Section: Physical Medicine and Rehabilitation

Original Research Article

EFFECT OF MUSCLE ENERGY TECHNIQUE AND MCKENZIE EXERCISE IN IMPROVING DISABILITY AND REDUCING PAIN IN COLLEGE STUDENTS WITH MECHANICAL NECK PAIN

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Abstract

Background: Neck pain is a common problem, with an annual incidence of approximately 15%. Cervicalgia is another name for neck pain. that students subject themselves to hours of prolonged reading, writing, and computer work, making them a high-risk group for neck pain. This study aimed to investigate the effect of the Muscle Energy Technique and McKenzie Exercise on Students with Mechanical Neck Pain. **Material and Methods:** This quasi-experimental research design included 30 patients at the Government Vellore Medical College and Hospital for one year. Group A received the Muscle Energy Technique, Group B received the McKenzie exercise, and Group C received static stretching. Post-test measures were taken after six weeks of training. The treatment duration was 15-20 minutes per session, with 3 sessions per week for 6 weeks. **Results:** There was a significant difference in VAS and NDI scores among the three groups ($p<0.05$). The post-test mean value showed improvement in all three groups, with greater improvements observed in the Muscle Energy Technique group. The VAS and NDI values were lower in group A than in the other two groups. **Conclusion:** Our study shows that these three treatments are effective at reducing pain and disability. However, Muscle Energy Technique has shown better results in reducing pain and disability in patients with mechanical neck pain.

INTRODUCTION

Neck pain is one of the most common musculoskeletal disorders among the general population. The point prevalence ranges from 10 to 22% and up to 38% in the elderly population, while the lifetime prevalence ranges from 14.2% to 71%. Cervicalgia is another name for neck pain. The International Association for the Study of Pain defines neck pain as: "Pain perceived as arising from anywhere within the region bounded superiorly by superior nuchal line, inferior by an unoriginally transverse line through the tip of the first thoracic spinous process, and laterally by sagittal plane tangential to the lateral border of the neck". Mechanical neck pain is a generalised neck and/or shoulder pain with mechanical characteristics, including symptoms provoked by maintained neck postures, neck movement, or palpation of the cervical muscles. The source of symptoms in mechanical neck pain is not completely understood but has been purported to be related to various anatomical structures, particularly the zygapophyseal or uncovertebral joints of the cervical spine. Students subject themselves to hours of prolonged reading, writing, and computer work which puts them at a high risk for neck pain.

Aim

This study aimed to investigate the effect of the Muscle Energy Technique and McKenzie Exercise on Students with Mechanical Neck Pain.

MATERIALS AND METHODS

This quasi-experimental study was conducted on 30 students with mechanical neck pain at the Government Vellore Medical College and Hospital, Vellore, for one year. The study was approved by

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the Institutional Ethics Committee before initiation, and informed consent was obtained from all patients.

Inclusion Criteria

Students age group 18-23 years (both male and female), VAS score (4-8) moderate pain, neck disability index > 10, and neck pain of minimum duration of the past 3 weeks were included.

Exclusion Criteria

Students with signs of serious pathology in the neck, history of recent surgeries in the previous 12 months, history of trauma or fractures in the cervical spine, signs of cervical radiculopathy, myelopathy, IVDP or thoracic outlet syndrome, signs of cervicogenic headache, signs of myofascial pain syndrome, facet joint syndrome, ligament instability, or malignancies were excluded from the study.

Methods

The method of randomisation was that students who reported first, second, and third at our outpatient clinic were assigned to Groups A, B, and C, respectively, with 10 in each group.

Group A: Muscle Energy Technique: It involves a post-isometric relaxation technique for the upper trapezius and levator scapulae muscles (Figure 1: A and B). The therapist takes the agonist muscle to a comfortable location before the tension barrier and holds the position. The therapist provided equal resistance to the participant contracting the agonist muscle with approximately 30% of their strength, for 7-10 seconds. The participant relaxed for approximately 5 seconds. Upon exhalation, the therapist moved the muscle to a new restriction barrier with an additional gentle stretch passing it (without pain), to a new starting point for safety, and to reduce contraction. Furthermore, the participant could assist in assuming this position. This position can also be held for 10-60 seconds before the next isometric contraction occurs. This process was repeated three to five times.

Group B: McKenzie exercise: This included neck retraction, neck flexion, neck retraction and extension, retraction and rotation, retraction, and lateral flexion (Figure 1: C, D, E, F, G). Each exercise was repeated 5-10 times per session and held for 5–10 s.

Group C: Control group: levator scapula stretching (Figure 1: H, I). Patient position: sitting upright on a chair. Rotate your head by 45° to the left. Place your left hand behind your head and gently pull it at an angle to the knee. Hold for 10 to 15 seconds, repeat 5 to 10 times, and repeat on to the opposite side. Stop the movement when you feel a slight sting on the right side of your neck.

The pre-test scores of the Neck Disability Index (NDI) and Visual Analogue Scale (VAS) were recorded. Post-test scores were obtained at the end of treatment on the Neck Disability Index (NDI) and Visual Analogue Scale (VAS). The treatment duration was six weeks.

Upper Trapezius stretching: Instruct the patient to slowly tilt your head sideways bringing the left ear towards the left shoulder. They felt a gentle stretch along the right side of the neck and shoulders. Hold for 10 to 15 seconds, repeat 5 to 10 times, and repeat on to the opposite side.

Muscle Energy Technique: Muscle Energy Technique (MET) was first described by Fred Mitchell.[1] MET is a soft tissue osteopathic manipulation method that incorporates precisely directed, isometric and isotonic contraction to improve musculoskeletal function and reduce pain.[2-5] MET can be used to stretch or lengthen muscles and fascia that lack flexibility. MET requires the patient to create a force by activating the targeted musculotendinous unit against a precisely directed counterforce applied by the therapist, followed by relaxation and passive stretch.

McKenzie exercises: The McKenzie method also called as MDT- Mechanical Diagnosis and Therapy. Intervention component of the McKenzie method. [6-10] represent the corresponding repeated and/or sustained flexion and extension movements. The McKenzie method uses an approach that includes postural awareness and repetitive movement with the fundamental idea that a converse power can diminish pain and return functions.

Stretching Exercises: Stretching involves the application of manual or mechanical force to elongate (lengthen) adaptively shortened and hypomobile structures. Stretching is believed to provide many physical benefits, including improved flexibility, injury prevention, and improved muscle performance.[11] Promotion of healing, and possibly decreased onset of muscle soreness. Static stretching involves stretching a muscle to a point of discomfort and holding the stretch for a length of time, followed by a return to the normal resting muscle length.

Statistical Analysis

All data analyses were performed using the computer software SPSS for Windows. All data collected were compared using paired ‘t’ test and one-way ANOVA technique and ‘F’ test and a p-value of 0.05 was considered statistically significant.

A

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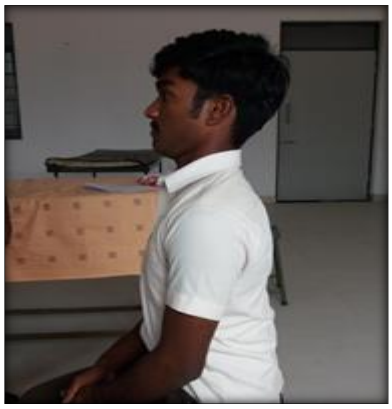
B



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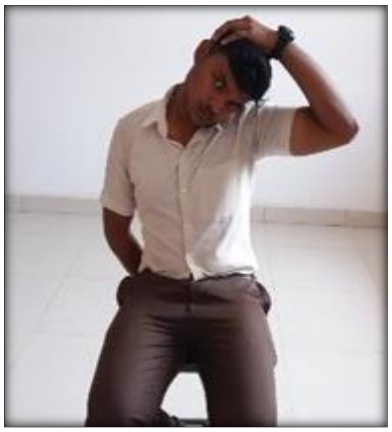

I

Figure 1: (A) Post-isometric relaxation for upper trapezius (B) Post-isometric relaxation for levator scapulae (C) Neck retraction (D) Neck flexion (E) Neck

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retraction and extension (F) Retraction and rotation (G) Retraction and lateral flexion (H) Levator scapula stretching (I) Upper trapezius stretching.

RESULTS

This study included 30 patients who were divided into three groups of each 10 patients.

There was a significant difference in the VAS and NDI scores among the three groups. [Table 1]

Using the Visual Analogue Scale for Groups A, B, and C, the calculated 'F' ratio was 14.643 (Table 2). For 2 and 27 degrees of freedom at a 5% level of significance, the table 'F' ratio was 3.35. The pain was significantly affected by VAS.

Neck Disability Index for Groups A, B, and C, the calculated 'F' ratio was 6.528. For 2 and 27 degrees of freedom at a 5% level of significance, the table 'F' ratio was 3.35. There was a significant effect of disability on the NDI. [Table 2]

Table 1: Comparison of VAS and NDI scale between the three groups

		Group A	Group B	Group C	P value
VAS scale	Pre-test	77	63	47	<0.05
	Post-test	57	51	43	
	Mean difference	20	12	4	
NDI scale	Pre-test	200	168	145	<0.05
	Post-test	158	154	141	
	Mean difference	42	14	4	

Table 2: Tabular presentation of one-way ANOVA for VAS and NDI scale

One way ANOVA		Source of Variation		Calculated 'F' ratio	Table 'F' ratio	P- value
		Between samples	Within samples			
VAS scale	Sum of Squares	9.87	9.1	14.643	3.35	<0.05
	Degree of freedom	2	27			
	Mean square	4.935	0.337			
NDI scale	Sum of Squares	9.87	9.1	14.643	3.35	<0.05
	Degree of freedom	2	27			
	Mean square	4.935	0.337			

DISCUSSION

Paired 'T' test results show that the pretest and post-test values of the Visual Analogue Scale for Group A, B and C, for 9 degrees of freedom and at a 5% level of significance, the table 't' value is 2.262 (Table 1), and the calculated 't' value for a group are 13.45, 7.292 and 2.430 respectively. Since the calculated 't' value is greater than the table 't' value null hypothesis is rejected. Hence, there was a significant effect on VAS in all groups. The pretest and post-test values of the Neck Disability Index for Group A, B and C are using paired 'T' test, For 9 degrees of freedom and at a 5% level of significance, the table 't' value is 2.262 (Table 1), and the calculated 't' value for a group are 16.797, 8.674 and 2.478 respectively. Since the calculated 't' value is greater than the table 't' value null hypothesis is rejected. Hence, there was a significant effect of all groups on the NDI.

The results of one-way ANOVA showed that the Visual Analogue scores for Groups A, B, and F' were 14.643 (Table 2). For 2 and 27 degrees of freedom at the 5% level of significance, the table 'F' ratio was 3.35. Since the calculated 'F' ratio is more than the table value 'F' ratio null hypothesis is rejected. Hence, there was a significant effect of pain on the VAS.

Neck Disability Index for Groups A, B, and C, the calculated 'F' ratio was 6.528 (Table 2). For 2 and 27 degrees of freedom at the 5% level of significance, the table 'F' ratio was 3.35. Since the calculated 'F' ratio is more than the table value 'F' ratio null hypothesis is rejected. Hence, disability has a significant effect on NDI.

The results of this study demonstrated the effectiveness of the Muscle Energy Technique in reducing neck pain and disability compared with McKenzie exercise and conventional treatment. Recorded values were analysed using a paired t-test and one-way ANOVA, and the results revealed that the three programs relieved neck pain and disability. One-way analysis of variance was used to determine group differences ANOVA was used and the results showed that there was a significant difference between the groups. Students who received the Muscle Energy Technique showed greater improvement when compared to the students who received the McKenzie exercise and the students who received levator scapulae stretching and upper trapezius stretching.

CONCLUSION

In conclusion, these three treatments are effective in reducing pain and disability. However, the muscle energy technique has shown better results in reducing pain and disability in patients with mechanical neck pain.

Limitations

This study focused only on the upper trapezius and levator scapula to decrease pain and disability. Other accessory muscles around the neck could not be considered due to lack of time. Students who participated in this study were between the age

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group of 18-23 years, and small sample sizes were used.

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