To Compare the Effect of Strengthening Exercise and Mckenzie Exercise Along with Postural Exercise in Hump Neck Patients Among College Students

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ABSTRACT:

Background: College students are increasingly experiencing hump neck, also known as forward head posture (FHP), as a result of their sedentary lifestyles, poor postural habits, and extended use of digital gadgets. Long-term spinal abnormalities, reduced mobility, and neck pain can result from this disorder, which is defined by an anterior location of the head. To control and reverse this postural anomaly, effective therapies are required.

Methods: A randomized controlled trial was conducted involving 60 college students aged 18–25 years who were diagnosed with hump neck. The participants were randomly assigned to two intervention groups. Group A received a combination of strengthening exercises and posture correction exercises, while Group B received McKenzie exercises along with posture correction exercises.

Result: Both groups demonstrated significant improvements in all outcome measures post-intervention ($p < 0.0001$). However, Group A exhibited greater improvements in CVA and VAS scores compared to Group B, indicating a more substantial correction in posture and reduction in pain.

Conclusion: Strengthening exercises had more noticeable effects than McKenzie exercises, even though both programs successfully enhanced posture and decreased neck pain when paired with posture correction.

Keywords: Hump neck , strengthening exercise, posture, McKenzie exercise, students.

INTRODUCTION:

Hump neck refers to the abnormal forward position of the head in relation to the neck and shoulders. It is characterized by an increased cervical lordosis, resulting in the appearance of a visible hump or a forward tilt of the head. Hump neck is often a consequence of poor posture, sedentary lifestyle, occupational factors, or underlying musculoskeletal conditions. [1] .The latest working habits adapted in our daily life such as use of computers and gadgets by spending long hours gazing at versatile screens or even activities of leisure like slouching on a couch in front of television, reading books and driving have lead to alterations of regular mechanics of body [2]. Abnormal biomechanics poses risks for various musculoskeletal problems such as neck pain (NP) and hump neck [3]

Hump neck is also caused by the Compression of the front portion of the involved vertebrae due to osteoporosis leads to forward bending of the spine (kyphosis) and creates a hump at the upper back. [4]. It also cause Postural Factors like poor posture, such as slouching or sitting with the head and shoulders forward, can lead to muscle imbalances and strain on the neck and upper back muscles. Over time, this can contribute to the development of hump neck. [5]. Pathophysiology of hump neck due to vertebral fractures, wedging of vertebrae and muscular imbalance. with an estimated prevalence of 60%–90%, which is a growing concern among the present generation. [6]. The most noticeable symptom is a visible hump or rounded appearance of the upper back. This can range in severity from a mild rounding to a more pronounced hump. Many individuals with hump neck experience back pain, which can range from mild to severe. The pain may be localized to the upper back or may radiate to the neck, shoulders, or lower back. Hump neck can cause stiffness and reduced flexibility in the upper back and neck. This can make it difficult to perform certain movements or maintain proper posture. Hump neck can affect spinal alignment, leading to changes in the overall curvature of the spine. This can result in postural changes and an altered gait. Severe cases of hump neck can potentially compress the spinal cord or nerve roots, leading to neurological symptoms such as weakness, numbness, or tingling in the arms. [7].

The hump neck primarily affects the thoracic spine, which is the middle region of the vertebral column, the key anatomical structures involved vertebrae,the thoracic spine consists of 12 vertebrae (T1-T12), which are numbered from the top down. Each vertebra has a body at the front and a vertebral arch at the back, forming the spinal canal.It also consists of Intervertebral Discs: The intervertebral discs are located between adjacent vertebrae and act as shock absorbers. They have a gel-like center called the nucleus pulposus, surrounded by a fibrous ring called the annulus fibrosus and it contains Spinous Processes,these spinous processes are bony projections that extend backward from the posterior part of each vertebra. These structures can be felt as the bony bumps along the midline of the back.It may contribute with ligaments which are bands of fibrous tissue that help stabilize the spine and connect various spinal structures. The ligamentum flavum, interspinous ligaments, and supraspinous ligament are some of the ligaments involved in the stability of the thoracic spine. Several muscles surround and support the thoracic spine. The erector spinae muscles, including the iliocostalis,

longissimus, and spinalis muscles, are large muscles that run along the length of the vertebral column and help maintain posture and control spinal movement. [8]

The weaker muscle groups that lead to improper postural alignment are especially targeted by strengthening workouts. These usually consist of the thoracic extensors, rhomboids, and middle trapezius, which are scapular retractors, as well as deep cervical flexors. Strengthening these muscles improves structural support and decreases the forward head angle, which aids in cervical spine realignment. Research indicates that strengthening postural muscles with resistance improves cervical alignment and functional efficiency over the long run.[9]

In order to realign the spine and lessen discogenic discomfort, McKenzie exercises, sometimes referred to as Mechanical Diagnosis and Therapy (MDT), emphasize prolonged postures and repetitive cervical motions. Exercises that concentrate symptoms and restore range of motion are key components of the McKenzie technique, which places an emphasis on active patient involvement. The McKenzie regimen for FHP usually consists of cervical retraction and extension movements, which can help restore postural balance and reduce intervertebral disc stress.[10].

The purpose of posture correction exercises is to retrain the body's postural awareness through both static and dynamic activities. These consist of shoulder-setting exercises, chin tucks, wall angels, and ergonomic instruction. By using neuromuscular retraining and proprioceptive feedback, posture repair seeks to return the spine to its optimal position. [11]

Key outcome measurements are necessary to assess how effective these interventions are. An objective measure of forward head posture that is commonly used is the craniovertebral angle (CVA); a lower CVA denotes a larger postural deviation. In [12] The Neck Disability Index (NDI) gauges the level of functional impairment associated to the neck, which reflects the participant's capacity to carry out everyday activities [13]. Neck pain severity is measured using the Visual Analogue Scale (VAS), which offers a subjective but useful indicator of treatment effectiveness [14]. The structural and symptomatic changes that occur after intervention are fully understood thanks to these outcome measures.

The only goal of this study is to find out the effectiveness of strengthening exercise with postural correction and mckenzie exercises with postural correction in hump neck patients.

MATERIALS AND METHODS:

Study Design: This study was a prospective, randomized controlled trial conducted over a 6-week period.

Study Setting: The research was carried out at a university physiotherapy clinic equipped for musculoskeletal assessments and therapeutic exercise sessions.

Sample Size: A total of 60 college students aged 18–25 years diagnosed with forward head posture (hump neck) were recruited based on inclusion criteria. Participants were randomly assigned into two equal groups (n=30 per group).

Inclusion Criteria:

- Age between 18 and 25 years
- Clinically diagnosed with forward head posture (CVA < 50 degrees)
- Mild to moderate neck pain (VAS 3–7)
- Neck Disability Index score between 10% and 40%
- Willing to provide informed consent

Exclusion Criteria:

- History of cervical spine surgery or fracture
- Presence of neurological symptoms or radiculopathy
- Diagnosed spinal deformities (e.g., scoliosis, kyphosis beyond postural origin)
- Ongoing treatment for neck pain elsewhere

Randomization: Simple random sampling method using a computerized random number generator was used to allocate subjects into:

- **Group A:** Strengthening + Posture Correction
- **Group B:** McKenzie Exercises + Posture Correction

Intervention Protocols:

Group A – Strengthening + Posture Correction:

- **Deep Cervical Flexor Training** (chin tucks in supine)
- **Scapular Retractor Strengthening** (rows with theraband)
- **Thoracic Extension** (prone extension exercises)
- **Postural Drills** (wall angels, postural holds)
- **Frequency:** 3 times/week for 6 weeks
- **Duration:** 30–40 minutes per session

Group B – McKenzie + Posture Correction:

- **Cervical Retraction Exercises** (sitting/standing)
- **Cervical Extension in Lying**
- **Sustained Positioning for Posture Correction**
- **Postural Drills** (same as Group A)
- **Frequency:** 3 times/week for 6 weeks
- **Duration:** 30–40 minutes per session

Outcome Measures:

1. **Craniovertebral Angle (CVA):** Measured using lateral photographic analysis with a plumb line reference. A larger angle indicates improved head alignment.
2. **Visual Analogue Scale (VAS):** Subjective measure of pain intensity on a 0–10 cm scale.
3. **Neck Disability Index (NDI):** A standardized questionnaire to evaluate the functional status of individuals with neck pain.

RESULT:

After 6 weeks of intervention, Group A (Strengthening + Postural Correction) showed significantly greater improvements in craniovertebral angle (52.6° ± 1.8), pain reduction (VAS: 1.7 ± 0.6), and neck function (NDI: 10.5% ± 3.2) compared to Group B (McKenzie + Postural Correction), which showed moderate improvements in CVA (48.3° ± 2.0), VAS (2.9 ± 0.7), and NDI (15.7% ± 3.6). All within-group and between-group differences were statistically significant with p-values less than 0.0001.

TABLE:

Outcome Measure	Group A (Pre)	Group A (Post)	Group B (Pre)	Group B (Post)	p-value (Between Groups)
CVA (°)	44.8 ± 2.1	52.6 ± 1.8	45.1 ± 2.3	48.3 ± 2.0	< 0.0001
VAS	5.6 ± 0.8	1.7 ± 0.6	5.5 ± 0.9	2.9 ± 0.7	< 0.0001
NDI (%)	29.3 ± 4.7	10.5 ± 3.2	28.9 ± 4.5	15.7 ± 3.6	< 0.0001

DISCUSSION:

In this randomized controlled study, college students with forward head posture (FHP) between the ages of 18 and 25 were compared for the relative efficacy of two physiotherapeutic interventions: McKenzie exercises combined with postural correction (Group B) and strengthening exercises paired with postural correction (Group A). Over the course of six weeks, the two intervention groups showed discernible improvements in their craniovertebral angle (CVA), Visual Analog Scale (VAS) ratings for neck pain, and Neck Disability Index (NDI) scores, demonstrating the effectiveness of both strategies in treating FHP. The CVA improvements that have been seen are consistent with earlier studies showing that focused exercise regimens can successfully treat FHP. According to a comprehensive review and meta-analysis by Mahmoud et al. (2018), therapeutic activities help people with FHP have less neck pain and a considerably better CVA.[15]. In a similar vein, Kim et al. (2019) discovered that McKenzie exercises significantly improved pulmonary function and CVA, highlighting the advantages of this strategy.[16]

Group A individuals in our study performed postural drills, thoracic extension exercises, scapular retractor strengthening, and deep cervical flexor training. The weakening of the deep neck flexors and scapular stabilizers is one of the muscular imbalances linked to FHP that these workouts treat. Kage et al. (2016) provided evidence of the efficacy of these strengthening activities, demonstrating notable enhancements in cervical posture and muscular flexibility subsequent to deep neck flexor strengthening.[17]

Participants in Group B undertook posture correction drills and McKenzie exercises, which included neck retraction and extension motions. In order to centralize pain and address mechanical dysfunctions, the McKenzie approach places a strong emphasis on prolonged postures and repetitive motions. Our results align with those of Kim et al. (2019), who showed that McKenzie exercises successfully raise FHP and related respiratory metrics.

Although there were notable improvements in all groups, Group A's mix of posture correction and strengthening activities seemed to have slightly more advantages in improving CVA and lowering neck discomfort. This implies that improving the endurance and strength of the muscles may have a greater effect on FHP patients' postural alignment and symptom alleviation. However, the McKenzie technique is still a useful treatment, especially for people who have discogenic neck discomfort or who benefit from directional preference exercises specifically.

It is significant to note that postural correction drills were included in both therapies, highlighting the importance of habitual posture awareness and education in controlling FHP. The inclusion of postural education is consistent with research by Mahmoud et al. (2023), which found that corrective exercises and postural education both significantly increase CVA in young people with FHP.

CONCLUSION:

This study concludes that college students with forward head posture (hump neck) benefit from strengthening exercises and McKenzie exercises when combined with postural correction. These activities also improve craniovertebral angle, reduce neck pain, and improve functional capacity. On the other hand, the group that combined posture correction with strengthening exercises showed noticeably better results than the McKenzie group. For the best recovery from postural neck dysfunction in young people, a planned strengthening program that emphasizes deep cervical flexors, scapular stabilizers, and thoracic extension is advised in conjunction with posture correction exercises.

LIMITATIONS:

This study has several limitations. The sample was limited to college students aged 18–25 years, which may affect the generalizability of the findings to other age groups or populations. The intervention period was relatively short (six weeks), and long-term follow-up was not conducted to assess the sustainability of the improvements. Additionally, the study did not include a control group receiving no intervention, which would have strengthened the causal inferences.

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DATA AVAILABILITY

Data are available under reasonable request to the corresponding author.

CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

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