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# Efficacy of ELDOA and Kendall Exercise on Posture, Pain and Functional Disability in Patient with Text Neck Syndrome: A Case Study

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## ABSTRACT

**Introduction:** A number of musculoskeletal disorders have been associated with teenage smartphone use. As a result of bringing the head forward and out of its natural alignment with the spine and neck, the most obvious form of bad posture is forward head posture (FHP). ELDOA helps in maximizing facial and spinal stretching by adopting a particular position for one minute whereas Kendall exercises are highly specific, targeting particular muscle groups and joint movements by enhancing their existing mobility and function.
**Objective:** The objective of this research is to determine if the ELDOA and Kendall exercises alleviate symptoms of text neck syndrome in a 23-year-old male patient by examining changes in posture, discomfort, and functional impairment.
**Materials and methods:** In order to gauge functional impairment, discomfort, and posture, a smartphone app was used (NDI). ELDOA and Kendall exercise was given to subjects for 5 weeks, 3 sessional per week each with 10 repetitions and 3 sets.
**Results:** Following the intervention after 5 weeks, there was an increase of 7-8 degrees of CV angle after the treatment compared to its pre-test value whereas pain and functional disability showed improvement from moderate disability to mild disability in NDI scale.
**Conclusion:** Research on people suffering with text neck syndrome has shown that the ELDOA and Kendall exercises may help with posture, discomfort, and functional impairment.

***Keywords:*** Cranio-vertebral angle, ELDOA, Forward head posture (FHP), Kendall exercise, Text neck syndrome.

## INTRODUCTION

Dr. Dean L. Fishman coined the term "text neck" to refer to neck alignments brought on by prolonged forward neck bending. Strain on the neck over an extended period of time might cause these injuries [1]. A group of symptoms known as "text neck syndrome" has emerged as a consequence of the improper and excessive usage of cellphones [2]. Text neck syndrome, sometimes called turtle neck posture, occurs when the neck is bent forward for lengthy periods of time when using a mobile device. Untreated text neck syndrome may cause serious damage to the cervical spine, such as ligament inflammation, nerve irritation, and a curved spine. The increasing prevalence of technology in contemporary life has led to the rise in worry for this syndrome as a new health issue[3]. When the head is flexed forward, the weight on the spine is greatly raised, the effects and quantity of weight are

then gradually and strongly amplified by adjusting the degrees[6]. Repeatedly bending the neck forward can alter the curvature of the cervical spine, affect supporting ligaments, tendons and muscles and even cause changes in bone structure. This commonly leads to change in posture and discomfort in the neck and surrounding areas[7].

This syndrome can affect a smartphone user's neck as a result of sustained cervical flexion and repetitive stress injuries[4]. According to studies, persons between the ages of 18 and 44 frequently use mobile phones. According to reports, 79% of people carry their smartphones with them nearly all the time[5.]

Text neck syndrome is commonly characterized by neck soreness or pain. Other symptoms include shoulder pain, a pronounced curvature of the spine, and persistent headaches. Pain associated with text neck syndrome is primarily attributed to tight trapezius and levator scapulae[3]. Additionally, it may result in muscular spasms and moderate to severe chronic low back pain in the upper back[2.]

Recent studies indicate a connection between the forward-leaning postures adopted during activities like texting, studying, browsing the internet, emailing, and gaming, and an increased risk of hyperkyphosis. This condition is linked to pulmonary and cardiovascular issues[8.] This raise concerns that younger generations, who are the most avid users of smartphones and tablets, may face future challenges such as chronic pain, disability, and potentially shortened life expectancy due to these postural habits.

In text neck syndrome, pain is primarily attributed to stiffness in the trapezius and elevator scapulae muscles[3]. Forward head posture, which is commonly recognized as a poor posture in the sagittal plane, exacerbates these issues[3]. Limited dorsal (back) range of motion (ROM) is often caused by imbalances in the muscles of the upper trapezius and levator scapulae. On the flip side, this condition is exacerbated by a lack of strength in the frontal (front) deep neck flexors and a weakness that worsens with extension in the posterior (back) middle and lower trapezius muscles[9.]

The Myofascial ELDOA (Elongation Longitudinaux avec Decoaption Osteo-Articulaire) technique, also known as LOADS (Longitudinal Osteoarticular Decoaptation Stretching), was first introduced by Guy Voyer in 1979[10]. This method focuses on maximizing the stretch of fascia and spine by assuming specific postures for one minute[11]. ELDOA aims to strengthen the spine and decompress it effectively. It integrates various treatment principles and produces both local and systemic effects. Benefits include decompression of zygapophyseal joints, enhanced disc fluid absorption, improved circulation and muscle tone, and extension of range of motion. Additionally, ELDOA can correct posture abnormalities, enhance breathing, and facilitate proprioception in the targeted segment. It also offers secondary benefits for organ systems[11].

Kendall exercises, developed by Elizabeth Kendall, are indeed valuable therapeutic movements aimed at improving joint mobility, flexibility, and muscle strength. These exercises are highly specific, targeting particular muscle groups and joint movements. Their primary goal is to help individuals either recover lost range of motion due to injury or illness, or enhance their existing mobility and function. One of the key strengths of Kendall exercises lies in their adaptability. They can be customized to suit the needs of individuals with various conditions, injuries, or levels of physical ability. By focusing on specific muscle groups and joint actions, these exercises facilitate rehabilitation and promote overall physical well-being[12]

An increasing number of people throughout the world are suffering from this novel condition, which has emerged as a major public health concern. More screen time is required due to the growing size of cellphones. Increased discomfort and impairment in the neck may be caused by leaning forward for lengthy periods of time to gaze at screens1. Physical treatment for

text neck syndrome has received less research attention than the condition's awareness and prevalence. Consequently, the purpose of this research is to find out, in as little as five weeks, if mobile phone users suffering from text neck syndrome may benefit from a combination of the Kendall exercises and ELDOA therapy.

**OBJECTIVE**

Finding out how well ELDOA and Kendall exercise work together to improve a patient's posture, discomfort levels, and functional handicap due to text neck syndrome is the goal of this study.

## MATERIALS AND METHODS

Examining how ELDOA and Kendall exercises affected the posture, discomfort, and functional impairment of patients suffering from text neck syndrome was the primary objective of this case study. A 23-year-old male was selected from a Physiotherapy college in Mangalore and underwent assessment based on inclusion and exclusion criteria. Inclusion criteria comprised of subject who scored 42 degrees in Cranio-vertebral angle (CVA) and 18 points on Neck Disability (NDI) scale who experienced mild pain and discomfort for 2 weeks. Subject with cervical fracture, cervical radiculopathy, severe neck pain, any cervical surgery and individuals who have taken Physiotherapy for neck pain over last 3 months were excluded. Materials used for assessment include smartphone with an inclinometer, Neck Disability Index scale sheet.

Posture was assessed by smartphone application and pain, functional disability by Neck disability index scale as pre-treatment outcome. ELDOA and Kendall exercise was given to subject for 5 weeks, 3 sessional per week each with 10 repetitions and 3 sets. Following the intervention after 5 weeks, the effect of both components was assessed by same tool as in pre- test. Patient education remained integral throughout the treatment process.

**OUTCOME MEASURE**

**Posture (CV Angle)**

CV angle was assessed by using the iPhone inclinometer. Here subject has to be in sitting position with head normal position then the angle is measured between the seventh cervical spinous process and tragus of ear. The accuracy of the iPhone inclinometer in measuring cervical mobility and head orientation seems to be high. All of the variables had great inter- and intra-tester reliability (ICC > 0.81)17. A more forward head position is indicated by a lower craniovertebral angle (CVA). A CVA less than 48-50 are defined as Forward head posture.

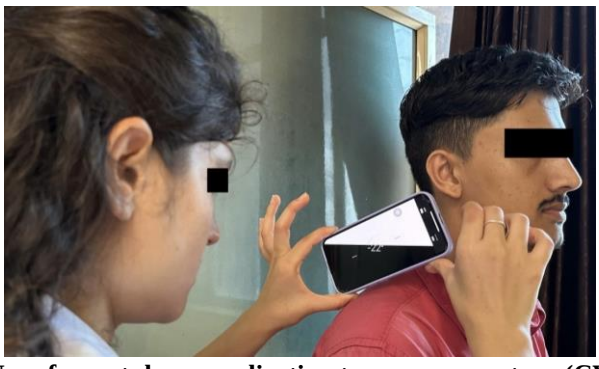

**Fig 1: Use of smartphone application to measure posture (CV angle)**

**NDI scale**

The NDI is used to measure functional impairment and pain because to its high reliability and validity. A higher NDI score indicates a more severe impairment; the ten parts of the NDI are rated from zero to fifty. With a maximum score of 50, each item may be assessed on a scale from 0 (no disability) to 5 (total impairment). The maximum possible score for each part is 5. If the first

statement is marked as true, the section score is 0, and if the final statement is recorded as true, the score is 5. No neck impairment is considered to exist with a score of 0–4, mild disability from 5–14, moderate disability from 15–24, severe disability from 25–34, and full disability from scores over 34.

**Interventions**

**ELDOA exercice**

The cervical spine has its approved stretching method, which is ELDOA. The patient was told to stay in the posture that would let the intervertebral segments be targeted. The ELDOA stretch also requires careful breathing. The patient was instructed to breathe deeply and diaphragmatically rather than holding their breath or straining.

**Level CO-C2.**

**Position:** Position yourself on your side with your lower leg bent at the knee and your cervical spine in a neutral position. The trunk was stabilized by bending the bottom leg. Lengthening the spine and neck helped bring this position forward. The next step was for the patient to raise their upper arm above while keeping their palm down. The patient maintained a vertical hip alignment when they placed the upper leg's foot in front of the knee. It was requested that the patient remain in this posture. The last thing to do was for the patient to look up at their head while sticking out their tongue.

**Dosage:** 1 minutes maintaining posture, 15 seconds hold, 5 repetitions, 3sessions per week on alternative days for 5 weeks.

**Level C4-C5.**

**Position:** The patient was first placed on their back with their arms resting by their sides. The next step was to have them bend at the knees and chest-out until they felt a tightness in the sacrum. The next step was to make them feel even more pressured by having them raise their heads off the floor. They moved forward in this posture by extending their arms and rotating their shoulders to the outside.

**Dosage:1** minute maintaining posture,15 seconds hold, 5 repetitions, 3 sessions per week on alternative days for 5 weeks.

**Level C5-C6.**

**Position:** The level C4–C5 progression looks like this. In order to reach the C5-C6 areas, the patient was told to raise both arms parallel to the ground and spin them towards the ceiling. For one minute, tension was kept constant.

**Dosage:** This routine was performed for five weeks, three times a week on different days, for a total of one minute of work and fifteen seconds of rest in between sets of five repetitions.

**Level C6-C7.**

**Position:** The level C5–C6 progression looks like this. To achieve a 45-degree angle from their body, the patient was told to raise both arms laterally in the coronal plane.

Dosage: Completed three times weekly on alternate days for five weeks, with a one-minute warmup and fifteen seconds of rest in between each set of five repetitions.

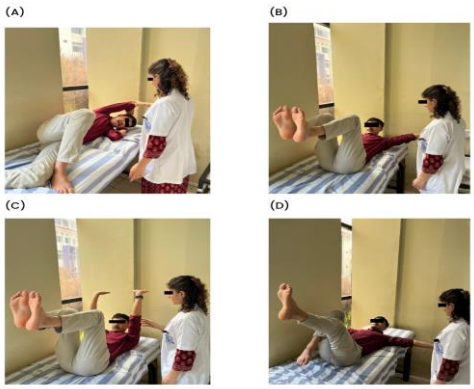


**Fig 2: A) Level C0-C2 B) Level C4-C5 C) Level C5-C6 D) Level C6-C7**

**Table no. 1: Kendall exercise**

| Treatment | Dosage |
|---|---|
| 1. Strengthening of deep cervical flexors<br>Procedure: Positioning supine with the chin tucked in and lifting the head for 2 to 8 s | Each posture was maintained for 30 s and 3 sets of 12 repetitions were performed with 3 sessions per week on alternate days for 5 weeks. |
| 2. Stretching of cervical extensors<br>Procedure: Maintaining a sitting posture, with hands on the occipital region, and flexed spine while moving head downwards to stretch cervical extensors, | Each posture was maintained for 30 s and 3 sets of 12 repetitions were performed with 3 sessions per week on alternate days for 5 weeks. |
| 3. Strengthening of retractors<br>Procedure: Maintaining an upright posture, keep the resistance band circling with strong support and stretching it with the upper limbs of both sides so that there is full retraction of the scapula | Each posture was maintained for 30 s and 3 sets of 12 repetitions were performed with 3 sessions per week on alternate days for 5 weeks. |
| 4. Stretching the pectoralis major and minor<br>Procedure: Keeping the patients hands-on the occipital region and standing behind the patient and pulling both elbows backward to target the bilateral pectoralis muscles. | Each posture was maintained for 30 s and 3 sets of 12 repetitions were performed with 3 sessions per week on alternate days for 5 weeks. |

## RESULT

**Table 2: Pre-post comparison of CV angle and NDI scale.**

| | Pre-value | Post-value |
|---|---|---|
| CVA | 42 | 49 |
| NDI Scale | 18 | 12 |

Pre-post comparison of CV angle shows improvement on posture whereas NDI scale shows improvement from moderate disability to mild disability.

## DISCUSSION

The purpose of this research was to determine if the ELDOA and Kendall exercises helped people with text neck syndrome with their posture, discomfort, and functional impairment. Watching a mobile phone in a flexed position for lengthy periods of time may lead to text neck syndrome, which is also known as turtle neck posture. Failing to address this condition may lead to significant harm to the cervical spine, including ligament inflammation, nerve irritation, and a curvature of the spine[3].

Stiffness in the trapezius and levator scapulae is the most common cause of text neck syndrome. The most obvious form of sagittal plane bad posture is a forward head position[3]. The foundation of the ELDOA method is a one-minute posture that maximizes fascial and spinal stretching. Its focus is on releasing pressure on the spine and strengthening it[11]. To improve mobility and function, Kendall exercises target emphasis on certain muscle groups and joint motions[12].

Results on posture in patients with text neck syndrome are improved when ELDOA is used in conjunction with the Kendall exercise, according to this current research. An investigation on the efficacy of the Kendall exercise for IT workers' forward head position by S. Rahul et al. (2024) lends credence to this. Results showed that IT workers who did the Kendall exercise had better forward head position than those who did not. In a further research, S Waqar et.al. (2022) found that ELDOA exercises successfully corrected forward head position[14].

In order to quantify posture, discomfort, and functional impairment, this research used a smartphone application called the iPhone inclinometer in conjunction with the Neck impairment Index. In a related research, F Ghorbani et al. (2020) assessed the cervical range of motion in individuals suffering from nonspecific neck discomfort using a smartphone app[19]. In a separate research, M. Farooq et al. (2023) assessed the functional impairment and pain levels of individuals with text neck syndrome using the neck disability index scale[13.] To back this up, Natalia Romero-Franco et al. (2021) demonstrated the validity and reliability of a

smartphone app by showing that it had high levels of dependability both across testers and within them (ICC>0.817). According to Howard Vernon's further research, the NDI's factor structure, internal consistency, and dependability are all highly regarded and well explained[18].

The results of this research demonstrated that individuals suffering from text neck syndrome had less discomfort and functional handicap after implementing the ELDOA and Kendall exercises. M. Javaid et al. (2022) came to a similar conclusion, stating that the ELDOA method significantly alleviated trigger point pain, cervical range of motion, and neck impairment. When it came to treating neck discomfort and functional dysfunction in patients with text neck syndrome, another research by Farooq et.al (2023) showed that the ELODA approach was better than post-to-post facilitation stretching. This study had some limitations. Firstly, it is a case study, it can be repeated on a large sample size. Second, since the experiment was conducted on subjects with moderate neck discomfort, it is not known how it may affect individuals with mild or severe pain. Third, strengthening exercise was given in the intervention but strength measurement was not taken as outcome measure. Also, the duration of study was limited to 5 weeks, long term effects are unknown.

Previous studies on text neck syndrome have been conducted in various ways and effectiveness of exercise has been demonstrated. However, the combined study on ELDOA and Kendall exercise with in a time duration of 5 weeks has not been thoroughly studied compared to the interventions of other body parts. Based on the results of this study, both exercises were effective in patients with text neck syndrome.

## CONCLUSION

Patients suffering from text neck syndrome had superior improvements in posture, discomfort, and functional impairment when compared to Kendall exercise and ELDOA, according to this study's results.

### *Declaration by Authors*

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**Conflict of Interest:** The authors declare no conflict of interest.

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