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Original Article

Effects of Modified Eldoa Technique In Patients with Cervical Radiculopathy

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ABSTRACT

ELDOA is a revolutionary technique for improvement of health and longevity of the spine which is introduced by French osteopath; Guy Voyer. The primary goal of ELDOA is to apply focused internal tension and load to decrease pressure on the discs of spine, increase blood flow and to reduce pain at cervical spine. There is little high-quality evidence on best no operative therapy for cervical radiculopathy. Objective: To determine the effects of Modified ELDOA technique in patients with cervical radiculopathy in terms of pain, nerve tension and disability. Methods: Thirty patients were randomly assigned either to a group that performed modified ELDOA along with conventional treatment aimed at decreasing the effects of pain, nerve tension and disability or to a group that performed ELDOA and received conventional treatment having the same goal as the former. Randomized controlled trial was selected as the design of study. Treatment protocol of control group included hot pack, TENS, PIR(MET) 4 reps with 6 sec hold, Maitland oscillations (20 reps in 3 sets), ELDOA at cervical spine, Neurodynamic stretching of involved nerve. Treatment protocol of experimental group included hot pack, TENS, PIR(MET)4 reps with 6 seconds hold, Maitland oscillations (20 reps in 3 sets), modified ELDOA at cervical spine, Neurodynamic stretching of involved nerve. Each patient received 8 sessions on alternate days covered in a total span of 16 days. Assessments were done at 1st 8thsession.The tools used were NDI, NPRS and ROM through goniometer. IBMSPSS-21 was used to analyze data. Results: The results demonstrated that treatment protocols of both the control and experimental groups have significant effects on reducing pain, tension and disability and improving mobility of cervical spine. Whereas, for difference in effectiveness of modified ELDOA and ELDOA, the overall p-values came out to be >0.05 while comparing the end values of both groups, showing that there is a non-significant difference in the effects of ELDOA and modified ELDOA. Conclusion: Modified ELDOA works effectively in posture correction hence improving the functional status of patient. Modified ELDOA and ELDOA postures help in treatment of cervical radiculopathy. The effectiveness of ELDOA and modified ELDOA has a non-significant difference.

INTRODUCTION

Cervical radiculopathy is defined as the marked nerve compression from arthritic bone spur or herniation of discs. Peak annual incidence of cervical radiculopathy is 2.1 cases per 1000 and occurs in fourth and fifth decades of life;3.3 cases per 1000 cases of cervical radiculopathy are reported [1]. Common cause of symptoms in upper extremity is the spondylosis occurring at cervical spine and the herniation of disc leads to the cervical radiculopathy. Sometimes there is unknown cause for cervical radiculopathy [2]. The cervical vertebrae are categorized into two categories, Atypical and Typical vertebra. Vertebral bodies of cervical spine mainly composed of trabecular or cancellous bone and small in comparison of other spinal vertebras. Atypical vertebras include Atlas C1, Axis C2 and Vertebra Prominens C 7 while C3 to C6 are included in the category of typical vertebra of cervical spine [3]. Skull is holded by Atlas by the help of atlanto-occipital joint aiding in nodding movement of head. Axis

forms a pivot that aids in rotation of the Atlas.C7 vertebra is also atypical vertebrae of cervical spine due the prominent spinous process. The features of typical vertebrae are 2 transverse foramina, bifid spinous process and a vertebral foramen [4]. Fibro cartilaginous cushions are naturally occurring in between the adjacent vertebrae of the vertebral column, termed as intervertebral disc. This disc serves the spine as a shock absorbing component. The number of discs present in the cervical spine is 6. The intervertebral disc is divided into two portions [5]. One is the nucleus pulposus and the other is annulus fibrosus. The inner portion, nucleus pulposus, is resistant to axial forces and is gelatinous in nature along with higher water content [6]. The outer portion, annulus fibrosus, is comprised of an outer fibrous ring which is flexible as well as tough in nature and serves as keeping the vertebrae together and allowing movements in spine. In comparison to lumbar spine's intervertebral discs, the discs belonging to cervical spine are not having concentric laminate of collagen fibers in annular portion [7]. The collagen aligns in the form of crescent mass tapering the uncinate processes laterally and anteriorly more in thickness and in the posterolateral direction it is deficient forming thin layer paramedian [8]. Neck disorders have a major distinct of cervical radiculopathy. Cervical radiculopathy supervenes when nerve in neck is tamped down or peeved where it arms away from the spinal cord [9]. The wear away or malfunction of nerve that results if one of the nerve roots nears the cervical vertebrae is flattened (decreased circumference of intervertebral foramen), the condition is termed as cervical radiculopathy [10]. Depending on the site of vitiated nerve roots, afflict of nerve roots in the cervical region can initiate ache and decreased sensations on the nerve's tract into the arm and hand. Firing pain fanning out towards arm, neck, chest, upper back, and shoulders are distinct precursors of cervical radiculopathy [11]. One can undergo curtailment of sensory stimulations, fatigue in muscles of upper limb and prickling in hand and fingers [12]. ELDOA technique works tardily but expeditiously to build up the improvements in the postures adapted by our body because of the sedentary lifestyles. These postures were designed by Guy Voyer [13]. The purpose behind the development of these postures was to improve bad postures and dehydration of discs. ELDOA is basically a French acronym when translated to English is termed as LOADS (Longitudinal osteo-articular decertation stretches). It is an active traction exercise used for spacing the joints and works by creating tension in the Fascia of the body. Hence it would be explained as postural self-normalizing pedagogy organized for broadening the space within a selected articulation [14]. This is done by creating facsial tension to fix the vertebra above the marked disc. ELDOA poses are very specific examined to other techniques. Disc encryption existing at any level of spine can be addressed through specific ELDOA poses [15]. Position involving specific intervertebral level is conserved by ELDOA. Dissertation of the targeted intervertebral level occurs because of the myofascial tension induced between superior vertebra which is a wandering point and the inferior vertebrae which is a fixed point. Verbal cues are given to the subject for the encouragement goals and for maintaining proper position and not to drop a pose [13]. ELDOA tends at multilevel of spine and can target specific levels as well. Subject is asked to focus on the breathing pattern to achieve better results and aid mental relaxation. While performing ELDOA, marked articular level is felt by therapist and fine tuning of subject is attained. Maintain the position of ELDOA unless the decapitation movement is felt. Achievement of final position of ELDOA needs working of therapist on the patients. ELDOA involves different levels of spine. The effects of ELDOA are improvements in postures [15].To determine the effects of Modified ELDOA technique in patients with cervical radiculopathy in terms of pain, Nerve Tension, and disability.

METHODS

Inclusion Criteria: Cervical Radiculopathy (Unilateral), Pain more than 3 on NPRS AT Neck, Both Gender, Age between 30 to 50years, three of the listed tests responds positively. ULTT for median, radial, or ulnar nerve, Limited ROM (anyone), Cervical Distraction test, Springing Test, Spurling's test. Exclusion Criteria: Malignancy, infection, trauma, bone deformities, Acute Disc Protrusion, Positive VBI, Positive Sharp purser test. Measurement Tools: Numeric pain rating scale. ROM (Goniometer), NDI, Neurodynamics [16]. Intervention: Intervention will be given for four weeks with 2 sessions per week. Group A (Control): HOT PACK, TENS, PIR (MET) 4 reps with 6 sec holds, Maitland Oscillations (20 reps in 3 sets), ELDOA of involved spinal segment, NE urodynamic stretching of involved nerve (median, ulnar or radial). Group B (Intervention). HOT PACK, TENS, PIR(MET)4 reps with 6 sec holds, Maitland Oscillations (20 reps in 3 sets), Modified ELDOA of involved spinal segment, Neurodynamics stretching of involved nerve (median, or radial). A randomized control trial was conducted from February 2019 to July 2019(6 months) at Attock Hospital Limited, Rawalpindi. In this study total 38 subjects were assessed with neck pain moving towards arm but only 30 patients met the inclusion criteria. The subjects were divided into two groups randomly, one named as Control group 'A group' and one as Experimental/Intervention group or 'B group', by

lottery method using convenient sampling technique. Among them 15 patients were randomly assigned to each group. Hence,30 patients were analyzed for further study. Group A included 15 patients that were treated by the protocol involving positions of ELDOA at cervical spine while Group B included 15 patients receiving treatment protocol following the positions of modified ELDOA at cervical spine. First and final assessments were done by structural questionnaire. Outcome measures included ROM (Goniometre), NPRS and NDI at baseline and last treatment sessions. For data analysis at baseline and end of treatment sessions IBM SPSS-21 was used. Firstly, Shapiro-Wilk test readings were noted for the consideration of the point that data distribution is normal or not. Parametric tests were applied on significant variables while for those whose significance was greater than 0.05 non-parametric tests were applied.

RESULTS

ULNTT1 was found positive in 60% of total subjects while negative in 40% subjects. In group The values came out to be 26.7% positive for ULNTT1 and 73.3% negative for ULNTT1. 73.3% of the total subjects showed positive ULNTT2 while 26.7% showed negative ULNTT2. In group A ULNTT2 was found positive in 26.7% subjects while negative in 73.3% subjects and for group B it was 13.3% positive and 86.7% negative. ULNTT3 was positive among 40% of subjects and negative for 60% of the subjects. In group A ULNTT3 was found positive in 73.3% and negative in 26.7% of subjects while in group B ULNTT3 was positive in 13.3% of subjects and negative in 86.7% of subjects. Man, Whitney U-test was applied on baseline to compare median values between control and experimental group. The median value of flexion for control group was 16.80 and for experimental group it was 14.20 with the IQR of 50(20.25) and p value of 0.416, which means values are not statistically significant. The median value for left side bending of control group was 15.60 and experiment group was 15.40 having IQR equals to 51.50(18) with the p value of 0.950 which is a non-significant value. NPRS value for control group was 17.67 and for experiment group was 13.33 with IQR of 08(01) and a p value of 0.129. NDI median value for control group was 10.97 and for experiment group was 20.03 with IQR of 42(11.89) and a p value equal to 0.05, Table 1.

S. No	Variable	Pre-Value	Post Value	Difference	P value
1.	Extension at cervical spine	57.80±9.97	67.53±3.94	-13.83±5.629	<0.05
2.	Right side bending at cervical spine	47.26±13.33	67.60±3.97	-128.11± 12.55	<0.05
3.	Left side bending at cervical spine	46.93±12.29	69.80±3.42	-29.70±16.03	<0.05
4.	Right rotation at cervical spine	58.73±8.56	70.53±4.22	-15.59±8.008	<0.05
5.	Left rotation at cervical spine	58.26±9.01	70.73±4.13	-17.20±7.73	<0.05

Table 1: Base Line Comparison Between Control Group and Experiment Group

To compare the pre and post mean values within the control group paired t-test was applied. The pre and post values of extension at cervical spine were 57.80 ±9.97 and 67.53 ±3.94 and a difference of -13.83 ±5.629 with a p-value being <0.05 which means the difference was statistically significant. The pre and post values of right side bending at cervical spine were 47.26 ±13.33 and 67.60 ±3.97 and a difference of -128.11 ±12.55 with a p-value<0.05. The pre and post values of left side bending came out to be 46.93 ±12.29 and69.80 ±3.42 and a difference of -29.70 ±16.03 with a significant statistical value i.e.,<0.05. The pre and post values of right rotation at cervical spine were 58.73 ±8.56 and 70.53 ±4.22 with the difference of -15.59 ±8.008 and a p-value<0.05 which is significant in nature according to statistics. The pre and post values for left rotation at cervical spine were 58.26 ±9.01 and 70.73 ±4.13 and a difference of 17.20 ±7.73 having a p-value<0.05 which is significant value statistically. (Table no. 05).Wilcoxon signed rank test was also used to compare pre and post values in control group. The pre and post values of median and IQR in control group for flexion at cervical spine were 50(16) and 68(09) with z-value of -3.449 and statistically significant value of <0.05. The pre and post values of NPRS were 08(01) and 02(01) with a z-value of -3.449 and p-value<0.05. The pre and post values of NDI in control group were 37.70(17.11) and 12(10) and z-value -3.411 and p-value <0.05. (Table no.06).

Test Variable	Pre Median IQR	Post Median IQR	Z value	P value
Flexion (ROM)	50(16)	68(09)	-3.449	<0.05
NPRS	08(01)	02(01)	-3.449	<0.05
NDI	37.70(17.11)	12(10)	-3.411	<0.05

Table 2: Pre & Post Values

To compare pre and post mean values within the experimental group paired t-test was applied. The pre and post values for flexion at cervical spine were 48.93 ±11.76 and 63.66 ±4.48 and difference of-19.09 ±10.37 with a p-value <0.05 which is a significant value according to statistics. The pre and post values for extension at cervical

spine 54.13 ±11.34 and 65.60 ±5.35 and difference of -15.78 ±7.15 having p-value<0.05 which is significant statistically. The pre and post values right side bending at cervical spine were 44.20 ±14.68 and 64.86 ±4.79 with a difference of -27.88 ±13.44 having significance of<0.05. The pre and post values of left rotation at cervical spine 54.46 ±6.62 and 66.33 ±3.86 with difference -15.51 ±8.21 and p-value <0.05, Table 3.

S. No	Variable	Pre-Value	Post Value	Difference	P value
1.	Flexion at cervical spine	48.93±11.76	63.66±4.48	-19.09±10.37	<0.05
2.	Extension at cervical spine	54.13±11.34	65.60±5.35	-15.78±7.15	<0.05
3.	Right side bending at cervical spine	44.20±14.68	64.86±4.79	-27.88±13.44	<0.05
4.	Right rotation at cervical spine	55.53±7.04	66.06±4.63	-13.90±7.16	<0.05
5.	Left rotation at cervical spine	54.46±6.62	66.33±3.86	-15.51±8.21	<0.05

Table 3: Pre and Post Comparison in Control Group

Wilcoxon signed rank test was also used to compare pre and post values in experimental group. The pre and post values of left side bending at cervical spine were 53(26) and 65(04) and a z-value of -3.415 and p-value<0.05 which is statistically significant. The pre and post values of NPRS in experimental group were 07(01) and 02(01) having z-value of -3.415 with p-value<0.05. The pre and post value of NDI were 46(24) and 10(12) having z-value of -3.40 with p-value<0.05 which is a significant value according to statistics, Table 4.

Test Variable	Pre Median IQR	Post Median IQR	Z value	P value
Lt Side Bending(ROM)	53(26)	65(04)	-3.415	<0.05
NPRS	07(01)	02(01)	-3.412	<0.05
NDI	46(24)	10(12)	-3.40	<0.05

Table 4: Pre & Post Values Comparison in Experiment Group

To compare the means of end values between the control and experiment groups independent t-test was applied. The mean value of extension in control group was 67.53±1.01 and in experiment group was 65.50±1.38 having p-value .101 which is not significant statistically. The mean values of right side bending in control group came out to be 67.60±1.02 and in experimental group it was 64.86±1.23 with a non-significant p-value of .371.The mean values of left side bending in control group came out to be 69.80±0.88 and in experimental group it was 65.46±1.12 with a non-significant p-value of .537.The mean values of right rotation in control group came out to be 70.53±1.09 and in experimental group it was 66.06±1.19 with a significant p-value of .040.The mean values of left rotation in control group came out to be 70.73±1.06 and in experimental group it was 66.33±0.99 with a non-significant p-value of .860, Table 5.

S. No	Variable	Groups	Difference	P value
1.	ROM Extension at cervical spine	Control	67.53+1.01	.101
		Experiment	65.50+1.38	
2.	ROM Right side bending at cervical spine	Control	67.60+1.02	.371
		Experiment	64.86+1.23	
3.	ROM Left side bending at cervical spine	Control	69.80+0.88	.537
		Experiment	65.46+1.12	
4.	ROM Right rotation at cervical spine	Control	70.53+1.09	.040
		Experiment	66.06+1.19	
5.	ROM Left rotation at cervical spine	Control	70.73+1.06	.860
		Experiment	66.33+0.99	

Table 5: Pre and Post Comparison in Experiment Group

Variable	Groups	Median	IQR	P value
Flexion (ROM)	Control	16.50	64 (9)	.524
	Experiment	14.50		
NPRS	Control	15.60	2 (01)	.944
	Experiment	15.40		
NDI	Control	17.20	12(11.34)	.287
	Experiment	13.80		

Table 6: End Value Comparison Between the Groups

DISCUSSION

We conducted on 30 patients randomly distributed in two groups. Each group was having 15 patients. One group performed ELDOA along with soft tissue and joint mobilizations with Neurodynamics stretching while the other group also received the same protocol but performed modified ELDOA postures. Outcomes were measured in NPRS and NDI and ROM using goniometer. First objective of the study was to find the effectiveness of modified ELDOA in patients with cervical radiculopathy on pain, disability, and nerve tension. In experiment or intervention group its overall effectiveness on NPRS and NDI was found using Wilcoxon test. Both had p-value <0.05 which is significant. Second objective of the study was to find out the difference in effectiveness of modified ELDOA and ELDOA. The overall p-values came out to be >0.05 while comparing the end values of both groups, showing that there is a non-significant difference in the effects of ELDOA and modified ELDOA. ELDOA is postural self-normalizing techniques which aim to leverage fascia in body to produce a type of active traction for spinal joints. It has tremendous neurological benefits. Body is linked from crown/apex to bottom anatomically and biomechanically. The links are different myofascial links. All connective tissue, tendons, muscles, ligaments, deep nerves, and aponeurosis, they are all in link from top of head to bottom of foot. When you elicit a movement there is a direct link or effect all through a myofascial chain. There is a theory which explains that information can be transmitted instantaneously through a communication that is extra neural and explanation of that would be through fascia. External forces or muscle activity generates mechanical tension in fascia which plays passive role in regulation of movement and postures [17]. My study

supports the point that modified ELDOA and ELDOA postures have an effective way to restore good posture control and reduce effects of sedentary lifestyle. It also reduces the pain, nerve tensions and disability in the subjects having cervical radiculopathy. The joints of our spine are continuously under the effect of gravitational force which is compressing it. Gravity inverted postures unload the spine and help in increasing physical makeup of spine [18]. Performing ELDOA increases muscle performance and tone, decreases pain and works on posture improvement by increasing space between spinal joints and lengthens spine. My study also shows that pain is decreased in both groups up to a significant limit along with a significant improvement in range of motions. Long term effects of cervical laminectomy were studied. The outcome of the study showed that the recovery rate after 1 year and 5 years was less than 45% and was 32.8% at last follow-up review [19]. Physiotherapy treatment protocol including the traction, exercises and NSAID showed good outcome when applied on patients having cervical radiculopathy (24 of 26 patients treated successfully conservatively) [20]. Our study is also supporting the idea of successful physiotherapy management of cervical radiculopathy by utilizing manual physiotherapy techniques. We find out that Modified ELDOA is significantly effective in the treatment of cervical radiculopathy. It reduces the pain and disability of the patient. Application of ELDOA also reduces pain and disability in the patients of cervical radiculopathy. The outcomes of study conducted on fascia stretching in disc protrusion patients by Abdul Ghafoor Sajjad also support my findings [13]. Cervical range of motion is improved by the application of muscle energy technique with the effects lasting to almost seven days [15]. Our study also included the application of MET for soft tissue mobilization and increasing the length of shortened muscles that might be affecting range of motion at cervical spine. Findings of our study are that the application of MET along with joint mobilization, modified ELDOA and ELDOA postures result in increased range of motion at cervical spine and decreased pain and disability. ELDOA is effective in improving range of motion and decreasing physical tension and also works on the management of pain [14]. My findings also show that ELDOA manages pain effectively and increases range of motion significantly. Modified ELDOA also showed significant effects on pain and range of motions.

CONCLUSIONS

This study concluded that ELDOA and modified ELDOA has significant effects on enhancing ranges of motion and functional status of the patients along with reduction of pain in patients with cervical radiculopathy. However, there is a non-significant difference between the effectiveness of ELDOA and modified ELDOA.

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