Clinical Trial Protocol
Iranian Registry of Clinical Trials

22 Nov 2026

Effects of Natural Apophyseal Glides, Sustained Natural Apophyseal Glides, Myofascial Release, and Combined Therapy on Mechanical Neck Pain in University Students: A Randomized Controlled Trial

Protocol summary

Study aim

To evaluate and compare the effectiveness of Natural Apophyseal Glides (NAGs) and Sustained Natural Apophyseal Glides (SNAGs) versus Myofascial Release (MFR) technique, individually and combined, on pain, mobility, and range of motion in university students.

Design

Three-arm, parallel-group, randomized trail with blinded postoperative care and outcome assessment. A total of 102 university students diagnosed with mechanical/non-specific neck pain were randomly allocated (1:1:1) using a computer-generated random sequence to received therapeutic interventions.

Settings and conduct

Eligible university students with mechanical neck pain from IISAT University, Gujranwala, PK were randomly allocated to one of three groups: Group A, receiving Natural Apophyseal Glides and Sustained Natural Apophyseal Glides; Group B, receiving Myofascial Release; or Group C, receiving combined therapy.

Participants/Inclusion and exclusion criteria

Inclusion criteria: Neck pain ≥4 weeks, Visual Analog Scale ≥3, Neck Disability Index 10–30%, and ≥10% limitation in cervical range of motion (ROM) in at least one direction. Exclusion criteria: Cervical fracture/trauma, radiculopathy, previous surgery, systemic inflammatory disease, concurrent physiotherapy for neck pain, or psychiatric illness affecting participation.

Intervention groups

All groups received treatment 3 times/week for 4 weeks (12 sessions). Group A: Natural Apophyseal Glides (NAGs; C2–C7 oscillatory glides) and Sustained Natural Apophyseal Glides during active cervical movements (20–25 min/session). Group B: Myofascial Release technique applied to cervical and shoulder girdle muscles (10–15 min/session). Group C: Combined protocol of Myofascial Release followed by Natural Apophyseal Glides and Sustained Natural Apophyseal Glides (20–25 min/session).

Main outcome variables

Visual Analog Pain Score, Neck Disability Score, and Cervical Range of Motion.

General information

Reason for update

Acronym

IRCT registration information

IRCT registration number: **IRCT20260529069564N3**
Registration date: **2026-07-08, 1405/04/17**
Registration timing: **retrospective**

Last update: **2026-07-08, 1405/04/17**
Update count: **0**

Registration date

2026-07-08, 1405/04/17

Registrant information

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Name of organization / entity

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Recruitment status

Recruitment complete

Funding source

Expected recruitment start date

2025-01-01, 1403/10/12

Expected recruitment end date
2025-06-30, 1404/04/09
Actual recruitment start date
2025-01-01, 1403/10/12
Actual recruitment end date
2025-06-30, 1404/04/09
Trial completion date
2025-06-30, 1404/04/09

Scientific title
Effects of Natural Apophyseal Glides, Sustained Natural Apophyseal Glides, Myofascial Release, and Combined Therapy on Mechanical Neck Pain in University Students: A Randomized Controlled Trial

Public title
Comparing Mulligan Mobilization and Myofascial Release Techniques for Neck Pain in University Students
Purpose
Treatment
Inclusion/Exclusion criteria
Inclusion criteria:
University students aged 18–30 years. Symptoms of mechanical or non-specific neck pain persisting for at least 4 weeks Visual Analog Scale (VAS) score ≥ 3. Neck Disability Index (NDI) score between 10% and 30% (mild to moderate disability). At least 10% limitation in one or more directions of cervical range of motion (ROM) as measured by a bubble inclinometer. Willingness to participate and provide written informed consent.
Exclusion criteria:
History of cervical fracture, trauma, or significant neck injury. Presence of cervical radiculopathy, including tingling, numbness, or weakness in the upper limbs. Previous cervical spine surgery. Systemic inflammatory or rheumatologic diseases (e.g., rheumatoid arthritis, fibromyalgia). Receiving concurrent physiotherapy or other rehabilitation treatment for neck pain. Psychiatric illness or cognitive impairment that may interfere with participation or outcome assessment. Refusal or inability to provide informed consent.
Age
From **18 years** old to **30 years** old
Gender
Both

Phase
N/A
Groups that have been masked

- Outcome assessor

Sample size
Target sample size: **120**
Actual sample size reached: **102**
Randomization (investigator's opinion)
Randomized
Randomization description
Participants were randomized in a 1:1:1 ratio into three intervention groups: Group A (Natural Apophyseal Glides and Sustained Natural Apophyseal Glides), Group B (Myofascial Release Technique), and Group C (Combined NAGs/SNAGs and Myofascial Release Technique). Individual participants were used as the unit of randomization. In randomization tool, we used Microsoft Excel 365 (RAND function) to generate the random allocation sequence. A simple randomization method was employed using a computer-generated random number sequence. The random allocation sequence was generated independently prior to participant enrolment using computer software. No stratification factors were applied during randomization. Allocation concealment was ensured through the use of sequentially numbered, sealed, opaque envelopes containing group assignments. After confirming eligibility and obtaining informed consent, each participant was assigned to a study group by opening the next envelope in sequence. Outcome assessors were blinded to group allocation; however, due to the nature of the interventions, participants and treating physiotherapists could not be blinded.
Blinding (investigator's opinion)
Single blinded
Blinding description
Blinding procedures were implemented as follows: Participants were blinded to group allocation and were not informed about the specific therapeutic approach assigned to them (NAGs/SNAGs, Myofascial Release, or combined therapy). All interventions were presented as standard physiotherapy techniques to minimize expectation bias. The principal investigator and treating physiotherapists were not blinded due to the nature of manual therapy interventions and their role in delivering treatment. Outcome assessors were blinded to group allocation and were not involved in the treatment process. They performed all baseline and post-intervention assessments independently without access to randomization codes or group assignments. Data analysts/statisticians were blinded to group allocation during data analysis by using coded group labels (A, B, and C) until completion of statistical analysis. The Data and Safety Monitoring Board was not involved in intervention delivery and remained independent of treatment allocation and outcome assessment. Manuscript writers were not involved in outcome assessment and were blinded to group coding during initial statistical interpretation.
Placebo
Not used
Assignment
Parallel
Other design features
Single-blind, three-arm, parallel-group randomized controlled trial with 1:1:1 allocation ratio. Participants were randomly assigned using a computer-generated random sequence with allocation concealment through sealed opaque envelopes. Outcome assessors were blinded to group allocation. Interventions were delivered three times per week for 4 weeks.

Secondary Ids

empty

Ethics committees

1

Ethics committee

Name of ethics committee

Institutional Review Board of Gujranwala Institute of Medical and Emerging Sciences

Street address

Ali Pur Chatha Road, Near Gujranwala Medical College, Gujranwala

City

Gujranwala

Postal code

52250

Approval date

2025-05-15, 1404/02/25

Ethics committee reference number

Ref No. (GIMES/RA/25/00476)

Health conditions studied

1

Description of health condition studied

Mechanical (non-specific) neck pain with associated disability and reduced cervical range of motion in university students.

ICD-10 code

M54.2

ICD-10 code description

Cervicalgia

2

Description of health condition studied

M54.2 - Cervicalgia (Neck pain) M25.60 - Stiffness of unspecified joint, not elsewhere classified (to represent the restriction in cervical range of motion)

ICD-10 code

ICD-10 code description

Primary outcomes

1

Description

Pain Intensity

Timepoint

at baseline (pre-intervention) and within 48 hours after the final session (post-intervention).

Method of measurement

Visual Analog Scale (VAS)

Secondary outcomes

1

Description

Functional Disability

Timepoint

at baseline (pre-intervention) and within 48 hours after the final session (post-intervention).

Method of measurement

Neck Disability Index (NDI)

2

Description

cervical range of motion (ROM)

Timepoint

at baseline (pre-intervention) and within 48 hours after the final session (post-intervention).

Method of measurement

measured using a bubble inclinometer (flexion, extension, right/left lateral flexion, and right/left rotation).

Intervention groups

1

Description

Intervention (Group 1): Participants receive Mulligan Concept manual therapy comprising Natural Apophyseal Glides (NAGs) followed by Sustained Natural Apophyseal Glides (SNAGs) for mechanical/non-specific neck pain. NAGs are applied to hypomobile or symptomatic cervical segments (C2–C7) identified during segmental assessment. Participants are treated in a neutral sitting position while the physiotherapist stands behind or beside the participant and applies an antero-superior glide to the cervical articular pillar using the thumb reinforced by the fingers. Passive, pain-free, mid-range oscillatory mobilizations are performed in 3 sets of 8–10 oscillations, with 30 seconds of rest between sets, for approximately 10–12 minutes. Following NAGs, SNAGs are applied to the symptomatic cervical segment. During SNAGs, the physiotherapist maintains a sustained accessory glide along the facet joint plane while the participant actively performs the restricted cervical movement (flexion, extension, or rotation). If the movement is pain-free, gentle end-range overpressure is added. Six to ten repetitions are performed for each symptomatic movement direction, with each sustained glide maintained for 5–10 seconds, requiring approximately 10–15 minutes. Each treatment session lasts approximately 20–25 minutes and is administered three sessions per week for four consecutive weeks (12 treatment sessions in total) by a licensed physiotherapist trained in the Mulligan Concept. No drugs, injections, or medical devices are used during the intervention.

Category

Rehabilitation

2

Description

Intervention (Group 2): Participants received Myofascial Release (MFR) therapy for mechanical/non-specific neck pain. The intervention targets the upper trapezius, levator scapulae, sternocleidomastoid (SCM), sub-occipital muscles, and the cervical and upper thoracic paraspinal muscles. Participants are positioned in either a comfortable short-sitting or prone position depending on the muscle being treated. A licensed physiotherapist

applies gentle, sustained manual pressure using the hands, fingers, knuckles, or forearms to areas of fascial restriction and myofascial trigger points. A neutral water-based gel is used as a lubricant to facilitate controlled deep tissue gliding and minimize friction. Myofascial release techniques include sustained trigger point pressure, cross-hand fascial stretching, and longitudinal gliding strokes. Sustained pressure is maintained until a palpable fascial release is achieved, typically 90–120 seconds per restricted point, with 2–3 repetitions for each affected muscle group. Each treatment session focuses on the cervical and upper thoracic region and lasts approximately 10–15 minutes. The intervention is administered three sessions per week for four consecutive weeks (12 treatment sessions in total) by a licensed physiotherapist experienced in manual therapy. No drugs, injections, or medical devices are used during the intervention.

Category

Rehabilitation

3

Description

Intervention 3 (Group 3): Participants received a combined manual therapy protocol consisting of Myofascial Release (MFR), Natural Apophyseal Glides (NAGs), and Sustained Natural Apophyseal Glides (SNAGs) for the management of mechanical/non-specific neck pain. The intervention is delivered by a licensed physiotherapist trained in manual therapy and the Mulligan Concept. Each treatment session begins with Myofascial Release (MFR) as a preparatory technique to reduce myofascial restrictions and improve soft tissue mobility. MFR is applied to the upper trapezius, levator scapulae, sternocleidomastoid (SCM), sub-occipital muscles, and cervical and upper thoracic paraspinal muscles. Participants are positioned in either a comfortable short-sitting or prone position depending on the muscle being treated. A neutral water-based gel is used to facilitate tissue gliding. The physiotherapist applies sustained manual pressure using the hands, fingers, knuckles, or forearms, employing trigger point release, cross-hand fascial stretching, and longitudinal gliding techniques. Sustained pressure is maintained for 90–120 seconds per restricted point, with 2–3 repetitions for each affected muscle group, for approximately 10–12 minutes. Following MFR, Natural Apophyseal Glides (NAGs) are applied to symptomatic or hypomobile cervical segments (C2–C7) identified during segmental assessment. With the participant seated in a neutral posture, the physiotherapist applies passive, pain-free, mid-range oscillatory antero-superior glides to the cervical articular pillars using the thumb reinforced by the fingers. NAGs are performed in 3 sets of 8–10 oscillations, with 30 seconds rest between sets. Immediately afterward, Sustained Natural Apophyseal Glides (SNAGs) are performed on the symptomatic cervical level. While the physiotherapist maintains a sustained accessory glide along the facet joint plane, the participant actively performs the restricted cervical movement (flexion, extension, or rotation). If the movement is pain-free, gentle end-range overpressure is applied. Six to ten repetitions are performed for each symptomatic movement direction, with each sustained glide maintained for 5–10 seconds. Each combined treatment session lasts approximately 20–25 minutes and is administered three times per week for four consecutive weeks (12 treatment sessions in total). No medications, injections, electrotherapy, or medical devices are used during the intervention.

Category

Rehabilitation

Recruitment centers

1

Recruitment center

Name of recruitment center
International Institute of Science, Arts and Technology (IISAT) University, Gujranwala

Full name of responsible person
Noor Fatima

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Sponsors / Funding sources

1

Sponsor

Name of organization / entity
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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
Gujranwala Institute of Medical and Emerging Sciences (GIMES)

Proportion provided by this source
100

Public or private sector
Private

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
Chiniot General Hospital, Korangi

Full name of responsible person
Sajjan Iqbal Memon

Position
Quality & Patient Safety Officer

Latest degree
Master

Other areas of specialty/work
Quality Improvement and Patient Safety

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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
Yes - There is a plan to make this available

Data Dictionary
Yes - There is a plan to make this available

Title and more details about the data/document
De-identified participant dataset, study protocol,

statistical analysis plan, informed consent form template, and supporting study documents from the randomized clinical trial evaluating Natural Apophyseal Glides (NAGs), Sustained Natural Apophyseal Glides (SNAGs), and Myofascial Release (MFR) for mechanical neck pain in university students. The dataset will include de-identified individual participant data underlying the published results for primary and secondary outcomes (VAS, NDI, and cervical range of motion).

When the data will become available and for how long

Data and supporting documents will be available beginning 6 months after publication of the primary study results and will remain available for 5 years following publication.

To whom data/document is available

Data will be available to qualified researchers, clinicians, academic institutions, and healthcare professionals conducting legitimate scientific research. Requests from commercial organizations will be considered on a case-by-case basis.

Under which criteria data/document could be used

Data will be shared for scientifically sound research purposes, including secondary analyses, meta-analyses, and educational or methodological research. Access will be granted following review and approval of a research proposal by the principal investigator. Shared data will be de-identified and may not be used for participant re-identification. Recipients may be required to sign a data-sharing agreement.

From where data/document is obtainable

Requests should be directed to the corresponding author via email. Data and documents can be obtained upon approval of the request from the study investigators at Gujranwala Institute of Medical and Emerging Sciences (GIMES), Gujranwala, Pakistan. Email: info@gimes.com.pk, and Website: https://gimes.com.pk

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

Interested researchers should submit a written request describing the study objectives, methodology, and intended use of the data. Requests will be reviewed by the principal investigator and research team within approximately 2–4 weeks. Upon approval and completion of any required data-sharing agreement, the requested documents and de-identified dataset will be provided electronically.

Comments

No personally identifiable participant information will be shared. Data will be provided in accordance with ethical approval requirements, participant confidentiality protections, and applicable institutional policies.