International journal of basic and applied research
www.pragatipublication.com
ISSN 2249-3352 (P) 2278-0505 (E)
Cosmos Impact Factor-5.86

Comparison between effectiveness of neck isometrics versus cervical mckenzie therapy in patients with cervical radiculopathy

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Abstract

IntroductionThe neck is a structure that stretches from the base of the skull and the inferior margin of the mandible above, to the shoulders and thorax below. It is formed of four major compartments: the vertebral compartment, the visceral compartment and the two vascular compartments on each side. Neck pain is a major public health problem which has a great effect on the individual in terms of pain and suffering, lost work days and health care costs. Cervical radiculopathy is a disorder of a nerve root and most often is the result of a compressive or inflammatory pathology from a space-occupying lesion.

method 30 patients with age group 20-50 years were selected by convenient sampling. Two groups consisting of 15 patients each were made. Patients in Group A was trained by using isometric exercises for neck flexors, neck extensors, neck rotators, and neck side flexors along with TENS and Group B was trained by using cervical McKenzie therapy along with TENS.

resultNo Significant improvement in pre and post scores of NPRS (p=0.617), NDI (p=0.015) and pressure biofeedback (p=0.118) was observed between the groups, but Group A was found clinically better than Group B.

Keywords: Cervical Radiculopathy, Isometric Exercises, McKenzie Therapy, Neck Pain, Pressure Biofeedback, TENS.

Received: 8 February **Revised: 17** February **Accepted: 24** February
Index in Cosmos
March 2019 Volume 9 Number 3
UGC Approved Journal

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www.pragatipublication.com
ISSN 2249-3352 (P) 2278-0505 (E)
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Manuscript

Introduction

The neck is a structure that stretches from the base of the skull and the inferior margin of the mandible above, to the shoulders and thorax below.Its formed of four major compartments: the vertebral compartment, which includes the cervical vertebrae and the associated postural muscles, the visceral compartment, containing glands like the thyroid, parathyroid, and thymus, and parts of both the respiratory and digestive tracts (larynx, pharynx, trachea, and esophagus), along with the two vascular compartments on each side that contain major blood vessels and the vagus nerve[1].

Neck pain is a major public health problem which has a major effect on the individual in terms of pain and suffering, lost work days and health care costs.Neck pain can arise due to muscular tightness in both the neck as well as upper back, or pinching of the nerves emanating from the vertebrae. There are specific muscles in the cervical spine when weakened tend to cause neck pain. Most common of these being the deep and anterior cervical flexors muscles[2].

Cervical radiculopathy is a disorder of a nerve root and most often it is resulted in compressive or inflammatory pathology from a space-occupying lesion such as a disc herniation, spondylitis, or cervical osteophytes[2,3].Pain is most prominent in acute cervical radiculopathy which diminishes as the condition becomes more chronic. It is described as sharp, achy, or burning pain located in the neck, shoulder, arm, or chest, depending on the nerve root involved.The location and pattern of symptoms may vary, depending on the affectednerve root level, and can include sensory and motor alterations if the dorsalor ventral nerve root is involved. Although patients with cervical radiculopathy usually have complaints of neck pain, the most often reason for seeking medical assistance is arm pain. Patients usually present with complaints of pain, numbness, tingling, and weakness in the upper extremity, which may result in significant functional limitations leading to disability[4]

Studies have identified impaired activation of the deep cervical flexor muscles, the longus colli and longus capitis, in people with neck pain[5,6]. Thus, exercise is one of the most frequently usedmodalities in the rehabilitation of subjects with neck pain to gain muscle strength and endurance[7].

Previous studies have shown that isometric exercises can have positive effects on neck pain.[8,9] Also some studies concluded that, TENS is more effective in the management of cervical radiculopathy along with isometric neck exercises in reducing pain. TENS has been increasingly used in physical therapy for the relief of pain.Earlier studies were conducted on cervical pain which reported that patients with cervical problems can be treated with McKenzie therapy for reduction of symptoms of cervical radiculopathy as an effective treatment[10].

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Method

Patients diagnosed with cervical radiculopathybetween 20 to 50 years of age and willing to join the study were selected by Simple random sampling. Screening was done for them by using spurling compression test. Totally 30 patients were selected for the study who fulfilled the criteria for inclusion.They were divided in 2 groups as group A and group B by using chit method.

Written consent was taken from all the patients and they were explained about the procedure according to their allotted groups. NPRS, Neck disability index and Pressure biofeedback for assessing strength of deep cervical flexor and extensor were assessed as an outcome measure before starting the first session as a part of pre assessment.

group A:

The subjects of group A were treated with isometric exercises for neck flexors, neck extensors, neck rotators, and neck side flexors with 7 sec hold and 10 repetitions, along with TENS with a duration of 10 minutes, frequency 5 Hz & high pulse duration current in 1 week, six sessions.

The electrode placement was decided as per the area of greatest intensity of pain along the nerve course or dermatomes.

group B:

The subjects of group B were treated with cervical McKenzie therapy wherein they were instructed to perform the following exercises:

- head retraction and neck extension in sitting position
- head retraction and neck extension in supine position
- left and right lateral bending
- head turning to right and left

These positions were maintained for 7 seconds, and repeated 10 times. And along with thisTENS was given over greatest area of pain for 10 min for 1 week, six sessions.

All the exercises were done under the therapist's supervision for both the groups. Pre- and post-intervention NPRS, NDI and pressure biofeedback scores were noted, and further statistical analyses was done.

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data analysis and interpretation

Table 1: Paired t test was used to compare pre-post scoresof group A.

GROUP A		
	mean±SD	p value
NPRS	4.733±1.944	<0.001
NDI	12.67±4.117	<0.001
BIOFEEDBACK	-28.4±11.59	<0.001

Table 2: Paired t test was used to compare pre-post scores of group B.

GROUP B		
	mean±SD	p value
NPRS	5.2±1.146	<0.001
NDI	16.33±4.608	<0.001
BIOFEEDBACK	-23.47±10.73	<0.001

Table 3:Unpaired t test was used to compare pre-post scores between group A and B.

UNPAIRED t TEST FOR BOTH GROUPS		
	mean±SD	p value
NPRS	5.2±1.586	0.216
NDI	16.3±4.68	0.015
BIOFEEDBACK	-23.47±11.26	0.118

Table 4-Comparison of NPRS score between the groups.

NPRS			
	PRE	POST	p-Value
GROUP A	6.73	2	0.216
GROUP B	7.6	2.4	

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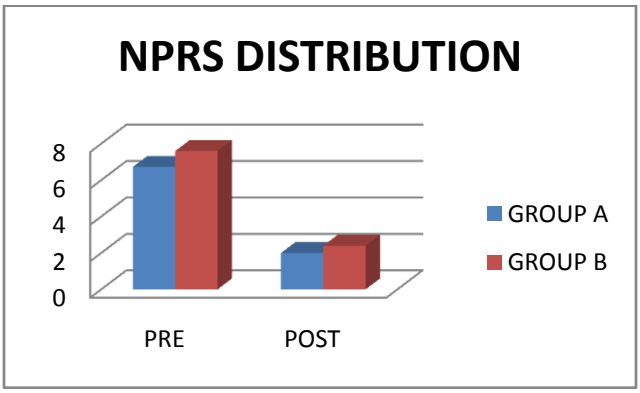
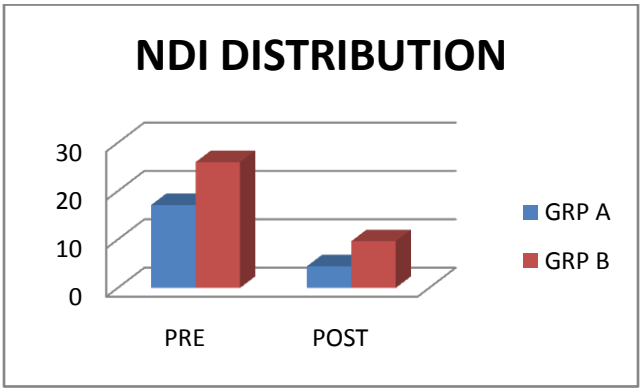


Graph 1

The above graph shows that there was a significant improvement in the NPRS scores of the subjects of both the groups who underwent their respective treatment sessions.

Table 5-Comparison of NDI score between the groups.

NDI			
	PRE	POST	p-Value
GROUP A	17.13	4.46	0.015
GROUP B	26	9.66	



Graph 2

The above graph shows that there was a significant improvement in the NDI scores of the subjects of both the groups who underwent their respective treatment sessions.

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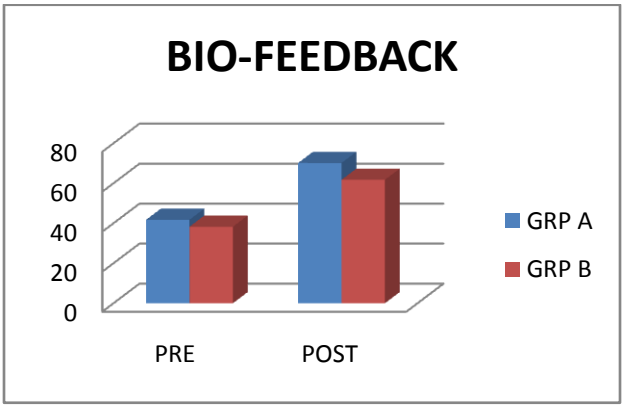
Table 6-Comparison of pressure biofeedback score between the groups.

BIOFEEDBACK			
	PRE	POST	p-Value
GROUP A	41.733	70.13	0.118
GROUP B	38.26	61.73	



Graph 3

The above graph shows that there was a significant improvement in pressure Biofeedback Reading of Group A as well as the Mc Kenzie therapy of Group B.

Result:

In this study, 30 patients with cervical radiculopathy were included based on the inclusion criteria, patients were treated with Neck isometrics in group A and Mc kenzie therapy in group B. Outcome measures were NPRS, NDI and Pressure biofeedback for assessing strength of deep cervical flexors and extensors. Data analysed by using professional statistics. Paired t test was used to compare pre and post intervention scores within the groups and was also used to compare pre-post scores between the groups.

Group A: By applying pairedt test for NPRS, NDI and Pressure biofeedback scores: Table 1 shows significant improvement in the NPRS scores with p value was <0.001, NDI scores with p value <0.001 and pressure biofeedback with p value <0.001.

Group B: By applying paired t test for NPRS, NDI and Pressure biofeedback scores: Table 2 shows significant improvement in the NPRS scores with p value was <0.001, NDI scores with p value <0.001 and pressure biofeedback with p value <0.001.

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Group A vs Group B:

1. By applying unpaired t test for NPRS scores: Table 4,Graph 1 shows that there was no significant improvement in the mean value of NPRS by using Neck Isometrics and Mckenzietherapy with p- values of 0.216. So effects of Neck isometrics and Mc Kenzie therapy are found equally significant clinically.
2. By applying unpaired t test for NDI scores:Table 5,Graph 2 shows that there was no significant improvement in the mean value of NDI by using Neck Isometrics and Mckenzie therapy with p- values of 0.015. So effects of Neck isometrics and Mc Kenzie therapy are found equally significant clinically.
3. By applying unpaired t test for Pressure Biofeedback scores: Table 6,Graph 3 shows that there was no significant improvement in the mean value of pressure biofeedback by using Neck Isometrics and Mckenzie therapy with p- values of 0.118. So effects of Neck isometrics and Mc Kenzie therapy are found equally significant clinically.

Discussion

Cervical radiculopathy may lead to the damage or disturbance of nerve function which results in compression of one of the nerve roots near the cervical vertebrae. It may lead to an inflammation of the nerve root or roots near the neural foramen. Neurological symptoms may include disc protrusion, degenerative changes or decrease in foraminal spaces, stenosis leading to an inflammatory response, osteophytic growth on the articular facets resulting in spondylosis or spondylolisthesis[11].

Due to all these changes, there are chances of developing pain in the cervical region or loss of sensation along the path of the nerve into the upper extremity, depending on where the damage roots are located.

30 subjects with cervical radiculopathy were selected randomly for the study. They were divided into 2 groups, group A and group B. both the groups comprised of 15 subjects each. Subjects of group A were given Neck isometrics with TENS and those of group B were given McKenzie therapy with TENS. Both the groups underwent their respective treatment sessions for 6 sessions in 1 week. Pre-treatment and post-treatment NPRS, NDI and Pressure Biofeedback readings were noted and analyses were done.

TENS is a widely used modality used as an alternative to medications for pain control.So in this study we have used TENS as a basic intervention for both the groups. The rationale for this treatment was provided by Melzack and Wall in1965 which is known as the gate control theory of pain. The mechanism involved is the stimulation of certain receptors that sends back impulses which has to pass into the spinal cord via the posterior root. These impulses arriving through relatively large-diameter nerves, effectively block any other (pain) impulses attempting to gain access to the cord. This decreases the pain temporarily. The other response to pain is the release of chemical mediators. The hypothalamus causes the pituitary gland to release β-endorphin that strongly inhibits pain. Other chemicals released at various levels in response to pain include the production of noradrenaline by

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the midbrain which causes inhibitory response to the activity of the spinothalamic tract. Also therelease of serotonine by the raphe nuclei inhibits the wide dynamic range neurons and the production of encephalin in the glomeruli in the laminae[12]

Isometric exercise is an astatic form of exercise in which a muscle contracts and produces a force without generating an appreciable change in the length of the muscle and without visible joint motion. Repetitive isometric contractions against near-maximal resistance have been shown to be effective method to improve isometric strength of a muscle. Functional demands usuallyinvolves the need to hold a position against a certain amount of resistance over a period of time. Hence, muscular endurance has been suggested to play an important role in maintaining sufficient postural stability than muscle strength. It also helps in preventing injuries during daily living tasks. In this study, the rationale to use neck isometrics was -

1. To activate the neck musculature by facilitating muscle firing
2. To minimize muscle atrophy when joint movement is not possible due to pain, spasm etc.
3. To re-establish neuromuscular control
4. To improve muscle strength without compromising with the joint integrity and without causing any pain
5. To develop postural stability
6. To develop static muscle strength in neck muscles to improve ROM.

The McKenzie method of Mechanical Diagnosis and Therapy (MDT) is an internationally acknowledged method of assessment and treatment for spinal pain. In general, exercises are used to strengthen muscles increase stability restore ROM etc. The McKenzie method exercises which were used here intended to directly and promptly diminish and eliminate the symptoms of the subjects. The exercises provided a beneficial and corrective mechanical directional end range loads to the underlying pain generator. Also, this method gave off an impression of being a good treatment option for the fact that McKenzie method was primarily performed by producing a power utilizing repeated end range movement in a direction that relieved the side effects of various subjects.

In this study, we have used Mc kenzie therapy as the efficacy of McKenzie protocol may be attributed to treatment of diminished spinal mobility resulting in shortening of the cervical spine. Therefore the structure requires a set of movements that support the procedure of remodeling. With the utilization of these loading actions, normal tissue function gets re-set up. Therefore McKenzie's therapy can not only be used as a set of exercises, but also as an intervention to lessen pain and enhance functional activity level.

Both the interventions were effective, although group A gave better results than group B. The p values of the NPRS, NDI, pressure biofeedback were<0.001 individually, whereas the p value for NPRS of both groups was 0.216, that of NDI was 0.0712 and that of pressure biofeedback was 0.118. A similar study can be performed with a larger sample size, taking into consideration gender, occupation and a different age group.

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Conclusion

Both the groups showed statistically significant improvements in the scores of NPRS, NDI, and Pressure Biofeedback when compared within the groups. So, statistically Group A (Neck isometrics with TENS) and Group B (McKenzie therapy with TENS) is equally effective. but when compared clinically, Neck Isometrics had shown better results than Mc Kenzie Therapy.

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Received: 8 February Revised: 17 February Accepted: 24 February
Index in Cosmos
March 2019 Volume 9 Number 3
UGC Approved Journal