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Effect of Thoracic Manipulation Along With Neck Stabilization Exercises On Pain and Range Of Motion In Subjects With Mechanical Neck Pain

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ABSTRACT-

BACKGROUND- *Mechanical neck pain is a musculoskeletal disorder characterized by pain, stiffness and reduced cervical and thoracic spine range of motion. People of age group 25-35 years are most commonly associated with these symptoms. Hence this study is conducted to improve neck muscle function and reduce symptoms.*

OBJECTIVES- *To determine the effect of thoracic manipulation along with neck stabilization exercises on pain, range of motion and cervical spine stability in subjects with mechanical neck pain.*

MATERIAL AND METHOD:*68 individuals diagnosed as Mechanical neck pain by certified physiotherapist or an orthopedician were selected as subjects. Subjects were divided in 2 groups, 34 in each group. Group A received Thoracic manipulation and neck stabilization exercises while group B received conventional group of exercises.pre and post assessment were taken by visual analogue scale , Bubble inclinometer and Stabilizer pressure biofeedback unit.*

RESULT: *Both the groups showed improvement in pain. Range of motion and cervical spine stability. But the group is improved in comparison with group B (P<0.0001)*

CONCLUSION: *Thoracic manipulation with neck stabilization exercises has significant effect on pain, range of motion and cervical spine stability.*

KEYWORDS: *Mechanical neck pain, Thoracic manipulation, Neck stabilization Exercise*

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I. INTRODUCTION:

Mechanical neck pain is the most common disorder experienced among greater population. The neck problem consists of symptoms such as pain, stiffness and reduced range of motion.[1]

Mechanical neck pain is related to the people of working age. Around 50% of people from working age experience mechanical neck pain. The prevalence of lifetime pain is 67-71%. Many research report high prevalence of neck pain among women than men[2,3]

Commonly, a sudden or insidious onset of mechanical neck pain has came forward. Normal daily mechanical loading might frequently trigger neck pain symptoms.[4]

Mechanical neck pain is characterized by a number of structural and functional features with compromised quality of life. In order to improve functional status and quality of life in patients with MNP, it is important to understand which structures are capable of producing pain and disability.[5-10]

Prolonged over activity of the superficial cervical muscles has been found to cause greater muscle fatigability and a reduction in the strength and endurance capacity of the muscles, joint position sense, and range of motion (ROM) in patients with neck pain.[11-14] This dysfunction causes the reduced mobility of cervical spine. [15]

Thoracic manipulation is a kind of treatment for the subjects with mechanical neck pain.[16,17]

The thoracic spine motion is coupled with end motion of cervical spine.[1] Hence, thoracic spine manipulation can be used to reduce potential risk of cervical spine manipulation and to improve mobility.[18] Thoracic spine manipulation improve range of motion and drainage of fluid surrounding joint. Pain relief from manipulation is because pain get modulated at the spinal cord level.[19]

Thoracic spine motion is linked with the end range motion of cervical spine hence thoracic spine approach can be suggested over cervical spine approach.[20]

It is found that certain muscles in the cervical spine tend to weaken in mechanical neck pain, the most common of these is deep neck flexor. Deep neck flexors plays a major role in posture maintenance in supporting and straightening the cervical lordosis. [21]

Neck stabilization exercises have been used to activate the deep muscles and decrease over activity of the surface muscles.[22-24] . As these exercises limit pain, improves function and prevent further injuries.

Thoracic manipulation alone has immediate effect in subjects with mechanical neck pain. But the stability remains the issue as there will be less stability of the structures after manipulation. Hence stability should be maintained after manipulating and stabilization exercises plays important role in improving stability of deep neck flexor muscles as these are the main structures which get weaken in subjects with mechanical neck pain.

II. MATERIAL AND METHODOLOGY AND PROCEDURE:

The study was conducted at Krishna Institute of Medical Sciences, Physiotherapy OPD, Karad. The ethical clearance was taken from Institutional Ethical Committee prior to the start of treatment. The subjects were taken as per inclusion and exclusion criteria. The inclusion criteria was both male and female subjects of 25-35 years of age having mechanical neck pain along with reduced cervical and thoracic range of motion and who were willing to participate. Subjects with traumatic head injury, who have undergone spinal surgeries, subjects with specific neck pain and having any vertebral fracture were excluded. An informed consent was taken from the subjects selected for study.

The random sample of 68 subjects was studied in this experimental study. These subjects were divided into 2 groups with simple random sampling method. Group A was experimental group with mean age of was 29.29 years while the Group B was control group with a mean age of 31.02 years. Group A had a Thoracic Manipulation with Neck Stabilization Exercise i.e., Exercise using Stabilizer pressure biofeedback unit for deep neck flexors. The group B was control group. They were given conventional treatment of free exercises, active range of motion exercises and isometric exercises of neck.

The pre treatment and post treatment assessment was done by outcome measures like Visual Analogue Scale, Bubble Inclinometer and Stabilizer Pressure Biofeedback Unit.

III. RESULT:

The statistical analysis of Visual Analogue Scale, Bubble Inclinometer and Stabilizer Pressure Biofeedback Unit was done by Paired t test.

1. Visual Analogue Scale :

Table no. 1 : comparison of pre and post VAS score within the group

	PRE	**POST**	**P VALUE**	**INFERENCE**
GROUP A	6.70±1.06	2.26+0.61	P<0.0001	Extremely significant
GROUP B	6.55 +1.16	4.20+ 1.12	P<0.0001	Extremely significant

In the Group A, the P value by paired t test was found to be <0.0001 which was extremely significant. In the group B, the P value by paired t was found to be <0.0001 which was extremely significant.

2. Bubble Inclinometer :

Table no. 2.1 Comparison of pre and post range of motion of cervical spine

		PRE	POST	P VALUE	INFERENCE
GROUP A	**FLEXION**	38.29+11.82	47.64+11.84	P<0.0001	Extremely significant
	EXTENSION	40.38+11.79	47.83+12.38	P<0.0001	Extremely significant
GROUP B	**FLEXION**	35.14+7.73	39.26+7.83	P<0.0001	Extremely significant
	EXTENSION	38.67+9.19	42.83+9.56	P<0.0001	Extremely significant

For cervical spine flexion ROM in the Group A, the P value by paired t test was found to be <0.0001 which was extremely significant. In the group B, the P value by paired t was found to be <0.0001 which was extremely significant.

For cervical spine extension in the Group A, the P value by paired t test was found to be <0.0001 which was extremely significant. In the group B, the P value by paired t was found to be <0.0001 which was extremely significant.

Table no. 2.2 Comparison of pre and post range of motion of thoracic spine

		PRE	POST	P VALUE	INFERENCE
GROUP A	**FLEXION**	16.73+4.76	24.11+5.76	P<0.0001	Extremely significant
	EXTENSION	17.41+3.08	24.73+3.30	P<0.0001	Extremely significant
GROUP B	**FLEXION**	17.79+4.51	21.58+4.33	P<0.0001	Extremely significant
	EXTENSION	19.41+3.30	21.41+5.95	P= 0.0301	Significant

For thoracic spine flexion in the Group A, the P value by paired t test was found to be <0.0001 which was extremely significant. In the group B, the P value by paired t was found to be <0.0001 which was extremely significant.

For thoracic spine extension in the Group A, the P value by paired t test was found to be <0.0001 which was extremely significant. In the group B, the P value by paired t was found to be 0.0301 which was extremely significant.

3. STABILIZER PRESSURE BIOFEEDBACK UNIT :

Table 3. Comparison of pre and post cervical spine stability

	PRE	POST	P VALUE	INFERENCE
GROUP A	16.02+4.81	26.58+5.73	P<0.0001	Extremely significant
GROUP B	17.38 + 4.55	21.67+4.76	P<0.0001	Extremely significant

In the Group A, the P value by paired t test was found to be <0.0001 which was extremely significant. In the group B, the P value by paired t was found to be <0.0001 which was extremely significant.

IV. DISCUSSION:

This study was conducted in the population of 25-35 years of age having mechanical neck pain to determine the effect of thoracic manipulation along with neck stabilization exercises on pain and range of motion. In this study 68 subjects had participated who were screened as per the inclusion and exclusion criteria and analyzed as per pre test outcome measures out of which 24 were male subjects and 44 were female subjects . The mean age of subjects included in Group A was 29.29 and in Group B was 31.02 out of 68 subjects, this was statistically - significant. Subjects were analyzed and divided into two groups according to convenience sampling followed by simple random sampling method. 34 subjects were included in Group A and were received Thoracic manipulation and Neck stabilization exercises with Stabilizer pressure biofeedback unit. The treatment protocol was continued for 6 weeks. Similarly, 34 subjects were included in Group B and were received conventional exercises for pain and range of motion and treatment protocol was continued for 6 weeks.

Pre and post test outcome measures for pain, range of motion and stability of cervical spine were Visual Analogue Scale, Bubble inclinometer and Stabilizer Pressure Biofeedback Unit respectively.

Thoracic manipulation is the adjunctive therapy for the neck pain disorders. This is high velocity low amplitude thrust manipulation i.e., Grade 5 mobilization involves a small amplitude thrust to produce joint cavitations and is accompanied by an audible ‘ cracking’ sound.

This can be given to reduce the loading and stress of the structures surrounding the affected area. Such spinal manipulation have various therapeutic benefits, such as stretching of shortened and thickened peri- articular soft tissues to improve range of motion, improve drainage of fluid within and surrounding the joint and changes in pain modulation , motor activity and proprioception.

However retraining the deep neck flexor muscles with neck stabilization exercises, has been shown to decrease neck symptoms and increase the activation of the deep neck flexor muscles during performance of the test of deep neck flexor with stabilizer pressure biofeedback unit, may improve the ability to maintain an upright posture of the cervical spine.

Intra group comparison (within group) was analyzed by paired t test for Visual analogue scale, Bubble inclinometer and Stabilizer pressure biofeedback unit. This showed that there was extremely significant difference of Group A VAS score with (P<0.0001). Bubble inclinometer score was also extremely significant with (P<0.0001). Stabilizer Pressure Biofeedback Unit score showed extremely significant difference with (P<0.0001)

Similarly in Group B, there was extremely significant difference of VAS score with (P<0.0001). Bubble inclinometer score was also extremely significant with (P<0.0001). Stabilizer Pressure Biofeedback Unit score was extremely significant with (P<0.0001).

In this study, an attempt was made to decrease pain, improve range of motion and cervical spine stability by the end of 6th week i.e., after the treatment program gets over.

There was reduction of symptoms in both the groups but in group A there was marked reduction in symptoms were seen.

Thoracic spine manipulation treatment is used to decrease pain and increase ROM. Mobility of the cervical spine is associated with mobility of the high thoracic spine (T1–4)[25]. Decreased mobility of cervical spine significantly related to neck pain because of the biomechanical links between the thoracic spine and the cervical spine.[26,27].Patients with neck pain showed decreased motion of the cervical spine coupled with the thoracic spine.[28] Thoracic manipulation contributed to recovery of normal biomechanics, thereby reducing mechanical stress in cervical spine and improving the distribution of joint forces.[29] This means that treatment of the thoracic spine is necessary to increase cervical ROM. Many researchers have examined cervical ROM after interventions for patients with neck pain. [30] But this study assessed thoracic as well as cervical ROM.

Neck stabilization exercises were also found effective in reducing pain in mechanical neck pain.[30] For common spinal problems like chronic mechanical back pain and intervertebral disc prolapse hydrotherapy and stabilization exercises were found to be effective.[31-32]

In conclusion, the result of current study shows that Thoracic Manipulation along with Neck Stabilization Exercises is more significant than routine exercises for pain and range of motion in subjects with mechanical neck pain. Further studies can be done for longer duration of treatment protocol in order to determine the long term effect in this program.

V. CONCLUSION

Different approaches are used for improvement of the pain, range of motion and stability of cervical spine for mechanical neck pain but this study concluded that the thoracic manipulation along with neck stabilization exercises was more effective than conventional exercises in improvement of pain, range of motion, cervical spine stability and improving quality of life.

Hence it is proved that Thoracic manipulation along with neck stabilization exercises has significant effect among subjects with mechanical neck pain.

CONFLICT OF INTEREST- Nil

ETHICAL CLEARANCE-Institutional Ethical Committee Of Krishna Institute Of Medical Sciences Deemed To Be University,Karad

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