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Effect of Muscle Energy Techniques and Ergonomic Consideration in Cervical Spondylosis

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ABSTRACT

Cervical spondylosis is a common degenerative condition and if not treated properly can lead to radiculopathy, myelopathy, pain and disability. There have been many treatment approaches, out of which Muscle Energy Technique can be an effective method. MET further has 2 techniques that is autogenic inhibition and reciprocal inhibition and these techniques have not been examined separately in previous literature. Additionally, the use of ergonomic pillow with MET has never been studied in cervical spondylosis. So this present study aims to study the effect of MET and ergonomic pillow in cervical spondylosis and also aims to compare the 2 techniques of MET. The present experimental study was performed among 60 individuals of both sexes between 45-60 age group. Cervical spondylosis will be diagnosed by the Spurling test and distraction test. For assessment goniometry, Plumb line, Numeric Pain Rating Scale and Neck disability index as used. On the basis of inclusion and exclusion criteria, the participants were divided into two equal groups of 30 each. Group A received Reciprocal inhibition MET along with pillow of a specific height, and group B received Autogenic inhibition MET along with pillow of a specific height for 4 weeks. The results showed MET and pillow use was effective in improving cervical range of motion, pain, neck disability and posture in both the groups, however the group A i.e. reciprocal inhibition was more effective as compared to autogenic inhibition. In conclusion following the application of Muscle Energy Technique with consideration of 4inch feather pillow is produced significant changes in pain, functional disability, Range of Motion and forward head posture. When compared there is results AIMET is superior to the RI-MET.

Keywords: cervical spondylosis, MET, pillow, pain, range of motion, disability

INTRODUCTION

The cervical spine, which consists of seven stacked vertebrae from C1 to C7, is an incredibly strong and flexible structure [1.] The cervical spine, which functions to carry out the numerous movements of the head and neck in relation to the trunk, is the body's most intricate articular system. The cervical spine is constantly moving, which exposes it to stress, strain, a variety of issues, including muscle stiffness and spasm, neck pain, disorders brought on by any trauma, such as whiplash injury, and changes in cervical curve. However, cervical spondylosis is the most widespread issue that affects people of all ages.

Cervical Spondylosis is a progressive degenerative disorder defined as "Vertebral osteophytosis secondary to degenerative disc disease'' of the human spine which is often caused by the natural aging process[2]. 25% of people under the age of 40, 50% of people over the age of 40, and 85% of people over the age of 60 have spondylotic alterations of the cervical spine, which are signs of degenerative changes. According to

Binder (2007), the point prevalence of neck discomfort in the general population ranges from 0.4% to 41.5%, the 1-year incidence is 4.8% to 79.5%, and the lifetime prevalence may reach 86.8%. Low back and neck discomfort continue to be prevalent, per the Global Burden of Diseases 2015 research.

The ligamentum flavum, posterior longitudinal ligament (PLL), and uncovertebral joints are only a few of the tissues that experience degenerative alterations that result in the narrowing of the spinal canal and intervertebral foramina. Axial neck discomfort, cervical myelopathy, and cervical radiculopathy are the three clinical symptoms that cervical spondylosis presents with as a result of possible compression of the spinal cord, spinal vasculature, and nerve roots[3].

The symptoms of cervical spondylotic myelopathy (CSM), are loss of manual dexterity, including difficulty writing, diffuse, nonspecific arm weakness, and abnormal sensations, and these are caused by compression of the spinal cord at one or more levels of the neck. According to Harrop et al. (2007), cervical spondylotic radiculopathy is brought on by nerve root compression in the neural foramina, which weakens the muscle that is innervated by the affected nerve root[4].

Neck movements, osteophytic spurs, herniated discs, and poor posture can all aggravate cervical nerve root and spinal cord irritation and compression[5]. According to a conservative estimate, 66% of patients exhibit a forward head position, which results in a muscular imbalance that causes stiffness in the neck extensors and weakness in the neck flexors (DNF).

In both healthy and pathological settings, postural muscles tend to shorten[6]. Therefore, improper loading of the facet joint and intervertebral disc will hinder night time rehydration and elasticity restoration, leading to intervertebral disc deterioration, if normal cervical lordosis is not maintained during sleep. 18% of individuals in a UK poll of 7669 adults reported having neck pain at the time of the survey, and 58% of those patients continued to report having pain one year later. Other signs and symptoms of cervical spondylosis include pain that is made worse by movement, referred pain at the occiput, in the area between the shoulder blades, in the upper limbs, or in the retro-orbital or temporal region (from C1 to C2), cervical stiffness that can be temporary or permanent, vague numbness, tingling, or weakness in the upper limbs, dizziness or vertigo, poor balance, rarely syncope, triggered migraine, "pseudo-angina", poorly localised tenderness, limited range of movement (forward flexion, backward extension, lateral flexion, and rotation to both sides), minor neurological changes like inverted supinator jerks[7].

The cervical spondylosis treatment plan is based on the patient's symptoms and condition severity. Different physiotherapy treatments are frequently used in both the acute and chronic phases. Pharmaceuticals like NSAIDS, anticonvulsants, and antidepressants are prescribed as part of non-surgical pain management. To stop additional harm to the cervical spine, patient education, exercise, and manual techniques are also useful treatments for cervical discomfort[3]. Studies show that individuals with cervical nerve root compression get successful surgical outcomes. However, according to Persson and Moritz (1997), the majority of research are either personal series or uncontrolled in other ways [8].

In terms of preference of techniques in the management of neck pain, exercise and manual therapy are most commonly applied by physiotherapists. Literature suggests muscle energy technique (MET) to be superior in improving neck pain and disability, but the effects on range of motion (ROM) are inconclusive[9].

MET is a technique in which patient voluntarily uses his muscle from a precisely controlled position

in a specific position. MET may be used to lengthen, shorten or spastic muscle, to strengthen weakened muscles, to reduce localised oedema and to mobilize restricted

joint[10]. In MET there are three types of contraction that is isometric, isotonic and isolytic. It has two specific inhibition reflex, autogenic inhibition reflex (AI) and reciprocal inhibition reflex (IR). The two physiological principles on which MET is based on are Post isometric relaxation (PIR) and reciprocal inhibition (RI).

Reciprocal inhibition (RI) is an indirect manual therapy technique. This muscle energy activation utilizes the reflex mechanism of reciprocal inhibition when antagonistic muscles are contracted. Autogenic inhibition (AI) includes post isometric relaxation (PIR) and post facilitation stretch (PFS). Post-isometric inhibition is also called as Lewit's PIR[11]. The exact mechanism for MET-induced pain relief is still unknown, although it has been proposed that MET act on joint proprioceptors and mechanoreceptors that will result in an effect on descending pathways, changing the motor programming of the target joint[12].

In previous study the reduction in functional disability in MET group initially can be explained by the reduction in symptoms, which was produced by shortening of postural muscles that is upper trapezius, levator scapulae and scalene. The initial improvement in extension and side flexion ROM (left and right) can be due to stretching of superficial muscles that is upper trapezius and levator scapulae. Flexion and rotation ROM (left and right) are improved later due to deep orientation of scalene muscles. Whereas, reduction in pain and improvement in ROM in the DNF training group initially can be due to reduction in cervical impairment, due to craniocervical flexion which is the principal action of DNF[6] .

The possible mechanism for the reduction in pain in the MET group can be attributed to the hypo analgesic effects which can be explained by the inhibitory Golgi tendon reflex, activated during the isometric contraction that leads to reflex relaxation of the muscle. Activation of muscle and joint mechanoreceptors leads to sympatho excitation evoked by somatic efferents and localized activation of the preaqueductal gray matter that plays a role in descending modulation of pain.

Combination of contractions and stretches (as used in METs) might be more effective for producing viscoelastic change than passive stretching alone, because the greater forces could produce increased viscoelastic change and passive stretching[13]. Moreover, to the best of our knowledge, currently no study exists focusing on the immediate effects of autogenic inhibition (AI) and reciprocal inhibition (RI) METs in the management of neck pain[14]. The present study was planned to compare the effects of autogenic and reciprocal inhibition technique of MET in the management of mechanical neck pain in terms of pain, disability, ROM and posture.

Additionally, many practitioners and physical therapists recommend that patients use appropriate cervical pillows to relieve neck pain and stiffness along with conservative therapeutic approaches such as exercise, electrotherapy modalities, cervical collars and traction. It is thought that cervical pillows may allow disc rehydration through preserved cervical lordosis and by reducing the load exerted on the intervertebral discs. The main role of a pillow during sleep is to support the cervical spine in a neutral position. This prevents adoption of more ‘‘end-range’’ cervical spine postures during sleep, which are believed to increase biomechanical stresses on cervical spine structures. This can compromise pain sensitive structures and produce waking symptoms, such as cervical pain and stiffness, headache, scapular or arm pain. So, the present study will focus on the use of appropriate pillow for management of cervical spondylosis.

However, there are no studies that show the effect of MET in combination with specific pillow height and limited studies have dealt with biomechanical outcomes, such as range of motion which is a well-known clinical manifestation of cervical spondylosis[15].

Consequently, this study aimed to evaluate the effectiveness of ergonomic pillow in conjunction with METs in improving the clinical such as disability index, pain severity and biomechanical such as cervical range of motion and posture[16]. Furthermore, the study also aims to compare 2 techniques of MET, i.e. Reciprocal Inhibition and Autogenic inhibition.

REVIEW OF LITERATURE

Author	Sample	Intervention and Outcome measures	Results	Conclusion
Kim *et al*. (2015)[17]	16 asymptomatic adults 20 to 30 years.	All patients were put in supine lying using different heights of pillow. Thoracic inlet angle (TIA), thoracic inlet slope (TIS), neck tilt (NT) and cobb's angle parameters were noted before and after intervention	Increasing the height of pillow increased the TIS and cobb's angle but NT decreased.	This study concluded that 10cm height of pillow is convenient height for the normal cervical lordotic curve.
Toshniwal and Amarntha (2019) [18]	26 participants Group A (N=13) =Conventional treatment 13 Group B (N=13)= conventional with MET	All the subjects were treated once a day continuously for 2 weeks. VAS, CROM, posture and pectoralis minor muscle tightness were assessed before and after treatment	Significant changes were seen in both techniques. However VAS score, FHP improved PMi tightness reduced in Group B which received but MET and CT. But there was no significant difference seen between the two groups in improvement of CROM.	MET in addition to CT was found to be more effective in reducing VAS score, improving FHP and reducing PMi tightness Thus, MET should be added to routine clinical practice.
Erfanian *et al.* (1998) [19]	105 participants Divided into four groups Group A Group B Group C Group D	Patients were asked to choose pillow size as comfortable for them and then supine and normal positioning of sleeping suggested. The parameters such as pain level, sleep quality and comfort level offered by the pillow were assessed pre and post pillow use	As a result the significant correlation between the pillow and the head posture depends upon the different pillow sizes.	It is concluded that one size pillow does not fits to all.
Muhammad Osama (2020)[14]	78 participants Group A = SS Group B= AI-MET Group C= RI-MET	All the participants received Transcutaneous Electrical Nerve Stimulation (TENS), hot pack and unilateral posteroanterior glide, followed by 3–5 repetitions of either static stretching (SS), AI-MET or RI-MET for five consecutive sessions. Numeric pain rating scale (NPRS) and Modified Sphygmomanometer Dynamometry (MSD)	A significant difference was observed in terms of isometric muscle strength in all groups. Both SS and MET are effective in muscle strengthing	AI and RI are more effective than SS AI more superior than RI.
Yadav *et al.* (2015) [6]	33 participants Group A= Conventional treatment Group B= Deep Neck Flexors) training with conventional treatment Group C= Conventional treatment with MET	Group A received conventional treatment such as MHP (Moist Heat Pack), Static Stretching exercises, Cervical spine nonthrust mobilization, Cervical spine active ROM (Range of Motion) exercises and Postural exercises. Group B received DNF training with conventional treatment. Group C received MET in addition to conventional treatment VAS, NDI and ROM	Significant change in mean score of VAS, NDI and ROM in all groups. After 2 weeks treatment.	Significant improvement in all the 3 groups, but more improvement was found in group B. So it is predicted from the results that patient pain, cervical flexion and extension ROM can be improved following DNF training as an adjunct to conventional treatment
Fazli *et al.* (2019) [20]	38 participants Group A= Experimental group Group B= Control group	Experimental group receives ergonomic latex pillow Control group receives usual pillow for the supine and side lying sleeping The CV angle and flexor and extensor muscle endurance were measured before and after the intervention.	Experimental group shows the significant changes in the cranio-vertebrae angle and extensor muscle endurance as compared to the control group	Ergonomic latex pillow can effects the changes in the cranio-vertebrae angle and extensor muscle endurance in cervical spondylosis patients.
Jhaveri and Gahlot (2018)[13]	40 participants The age between 20 to 40 years 20 subjects in each group Group A= Myofascial release technique(MFR) Group B= Muscle energy technique (MET)	Group A received 5 to 7 repetitions of MFR while Group B received 3 repetitions of MET for 7 sessions. Both groups evaluate the VAS, ROM and NDI scales before and after the treatment of 4 weeks.	Results showed a statistically significant difference ($p < 0.05$) showing improvement in mean of VAS, CROM, NDI before and after intervention within groups	MET found to be significantly more effective than MFR in improving pain, cervical disability and cervical movements for subjects with chronic trapezitis

MATERIALS & METHODS

The present experimental study was performed among 60 individuals taken from physiotherapy OPD, Private physiotherapy clinics and hospitals. Ethical clearance was obtained from Institutional Ethical Committee. A random (convenient) sampling method was used. Individuals were screened based on the inclusion and exclusion criteria. Inclusion criteria included cervical spondylosis patients of both sex between 45-60 age group. Exclusion criteria included healthy people, patients who are already taking treatment, patients with any other musculoskeletal disease or neck pain due to any other cause.

Participants of the study were given detailed information about the purpose, aims, objectives, procedure of the research in the language which is easily understood by the subjects and then a voluntary consent was also obtained. Cervical spondylosis will be diagnosed by the Spurling test[21] and distraction test[22]. Thereafter cervical spondylosis will be assessed for cervical range of motion by using Goniometry[23], posture using Plumbline[24]. The intensity of pain will be investigated by using Numeric Pain Rating Scale[25] and for the investigation of the neck disability Neck disability index[26] was used.

On the basis of inclusion and exclusion criteria, the participants will be divided into two equal groups of 30 each. Group A will receive Reciprocal inhibition muscle energy technique along with pillow of a specific height, and group B will receive Autogenic inhibition muscle energy technique along with pillow of a specific height for 4 weeks. The pre and post assessment will be taken on Day 1 and on the end of 4th week respectively.

STATISTICAL ANALYSIS

Table 1 shows the average of age of the individuals

Group	Mean age (years)	N	Std. Deviation	Std. Error Mean
A(RECIPROCAL INHIBITION)	49.03	30	6.589	1.203
B (AUTOGENIC INHIBITION)	49.13	30	6.580	1.201

GROUP-A PARAMETERS

Table 2 shows the comparison between pre and post test values of cervical range of motion– goniometer of group A.

	Mean	Std. Deviation	Std. Error Mean
Pre cervical flexion	28.667	10.0801	1.8404
Post cervical flexion	38.000	7.2635	1.3261
Pre cervical extension	34.333	11.3512	2.0724
Post cervical extension	42.500	9.3541	1.7078
Pre cervical rotation	50.833	13.0042	2.3742
Post cervical rotation	60.167	10.8662	1.9839
Pre cervical lateral flexion	24.833	8.1456	1.4872
Post cervical lateral flexion	34.333	6.1214	1.1176

Table 3 shows the comparison between pre and post test values of pain- numeric pain rating scale of group-A.

	Mean	Std. Deviation	Std. Error Mean
Pre- numeric Pain rating scale	7.233	1.4547	.2656
Post numeric Pain rating scale	2.667	1.7486	.3192

Table 4 shows the comparison between pre and post values of disability- neck disability index of group-A

	Mean	Std. Deviation	Std. Error Mean
Pre-neck Disability Index	**23.567**	**7.9294**	**1.4477**
Post-neck Disability Index	9.767	4.8614	.8876

Table 5 represents the correlation between pre and post test values of cervical range of motion, numeric pain rating scale and neck disability of group-A

	Correlation	Sig.
Pre cervical flexion & Post cervical flexion	.892	.000
Pre cervical extension & Post cervical extension	.926	.000
Pre cervical rotation & Post cervical rotation	.810	.000
Pre cervical lateral flexion & Post cervical lateral flexion	.689	.000
Pre-pain numeric pain rating scale & Post pain numeric pain rating scale	.737	.000
Pre -disability neck disability index & post disability neck disability Index	.845	.000

Table 6 shows the comparison between the pre and post test values of forward head posture- plumb line test of group A using paired-t test.

	PRESENT	ABSENT
Pre-forward Head posture	86.7	13.3
Post-forward Head posture	43.3	56.7

Table 7 shows the comparison between pre and post test values of cervical range of motion– goniometer of group B.

	Mean	Std. Deviation	Std. mean error
Pre cervical flexion	30.000	9.9134	1.8099
Post cervical flexion	42.667	6.9149	1.2625
Pre cervical extension	35.667	10.3168	1.8836
Post cervical extension	49.667	8.1931	1.4958
Pre cervical rotation	49.333	12.3689	2.2582
Post cervical rotation	65.833	8.2088	1.4987
Pre cervical lateral flexion	30.333	9.0019	1.6435
Post cervical lateral flexion	40.833	4.7495	.8671

Table 8 shows the comparison between the pre and post test values of pain- numeric pain rating scale of group-B

	Mean	Std. Deviation	Std. MeanError
Pre numeric pain rating scale	7.167	1.7436	.3183
Post numeric pain rating scale	2.700	1.4890	.2719

Table 9 shows the comparison between the pre and post test values of disability- neck disability index of group- B.

	Mean	Std. Deviation	Std. Error Mean
Pre-Neck Disability Index	21.667	8.7349	1.5948
Post-Neck Disability Index	7.000	4.7416	.8657

Table 10 represent the correlation between pre and post test values of cervical range of motion, Numeric pain rating scale and Neck disability index of group-B.

	Correlation	Sig.
Pre cervical flexion & post cervical flexion	.817	.000
Pre cervical extension & post cervical extension	.808	.000
Pre cervical rotation & post cervical rotation	.710	.000
Pre cervical lateral flexion & post cervical lateral flexion	.746	.000
Pre numeric pain rating scale & post numeric pain rating scale	.870	.000
Pre neck disability index & post neck disability index	.843	.000

Table 11 shows the comparison between the pre and post test values of forward head posture- plumb line test of group B using paired-t test.

	PRESENT	ABSENT
Pre-forward head Posture	83.3	16.7
Post- forward head Posture	40.0	60.0

Table 12 represent the comparison of pre and post cervical range of motion values, numeric pain rating scale values, neck disability index values between group A and B.

	Group	N	Mean	Std. Deviation	Std. Error Mean	Significance
Pre cervical flexion	A	30	28.667	10.0801	1.8404	
	B	30	30.000	9.9134	1.8099	
Post cervical flexion	A	30	38.000	7.2635	1.3261	.013
	B	30	42.667	6.9149	1.2625	
Pre cervical extension	A	30	34.333	11.3512	2.0724	
	B	30	35.667	10.3168	1.8836	
Post cervical extension	A	30	42.500	9.3541	1.7078	.003
	B	30	49.667	8.1931	1.4958	
Pre cervical rotation	A	30	50.833	13.0042	2.3742	
	B	30	49.333	12.3689	2.2582	
Post cervical rotation	A	30	60.167	10.8662	1.9839	.026
	B	30	65.833	8.2088	1.4987	
Pre cervical lateral flexion	A	30	24.833	8.1456	1.4872	
	B	30	30.000	9.0019	1.6435	
Post cervical lateral flexion	A	30	34.333	6.1214	1.1176	.000

	B	30	40.833	4.7495	.8671	
Pre numeric pain rating scale	A	30	7.233	1.4547	.2656	
	B	30	7.167	1.7436	.3183	
Post numeric pain rating scale	A	30	2.667	1.7486	.3192	.937
	B	30	2.700	1.4890	.2719	
Pre neck disability index	A	30	23.567	7.9294	1.4477	.030
	B	30	21.667	8.7349	1.5948	
Post neck disability index	A	30	9.767	4.8614	.8876	
	B	30	7.000	4.7416	.8657	

RESULT

The study was conducted on 60 subjects with cervical spondylosis. The subjects were divided into two groups, one group (A) with 30 subjects received Reciprocal inhibition MET with a pillow of specific height and the other group (B) received Autogenic inhibition MET with a pillow of specific height. The mean age of the participants in group A and B was 49.03±6.5 years and 49.13±6.5 respectively.

The Pre treatment values for group A are pre cervical flexion 28.66±10.0801, pre cervical extension is 34.33±11.3512, pre cervical rotation 50.833±13.0042, pre cervical lateral flexion 24.833±8.1456, pre Numeric pain rating scale is 7.233±1.4547, pre Neck disability index is 23.567±7.9294 and pre forward head posture is present in 86.7% population absent in 13.3% population. After the treatment with Reciprocal inhibition and pillow of a specific height the values of group A are, post cervical flexion 38.00±7.2673, post cervical extension 42.50±9.3541, post cervical rotation 60.167±10.8662, post cervical lateral flexion 34.333±6.1214, post numeric pain rating scale is 2.667±1.7486 and neck disability index is 9.767±4.8614 the forward head posture in group A is present in 43.3% and absent in 56.7%.

The Pre treatment values for group B are, pre cervical flexion 30.000±9.9, pre cervical extension 35.667±10.3168, pre cervical rotation 49.333±12, pre cervical lateral flexion 30.333±9.0, pre numeric pain rating scale 7.167±1.7, pre neck disability index 21.66±8.7, pre forward head posture was present in 83.3% and absent value is 16.7%. After the treatment with Reciprocal inhibition and pillow of a specific height the values of group B are, post cervical flexion 42.667±6.914, post cervical extension 49.667±8.1, post cervical rotation 65.833±8.2, post cervical lateral flexion 40.833±4.7, post numeric pain rating scale 2.700±1.4, post neck disability index 7.000±4.7 and post forward head posture was present in 40.0% and absent in 60.0%.

Within the group comparison of pre and post treatment values showed the correlation and significance. In group A the correlation and significance between the pre and post cervical flexion is 0.892 and 0.000, pre and post cervical extension is 0.926 and 0.000, pre and post cervical rotation is 0.810 and 0.000, pre and post cervical lateral flexion is 0.689 and 0.000, pre and post numeric pain rating scale is 0.737 and 0.000 and pre and post neck disability index is 0.845 and 0.000 respectively.

In group B the correlation and significance between the pre and post cervical flexion is 0.817 and 0.000, pre and post cervical extension is 0.808 and 0.000, pre and post cervical rotation is 0.710 and 0.000, pre and post cervical lateral flexion is 0.746 and 0.000, pre and post numeric pain rating scale is 0.870 and 0.000 and pre and post neck disability index is 0.843 and 0.000.

Between the groups comparison was done independent sample test shows the comparison of Group A and Group B in pre and post observation. In pre observation analysis the significant value of pre cervical flexion is 0.785, pre cervical extension is 0.644, pre cervical rotation is 0.479, pre cervical lateral flexion is 0.916, pre neck disability index value is 0.380. In post observation analysis the significant value of post cervical flexion 0.838, post cervical extension 0.152, post cervical rotation 0.079, post cervical lateral flexion 0.201, post neck disability index 0.739.

The findings of the current study show a significant difference ($p < 0.05$) between the

two groups in terms of improving range of motion of cervical and reduce the pain, functional disability and forward head posture, after the 1st and 4th week treatment session, with participants in the autogenic inhibition MET exhibiting greater average values for range of motion and reduce the pain, functional disability and forward head posture as compared to reciprocal inhibition MET.

DISCUSSION

This present study was done to examine the effect of Muscle energy techniques on cervical spondylosis. MET is defined as a manual treatment in which a patient produces a contraction in a precisely controlled position and direction against a counterforce applied by a manual therapist[12].

The possible mechanism for pain reduction in MET group can be explained by inhibitory Golgi Tendon reflex, activated during isometric contraction that leads to reflex relaxation of muscle. Activation of muscle and joint mechanoreceptors leads to sympathoexcitation evoked by somatic efferents and localized activation of periaqueductal grey matter that plays a role in descending modulation of pain. Whereas the effects of MET component for increase in ROM post treatment can be explained on the basis of physiological mechanisms behind the changes in muscle extensibility – reflex relaxation, viscoelastic change, and changes to stretch tolerance[6].

The results obtained in previous study explain for pain in MET group were in consensus with the previous study in which pain intensity was reduced following the MET over the neck area and over other parts of the body. On the other aspect, impairment in craniocervical flexors muscle performance appears to be a feature in some chronic neck disorders.

In present study the range of motion, pain intensity, neck disability and posture were evaluated in cervical spondylosis population. 60 patients who complain of neck pain were selected for this study following stratified sampling method. All subjects were divided into two equal groups, 30 subjects in each group. Group A subject receives the Reciprocal Inhibition of Muscle Energy Technique (MET). And Group B subject receives the Autogenic Inhibition of Muscle Energy Technique.

In procedure of this study both the participating group receives the MET with ergonomic 4inch feather pillow for 4 weeks treatment.

The measurements were taken before treatment of 4 weeks then after 4 weeks of treatment. The parameters include Goniometer for measuring the Range of Motion, Numeric Pain Rating Scale for measuring the intensity of pain, Neck disability index for measuring neck disability and plumbline test for forward head posture.

In Group A includes 30 subjects receive reciprocal inhibition MET along with ergonomic pillow. The RI included stretching but contrary to AI, i.e. Stretching of one side and isometric contraction of the other side of neck i.e. antagonist muscle side with the 50% of total patient's effort was followed. This position holds for 10 seconds, while agonist's muscle was still in the stretched position, with 5 seconds of rest after every repetition. This procedure was repeated 5 times and the patient was suggested to take 4inch size of feather pillow. Group B also includes the 30 subjects, who received Autogenic inhibition MET along with pillow. AI included stretching of one side and performing isometric contraction with 50% of the total patient's effort in the same side that was being stretched and position hold for 10 seconds, with 5 seconds of rest after every repetition. This procedure was repeated 5 times. The only difference between both techniques is that for autogenic inhibition isometric contraction of the involved muscle was performed while for reciprocal inhibition the isometric contraction of the antagonist's muscle was performed; the overall procedure remained the same. Repeat same procedure to take

measurement after the 4 weeks.

The findings of the current study show a significant difference ($p < 0.05$) between the two groups in terms of improving range of motion of cervical and reduce the pain, functional disability and forward head posture, after the 1st to 4th week treatment session, with participants in the autogenic inhibition MET exhibiting greater average values for range of motion and reduce the pain, functional disability and forward head posture as compared to other groups.

Fryer has suggested that MET may stimulate joint and muscle proprioceptors, producing an improvement in deep segmental muscle recruitment, motor control, and joint stability. The range of motion of cervical is improving by the mechanism of rhythmic repetitive muscle contractions performed during MET may relieve passive congestion in the paraspinal muscles, as a result of fluctuating blood and lymph pressure gradients propelling fluid throughout the body. It has also been suggested that drainage of fluid from the zygapophyseal joint and segmental muscles may achieve a change in ROM and end-feel[27]. M. Osama et al. showed more improvement in pain scores at the last session as compared to 1st session in both groups. This might be due to the difference between outcome measures. They used numerical pain rating scale while the current study used VAS, which is more sensitive to measuring pain level. Another reason could be the difference between treatment sessions[28].

Another study by Phadke et al. conducted on the effect of post-isometric relaxation (AI) versus static stretching also showed similar results as the current study in terms of reducing pain level[9] Findings of the study conducted by Mahajan et al., 2021 showed that even though both the treatments were found to be effective in terms of alleviating pain and improving range of motion were observed[29]. These findings were consistent with the findings reported by Wilson et al. who found MET to be effective in decreasing disability in neck pain[30].

CONCLUSION

There is a significant reduction of pain, functional disability and significant reduction in forward head posture in both groups. There is also improvement in range of motion of cervical in both groups. However the improvement was more significant in group B that concludes that the autogenic inhibition MET is superior than the reciprocal inhibition MET.

So, this study concludes that the following application of Muscle Energy Technique with consideration of 4inch feather pillow is produced significant changes in pain, functional disability, Range of Motion and forward head posture. When compared there is results AIMET is superior to the RI-MET.

Future Scope

The findings of the present study have important clinical implications for management of cervical spondylosis among old age, given the positive correlation between MET, pillow of specific height and cervical range of motion, pain, neck disability and forward head posture has been found. This study revealed that Autogenic inhibition can produce better effect than Reciprocal inhibition. Along with MET a pillow of specific height can also improve the condition of cervical spondylosis. Therefore health care professionals can encourage the use of specific height pillow along with MET for the betterment of individuals with cervical spondylosis.

Limitations: This present study was a short-term study with small sample size. Certain factors like medications, life style, sleeping pattern were not controlled. There was unknown the use of pillow by the subjects.

Declaration by Authors

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