

# Efficacy of Neural Tissue Mobilization along with Conventional Physiotherapy and only Conventional Physiotherapy in Patients with Chronic Mechanical Radiating Neck Pain of Dhaka City in Bangladesh

Md. Ibrahim Khalil<sup>1</sup>, Nasirul Islam<sup>2</sup>, S M Ferdous Alam<sup>3</sup>, Dr Md. Jahangir Alam<sup>4</sup>, Firoz Ahmed Mamin<sup>5</sup>

## Abstract

**Background:** Neural tissue mobilization is one of the many methods of manual therapy of soft tissue conditions and more specifically, neural tissue and tissues surrounding the nervous system. Cervical radiculopathy is the result of cervical nerve root pathology that may lead to chronic pain, disability and reduce ROM. **Objective:** To determine the efficacy of neural tissue mobilization along with conventional physiotherapy and only conventional physiotherapy in improving pain, neck range of motion and neck disability index in patients with chronic mechanical radiating neck pain. **Methodology:** Experimental study was conducted with triple blinded. 32 participants were conveniently selected with history of radiating neck pain since 03 months and above. Initially, all the subjects were assessed for pain by NPRS, ROM by goniometer and Disability by Oswestry Neck Disability Index. Experimental group received nerve mobilization for radial, medial and ulnar along with conventional physiotherapy, while Control group received only conventional physiotherapy which include manual cervical traction, hot pack, IRR, retraction exercise and isometric strengthening exercises for cervical. Reassessment was done after six sessions of treatment program. **Analysis:** Significance test for difference of means were done using 'Wilcoxon signed-rank test' for between groups comparison and 'Mann-Whitney U test' for within groups comparison. **Results:** About 59% participants were male and 41% participants were female. The study reveals that conventional physiotherapy group with a mean age was  $44.63 \pm 9.73$  years and neural mobilization group with a mean age was  $47.50 \pm 10.35$ . Subjects were evaluated before and after 06 sessions of treatment for pain, neck range of motion and neck disability index. The outcome of the statistical test within group analysis showed statistically significant in maximum indicators ( $p < 0.05$ ) and between group analysis showed statistically significant of pain in case change of severity of neck pain ( $p < 0.05$ ) and change of neck pain during sitting position ( $p < 0.05$ ). Also there was decrease of pain in case of pain during lying, flexion, extension, side flexion to right, side flexion to left, rotation to right, rotation to left and travelling but not statistically significant. Between group analysis showed statistically significant improvement change in case of active ROM in rotation to right side of neck ( $p < 0.05$ ) and change in active ROM in rotation to left side of neck ( $p < 0.05$ ). Also there was improvement of range of motion in case of flexion, extension, side flexion to right and left side but it was not statistically significant improvement. Disability was improvement but it was not statistically significant improvement. **Conclusion and Recommendations:** This study showed a significant improvement in neck range of motion and decrease in neck disability index and pain within two therapeutic interventions that is conventional physiotherapy along with neural mobilization and only conventional physiotherapy. It can be concluded that both the intervention is effective therapeutic options in the treatment of cervical radiculopathy. However between group findings does not give a clear idea about which treatment approach is superior to another treatment approach.

**Key words:** Neural Tissue Mobilization, Conventional Physiotherapy, Chronic Mechanical Radiating Neck Pain.

<sup>1</sup> Associate Professor & Head, Department of Physiotherapy, State College of Health Sciences, Dhanmondi, Dhaka-1209, Bangladesh.

<sup>2</sup> Associate Professor and Acting Principal, BHPI, CRP, Savar, Dhaka.

<sup>3</sup> Assistant Professor, BHPI, CRP, Savar, Dhaka.

<sup>4</sup> Associate Professor, NITOR, Dhaka

<sup>5</sup> Assistant Professor, BHPI, CRP, Savar, Dhaka

**Introduction:** Chronic mechanical radiating neck pain is worldwide health problem. Most often is the result of a compression or inflammatory pathology from a space occupying lesion such as disc herniation, spondylitic spur, or cervical osteophyte (Sambyal and Kumar, 2013; Ellenberg, et al., 1994). The average annual incidence rate of cervical radiculopathy is 85 per 100,000 for the population in its entirety, with an increased prevalence occurring in the fifth decade of

life, 203 per 100,000 (priya Vishnu, 2015). The most frequently involved nerve roots are the cervical 6 (C6) and cervical 7 (C7) cervical roots which are typically caused by C5-C6 or C6-C7 disc herniation or spondylosis (Sambyal and Kumar, 2013; Milne, 1991; Radhakrishnan, et al., 1994). It's estimated that 50% of the population experienced neck and upper extremity pain at some time in their lifetime (Sambyal and Kumar, 2013; Hult, 1954).

The position and arrangement of symptoms could be vary, depending on the nerve root level exaggerated and can include sensory and motor alterations if the dorsal and ventral nerve root is complicated. Although patients with radiating neck pain often seeking for medical assistance to reduce arm pain. Patients frequently present of pain, numbness, tingling, and weakness in the upper extremity, which often result in significant functional restrictions and incapacity. Physical therapy programs play a significant role in the treatment and improvement of symptoms in patients with cervical spine syndromes. Conservative treatment for radiating neck pain includes short-term use of a soft cervical collar, traction, medications. Manipulation, physical therapy and steroid injections are also part of a conservative plan of management of physical therapy interventions; cervical traction has been considered as a therapy of choice for patients with cervical radiculopathy. A multitude of physical therapy interventions has been projected to be effective in the management of cervical radiculopathy, including manual cervical traction manipulation, therapeutic exercise, and modalities. But no study has directly compared the two different treatment procedures nor has seen the effect of nerve mobilization in comparison to conventional physiotherapy (Sambyal and Kumar, 2013). The study objective was to investigate the efficacy of neural tissue mobilization along with conventional physiotherapy and only conventional physiotherapy in patient with chronic mechanical radiating neck pain on improving neck pain, ROM, radicular symptoms and neck disability. It was hypothesized that neural tissue mobilization along with conventional physiotherapy has a significant improvement on neck pain, ROM, radicular symptoms and neck disability in subjects with unilateral chronic mechanical radiating neck pain.

**Methodology:** An experimental study design was conducted on 32 patients with chronic mechanical radiating neck pain attending at Bangladesh Health Professions Institute (BHPI) using purposive sampling technique. Sixteen in the conventional physiotherapy group (control group) and sixteen in the neural mobilization along with conventional physiotherapy group (Trial group). This experimental study was conducted in Dhaka city in order to determine the efficacy of neural mobilization along with conventional physiotherapy technique and only conventional physiotherapy in patient with chronic radiating neck pain. A pre-tested modified interviewer administered structured questionnaire was used to collect the information. Section A contained socio-demographic related variables; section B contained disease related variables;

section C contained neck pain related variables; section D contained active ROM related variables; and section E contained neck disability Index related variables. Subjects scored their pain on Numeric Pain Rating Scale (NPRS), Range of Motion (ROM) and disability on Oswestry Neck Pain Disability Index before and after completing treatment. The data were entered and analyzed by using SPSS (Statistical Package for Social Sciences) software version 20. After receiving six sessions of interventions data were analyzed by 'Wilcoxon signed-rank test' for between group's comparison and 'Mann-Whitney U test' for within group's comparison for pain, ROM and disability; t-test could not be applied as data violated the condition of normality. Then analyzed data were presented according to the variables of the study. Ethical approval was taken from the ethical review board of Bangladesh Health Professions Institute (BHPI). Both verbal and written consents were taken from the participants prior to the data collection process.

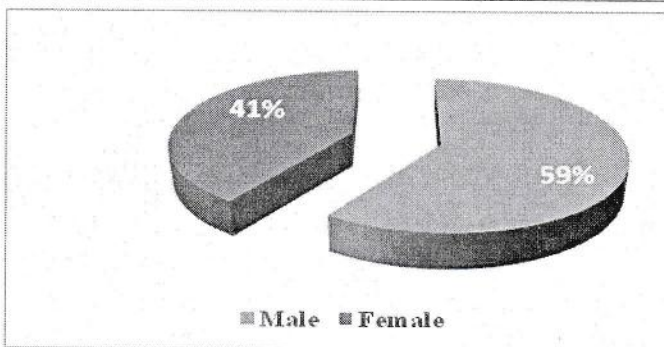
## Results

The table 1 reveals that the mean age of the participants were  $44.63 \pm 9.73$  years with a range from 26 to 65 years. It is found from table 1 that 43.7%, 31.3%, 18.7% and 6.3% of the participants belonged to age group 46-55 years, 36-45 years, 26-35 years, 56-65 years respectively of conventional physiotherapy technique compare to neural mobilization technique mean age of the respondents were  $47.50 \pm 10.35$  years with a range of from 26 to 65 years that 37.5%, 31.3%, 18.7%, 12.5% of the participants belonged to age group 36-45 years, 56-65 years, 46-55 years and 26-35 years respectively. The figure 1 reveals that about 59% participants were male and 41% participants were female. The table 2 reveals that the Sitting Posture among the participants of conventional physiotherapy, 62.50% was good and 37.50% were fair and 0% was poor. Other hands 75% were fair, 18.8% were good and 6.3% were poor in the participants of neural mobilization before treatment. The table 3 reveals that the Sitting Posture among the participants of conventional physiotherapy, 87.50% was good and 12.50% were fair and 0% was poor. Other hands 93.8% were good, 6.3% were fair and 0% were poor in the participants of neural mobilization after treatment. The table 4 reveals that the Standing Posture among the participants of conventional physiotherapy, 62.50% was good and 37.50% were fair and 0% was poor. Other hands 75% were fair, 18.8% were good and 6.3% were poor in the participants of neural mobilization before treatment. The table 5 reveals that the standing Posture among the participants of conventional physiotherapy, 87.50% was good and 12.50% were fair and 0% was poor.

Other hands 93.8% were good, 6.3% were fair and 0% were poor in the participants of neural mobilization before treatment. The table 6 reveals that the nature of symptoms among the participants of conventional physiotherapy, 37.5% of cases were in Tingling, 25% of cases were in Tightness, 25% of cases were in Sharpness and 12.5% of cases were in Stinging. Other hands 56.3% of cases were in Stinging, 50% of cases were Tingling, 37.5% of cases were in Tightness and 6.3% of cases were in Sharpness in the participants of neural mobilization before treatment. The table 7 reveals that the nature of symptoms among the participants of conventional physiotherapy, 33.3% of cases were in Sharpness, 26.7% of cases were in Tingling, 26.7% of cases were Stinging, 20% of cases were in Numbness and 6.7% of cases were in Tightness. Other hands 43.8% of cases were in Stinging, 43.8% of cases were in Tightness, 12.5% of cases were Tingling, 0% of cases were in Sharpness and 0% of cases were in Numbness in the participants of neural mobilization after treatment.

**Table 1: Distribution of respondents by age (n= 32)**

Age in years	Conventional Physiotherapy		Neural Mobilization & Conventional Physiotherapy	
	Frequency	Percentage	Frequency	Percentage
26-35	3	18.7	2	12.5
36-45	5	31.3	6	37.5
46-55	7	43.7	3	18.7
56-65	1	6.3	5	31.3
Total	16	100.0	16	100.0
Mean± SD	44.63 ± 9.73		47.50 ± 10.35	



**Figure 1: Distribution of participants by sex (n=32)**

**Table 2: Distribution of participants by Sitting Posture (Before Treatment) (n=32)**

Sitting Posture	Conventional Physiotherapy		Neural Mobilization & Conventional Physiotherapy	
	Frequency	Percentage	Frequency	Percentage
Good	10	62.50	3	18.8
Fair	6	37.50	12	75.0
Poor	0	0	1	6.3
Total	16	100	16	100.0

**Table 3: Distribution of participants by Sitting Posture (After Treatment) (n=32)**

Sitting Posture	Conventional Physiotherapy		Neural Mobilization & Conventional Physiotherapy	
	Frequency	Percentage	Frequency	Percentage
Good	14	87.50	15	93.8
Fair	2	12.50	1	6.3
Poor	0	0	0	0
Total	16	100	16	100

**Table 4: Distribution of participants by Standing Posture (Before Treatment) (n=32)**

Standing Posture	Conventional Physiotherapy		Neural Mobilization & Conventional Physiotherapy	
	Frequency	Percentage	Frequency	Percentage
Good	10	62.5	3	18.8
Fair	6	37.5	12	75.0
Poor	0	0	1	6.3
Total	16	100	16	100.0

**Table 5: Distribution of participants by Standing Posture (After Treatment) (n=32)**

Standing Posture	Conventional Physiotherapy		Neural Mobilization & Conventional Physiotherapy	
	Frequency	Percentage	Frequency	Percentage
Good	14	87.5	15	93.8
Fair	2	12.5	1	6.3
Poor	0	0	0	0
Total	16	100	16	100.0

**Table 6: Distribution of participants by nature of symptoms during neurodynamic testing (sensory) (Before Treatment) (n=32)**

Symptoms	Conventional Physiotherapy		Neural Mobilization & Conventional Physiotherapy	
	Frequency	Percent of Cases	Frequency	Percent of Cases
Stinging	2	12.5%	9	56.3%
Tingling	6	37.5%	8	50.0%
Tightness	4	25.0%	6	37.5%
Sharpness	4	25.0%	1	6.3%

*\*Multiple Responses*

**Table 7 Distribution of participants by nature of symptoms during neurodynamic testing (sensory) (After Treatment) (n=32)**

Symptoms	Conventional Physiotherapy		Neural Mobilization & Conventional Physiotherapy	
	Frequency	Percent of Cases	Frequency	Percent of Cases
Stinging	4	26.7%	7	43.8%
Tingling	4	26.7%	2	12.5%
Tightness	1	6.7%	7	43.8%
Sharpness	5	33.3%	0	0
Numbness	3	20.0%	0	0

*\*Multiple Responses*

**Table 8: Baseline characteristic of patients**

Criteria	Conventional Physiotherapy group	Neural Mobilization & Conventional Physiotherapy group
Age (year)- Mean± SD	44.63± 9.73	47.50± 10.34
<b>Gender (%)</b>		
Male	56.3	62.5
Female	43.8	37.5
<b>Occupation (%)</b>		
House wife	31.3	31.3
Worker	12.5	12.5
Service Holder	25.0	37.5
Business	25.0	6.3
Retired Person	6.3	12.5
<b>Last episode of pain in month (%)</b>		
1-2 Month	43.8	50.0
3-4 Month	50.0	25.0
5-6 Month	6.2	25.0
Pain at neck during resting position (Mean± SD)	7.31± 1.14	7±1.366
Pain at neck during sitting position (Mean± SD)	5.75± 1.125	4.938±1.806
Pain at neck during lying position (Mean± SD)	4.38± 2.78	4.56±1.459
Pain at neck during flexion of neck (Mean± SD)	5.44± 2.25	5.25±2.324
Pain at neck during extension of neck (Mean± SD)	4.94± 1.95	4.25±2.176
Pain at neck during right side flexion (Mean± SD)	5.06± 2.235	4.75±2.324
Pain at neck during left side flexion (Mean± SD)	5.19± 2.401	4.31±1.662
Pain at neck during rotation to right side (Mean± SD)	5.19± 1.974	4.75±2.408
Pain at neck during rotation to left side (Mean± SD)	5.19± 2.401	4.19±1.682
Pain at neck during travelling (Mean± SD)	5.44± 1.931	5.94±1.124
Active ROM in flexion (Mean± SD)	43.75±8.062	47.19±10.483
Active ROM in extension (Mean± SD)	37.50±13.039	43.44±7.685
Active ROM of right side flexion of neck (Mean± SD)	38.44±8.509	37.81±7.296
Active ROM in left side flexion of neck (Mean± SD)	33.75±11.328	37.50±9.661
Active ROM in rotation to right side of neck (Mean± SD)	41.88±11.236	51.56±7.465
Active ROM in rotation to left side of neck (Mean± SD)	39.69±11.757	50.94±5.543
Oswestry Neck pain disability index (Mean± SD)	29.50±12.253	33.88±15.958
Disability (Mean± SD)	1.88±0.719	2.13±0.806

**Table: 9: Means± SD measured by Numeric Pain Rating Scale after six sessions of intervention in both control and trail groups are shown (post-test)**

Variables	Mean ± SD in control group	Mean ± SD in trial group
Neck Pain during resting position (Mean± SD)	0.88±0.957	2.19±1.109
Neck Pain during sitting position (Mean± SD)	0.93±0.961	1.81±0.911
Neck Pain during lying position (Mean± SD)	0.88±1.147	1.31±0.946
Neck Pain during flexion of neck (Mean± SD)	1.19±1.109	2.13±1.025
Neck Pain during extension of neck (Mean± SD)	0.94±1.181	1.19±1.223
Neck Pain during right side flexion (Mean± SD)	0.81±0.981	1.50±1.211
Neck Pain during left side flexion (Mean± SD)	1.19±1.047	1.50±1.033
Neck Pain during rotation to right side (Mean± SD)	1.19±0.981	1.25±1.238
Neck Pain during rotation to left side (Mean± SD)	1.06±1.124	1.38±1.50
Neck Pain during travelling (Mean± SD)	0.69±0.946	1.88±1.455
Variables	Mean ± SD in control group	Mean ± SD in trial group
Active ROM in flexion (Mean± SD)	53±7.512	52.19±7.064
Active ROM in extension (Mean± SD)	46.67±6.455	46.56±5.692
Active ROM of right side flexion of neck (Mean± SD)	47.81±4.460	46.88±4.031
Active ROM in left side flexion of neck (Mean± SD)	46.56±5.977	46.25±2.887
Active ROM in rotation to right side of neck (Mean± SD)	55.63±5.123	57.19±2.562
Active ROM in rotation to left side of neck (Mean± SD)	55±4.082	55.94±2.016
Oswestry Neck pain disability index (Mean± SD)	6.75±3.416	11.75±7.038
Disability (Mean± SD)	1±0.00	1.06±0.250

**Table 10 Relationship between mean change of neck pain with conventional physiotherapy group & neural mobilization group**

Variables	Conventional physiotherapy			Neural Mobilization & Conventional Physiotherapy			Diff. in Diff. (7=6-3)
	Pre Test (1)	Post Test (2)	Change (3=2-1)	Pre Test (4)	Post Test (5)	Change (6=5-4)	
Change in severity of neck pains	7.31	0.88	-6.43***	7.00	2.19	-4.81***	1.62*
Change in severity of neck pain in sitting position	5.75	0.88	-4.87***	5.00	1.81	-3.19***	1.68*
Change in severity of neck pain in lying position	4.38	0.88	-3.50***	4.56	1.31	-3.25***	0.25
Change in severity of neck pain during flexion of neck	5.44	1.19	-4.25***	5.25	2.13	-3.12***	1.13
Change in severity of neck pain during extension of neck	4.94	0.94	-4.00***	4.25	1.19	-3.06***	0.94
Change in severity of neck pain during flexion to right side	5.06	0.81	-4.25***	4.75	1.50	-3.25***	1.00
Change in severity of neck pain during flexion to left side	5.19	1.19	-4.00***	4.31	1.50	-2.81***	1.19
Change in severity of neck pain during rotation to right side	5.19	1.19	-4.00***	4.75	1.31	-3.44***	0.56
Change in severity of neck pain during rotation to left side	5.19	1.06	-4.13***	4.19	1.38	-2.81***	1.32
Change in severity of neck pain during travelling	5.44	0.69	-4.75***	5.94	1.88	-4.06***	0.69

Note: \*\*\* Significant at 0.001 level, \*\* Significant at 0.01 level, \* Significant at 0.05 level

**Table 11 Relationship between mean change of ROM with neural mobilization group and conventional Physiotherapy group**

Variables	Conventional physiotherapy			Neural Mobilization & Conventional Physiotherapy			Diff. in Diff. (7=6-3)
	Pre Test (1)	Post Test (2)	Change (3=2-1)	Pre Test (4)	Post Test (5)	Change (6=5-4)	
Change in active ROM of neck in flexion	43.75	52.19	8.44**	47.19	52.19	5.00	-3.44
Change in active ROM in extension of neck	37.50	46.25	8.75**	43.44	46.56	3.12*	5.63
Change in active ROM of right side flexion of neck	38.44	47.81	9.37**	37.81	46.88	9.07***	0.30
Change in active ROM of left side flexion of neck	33.75	46.56	12.81**	37.50	46.25	8.75*	4.06
Change in active ROM in rotation to right side of neck	41.88	55.63	13.75**	51.56	57.19	5.63**	8.12*
Change in active ROM in rotation to left side of neck	33.75	46.56	12.81**	37.50	46.25	8.75*	4.06

Note: \*\*\* Significant at 0.001 level, \*\* Significant at 0.01 level, \* Significant at 0.05 level

**Table: 12 Relationship between mean change of Oswestry neck pain disability with neural mobilization group and conventional Physiotherapy group**

Conventional physiotherapy			Neural Mobilization & Conventional Physiotherapy			Diff. in Diff. (7=6-3)
Pre Test (1)	Post Test (2)	Change (3=2-1)	Pre Test (4)	Post Test (5)	Change (6=5-4)	
28.13	6.75	21.38***	33.88	11.75	-22.13***	-0.75

Note: \*\*\* Significant at 0.001 level

**Table: 12** reveals that in the neural mobilization group average score of Oswestry neck pain disability was 33.88 during pre test and 11.75 at post test. The difference between these two averages, -22.13, is the improvement/decrease in average score of Oswestry neck pain disability due to Neural mobilization plus Conventional Physiotherapy. The improvement is statistically significant at 0.001 level. On the other hand in the Control group, average of pre test and post test scores were 28.13 and 6.75 respectively, the improvement/decrease in average disability score being -21.38 which is statistically significant at 0.001 level. The difference between these two changes, -0.75, is due to Neural Tissue Mobilization. It is found that the

impact/improvement of Neural Tissue Mobilization is less/negative and not statistically significant.

On the basis of all results, the alternative hypothesis was accepted and null hypothesis was rejected i.e. the neural mobilization has negative impact to use simultaneously with conventional physiotherapy.

#### Discussion

The experimental study was conducted during the period from June 2015 to May 2016 at Bangladesh Health Professions Institute(BHPI), CRP, Savarin Dhaka, Bangladesh. The results are discussed in

relation to the aim and objectives of the study, as well as relevant literature. The primary aim of this study was to determine from a review of patients records, the treatment approaches used by physiotherapists, and the documented outcomes in the management of patients with neural tissue mobilization at CRP, Savar, Dhaka.

The study revealed that both neural tissue mobilization along with conventional physiotherapy and only conventional physiotherapy is effective in improving pain, neck range of motion and neck disability index in patients with chronic mechanical radiating neck pain but neural tissue mobilization has a vital role to correct posture & to reduce symptoms of stinging, tingling, tightness & sharpness.

The analysis of the study sample reveals that more males than females were treated during the study period. The average age of the sample was 46 years, indicates that most of the affected persons were of working age. The mean age of the participants of conventional physiotherapy technique group were less than neural mobilization technique group which could be an influencing factors for better improvement in conventional physiotherapy group in comparing to neural mobilization group. The mean monthly income in conventional physiotherapy group was higher than neural mobilization group; it could also be a confounding variable to influence for better improvement in conventional physiotherapy group.

Occupation is very important variable to be considered not only in research process, but also in daily practice as it can influence decision making in the management options. It is difficult to find reasons why more males than females attended for physiotherapy treatment although similar trends regarding gender, age and attendance for treatment were found in many studies: Chiu, Lau, Ho et al., (2006); Tseng et al., (2006) and Côté et al., (2003) to mention a few Service holder participants were more in neural mobilization group than conventional physiotherapy group, it would be a confounding factor for less effective of treatment for their job stress like computer work and other desk work in static posture. Neural Mobilization has great role for improving posture correction. In this study also revealed that the before treatment there was 3 in number in good posture in both standing and sitting posture, moreover, after neural mobilization there were 15 in number in both standing and sitting posture which was significantly improved in terms of postural correction than conventional physiotherapy group. Duration of pain in last episode was more in neural mobilization group than conventional physiotherapy group, which might be a influencing factors for less effectiveness of

neural mobilization technique compared conventional physiotherapy. The study revealed that the symptoms (Stinging, Tingling, Sharpness, and Numbness) were reduced more in neural mobilization group than conventional physiotherapy group. The study showed the radiation of pain was reduced in both group. The study also found that induced pain in movement was reduced more in neural mobilization group than conventional physiotherapy group. The study revealed that both constant and intermittent symptoms were reduced more in neural mobilization group than conventional physiotherapy group. Severity of pain was reduced in both groups where as moderate pain was reduced more in neural mobilization group than conventional physiotherapy group. Severity of disability was reduced in both group, and it also revealed that the neural mobilization is effective to minimize crippled disability.

Severity of neck pain at rest of both groups showed improvement, the improvement is statistically significant within group at 0.001 level in both neural mobilization & conventional physiotherapy group respectively. The difference between these two changes is due to Neural Tissue Mobilization and is statistically significant at 0.05 level. These finding were similar to the study carried out by Cleland, et al., 2005; Pratik, et al., 2014; Richard, et al., 2008; Savva and Giakas, 2013. Severity of neck pain in sitting position of both groups showed improvement, the improvement is statistically significant within group at 0.001 level in both neural mobilization & conventional physiotherapy group respectively. The difference between these two changes is due to Neural Tissue Mobilization and is statistically significant at 0.05 level. These finding were similar to the study carried out by Cleland, et al., 2005; Pratik, et al., 2014; Richard, et al., 2008.

Both groups showed improvement in right rotation, the improvement is statistically significant at 0.01 & 0.001 level in neural mobilization & conventional physiotherapy group respectively. The difference between these two changes is due to Neural Tissue Mobilization and is statistically significant at 0.05 level. These finding were similar to 2008; Pratik, et al., 2014. The study carried out by Cleland, et al., 2005; Richard, et al., 2008.

Both groups showed improvement in left rotation, the improvement is statistically significant within at 0.01 & 0.001 level in neural mobilization & conventional physiotherapy group respectively. The difference between these two changes is due to Neural Tissue Mobilization and is statistically significant at 0.05 level. These finding were similar to the study carried out by Cleland, et al., 2005; Pratik, et al., 2014; Richard, et al., 2008.

Both groups showed improvement in disability, the improvement is statistically significant at 0.001 level in neural mobilization & conventional physiotherapy group respectively. It is found that the improvement of Neural Tissue Mobilization is less and was not statistically significant. This finding was similar to the study carried out by Cleland, et al., 2005; Pratik, et al., 2014; Richard, et al., 2008; Murphy et al., 2006; Ragonese, 2009; Savva and Giakas, 2013; Nee, et al., 2012; Allison, et al., 2002; Coppieters, et al., 2003a.

### Limitations

Matching did not do. There was an absence of randomization in sampling method. There was no follow up. The study was conducted with 32 patients of neck pain with radiating, which was a very small number of samples in both groups and was not sufficient enough for the study to generalize the wider population of this condition. The mean age of the participants of conventional physiotherapy technique group were less than neural mobilization technique group which could be an influencing factors for better improvement in conventional physiotherapy group in comparing to neural mobilization group. It was limited by the fact daily activities of the subject were not monitored which could have influenced. Treatment sessions were not efficient to get the actual result. Subjects with wide range group between 26 to 65 years of age were considered for the study, thus results could not be generalized to individual age. Dosage of treatment parameters of the combined treatment techniques in the study was not standardized according to individual patients. Only efficacy of neural mobilization of radiating neck pain did not compute.

### Conclusion and recommendations

This study showed a significant improvement in neck range of motion and decrease in neck disability index and pain within two therapeutic interventions that is conventional physiotherapy along with neural mobilization and only conventional physiotherapy. It can be concluded that both the intervention is effective therapeutic options in the treatment of cervical radiculopathy. However between group findings does not give a clear idea about which treatment approach is superior to another treatment approach. The results suggest that the addition of neural mobilization along with conventional physiotherapy yields no significant

additional benefit to pain, ROM, or disability in patients with cervical radiculopathy, but it has a vital role to correct posture & to reduce symptoms of stinging, tingling, tightness & sharpness. So simultaneously neural tissue mobilization along with conventional physiotherapy is recommended in patients with chronic mechanical radiating neck pain.

### References

- Allison, S. (2003). Reliability and Diagnostic Accuracy of the Clinical Examination and Patient Self Report Measures for Cervical Radiculopathy. *Spine Journal*, 28 (1), pp.52-62.
- Chiu, T.W., Lau, K.T., Ho, C.W., Ma, M.C., Yeung, T.F., Cheung, P.M. (2006). A study on the prevalence of and risk factors for neck pain in secondary school teachers. *Pubmed*, 120 (6), pp.563-565. DOI:10.1016/j.puhe.2006.01.007
- Cleland, A.J., Whitman, J.M., Fritz, J.M., Palmer, J.A. (2005). Manual physical therapy, cervical traction, and strengthening exercises in patients with cervical radiculopathy: a case series. *Journal of Orthopaedic and Sports Physical Therapy*, 35(12), pp.802-811.
- Coppieters, W.M., Stappaerts, H.K., Wouters, L.L., et al. (2003a). The immediate effects of a cervical lateral glide treatment technique in patients with neurogenic cervicobrachial pain. *Journal Orthopedic Sports Physical Therapy*, 33, pp.369-378.
- Cote, P, Cassidy, J.D., Carroll, L.J., Kristman, V., (2004). The annual incidence and course of neck pain in the general population. A population-based cohort study. *Pain*, 112, pp.267-273.
- Ellenberg, M.R, et al. (1994). Cervical Radiculopathy. *Archives of Physical Medicine and Rehabilitation*, 75, pp.342-352.
- Hult, L. (1954). The Munksfors investigation. *Acta Orthopedic Scand Supply*, 16, pp.1-76.
- Jellad, A., Salah, Z.B., Boodokdane, S., Migaou, H., Bahri, I., Rejeb, N., (2009). The value of intermittent cervical traction in recent cervical radiculopathy. *Annals of Physical and Rehabilitation Medicine*, 52(9), pp.638-652.



- Murphy, R.D., Hurwitz, L.E., Gregory, A., et al. (2006). A nonsurgical approach to the management of patients with cervical radiculopathy: a prospective observational cohort study. *Journal Manipulation Physiology Therapy*, 29, pp.279-287.
- priya Vishnu, K. R. V., Kumaresan, A., Jagatheesanalagesan., Prathap, S. (2015). Effectiveness of neural mobilization and central glides for patients with cervical radiculopathy. *Journal of Pharmaceutical Biology*, 5(3), pp.199-202.
- Radhakrishnan, K., Litchy, W.J., O'Fallon, W.M., et al. (1994). Epidemiology of cervical radiculopathy. A population based study from Rochester, Minnesota, 1976 through 1990. *Brain*, 117, pp.325-335.
- Ragonese, J. (2009). A randomized trial comparing manual physical therapy to therapeutic exercises, to a combination of therapies, for the treatment of cervical radiculopathy. *Orthop. Physical Therapy Practical*, 21, pp.71-76.
- Richard, et al. (2008). Neural Mobilization: A Systematic Review of Randomized Controlled Trials with an Analysis of Therapeutic Efficacy. *The Journal of Manual & Manipulative Therapy*, 16(1) pp.8-22.
- Sambyal, S., Kumar, S. (2013). Comparison between Nerve Mobilization And Conventional Physiotherapy In Patients With Cervical Radiculopathy. *International Journal of Innovative Research and Development*, 2(8), pp.442-445.
- Tseng, Y.L., Wang, W.T., Chen, W.Y., Hou, T.J., Chen, T.C., Lieu, F.K. (2006). Predictors for the immediate responders to cervical manipulation in patients with neck pain. *Manual Therapy*, 11 (4), pp. -315.