotation. The patient should be able to perform 45 degrees of active external rotation of the humerus without compensatory movements in the scapula or glenohumeral joint . If the patient is unable to perform the test (+- or --), the therapist will introduce the person with visual, verbal and tactile guidance to the external rotation of the shoulder in the glenohumeral joint up to 45 degrees without moving the scapula or glenohumeral slip (usually 20 to 30 slow repetition). The initial correction of movement fault will be done in the position where the patient is lying supine and the arm is supported by his side. The patient will then actively externally rotate the shoulder through part of the range while holding the scapula in upward rotation (lying on the scapula) and the humeral head in posterior glide (patient touch) . Externally rotates the shoulder so that it can maintain the neutral position of the scapula. After movement control is improved, training will be progressed. And if the person was able to perform the isolation test (++), the movement control exercise will be performed in the standing position without the support of the scapula and humerus . 3) Elevation movement in the sagital plane (flexion): 1-3: The criterion of the correctness of the movement for the observational or tactile assessment of the movement of the elevation in the sagital plane: in this movement, 3 processes occur: elevation of the humerus in the glenohumeral joint, upward rotation of the glenoid along with slight elevation of the scapula and slight movement In the trunk, the first phase of the movement, which includes the initial 90 degrees of movement, includes the elevation of the humerus in the glenohumeral joint and the stability of the scapula. Also, sliding down the humerus should start at this stage. The second phase of movement mainly consists of upward glenoid rotation of the scapula and slight scapular elevation (clavicle rotation is required for scapula rotation), which is concurrent with glenohumeral rolling for arm elevation. During this phase, the head of the humerus continues to slide down. After 160 degrees of flexion, a small amount of trunk movement may also occur. These movements include trunk extension in bilateral movement and unilateral bending of the trunk in unilateral arm movement. The following movements occur during flexion in the full range above the head, it will indicate a

movement fault in performing arm flexion in a person: 1) Elevation of the scapula at the beginning of the movement or its predominance compared to the upward rotation movement of the scapula 2) Moving the scapula forward during flexion 3) Winging of the scapula (lifting the inner side of the scapula from the rib cage) 4) Anterior tilt of the scapula or protrusion of the lower angle of the scapula 5) Downward rotation of the scapula 6) Internal glenohumeral rotation 7) Downward glenohumeral displacement (excessive downward sliding of the humeral head during elevation). Dissociation test and specific exercise based on movement fault control: the patient is standing while the arm is in the side of the body and the scapula will be in a neutral position and the glenohumeral joint will be in neutral rotation (palm facing in). Then the patient will be asked to keep the scapula in a neutral position and raise the arm up to 90 degrees of shoulder flexion and then return it to the side of the body. The stability of the scapula is in the initial 60 degrees of movement. In the second phase during abduction, external rotation of the glenohumeral joint begins and must continue throughout the range. A little thoracic lateral flexion also occurs in unilateral arm abduction . 2-4) Criteria for detecting movement fault during visual or tactile assessment of elevation movement in the frontal plane: if any of the following movements during arm abduction in the full range If it happens above the head, it indicates a movement fault in performing arm abduction in the person. 1) Downward rotation of the scapula 2) Elevation of the scapula (excessive elevation or initiation of movement with elevation) 3) Winging of the scapula 4) Anterior displacement of the scapula 5) Delayed or absent glenohumeral external rotation during abduction 6) Downward displacement of the glenohumeral (excessive increase in the downward glide of the humeral head during elevation). Dissociation test and specific exercise based on the control of the patient's movement fault: The patient will stand in a standing position while the arm is at the side of the body and the scapula is in a neutral position and the glenohumeral joint is in neutral rotation (palm facing inward). We ask the patient to keep the scapula in a neutral position and raise the arm to 90 degrees of abduction (in the scapular plane) and then return it to the side of the body. If the patient was not able to perform the test (+- or --), the therapist will familiarize the person with visual, verbal and tactile guidance with the shoulder abduction movement in the glenohumeral joint up to 90 degrees without making a movement fault in the glenohumeral scapula (usually 20 to 30 slow repetition). The initial correction of movement fault will be done in a position where the patient is standing against the wall with the elbow bent to reduce the lever arm and force, and the scapula is supported by leaning on the wall . Then we ask the patient to abduct the shoulder in a part of the range without compensatory movements of the scapula or humerus. When the patient's movement control is improved, he will perform arm abduction without support in a part of the range that he can control well by touch. If the individual was able to perform the dissociation test (++), movement control training would be progressed to unsupported standing training. Then, to further progress the exercise, arm abduction will be performed in full range and with a straight elbow.

**Category**

Rehabilitation

### 2

**Description**

Control group:In this group, scapula stabilization exercises will be performed. These exercises will include a group of open and closed chain exercises as follows: wall slides with squat, wall push-ups plus ipsilateral leg extension, lawnmower with diagonal squat, resisted scapular retraction with contralateral 1-leg squat, robbery with squat.The control group will receive two sessions a week for four weeks and eight sessions in total. These exercises will be done in three sets with ten repetitions in each session. The elastic band with the resistance level of the red color code will be used to perform the exercises, and the green and blue bands will be improved.

**Category**

Rehabilitation

## Recruitment centers

### 1

**Recruitment center**

**Name of recruitment center**

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**Full name of responsible person**

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**Name of recruitment center**

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**1**

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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**
Iran University of Medical Sciences
**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

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## Person responsible for updating data

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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