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Effect of Transverse Oscillatory Pressure on Pain and Range of Motion in Bilateral Cervical Radiculopathy: A Pilot Study

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Abstract: **Cervical Radiculopathy (CR) is a peripheral nervous system disorder affecting the normal function of Cervical Nerve Roots (CNRs) and is often associated with chronic pain and functional limitations in daily life. Transverse Oscillatory Pressure(TOP) , one of the frequently used manipulative techniques by physiotherapists has been claimed to be effective in amelioration of pain intensity especially radiating pain in cervical, thoracic, and lumbar regions. TOP also provides some benefit in the treatment of chronic mechanical neck pain. Objective: This study is to evaluate the effect of (TOP) in the bilateral cervical radiculopathy. Methods: This study was conducted among 10 subjects of both male and female gender within age group of 18 to 58 years, having symptomatic bilateral cervical radiculopathy. The subjects were given Transverse oscillatory pressure (TOP) as an intervention. Pre and post assessment of cervical range of motion (flexion, extension, right lateral flexion, left lateral flexion, right rotation, and left rotation) was measured using Universal Goniometer and Visual Analogue Scale (VAS) was used for the neck pain assessment. Results: In the present study, the statistical analysis showed there is a significant difference in pre and post-test scores of cervical range of motion and also there was reduced neck pain among the subjects. Conclusion: This study concluded that transverse oscillatory pressure is effective in improving neck range of motion and in reducing neck pain among the subjects with bilateral cervical radiculopathy.**

Keywords: **Bilateral cervical radiculopathy, Transverse oscillatory pressure, Pain, Range of Motion.**

I. INTRODUCTION

Cervical Radiculopathy (CR) is a term used to describe pain radiating into the arm corresponding to the dermatome of the involved cervical nerve root.[1]Cervical radiculopathy forms an important subgroup of neck disorders despite the fact that it is not as frequent as general neck pain, but it has been shown to lead to more severe pain and disability. [2] In the only large retrospective population-based study, the annual age adjusted incidence rate was 83.2 per 100,000 persons (107.3 for men and 63.5 for women) with a peak incidence in the fifth and sixth decade for both genders.[3]

Most common cause of radiculopathy is cervical disc herniation, followed by cervical spondylosis.[4, 5] CR is less commonly caused by intra spinal or extra spinal tumors, trauma with nerve root avulsion, synovial cysts, meningeal cysts dural arterio-venous fistulae[6] or tortuous vertebral arteries.[7]

The diagnosis of radiculopathy is based on information received during the subjective and physical examination, which is then confirmed via diagnostic imaging or supported by surgical findings.[8] Most commonly used test like spur lings test[9] ,shoulder abduction test,[10] upper limb tension test(ULTT) or upper limb neural tension test (ULNT)[11] neck traction/distraction test, and Valsalva maneuver.[12] The main objectives of treatment in patients with cervical radiculopathy are to relieve pain, improve neurologic function, and prevent reocurrence.[13] Some investigators advocated the use of short term immobilization with either a hard or a soft collar to aid in pain control.[14] There are several intervention strategies commonly used in the management of CR. Modalities like TENS, IFT, Ultrasound, cervical traction, electrical muscle stimulatoer,SWD.[15]

An extensive literature review carried out by Haldeman found that transverse oscillatory pressure (TOP), which is one of the techniques of manipulation, provides some benefit in the treatment of chronic mechanical neck pain. Empirical observations of Maitland reported that TOP was recommended for unilaterally distributed symptoms of cervical origin.

Egwu studied the manual forces applied during vertebral mobilization to the cervical spine and found that less time was spent in the use of anterior posterior unilateral pressure and posterior anterior unilateral pressure, he also noted that significantly more patients were pain-free with the use of these techniques when compared to cervical oscillatory rotation and TOP. TOP, originated by Nwuga, although one of the frequently used manipulative techniques by physiotherapists, has been claimed to be effective in amelioration of pain intensity especially radiating pain in cervical, thoracic, and lumbar regions. It involves mobilization of the spinous process of the vertebrae in the region of the spine that had mechanical pain. This technique was reported to be useful when pain has a unilateral distribution, whether localized to the neck or referred to the upper limb. However, there was dearth of documenting evidence on the efficacy of TOP in the management of cervical radiculopathy.[14]

II. METHODOLOGY

10 subjects with bilateral cervical radiculopathy confirmed positive spurling test were included. The purpose of the study was explained and written consent was taken from the patient. Cervical ROM and VAS scores were being noted before and after the treatment. Both male and female subjects within age group of 18 to 58 years having bilateral cervical radiculopathy, with positive spurling test, bilateral sensory and motor deficits including sharp pain, muscle weakness and numbness in the upper limb were included in study. Subjects having history of cervical myelopathy, cervical spondylosis or signs of upper motor neuron disease, Unilateral Cervical Radiculopathy (CR), suffering from any other musculoskeletal conditions in the affected limb, who were currently on medications for bilateral cervical radiculopathy and cervical spine surgery within the last 6 months, and non-cooperative patients were excluded. Outcome measures were visual analogue scale (VAS) for assessing pain and universal goniometer to assess range of motion of cervical spine.

Intervention:

Transverse oscillatory pressure:

Subject was positioned in prone lying and therapist stood on the side of the patient, the therapist placed the pad of the thumbs against the left side (or right side depending on the location of pain) of the spinous process of vertebrae to be moved. The fingers were spread out on the neck and upper thoracic region. Pressure was directed horizontally through the thumbs to the side of spinous process. Transverse Oscillatory Pressure was executed by a pressure relaxed sequence on the spinous process. Movement was initiated from the trunk and transmitted down the arm to the thumbs.[16] Treatment was affected by push-relax sequence on the spinous using the thumb to produce an oscillatory movement. Transverse pressure was directed towards the side of pain on the cervical vertebra.

The oscillation was given rhythmically for a period of 20 seconds. This was repeated 3 times with a rest period of 2 minutes per session. Treatment was administered 3 times per week for 2 weeks with a total of 6 treatment sessions. Total duration of treatment 15 minutes. The subject's response was assessed after 6th treatment session using VAS and goniometry. Subject was advised not to involve in any other interventions.[14]

Fig: Performing Transverse Oscillatory Pressure

III. RESULTS

Table: Data of Outcome Measures with P Value

Sl.no	Outcome measures	Pre test		post test		Paired t-test/ wilcoxon test	P-Value
		Range	Mean ± SD	Range	Mean ± SD		
1	Flexion ROM	40-71	53.1 ± 12	48-77	60.4± 10.5	t = 8.045	p<0.05*
2	Extension ROM	35-64	53 ± 8.57	42-68	61 ± 9	t = 7.826	p<0.05*
3	Cervical right lateral flexion	20-38	29.6 ± 4.94	28-42	35.3 ± 3.88	t = 14.40	p<0.05*
4	Cervical Left lateral flexion	20-35	27.8 ± 4.51	28-41	32.9 ± 4.22	t = 11.76	p<0.05*
5	Right rotation	37-72	57.5 ± 12.42	45-81	65.1 ± 12.56	t = 12.66	p<0.05*
6	Left rotation	32-79	49.2 ± 14.52	41-80	56.2 ± 11.95	t = 3.96	p<0.05*
7	V.A.S (Pain)	6-9	7.40 ± 1.17	3-5	4.1 ± 0.73	z =2.80	p<0.05*

*Statistically Significant

IV. DISCUSSION

The purpose of this study was to evaluate the effect of transverse oscillatory pressure in the treatment of bilateral cervical radiculopathy The results of the present study showed a highly significant increase in the cervical range of motion (flexion, extension, lateral flexion and cervical rotation) as well as decrease in pain. So, it implies that intervention of Transverse Oscillatory Pressure was significantly effective on reducing pain and improving range of motion among the subjects with bilateral cervical radiculopathy.

By applying TOP directly to the painful area that alter segmental biomechanics by releasing trapped meniscoids, adhesions or by diminishing distortion in the intervertebral disc and restored joint play movement and increases the mobility of cervical region. Also, individual motion segments are thought to be capable of buckling, thereby producing relatively large vertebral motions that achieve a new position of stable equilibrium. The manipulative impulse provides sufficient energy to restore a buckled segment to a lower energy level, thus reducing mechanical stress or strain on soft and hard spinal soft tissues. Giles proposed that spinal manipulation activates all known mechano sensitive, somatosensory receptors because they all possess mechanical thresholds lower than the peak force delivered during a manipulation and the receptor types are responsive to dynamic and/or static components of a mechanical stimulus. By this evidence TOP relieves pain faster. Researchers have reported that TOP to the spinal region has both neurological and mechanical effects.[14]

Limitations and Future scope of the study:

Future studies can be done on larger sample size. In present study, the variables were pain and ROM, studies can be done on neck disabilities, and strength of neck muscles, and can be done with a longer treatment duration. Regular follow-up can be maintained.

Conclusion:

This study concluded that Transverse Oscillatory Pressure (TOP) is effective in improving neck range of motion and reducing pain among the subjects with bilateral cervical radiculopathy.

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