Original Article

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Comparative Study of Neural Tissue Mobilization and Manual Traction in Patients with Cervical Spondylosis

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Abstract

Objective: To compare the efficacy of Neural Tissue Mobilization and Manual Traction in patients with Cervical Spondylosis.

Study Design: Experimental design

Method: 30 subjects of cervical spondylosis, age group 50-65 yrs participated in the study and were divided into 3 groups (10 subjects in each group). Group A was treated with neural tissue mobilization, neck isometrics and hot pack; Group B was treated with cervical manual traction, neck isometrics and hot pack & Group C was treated with hot pack only. Then the results were compared on NDI scale, VAS scale and active ROM of cervical spine.

Result: This study showed significant results of cervical manual traction on all outcome measures. However, neural tissue mobilization was significant on NDI scale, cervical right rotation and left rotation.

Conclusion: The study concluded that in patients with cervical spondylosis, treatment with cervical manual traction, neck isometrics and hot pack helps in reducing the pain, increasing the range of motion of cervical spine and efficiency in activities of daily living, as seen by improvement in VAS scale, active ROM of cervical spine and NDI scale respectively. Cervical Manual Traction showed significantly better results on all outcome measures as compared to Neural Tissue Mobilization in patients with cervical spondylosis.

Keywords: Cervical Spondylosis, Cervical Manual Traction, Neural Tissue Mobilization.

Introduction

Cervical spondylosis is a generalized disease process affecting all levels of the cervical spine. Cervical spondylosis encompasses a sequence of degenerative changes in the intervertebral discs, osteophytes of the vertebral bodies, hypertrophy of the facets and laminal arches, and ligamentous and segmental instability. The natural history of cervical spondylosis is associated with the ageing process. Senescent and pathologic processes are thus morphologically indistinguishable (1).

The outcome of neck pain depends on the underlying cause, but acute neck pain usually resolves within days or weeks, although it can recur or become chronic. Aetiological factors are poorly understood and are usually multifactorial, including poor posture, anxiety, depression, neck strain, and sporting or occupational activities. When mechanical factors are prominent, the condition is often referred to as "cervical spondylosis," although the term is often applied to all non-specific neck pain. Mechanical and degenerative factors are more likely to be present in chronic neck pain (2). The most common cause of cervical radiculopathy is foraminal encroachment of the spinal nerve due to

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combination of factors, including decreased disc height and degenerative changes of the unco-vertebral joints anteriorly and zygapophyseal joints posteriorly (i.e., cervical spondylosis). In contrast to disorders of the lumbar spine, herniation of the nucleus pulposus is responsible for only 20 to 25 percent of cases (3).

Presenting features of cervical spondylosis are cervical pain aggravated by movement, referred pain (occiput, between the shoulder blades, upper limbs), retro-orbital or temporal pain (from C1 to C2), cervical stiffness-reversible or irreversible, vague numbness, tingling, or weakness in upper limbs, dizziness or vertigo, poor balance and rarely, syncope, triggers migraine, "pseudo-angina". Signs in patients with cervical spondylosis generally are poorly localized tenderness, limited range of motion and minor neurological changes like supinator jerk (2).

Radiculopathy (nerve root compression) due to cervical spondylosis usually occurs at the C5 to C7 levels, although higher levels can also be affected. Neurological features follow a segmental distribution in the upper limb, with sensory symptom (shooting pains, numbness, hyperaesthesia) being more common than weakness. Reflexes are usually diminished at the appropriate level (biceps (C5/6), supinator (C5/6), or triceps (C7)) (2).

Table 1: Comparison of mean NDI score in group A, B and C in Pre and Post condition

Group	Pre	Post	T-value	Level of significance	P-value
A	26.6	22.8	3.8	Significant	<0.01
B	27.9	21	6.44	Significant	<0.001
C	28.1	25.5	2.13	Insignificant	>0.05

Table 2: Comparison of VAS scale in group A, B and C in Pre and Post conditions.

Group	Pre	Post	T-value	Level of significance	Probability
A	6.75	5.65	2.03	Insignificant	>0.05
B	7.3	5.1	4.03	Significant	<0.01
C	6.85	6.15	1.11	Insignificant	>0.05

Exercise regimens-using proprioceptive, strengthening, endurance, or coordination exercises-are more effective than usual care (analgesics, non-steroidal anti-inflammatory drugs, or muscle relaxants) or stress management. Manual treatments (mobilization physiotherapy or manipulation) provide limited evidence that mobilization physiotherapy and manipulation are more effective for chronic neck pain than less active treatments (drug treatment, education, counselling). However, manipulation has occasionally been associated with serious neurological complications (2).

When neural mobilization is used for treatment of adverse neurodynamics, the primary theoretical objective is to attempt to restore the dynamic balance between the relative movement of neural tissues and surrounding mechanical interfaces, thereby allowing reduced intrinsic pressures on the neural tissue and thus promoting optimum physiologic function. The hypothesized benefits from such techniques include facilitation of nerve gliding, reduction of nerve

Table 3: Comparison of Cervical Active ROM in groups A, B and C in Pre and Post conditions

FLEXION ROM					
Group	Pre	Post	T-value	Level of significance	P-value
A	35.9	38.4	1.85	Insignificant	>0.05
B	33.4	38.9	3.95	Significant	<0.01
C	32.1	32.9	0.52	Insignificant	>0.05
EXTENSION ROM					
A	56.7	59.3	1.48	Insignificant	>0.05
B	60.4	65.7	4.95	Significant	<0.001
C	55.1	56	0.82	Insignificant	>0.05
RIGHT SIDE FLEXION ROM					
A	32.9	35.2	2.11	Insignificant	>0.05
B	31.6	36.4	4.03	Significant	<0.01
C	31.3	32.2	1.05	Insignificant	>0.05
LEFT SIDE FLEXION ROM					
A	36.2	38.6	1.69	Insignificant	>0.05
B	35.8	40.3	4.94	Significant	<0.001
C	36.5	37.5	1.96	Insignificant	>0.05
RIGHT ROTATION ROM					
A	57.2	59.7	2.97	Significant	<0.02
B	56.5	60.8	5.24	Significant	<0.001
C	55.2	56.4	1.76	Insignificant	>0.05
LEFT ROTATION ROM					
A	62.2	64.5	3.33	Significant	<0.01
B	62.1	66.5	4.65	Significant	<0.01
C	61.5	62.7	1.42	Insignificant	>0.05

adherence, dispersion of noxious fluids, increased neural vascularity, and improvement of axosplasmic flow (4).

Traction has also been reported to decrease pain by providing muscle relaxation, stimulation of mechanoreceptors and inhibition of reflex muscle guarding (5). Manual cervical traction is suggested to relieve pain and muscle spasm in the neck and upper quartile. Afferent input generated by these procedures may lower the excitability of á-motoneuron pools of upper limb muscles. While joint receptors are traditionally viewed as the receptor most likely to evoke responses to manual therapy, a review of the literature into possible mechanisms underlying manual cervical traction suggests stretch generated in cervical muscles and skin during the procedure has the potential to influence the excitability of á-motoneurons (6).

This study aims to compare the efficacy of neural tissue mobilization & cervical manual traction in patients having cervical spondylosis.

Materials and Method

Sample: 30 individuals with cervical spondylosis participated in study from RBTB hospital and residents in Ashok Nagar.

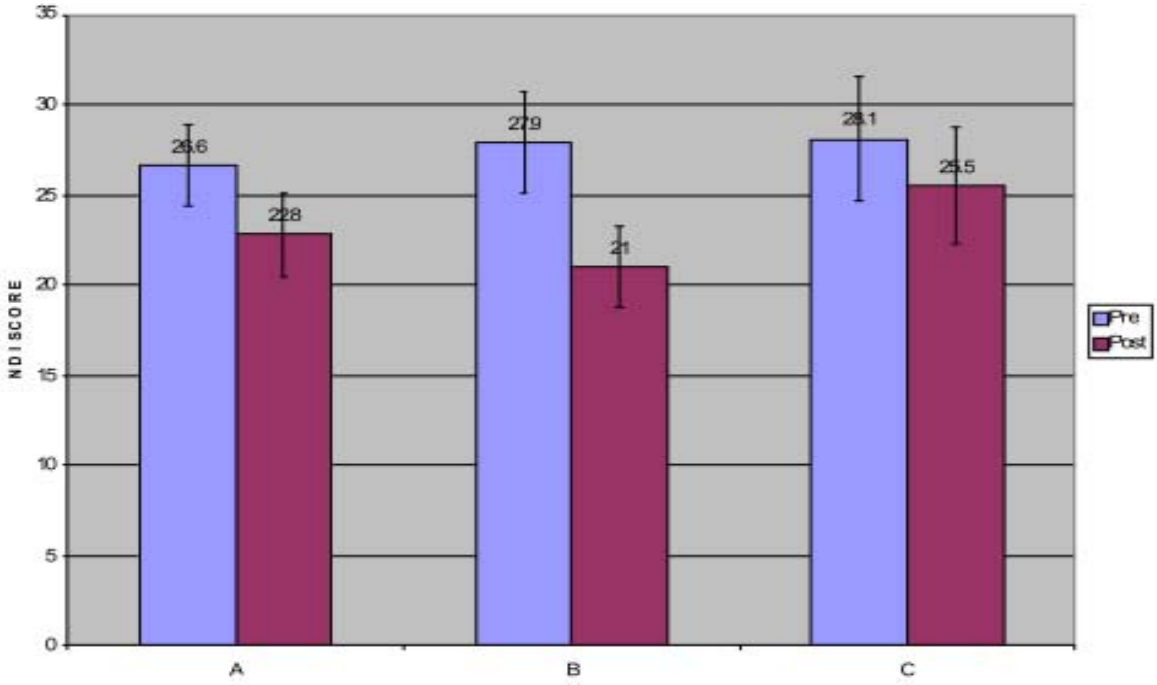
Inclusion criteria

1. Having cervical spondylosis since 10 or more years
2. Unilateral Radiculopathy
3. NDI score >24
4. ULTT1 positive
5. Ability to read English

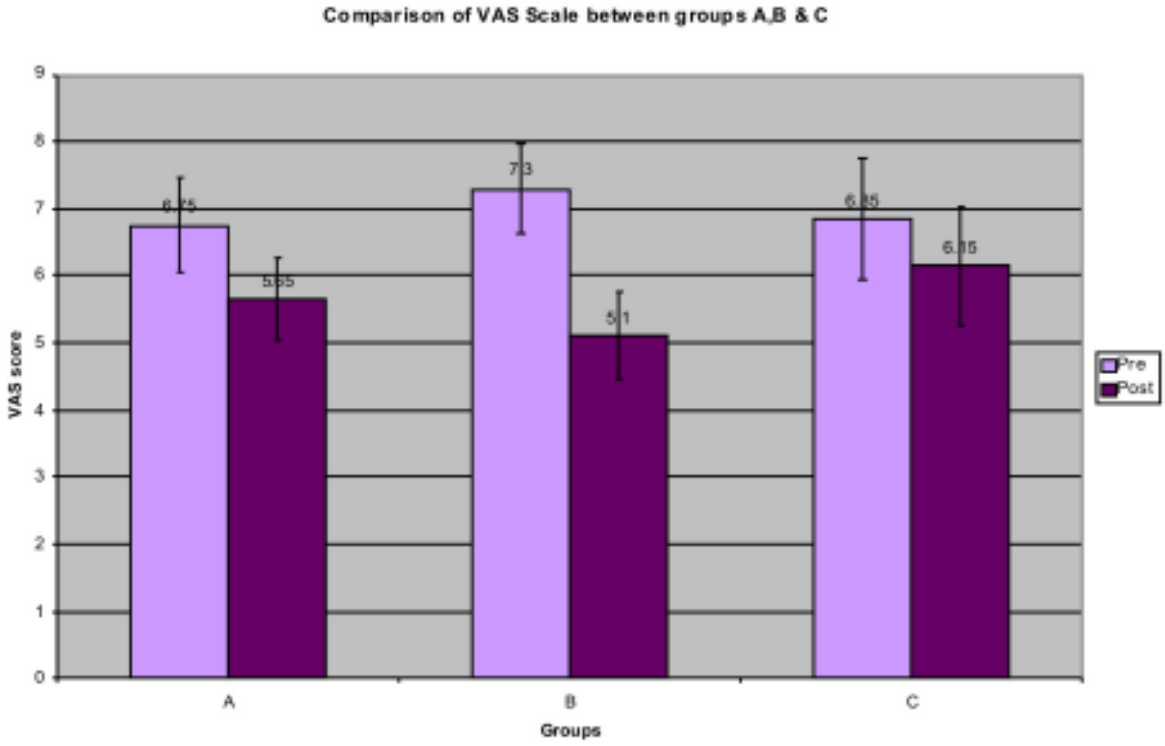
Exclusion criteria

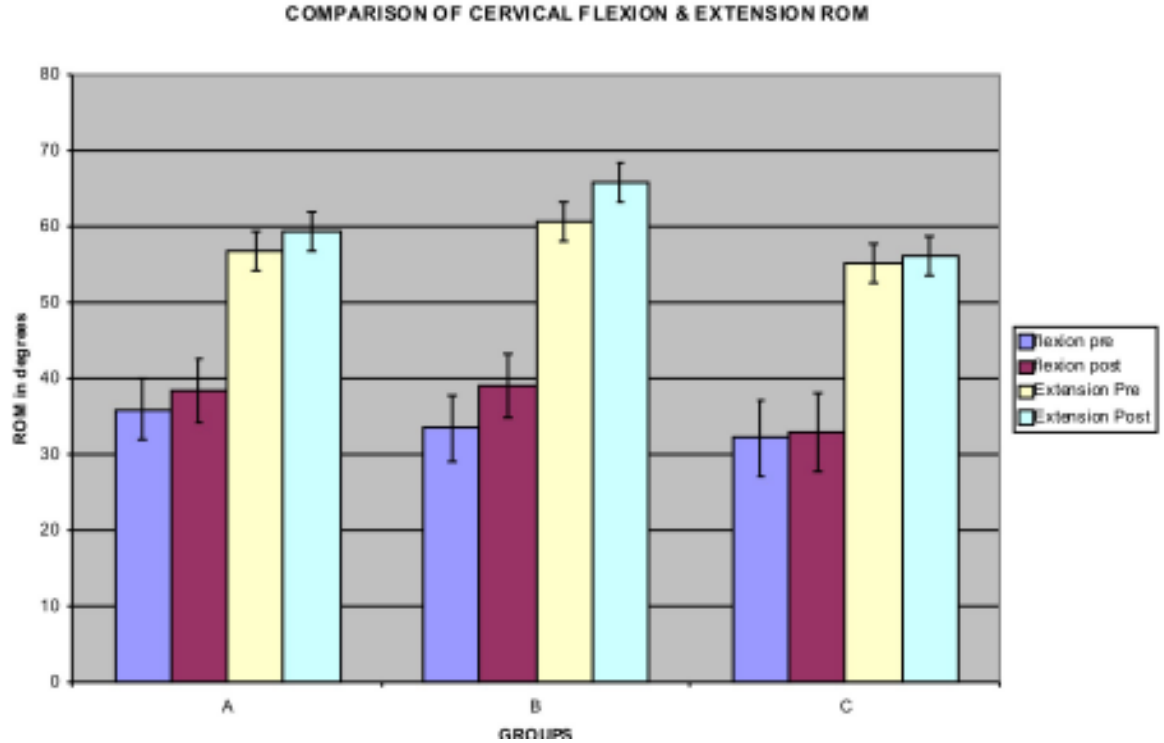
1. Contraindication to manual therapy techniques.
2. Cervical spine surgery.
3. Patients involved in compensation and/or ligament associated neck and/or upper limb pain.

Comparision of NDI Score between Groups



4. Soft tissue inflammatory condition like tendinitis, tenosynovitis, capsulitis & bursitis.
5. Tumors
6. Circulatory disturbances
7. Cervical myelopathy
8. Specific pathology due to trauma of the shoulder girdle complex, arm or hand on the affected side.





Procedure

30 individuals with cervical spondylosis were selected. They were assessed & randomly allocated to one to the three groups given below. Measurements of NDI scale, VAS scale and ROM of cervical spine were taken before and after the treatment to compare the effectiveness of the various treatments given.

Group A: Neural tissue mobilization (NTM), neck isometrics and hot pack;

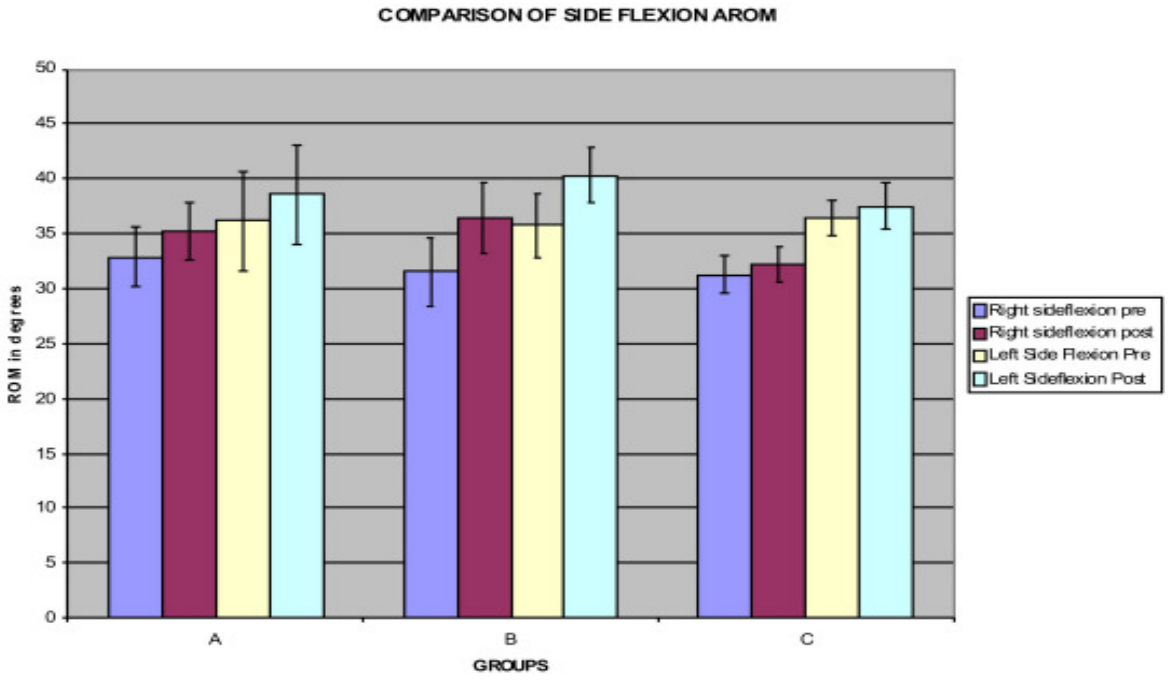
Group B: Cervical manual traction, neck isometrics and hot pack;

Group C: Hot pack only

Group A: NTM was given by the therapist on the ipsilateral side of the patients by positioning them in supine lying, slightly diagonal across the bed with affected side towards the open side of the couch and shoulder placed slightly out of the couch. The therapist was standing next to the head of the patient, facing towards his feet. Constant shoulder depression was maintained throughout the treatment session, once started, with pressure application from the thigh of the therapist. While the shoulder girdle is depressed, the glenohumeral joint is taken to the appropriate abduction position (90 deg.), elbow extended, forearm supinated, wrist extended, fingers & thumb extended and cervical spine side flexion of the contralateral side and neural tissue mobilization was then given by the therapist without any discontinuity in between the treatment. Dosage of mobilization was 2 sets of 30 repetitions each day, for 5 days. Following hot pack, neck isometric exercises to group A and B.

Group B: Manual cervical traction was given with patient in supine lying position and relaxed. The therapist stood at the head of the treatment table, suppoting the weight of the patient's head in the hands. Hand placement depends on comfort, vary the patient's head position in flexion, extension, side bending with rotation until the tissues to be stretched are taut, and then apply a traction force by assuming a table stance and leaning backward in a controlled manner. The force was usually applied intermittently with a smooth and gradual building and releasing of the traction force. Dosage of cervical traction was 15 repetitions, twice a day for 5 days.

Group C: The patients in this group were treated with hot pack under the cervical spine for 15 min for 5 days.



Outcome measures

1. NDI Scale
2. VAS Scale
3. Active ROM of Cervical Spine

Result

Baseline characteristics

The age of patients was between 50-65 years. Both males and females were included in the study and duration of cervical spondylosis symptoms were 10 years or more.

Both neural tissue mobilization and cervical manual traction were significantly effective with $p<0.001$ and Group C showed insignificant results with $p>0.05$.

Cervical manual traction was significantly effective with $P<0.01$; and neural tissue mobilization & application of hot pack showed insignificant results in cervical spondylosis patients on calculating T- values.

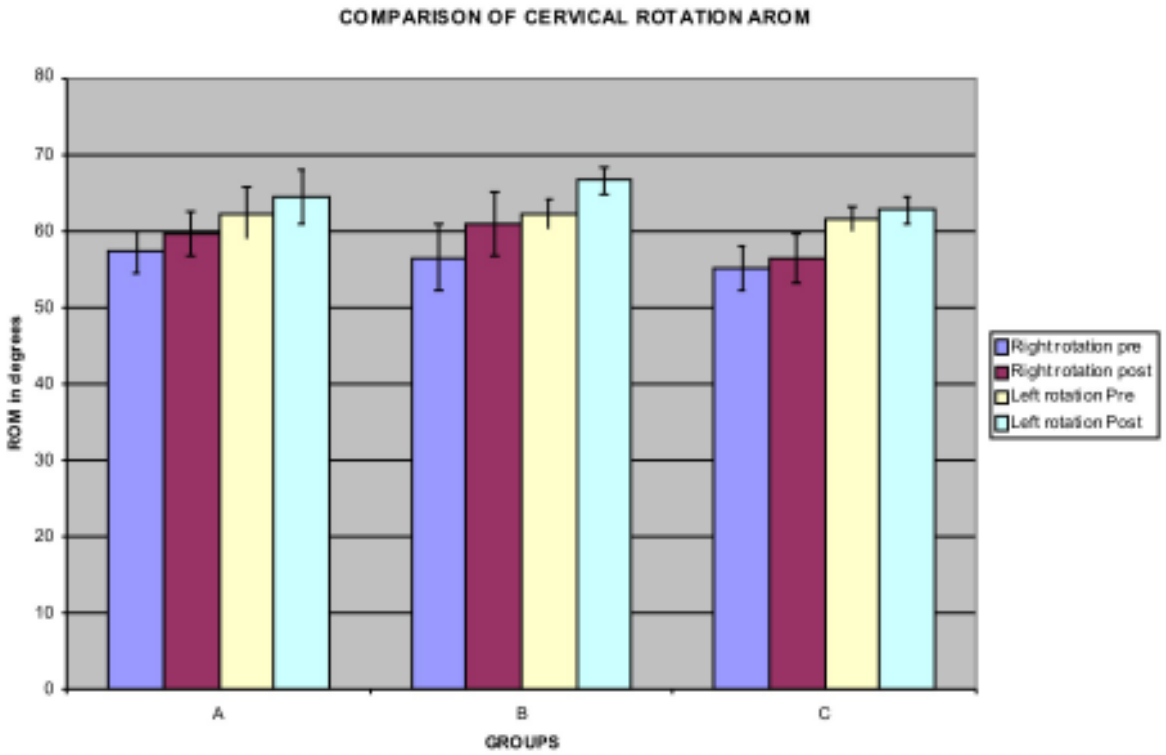
There was a significant improvement in active ROM of cervical spine with cervical manual traction. However, with neural tissue mobilization, only rotation showed significant results.

This is a comparison of NDI scale in group A, B and C in Pre and Post conditions. Both neural tissue mobilization and cervical manual traction were significantly effective with $P<0.01$ & $P<0.001$ respectively and application of hot pack was found insignificant on cervical spondylosis patients on calculating T- values.

Cervical manual traction was significantly effective with $p<0.01$ and neural tissue mobilization & application of hot pack was found insignificant on comparing VAS score.

Cervical manual traction was significantly more effective with $P<0.01$ and neural tissue mobilization & application of hot pack were found insignificant in cervical spondylosis patients on calculating T- values.

Cervical manual traction showed significant results with $P<0.01$ and neural tissue mobilization & application of hot pack was found insignificant on cervical spondylosis patients.



Both neural tissue mobilization and cervical manual traction were significantly effective with P<0.02 & P<0.001 respectively. However, the application of hot pack was found insignificant.

Discussion

The study compared the effect of Neural Tissue Mobilization and Manual Traction in patients with cervical spondylosis. The outcome measures neck disability index, active ROM of cervical spine and pain assessment on VAS scale. The result of the study supports the manual traction as it shows significant results on all the outcome measures. Neural tissue mobilization was found significantly effective only on NDI scale and cervical left and right rotation.

The subjects chosen for this study fulfilled the inclusion criteria for cervical spondylosis. The cause of subject's signs was postulated to be neurogenic because of the distribution and behavior of pain and the adverse response to neural tissue provocative tests.

The group to which manual traction, neck isometric exercises and hot pack was given showed significant improvement in cervical spondylosis. *Ktavich, Lynley* in his study of Neural Mechanisms Underlying Manual Cervical Traction found that Manual cervical traction is suggested to relieve pain and muscle spasm in the neck and upper quartile. Afferent input generated by these procedures may lower the excitability of motor neuron pools of upper limb muscles. While joint receptors are traditionally viewed as the receptor most likely to evoke responses to manual therapy, a review of the literature into possible mechanisms underlying manual cervical traction suggests stretch generated in cervical muscles and skin during the procedure has the potential to influence the excitability of motor neurons (6).

It was found from a randomised clinical trial on the effects of cervical traction (CT) and exercise on the patients with chronic cervical spondylosis. There was a marked improvement in both the groups treated with CT and NSAIDs (P<0.001). But there was nearly significant difference regarding improvement in treatment with CT plus exercise than with NSAID (P = 0.06). The results indicate that the improvement of the patients with chronic cervical spondylosis was more in CT plus exercise than analgesics. So, CT & neck muscle strengthening exercise may have some more beneficial effects than NSAIDs on chronic cervical spondylosis (7).

The group to which neural tissue mobilization, neck isometric exercises and hot pack were given, showed significant effects only on NDI scale and cervical rotation to both left and right sides, even Michael Shacklock also concluded in his study that Mobilization of the nervous system is an approach to physical treatment of pain. The method relies on influencing pain physiology *via* mechanical treatment of neural tissues and the non-neural structures surrounding the nervous system. Previous descriptions of this method have not clarified the relevant mechanics and physiology, including interactions between these two components. To address this, a concept of neurodynamics is described. The body presents the nervous system with a mechanical interface *via* the musculoskeletal system. With movement, the musculoskeletal system exerts non-uniform stresses and movement in neuraltissues, depending on the local anatomical and mechanical characteristics and the pattern of body movement. This activates an array of mechanical and physiological responses in neural tissues. These responses include neural sliding, pressurization, elongation, tension and changes in intra-neural microcirculation, axonal transport and impulse traffic (8).

The neural tissue mobilization could not show significant improvement on VAS scale, cervical flexion, and extension and side flexion. Also Mark T. Walsh studied and discussed about the basic science and the research that supports or refutes the efficacy of these techniques. There is sufficient biomechanical evidence that the peripheral nerve under tension undergoes strain and glides within its

interfacing tissue. Evidence supports that Upper Limb Neural Tension Test causes strain within the peripheral nervous system however; it is also evident that Upper Limb Neural Tension Test places strain on other multi-segmental tissues. Clinical investigation has examined intra-rater reliability and has begun to define the parameters of a positive test but there is lack of randomized controlled studies. There is limited evidence reporting favorable outcomes when using neural mobilization to treat specific patient populations, and the appropriate parameters of dosage (i.e., duration, frequency, and amplitude) remain to be confirmed. Clinical application of these techniques must be applied in a practical manner that relies on continual clinical reasoning (9).

Limitations of the Study

The size of the sample was small. Long-term follow-up could not be taken.

Conclusion

The study concluded that in patients with cervical spondylosis, a treatment combining cervical manual traction, neck isometrics and hot pack helps in reducing the pain, increasing the range of motion of cervical spine and efficiency in activities of daily living, as seen by improvement in VAS scale, active ROM of cervical spine and NDI scale respectively.

Cervical Manual Traction showed significantly better results on all outcome measures as compared to Neural Tissue Mobilization in patients with cervical spondylosis.

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