# Clinical Trial Protocol
# Iranian Registry of Clinical Trials

22 Nov 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

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**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**
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**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**

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**Name of recruitment center**

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## Sponsors / Funding sources

### 1

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**Full name of responsible person**

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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**

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**

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**Position**

Student

**Latest degree**

Master

**Other areas of specialty/work**

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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**
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**