Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

Investigation and Comparison of the Efficacy of Standard Corrective Exercises versus Sensorimotor Exercises on Improving Shoulder Proprioception in Overhead Athletes with Scapular Dyskinesis.

Protocol summary

Study aim
Investigation and Comparison of the Efficacy of Standard Corrective Exercises versus Sensorimotor Exercises on Improving Shoulder Joint Proprioception in Overhead Athletes with Scapular Dyskinesis

Design
A randomized, single-blind (participant-blinded), controlled, parallel-group clinical trial involving 24 patients. Block randomization will be used for random allocation.

Settings and conduct
Volunteers presenting to Dr. Rezaian's physiotherapy clinic in Isfahan during the study will be enrolled, if they meet the eligibility criteria and will be randomly allocated to the intervention and control groups using block randomization. The study will be conducted as a single-blind trial.

Participants/Inclusion and exclusion criteria
Inclusion: Athletes (18-45 yrs) with at least 3 yrs experience - dominant scapular dyskinesia - shoulder abduction/flexion ability - no similar training (past 3 months), BMI 18.5-26.9 ؛ Exclusion: Shoulder/upper limb injury (past 6 months), shoulder/upper limb/spine surgery - neuromuscular/rheumatologic/systemic diseases - active shoulder/elbow/wrist pain - spinal/thoracic abnormalities - pregnancy/lactation.

Intervention groups
Group 1: Participants will undergo standard corrective exercises for scapular dyskinesis. The intervention will be conducted over 4 weeks with 3 sessions per week. Each treatment session will last between 40 to 50 minutes with 45 to 60 seconds of rest allocated between each set or exercise. Group 2: Participants will undergo a sensorimotor exercise intervention. The intervention will be implemented over 4 weeks with 3 sessions per week. Each treatment session will last approximately 30 to 40 minutes with 45 to 60 seconds of rest allocated between each set or exercise.

Main outcome variables
Shoulder Joint Proprioception, Upper Extremity Performance, Scapular Dyskinesis

General information

Reason for update

Acronym
-

IRCT registration information
IRCT registration number: **IRCT20180711040419N4**
Registration date: **2026-06-14, 1405/03/24**
Registration timing: **prospective**

Last update: **2026-06-14, 1405/03/24**
Update count: **0**

Registration date
2026-06-14, 1405/03/24

Registrant information

Name
Katayoon Rezaei

Name of organization / entity

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Iran (Islamic Republic of)

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Recruitment status
Recruitment complete

Funding source

Expected recruitment start date
2026-06-22, 1405/04/01

Expected recruitment end date
2026-11-22, 1405/09/01

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

Scientific title
Investigation and Comparison of the Efficacy of Standard Corrective Exercises versus Sensorimotor Exercises on Improving Shoulder Proprioception in Overhead Athletes with Scapular Dyskinesis.

Public title
The Effect of Standardized Corrective Exercise on Shoulder Joint Proprioception in Overhead Athletes with Scapular Dyskinesis: A Randomized Controlled Trial
Purpose
Other
Inclusion/Exclusion criteria
Inclusion criteria:
Age between 18 and 45 years. Athletes in overhead sports (e.g., volleyball, basketball, handball) with at least 3 years of regular training experience. Presence of scapular dyskinesis in the dominant limb. Ability to perform shoulder abduction and flexion without severe limitations or functional impairment (i.e., defined as the inability to perform at least 90 degrees of flexion or abduction, or the presence of severe pain (VAS > 7)). No participation in similar training programs within the past 3 months. Body Mass Index (BMI) between 18.5 and 26.9.
Exclusion criteria:
History of structural injuries to the shoulder or upper extremity within the past 6 months (e.g., fracture, dislocation, rotator cuff tear, or labral tear). History of surgery involving the shoulder, upper extremity or spine. Neuromuscular, rheumatologic, or systemic diseases affecting proprioception (e.g., diabetes, rheumatoid arthritis, thoracic outlet syndrome, cervical radiculopathy, etc.). Presence of acute and active pain in the shoulder, elbow or wrist at the time of testing or during activities of daily living. Evident structural abnormalities of the spine or thoracic cage, such as kyphosis or scoliosis, that may influence shoulder movement patterns. Pregnancy or breastfeeding in female athletes.
Age
From **18 years** old to **45 years** old
Gender
Both

Phase
N/A
Groups that have been masked

- Participant
- Data analyser

Sample size
Target sample size: **24**
Randomization (investigator's opinion)
Randomized
Randomization description
Participants will be randomly allocated to one of two groups using block randomization. A block size of 4 and a total of 6 blocks will be used.
Blinding (investigator's opinion)
Single blinded
Blinding description
The random sequence will be generated prior to the start of the study by an independent individual, and opaque sealed envelopes will be used for allocation concealment. After each participant is enrolled, the corresponding envelope will be opened and the intervention group will be assigned. Data analysts will also be blinded to participant group assignment through coding in order to minimize the risk of bias.
Placebo
Not used
Assignment
Parallel
Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee
Name of ethics committee
Ethics committee of Shiraz University of Medical Sciences
Street address
Zand St., Imam Hossein Square, Shiraz Medical School, Building No. 3, Third Floor, Vice Chancellor for Research, Medical School
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Province
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Postal code
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Approval date
2026-05-12, 1405/02/22
Ethics committee reference number
IR.SUMS.REHAB.REC.1405.002

Health conditions studied

1

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

Primary outcomes

1

Description
Shoulder Joint Proprioception

Timepoint
The absolute Angular Error of active shoulder joint reconstruction is measured before and after the exercises in both groups.
Method of measurement
The absolute Angular Error of active regeneration of the dominant shoulder joint is measured using an isokinetic device in three movements of internal and external rotation (45 °) and flexion (90 °).

Secondary outcomes

1

Description
Upper extremity performance
Timepoint
The mean scores of upper extremity performance are measured before and after the exercises in both groups.
Method of measurement
Quick-Disabilities of the Arm, Shoulder and Hand questionnaire includes 11 questions. Scoring 1 to 5, calculated as (average × 25).

2

Description
Scapular Dyskinesis
Timepoint
The mean scores of the scapular movement pattern are measured in the scapular Dyskinesis test before and after the exercises in both groups.
Method of measurement
Scapular Dyskinesis Test

Intervention groups

1

Description
Intervention group: Participants in the intervention group will only undergo standard corrective exercises for scapular dyskinesis. This combined protocol is based on the clinical guideline provided by Seitz at the Denver Shoulder Specialty Clinic, which has demonstrated effectiveness in correcting shoulder position and movement. The intervention will last for 4 weeks, with 3 sessions per week. Each treatment session will last between 40 to 50 minutes (warming-up, corrective exercises, cooling down), and to maintain exercise quality and prevent early muscle fatigue, rest periods of 45 to 60 seconds will be allocated between sets or exercises. Throughout all sessions, the number of repetitions will be kept constant to preserve the quality of each movement. During the treatment, participant body positions (including head, neck, shoulder, and scapula posture) will be monitored and corrected in sitting and standing positions. The exercises in this group follow three main axes: stretching shortened muscles, strengthening weak muscles, and motor control exercises to correct scapular functional patterns. Exercises will start with low intensity and progress gradually according to the principle of overload. The weekly progression pattern of the exercises is as follows: in the first week, focus is on correcting posture, reducing movement constraints, and initial activation of stabilizer muscles, with exercises performed at an easy and manageable level. In the second week, range of motion and motor control are increased, and light resistance with elastic bands is added. In the third week, participants will engage in more functional and multi-joint exercises (such as Push-up Plus), with increased bodyweight challenges. In the fourth week, exercise intensity is increased by adding more resistance, including advanced exercises like Shoulder Press, as well as strengthening core muscles to stabilize the thorax and improve scapular control. Complete description of standard corrective exercises: __ Week 1: Exercises: Chin Tucks, Scapular Retraction, Arm Swing, Wall Slides Posture: Sitting / Standing Repetitions/Sets: 2–3 sets of 10–12 repetitions or 2–3 sets lasting 1–2 minutes __ Week 2: Exercises: Wall Slides + Serratus Punch, Scapular Clock, Prone Y Raise, Scapular Retraction with light resistance band Posture: Prone / Sitting / Standing Repetitions/Sets: 2–3 sets of 10–12 repetitions __ Week 3: Exercises: Pectoralis Minor stretch, Dynamic Hug, Push-Up Plus, Scapular Wall Push-Ups Posture: Standing / Functional Repetitions/Sets: 2–3 sets of 10–12 repetitions or 20–30 seconds holds __ Week 4: Exercises: External shoulder rotation with band, Lat Pull-Downs with band, Functional exercises (Shoulder Presses), Core strengthening exercises (Plank and Side Plank) Posture: Standing / Functional Repetitions/Sets: 2–3 sets of 10–12 repetitions
Category
Rehabilitation

2

Description
Control group: Participants in the control group will undergo sensorimotor exercises designed to improve proprioception, glenohumeral joint stability, and neuromuscular control of the shoulder girdle in overhead athletes with scapular dyskinesis. This intervention will be implemented over 4 weeks, with 3 sessions per week. Each treatment session will last approximately 30 to 40 minutes (warm-up, sensorimotor exercises, and cool-down), and rest periods of 45 to 60 seconds will be allocated between sets or exercises to maintain movement quality and prevent early fatigue of the stabilizer muscles. To ensure the effectiveness of the intervention, the correct execution and quality of the exercises will be supervised and corrected by a specialized physical therapist in all sessions. Furthermore, the structure of this protocol is based on progressive advancement from stable to unstable surfaces to incrementally enhance sensorimotor stimulation, neuromuscular coordination, and reactive shoulder control. In the first week, the focus is on performing exercises on stable surfaces, establishing controlled hand contact with the surface, and enhancing joint position perception. Gradually, in the second week, the exercises shift to semi-unstable surfaces, and simple, unidirectional movements are initiated. In the third week,

the level of surface instability increases, and the athlete is challenged with multi-directional movements, greater movement variability, and higher weight-bearing on the upper extremity. Finally, in the fourth week, the exercises continue with more advanced challenges, such as stabilization on a ball, rapid changes in direction, and the addition of rotational and combined shoulder patterns, so that the neuromuscular system trains for faster and more precise responsiveness. Complete description of sensorimotor exercises: __ Week 1: Maintaining balance with both hands on the floor (3 sets × 30–40 seconds hold), Maintaining one, handed balance with circular movements on the wall (3 sets × 12–15 revolutions). __ Week 2: Maintaining hand balance on a balance board in a kneeling position, forward-backward movement (3 sets × 12–15 repetitions), Dynamic stabilization on a ball or single-handed (3 sets × 30–40 seconds hold). __ Week 3: Hand balance on a balance board in a kneeling position (movement in four directions0 (3 sets × 12–15 repetitions per direction), Single-handed stabilization on the floor (3 sets × 30–40 seconds hold). __ Week 4: Dynamic single-handed stabilization on a ball (3 sets × 15 repetitions), Catching a ball in a 90° abduction and 90° flexion position + performing internal-external rotation (3 sets × 15 repetitions).

Category
Rehabilitation

Recruitment centers

1

Recruitment center

Name of recruitment center
Dr. Rezaian's Physiotherapy Clinic
Full name of responsible person
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Sponsors / Funding sources

1

Sponsor

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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
Shiraz 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

Contact

Name of organization / entity
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Full name of responsible person
Katayoon Rezaei
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Latest degree
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Other areas of specialty/work
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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
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

Title and more details about the data/document
Information collection, informed consent form and SPSS file

When the data will become available and for how long
After publication the results of the study

To whom data/document is available
Researchers working in academic and scientific institutions

Under which criteria data/document could be used
Only for recording information in scientific databases

From where data/document is obtainable
Correspondence with the project manager by email. rezaeik@sums.ac.ir

What processes are involved for a request to access data/document
Maximum one month after sending the request by email

Comments