Clinical Trial Protocol
Iranian Registry of Clinical Trials

10 Jun 2026

Comparing the Effects of McKenzie Exercises and PNF on Angles, Performance, and Symptoms in Women with Upper Crossed Syndrome and Temporomandibular Joint Disorder: a randomized clinical trial

Protocol summary

Study aim

Comparison of the effects of six weeks of McKenzie and PNF exercises on shoulder posture, pain, function, and jaw noise in women aged 20 to 40 with upper crossed syndrome.

Design

The sample size is 42 participants, with 14 individuals in each of the three groups control, McKenzie, and PNF assigned through simple randomization.

Settings and conduct

Volunteers are recruited from the School of Dentistry, Tehran University of Medical Sciences, and the International Campus.

Participants/Inclusion and exclusion criteria

Voluntary women aged 20 to 40 with upper crossed syndrome and temporomandibular joint disorder (TMD), with a BMI between 18 and 25 No use of medications or other treatments No severe spinal problems, fractures, surgeries, or severe pelvic and lumbar deformities No rheumatologic, neurological disorders, or systemic diseases No significant temporomandibular joint issues and no history of traumatic injury to the jaw or neck No fibromyalgia syndrome No physiotherapy or similar treatments in the past 3 months Diagnosed with TMD by a specialist physician Angle criteria: Forward head posture ≤ 50 degrees, forward shoulder posture ≥ 52 degrees, and hyper kyphosis ≥ 40 degrees.

Intervention groups

There are three groups: McKenzie, PNF, and control. The first two groups perform exercises for 30 to 45 minutes, three days a week, for six weeks, and are evaluated before and after the intervention. The control group is only evaluated after six weeks.

Main outcome variables

Changes in forward head angle, forward shoulder angle, kyphosis, and changes in jaw symptoms including noise, pain, and Jaw weakness.

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20250504065596N1**
Registration date: **2025-08-27, 1404/06/05**
Registration timing: **prospective**

Last update: **2025-08-27, 1404/06/05**
Update count: **0**

Registration date

2025-08-27, 1404/06/05

Registrant information

Name

Sarvenaz Shabani Panbeh Choleh

Name of organization / entity

The University of Shahid Beheshti

Country

Iran (Islamic Republic of)

Phone

+98 11 3375 6251

Email address

s.shabanipanbeh@mail.sbu.ac.ir

Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2025-09-23, 1404/07/01

Expected recruitment end date

2025-10-22, 1404/07/30

Actual recruitment start date

empty

Actual recruitment end date

empty

Trial completion date

empty

Scientific title
Comparing the Effects of McKenzie Exercises and PNF on Angles, Performance, and Symptoms in Women with Upper Crossed Syndrome and Temporomandibular Joint Disorder: a randomized clinical trial

Public title
Comparison of the Effects of Two Types of Exercise on Women with Upper Crossed Syndrome and Temporomandibular Joint Disorder

Purpose
Supportive

Inclusion/Exclusion criteria

Inclusion criteria:
Voluntary Participation Body Mass Index between 18 and 25 Diagnosis of TMD based on the specialist's assessment At least one month has passed since the onset of TMD pain "Forward head posture ≤ 50 degrees, forward shoulder posture ≥ 52 degrees, and hyper kyphosis ≥ 40 degrees." Female participants only 20 to 40 years old Presence of clicking sounds in the temporomandibular joint(TMJ) Functional disability of the temporomandibular joint (TMJ) Presence of pain in the temporomandibular joint (TMJ) and associated structures

Exclusion criteria:
Use of medication or other interventions Presence of specific spinal pathologies such as severe disc herniation (grade II or III) History of spinal fracture or surgery Presence of severe deformities in the lumbar spine or pelvis Presence of rheumatologic disorders Presence of sequestrated (migrated) disc displacement, TMJ osteoarthritis, or arthritis according to DC/TMD criteria History of traumatic injuries to the mandible or cervical spine Presence of fibromyalgia syndrome Presence of systemic diseases (rheumatoid arthritis, systemic lupus erythematosus, or psoriatic arthritis) Presence of neurological disorders History of any treatment (physiotherapy, splint therapy, or acupuncture) within 3 months prior to the study

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

Gender
Female

Phase
N/A

Groups that have been masked
No information

Sample size
Target sample size: **42**

Randomization (investigator's opinion)
Randomized

Randomization description
Simple Randomization: Participants, after confirming the inclusion and exclusion criteria, are randomly assigned to the intervention and control groups using a randomization table. The randomization table consists of a sequence of numbers or letters generated by randomization software, and each participant is assigned to a group based on their enrollment number. This method minimizes bias and ensures an equal distribution of characteristics between the groups.

Blinding (investigator's opinion)
Not blinded

Blinding description

Placebo
Not used

Assignment
Parallel

Other design features

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee
Research Ethics Committees of Shahid Beheshti University

Street address
No. 91, Corner of Yousef Alley, Before Dr. Gharib Street, Forsat Shirazi Street, Eskandari North Street, Azadi Street

City
Tehran

Province
Tehran

Postal code
1419794531

Approval date
2025-04-19, 1404/01/30

Ethics committee reference number
IR.SBU.REC.1404.007

Health conditions studied

1

Description of health condition studied
Temporomandibular Joint Disorder

ICD-10 code
M26.6

ICD-10 code description
Temporomandibular joint disorders

2

Description of health condition studied
Upper Cross Syndrom

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description
Forward Head

Timepoint

One day before the start of the study, followed by six weeks of training, and then one day after the end of the training

Method of measurement

Photogrammetry method for evaluating upper crossed syndrome

2

Description

Shoulder Forward

Timepoint

One day before the start of the study, followed by six weeks of training, and then one day after the end of the training

Method of measurement

Photogrammetry method for evaluating upper crossed syndrome

3

Description

Kyphosis

Timepoint

One day before the start of the study, followed by six weeks of training, and then one day after the end of the training

Method of measurement

Photogrammetry method for evaluating upper crossed syndrome

4

Description

Temporomandibular joint noise

Timepoint

One day before the start of the study, followed by six weeks of training, and then one day after the end of the training

Method of measurement

Diagnostic Criteria for Temporomandibular Disorders

5

Description

Temporomandibular joint pain

Timepoint

One day before the start of the study, followed by six weeks of training, and then one day after the end of the training

Method of measurement

Diagnostic Criteria for Temporomandibular Disorders

6

Description

Temporomandibular joint function

Timepoint

One day before the start of the study, followed by six weeks of training, and then one day after the end of the training

Method of measurement

Diagnostic Criteria for Temporomandibular Disorders

Secondary outcomes

empty

Intervention groups

1

Description

Control group: No intervention is applied. Only assessment of Upper Crossed Syndrome and Temporomandibular Joint Disorder (TMD) is performed initially, and then reassessed six months later.

Category

Treatment - Other

2

Description

Intervention group one: The McKenzie exercise program is performed as a cervical stabilizing exercise. The purpose of the McKenzie exercise program is to eliminate pain and restore postural control and balance. The training protocol lasts for 6 weeks, 3 sessions per week, totaling 16 sessions, and for warm-up 10 minutes and for cool-down 5 minutes in total 15 minutes and 30 minutes of exercise time will be considered. Sufficient explanations and demonstrations were provided to ensure correct exercise performance, and the training was conducted under the supervision of the researcher. The subjects performed 7 movements at maximum static strength for 7 seconds and in total 20 repetitions with 3 seconds rest between each movement. The exercise intensity increased each week by adding 10% to the number of repetitions. The exercises included: chin tuck in sitting position, cervical extension in sitting or standing position, lifting the head in supine position, turning the head to the left and right in supine position, lateral flexion to the left and right, chin tuck with head rotation and looking toward the shoulder, cervical flexion in sitting position.

Category

Treatment - Other

3

Description

Intervention group two: The PNF program consists of a total of eight therapeutic exercises. Considering the alignment of the cervical spine and pain in the temporomandibular joint, the position will be performed with greater support. All exercise programs were designed based on the basic principles of PNF, the fundamental procedures, and the philosophy of PNF, and the PNF patterns and techniques were adapted to the hypothesis of activity limitation. The weekly programs were adjusted by combining three to four exercise programs according to the patient’s level of adaptation to the program. Before starting the exercise program, general explanations and precise instructions regarding deep breathing will be given to the patient, and when the patient reports pain or fatigue, the exercise will be stopped for 2 to 3 minutes of rest. Rest will not be

considered during the entire exercise period. In the last 3 weeks, all exercises will be performed, and the exercise intensity will be increased each week by adding 10% to the number of repetitions. The training protocol lasts for 6 weeks, 3 sessions per week, totaling 16 sessions, and for warm-up 10 minutes and for cool-down 5 minutes, in total 15 minutes, and 30 minutes of exercise time will be considered. Sufficient explanations and demonstrations were provided to ensure correct exercise performance, and the training was conducted under the supervision of the researcher. The exercises included: stretching of the upper cervical extensor muscles, reciprocal inhibition of suboccipital muscles with strengthening of suprahyoid muscles, increasing stability in the corrected position of the cervical spine and temporomandibular joint (TMJ) with device, tongue exercise in the corrected cervical position, increasing mobility of the mandible in the corrected cervical position, mouth opening, biting an apple, and holding a towel behind the neck while opening the mouth.

Category

Treatment - Other

Recruitment centers

1

Recruitment center

Name of recruitment center

Tehran University of Medical Sciences (TUMS)

Full name of responsible person

Sarvenaz Shabani Panbecholeh

Street address

School of Dentistry Tehran University of Medical Sciences End of North Kargar Street, Adjacent to Atomic Energy Organization, Before Hakim Expressway (East Exit) Tehran, Iran

City

Tehran

Province

Tehran

Postal code

۱۴۳۹۹۵۵۹۹۱

Phone

+98 21 4279 4500

Email

dentistry@tums.ac.ir

2

Recruitment center

Name of recruitment center

Tehran International Campus School of Dentistry

Full name of responsible person

Sarvenaz Shabani Panbecholeh

Street address

School of Dentistry, International Campus, Mahan St. (Shahid Zolfi), Opposite Shariati Park, Beginning of Khani Abad-e No, Navab Expressway, Tehran, Iran

City

Tehran

Province

Tehran

Postal code

1417653761

Phone

+98 21 5585 1151

Fax

Email

dentistyic@tums.ac.ir

Sponsors / Funding sources

1

Sponsor

Name of organization / entity

Shahid Beheshti University

Full name of responsible person

Amir Hossein Barati

Street address

Shahid Shahriari Square, Evin, Tehran, Iran

City

Tehran

Province

Tehran

Postal code

1983969411

Phone

+98 21 2990 5821

Email

pr-office@sbu.ac.ir

Grant name

Grant code / Reference number

Is the source of funding the same sponsor organization/entity?

Yes

Title of funding source

Shahid Beheshti University

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

Shahid Beheshti University

Full name of responsible person

Sarvenaz Shabani Panbecholeh

Position

Student

Latest degree

Master

Other areas of specialty/work

Corrective movements and sports pathology

Street address
No. 91, Corner of Yousef Alley, Before Dr. Gharib Street, Forsat Shirazi Street, Eskandari North Street, Azadi Street
City
Tehran
Province
Tehran
Postal code
1419794531
Phone
+98 21 6659 5554
Email
sarvenazshabani@yahoo.com

Person responsible for scientific inquiries

Contact
Name of organization / entity
Shahid Beheshti University
Full name of responsible person
Sarvenaz Shabani Panbecholeh
Position
student
Latest degree
Master
Other areas of specialty/work
Master of Science in Corrective Movements and Sports Injury Pathology
Street address
No. 91, Corner of Yousef Alley, Before Dr. Gharib Street, Forsat Shirazi Street, Eskandari North Street, Azadi Street
City
Tehran
Province
Tehran
Postal code
1419794531
Phone
+98 21 6659 5554
Email
sarvenazshabani@yahoo.com

Person responsible for updating data

Contact
Name of organization / entity
Shahid Beheshti University
Full name of responsible person
Sarvenaz Shabani Panbecholeh
Position
student
Latest degree
Master
Other areas of specialty/work
Master of Science in Corrective Movements and Sports Injury Pathology
Street address
No. 91, Corner of Yousef Alley, Before Dr. Gharib Street, Forsat Shirazi Street, Eskandari North Street, Azadi Street
City
Tehran
Province
Tehran
Postal code
1419794531
Phone
+98 21 6659 5554
Email
sarvenazshabani@yahoo.com

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
No - There is not 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 the factors considered in the research are averaged after statistical analysis
When the data will become available and for how long
Access started in 1405
To whom data/document is available
all people
Under which criteria data/document could be used
If you are conducting related research to help other people
From where data/document is obtainable
email to sarvenazshabani@yahoo.com
What processes are involved for a request to access data/document
If you provide documented proof of your research work, it is possible to send data quickly, but there is no right to copy the data.
Comments