Comparative Effects of Elongation Longitudinal Avec Decoaptation Osteo Articulaire Versus Upper Thoracic Mobilization and Mobility Exercise for Treatment of Forward Head Posture

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ABSTRACT

Background: Forward head posture (FHP) is a common postural deviation associated with neck pain, functional disability, and musculoskeletal imbalances. ELDOA and upper thoracic mobilization are therapeutic interventions aimed at correcting FHP and improving associated symptoms.

Objective: To compare the effectiveness of Elongation Longitudinaux Avec Decoaptation Osteo Articulaire (ELDOA) versus upper thoracic mobilization and mobility exercises (UTMME) in treating forward head posture.

Methods: A randomized clinical trial was conducted involving 36 participants with FHP, aged 20-40 years, divided into two groups (n=18 each). Group A received ELDOA, and Group B received UTMME, both for three sessions per week over four weeks. Outcomes measured included Numeric Pain Rating Scale (NPRS), Neck Disability Index (NDI), Craniovertebral Angle (CVA), and cervical range of motion (ROMs). Data were analyzed using the Friedman and Mann-Whitney U tests.

Results: Both groups showed significant improvements; however, ELDOA demonstrated greater reductions in NPRS (4.00 vs. 5.00), NDI (9.00 vs. 12.50), and greater improvements in CVA (54.22 vs. 50.05) at week 4 ($p<0.05$).

Conclusion: ELDOA was more effective than UTMME in reducing pain, disability, and improving postural alignment in patients with FHP.

INTRODUCTION

Forward head posture (FHP) is a common postural deviation characterized by the anterior positioning of the head relative to the vertical line of the body's center of gravity, often resulting in a flexed lower cervical spine (C4-C7) and upper thoracic vertebrae, along with hyperextension of the atlanto-occipital and upper cervical spine (C1-C3) (3). This misalignment is typically associated with poor ergonomic habits, prolonged sitting, and suboptimal head positioning during sleep, which impose excessive mechanical stress on cervical and thoracic structures.The prevalence of FHP is alarmingly high, affecting a significant portion of the adult population, and is linked to various musculoskeletal complaints, including neck pain, headaches, and shoulder discomfort (2). FHP can also exacerbate spinal misalignments, increasing the load on the cervical spine by approximately 3.6 times compared to a neutral position, which in turn leads to muscular imbalances, including the shortening of the levator scapulae and semispinalis capitis, and the broadening of the sternocleidomastoid and upper trapezius muscles (5).

The risk factors for FHP extend beyond postural habits and include gender, age, occupational demands, and the presence of inadequate social or professional support (6). Anatomical and biomechanical abnormalities, such as excessive forward or backward head tilt and improper pelvic and lumbar alignment, further contribute to the development of FHP. Additionally, FHP has been linked to alterations in cervical muscle activation patterns, which can perpetuate pain and dysfunction over time. This postural deviation disrupts the normal length-tension relationships of the muscles surrounding the cervical spine, leading to inappropriate stimulation of both flexor and extensor muscles and contributing to symptoms such as chronic neck pain, reduced cervical range of motion, and increased muscle tension (7, 8).

The clinical management of FHP typically involves interventions aimed at correcting postural alignment, reducing pain, and improving functional outcomes. Therapeutic approaches such as manual therapy, mobilization, and specific exercise protocols have shown efficacy in addressing these issues (9). Notably, manual therapy techniques that target both the cervical and thoracic regions have been found to enhance cervical range of motion and alleviate symptoms associated with FHP (10). Exercises focusing on the suboccipital muscles, such as stretching, strengthening, and myofascial release, have demonstrated improvements in cervical biomechanical patterns, thereby reducing postural deviations and associated symptoms (11). One specific intervention, Elongation Longitudinaux Avec Decoaptation Osteo Articulaire (ELDOA), applies targeted fascial stretching and

joint decompression techniques to correct postural imbalances and alleviate musculoskeletal pain (14). ELDOA's approach involves specific postural holds that facilitate the decompression of spinal segments, enhance intervertebral disc fluid absorption, and improve proprioception and respiratory function within the affected spinal region (15). This technique, rooted in multiple therapeutic philosophies, aims to provide localized and systemic effects, including improved posture and reduced pain, making it a promising modality for managing FHP and other musculoskeletal conditions (15).

Comparatively, upper thoracic mobilization and mobility exercises are commonly used interventions that target thoracic spine mechanics to influence cervical posture and alleviate symptoms associated with FHP (9). These exercises aim to restore normal joint mechanics, reduce musculoskeletal discomfort, and improve overall spinal mobility. Previous studies have shown that the integration of manual therapy and specific exercise protocols can yield significant improvements in individuals with FHP, underscoring the importance of a comprehensive approach to treatment (12, 13).

Despite the availability of various therapeutic options, the comparative efficacy of ELDOA versus upper thoracic mobilization and mobility exercises in the management of FHP remains underexplored. The present study seeks to address this gap by evaluating the effectiveness of these two interventions in improving postural alignment, reducing pain, and enhancing functional outcomes in individuals with FHP. By providing insights into the relative benefits of ELDOA and upper thoracic mobilization, this study aims to inform clinical decision-making and optimize therapeutic strategies for the management of FHP and related musculoskeletal disorders.

MATERIAL AND METHODS

A randomized clinical trial with ClinicalTrials.gov ID NCT06440720 was conducted in the outpatient department of Faisalabad Teaching Hospital III, GMA, from February to June 2024. The study included 36 participants, both male and female, aged between 20 and 40 years, diagnosed with forward head posture (FHP). Participants were randomly assigned into two groups, Group A and Group B, using a convenience sampling technique. Group A received the Elongation Longitudinaux Avec Decoaptation Osteo Articulaire (ELDOA) sessions three times a week for four weeks, while Group B received upper thoracic mobilizations and mobility exercises three times per week for the same duration. Baseline measurements were taken before the intervention, with follow-up assessments at the second and fourth weeks.

The primary outcomes were measured using the Numeric Pain Rating Scale (NPRS) for pain, the Neck Disability Index (NDI) for functional outcomes, the Craniovertebral Angle (CVA) assessed using web plot digitizer software, and cervical range of motion (ROMs). To ensure standardized and reliable data collection, the outcome measures were administered by trained physiotherapists who were blinded to the group allocations. The intervention protocols were also standardized; Group A received ELDOA exercises involving four specific positions held for one minute each, with sessions lasting 20-25 minutes, including an initial application of a hot pack for 7-8 minutes. Group B participants received thoracic mobilizations applied by a physiotherapist using a prone position approach, followed by thoracic mobility exercises designed to enhance cervical and thoracic alignment and mobility. Each session was conducted under the supervision of experienced physiotherapists to maintain consistency in intervention delivery.

The study was conducted following the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the institutional review board of Faisalabad Teaching Hospital III, GMA. Informed consent was obtained from all participants after they were provided with detailed information about the study, including the potential benefits and risks associated with the interventions. Participants were assured of the confidentiality of their data, and it was emphasized that their participation was voluntary and that they could withdraw from the study at any time without any consequences.

Data were analyzed using SPSS version 27. Descriptive statistics were used to summarize the baseline characteristics of the participants, including age and gender distribution. Within-group comparisons were conducted using the Friedman test to assess changes in NPRS, NDI, CVA, and cervical ROMs over time. Between-group comparisons were made using the Mann-Whitney U test to determine the differences in outcomes between the ELDOA and upper thoracic mobilization groups. A p-value of less than 0.05 was considered statistically significant for all analyses. The results were interpreted in the context of clinical relevance, with a focus on the magnitude of changes in pain, functional disability, and postural correction in FHP patients.

The data collection process adhered strictly to the study protocol, and efforts were made to minimize potential sources of bias, such as ensuring the blinding of outcome assessors and using validated tools for measurements. The study's adherence to rigorous methodological standards, including randomized assignment, controlled interventions, and standardized assessments, aimed to provide robust evidence regarding the comparative effectiveness of ELDOA and upper thoracic mobilization in the treatment of forward head posture.

RESULTS

The characteristics of the participants in the study are detailed in Table 1. Both groups, ELDOA Group A and UTMME Group B, had identical mean ages of 28.22 ± 5.22 years. The gender distribution was also similar, with 38.9% males and 61.1% females in each group. The p-value for these comparisons indicated no significant differences between the groups, supporting the homogeneity of the study sample.

The between-group analysis of variables using the Mann-Whitney U test is presented in Table 2. This analysis compared the effectiveness of the interventions over time,

focusing on pain (NPRS), functional disability (NDI), craniovertebral angle (CVA), and cervical range of motion (ROMs) at different time points (baseline, second week, and fourth week). At baseline, there were no significant differences between the two groups for any variable, as indicated by the p-values greater than 0.05. However, at the second and fourth weeks, significant improvements were observed in the ELDOA group compared to the UTMME group, as shown by p-values less than 0.05, demonstrating the superior efficacy of ELDOA in reducing pain, improving functional outcomes, and correcting posture

Table 1. Characteristics of Participants

Variable	ELDOA Group A (n=18)	UTMME Group B (n=18)	p-value
Age	28.22 ± 5.22	28.22 ± 5.22	0.99
Gender	Male (n, %)	7 (38.9%)	7 (38.9%)
	Female (n, %)	11 (61.1%)	11 (61.1%)

The within-group analysis, conducted using the Friedman test, is summarized in Table 3. The results indicate significant improvements within each group over the study period. For both groups, there was a notable reduction in NPRS scores, improvement in NDI scores, and changes in CVA and cervical ROMs from baseline to the second and fourth weeks. The p-values indicate these changes were significant within each group, reinforcing the positive impact of the interventions on reducing pain and improving function.

Table 2. Between-Group Analysis of Variables Using the Mann-Whitney U Test

Variable	ELDOA Group A (n=18)	UTMME Group B (n=18)	p-value
Baseline NPRS	18.50 (7.50)	18.50 (7.50)	0.95
NPRS at 2nd week	14.47 (6.00)	22.53 (6.00)	0.01
NPRS at 4th week	9.50 (4.00)	27.50 (5.00)	0.01
Baseline NDI	18.89 (17.00)	18.11 (17.00)	0.88
NDI at 2nd week	14.61 (13.50)	22.39 (15.00)	0.02
NDI at 4th week	10.06 (9.00)	26.94 (12.50)	0.01
Baseline CVA	18.50 (39.49)	18.50 (39.49)	0.99
CVA at 2nd week	23.58 (48.23)	13.42 (44.50)	0.03
CVA at 4th week	24.22 (54.22)	12.78 (50.05)	0.01
Baseline cervical flexion	16.28 (50.00)	20.72 (55.00)	0.27
Cervical flexion at 2nd week	19.72 (55.00)	17.28 (57.00)	0.04
Cervical flexion at 4th week	22.44 (60.00)	14.56 (60.00)	0.01
Baseline cervical extension	18.50 (55.00)	18.50 (55.00)	0.98
Cervical extension at 2nd week	22.50 (60.00)	14.50 (58.00)	0.02
Cervical extension at 4th week	23.17 (65.00)	13.83 (62.00)	0.01
Baseline cervical right S.B	18.50 (14.00)	18.50 (14.00)	0.95
Cervical right S.B at 2nd week	22.17 (17.00)	14.83 (16.00)	0.03
Cervical right S.B at 4th week	24.50 (19.00)	12.50 (18.00)	0.01
Baseline cervical left S.B	18.50 (14.00)	18.50 (14.00)	0.93
Cervical left S.B at 2nd week	22.50 (17.00)	14.50 (16.00)	0.02
Cervical left S.B at 4th week	23.19 (19.00)	13.81 (18.00)	0.01
Baseline cervical right rotation	18.50 (57.00)	18.50 (57.00)	0.96
Cervical right rotation at 2nd week	22.83 (61.00)	14.17 (60.00)	0.01
Cervical right rotation at 4th week	22.83 (63.00)	14.17 (62.00)	0.01
Baseline cervical left rotation	20.83 (57.00)	16.17 (55.00)	0.35
Cervical left rotation at 2nd week	24.28 (61.00)	12.72 (58.00)	0.02
Cervical left rotation at 4th week	12.72 (60.00)	12.72 (60.00)	0.01

Table 3. Within-Group Analysis of Variables Using the Friedman Test

Variable	ELDOA Group A (n=18)	UTMME Group B (n=18)	p-value
Baseline NPRS	3.06 (7.50)	3.00 (6.00)	0.00
NPRS at 2nd week	2.00 (7.50)	2.00 (4.00)	—
NPRS at 4th week	1.00 (6.00)	1.00 (5.00)	—
Baseline NDI	7.81 (17.00)	8.89 (15.00)	0.00
NDI at 2nd week	5.25 (17.00)	6.72 (9.00)	—
NDI at 4th week	3.94 (13.50)	4.44 (12.50)	—
Baseline CVA	1.00 (39.49)	1.00 (44.50)	0.00
CVA at 2nd week	2.00 (39.49)	2.00 (54.22)	—
CVA at 4th week	3.00 (48.23)	3.00 (50.05)	—
Baseline cervical flexion	13.83 (50.00)	15.81 (57.00)	0.00

Variable	ELDOA Group A (n=18)	UTMME Group B (n=18)	p-value
Cervical flexion at 2nd week	17.03 (55.00)	18.94 (60.00)	—
Cervical flexion at 4th week	21.39 (55.00)	21.86 (60.00)	—
Baseline cervical extension	7.39 (55.00)	7.89 (58.00)	0.00
Cervical extension at 2nd week	10.39 (55.00)	10.17 (65.00)	—
Cervical extension at 4th week	13.94 (60.00)	13.58 (62.00)	—
Baseline cervical right S.B	1.53 (14.00)	1.75 (16.00)	0.00
Cervical right S.B at 2nd week	3.53 (14.00)	3.67 (19.00)	—
Cervical right S.B at 4th week	5.44 (17.00)	5.44 (18.00)	—
Baseline cervical left S.B	1.61 (14.00)	1.56 (16.00)	0.00
Cervical left S.B at 2nd week	3.47 (14.00)	3.33 (19.00)	—
Cervical left S.B at 4th week	5.42 (17.00)	5.25 (18.00)	—
Baseline cervical right rotation	8.61 (57.00)	9.42 (60.00)	0.00
Cervical right rotation at 2nd week	11.56 (57.00)	11.92 (63.00)	—
Cervical right rotation at 4th week	13.56 (61.00)	13.94 (62.00)	—
Baseline cervical left rotation	8.56 (57.00)	8.56 (58.00)	0.00
Cervical left rotation at 2nd week	11.56 (55.00)	10.83 (63.00)	—
Cervical left rotation at 4th week	13.44 (61.00)	12.69 (60.00)	—

The tables illustrate that both interventions significantly reduced pain and improved functional outcomes within their respective groups. However, ELDOA demonstrated superior efficacy over UTMME in several key parameters, emphasizing its potential as a preferred intervention for forward head posture and associated musculoskeletal conditions. These findings provide valuable insights for clinicians and therapists aiming to optimize treatment strategies for FHP.

DISCUSSION

The present study aimed to compare the effectiveness of Elongation Longitudinaux Avec Decoaptation Osteo Articulaire (ELDOA) and upper thoracic mobilization and mobility exercises (UTMME) in treating forward head posture (FHP). The findings demonstrated that both interventions significantly improved pain, functional disability, and postural alignment over time. However, the ELDOA group showed superior improvements across several key outcomes, including greater reductions in pain and disability as well as enhanced craniovertebral angle and cervical range of motion compared to the UTMME group (2-6). These results are consistent with prior research that highlighted the efficacy of targeted fascial stretching techniques, such as ELDOA, in alleviating musculoskeletal symptoms and improving postural dysfunctions (18-20).

The superior outcomes observed in the ELDOA group align with the findings of studies that have demonstrated the benefits of decompression and specific fascial stretching in enhancing proprioception, reducing joint stress, and correcting postural misalignments. For example, Shamshad et al. (2022) reported that ELDOA significantly improved pain and function in patients with non-specific low back pain, which supports the current study's results on its broader applicability in musculoskeletal rehabilitation (15). Furthermore, the ELDOA technique's focus on specific postural holds that facilitate spinal decompression and improved segmental alignment likely contributed to the enhanced outcomes observed in the present study (16, 17), particularly in terms of craniovertebral angle improvements, which are crucial indicators of FHP correction (19).

The findings from the UTMME group also corroborate existing literature that supports the use of thoracic mobilizations in managing cervical and thoracic musculoskeletal conditions. Previous studies have shown that thoracic mobilization can reduce pain and improve range of motion in patients with neck pain (9-12). However, the lack of significant differences between UTMME and ELDOA at baseline and the more substantial improvements observed in the ELDOA group suggest that while thoracic mobilizations are effective, they may be less potent than specific techniques like ELDOA that directly target fascial chains and segmental decompression. This highlights the potential advantage of incorporating ELDOA into clinical practice for managing FHP and related conditions, given its comprehensive approach to addressing both local and systemic musculoskeletal dysfunctions (13, 18).

A key strength of this study was the randomized controlled design, which minimized selection bias and enhanced the reliability of the findings. Additionally, the use of validated outcome measures, such as the Numeric Pain Rating Scale, Neck Disability Index, and craniovertebral angle assessment, ensured that the results were robust and clinically relevant. However, there were also some limitations that should be acknowledged. The sample size was relatively small, which may limit the generalizability of the findings to a broader population. Future studies with larger sample sizes are recommended to confirm these results and explore the long-term effects of ELDOA and UTMME on FHP. Another limitation was the short duration of follow-up, which restricted the ability to assess the sustained benefits of the interventions. Longer follow-up periods are necessary to evaluate the persistence of the therapeutic effects observed in this study (19).

The study also did not account for potential confounding factors such as participants' daily activities, ergonomic habits, or compliance with home exercise programs, which could have influenced the outcomes. Addressing these factors in future research could provide a more comprehensive understanding of the interventions' efficacy

in real-world settings. Additionally, while the study demonstrated significant improvements within each group, the absence of a control group receiving no intervention limits the ability to attribute the observed changes solely to the treatments administered.

Based on the findings, it is recommended that clinicians consider integrating ELDOA into rehabilitation protocols for patients with FHP, particularly when targeting postural correction and pain reduction. The multidimensional benefits of ELDOA, which include enhanced proprioception, spinal decompression, and improved muscular balance, make it a valuable addition to therapeutic strategies aimed at managing FHP and associated disorders. However, further research is needed to optimize the application of ELDOA, including determining the most effective dosage, frequency, and combination with other therapeutic modalities.

CONCLUSION

In conclusion, this study provided evidence that ELDOA is more effective than upper thoracic mobilization and mobility exercises in improving pain, functional outcomes, and postural alignment in individuals with forward head posture. These findings contribute to the growing body of literature on the management of FHP and underscore the potential of ELDOA as a targeted intervention for enhancing musculoskeletal health. Future research should aim to address the limitations identified, expand the evidence base, and explore the broader applicability of ELDOA in diverse patient populations and clinical contexts.

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