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Original Article

Comparative Effect of Muscle Energy Techniques and Mulligan Mobilization on Pain and Range of Motion in Patients with Mechanical Neck Pain

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ABSTRACT

Mechanical cervical pain starts at the back of the head and moves down the neck to the lower cervical spine and shoulders. Vertebral arrangements are interrupted with this condition, and the joints of the cervical spine and ribs perform abnormal biomechanical movements, resulting in diminished mobility and pain. **Objective:** To compare the effectiveness of Muscle Energy Techniques (METs, Post-isometric relaxation) with Mulligan Mobilization (Natural Apophyseal Glides, NAGs) in subjects with Mechanical Neck Pain **Methods**: It was a Randomized Controlled Clinical Trial. Sixty patients are allocated in 2 groups: A and B with 30 patients in each group with age limit from 25-50 years treated for 4 weeks on alternate days with METs and Mulligan mobilization with baseline exercise plan respectively. Intervention plan was divided into 2 phases. Outcome measures used in this study are Numeric Pain Rating Scale (NPRS), Neck Disability Index (NDI) and Goniometer for Neck range of motions. **Results:** Patients in group B showed marked improvement as compared to group A. *p-value* less than 0.05 is considered significant. Mean age of patients for Group A was 39.91±8.14 and in Group B was 42.39±8.01 respectively. **Conclusion:** It is concluded from the study that Mulligan Mobilization was more effective as compared to METs in progressing NPRS and NDI scales.

INTRODUCTION

Mechanical cervical pain starts at the back of the head and moves down the neck to the lower cervical spine and shoulders. Vertebral arrangements are interrupted with this condition, and the joints of the cervical spine and ribs perform abnormal biomechanical movements, resulting in diminished mobility and pain [1,2]. Generalized neck discomfort is induced by enhanced neck position, motion related to neck, or any type of pain on probing of cervical musculature without illnesses [3]. Muscle spasms, faintness, and generalized pain in the cervical area, shoulders, and arms are all signs and symptoms of neck discomfort, which can lead to movement restrictions. The epidermis, dermal tissue, articular apophyseal joint sheath, longitudinal ligaments, ligamentum flavum, and inter vertebral body ligaments are all examples of connective tissues and annulus fibrosis of the intervertebral disc may all be distorted in mechanical neck discomfort [4]. Neck discomfort, limited range of motion, and stiffness are common indications of mechanical neck pain. Tenderness in the neck and shoulder region is increased by neck movements or prolonged neck postures [5]. Personal and psychological factors (work satisfaction,

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stress level, anxiety, and depression) all have a part in the development of this condition [6]. Clinical examination is difficult to utilize to make a precise prediction because signs and symptoms are sometimes nonspecific [7]. Mechanical discomfort is widespread in persons who work with computers, clerical jobs, students, and people who live a sedentary lifestyle [8,9]. Work that requires uncomfortable occupational posture, hard lifting, and physical exertion During a long time of working with the head and neck in a forward position, the neck extensor muscles would be stretched excessively [10]. Variations of manual techniques include placement release technique, muscle energy technique, muscle energy technique, Cyriax methodology, NAGS and SNAGS, manual strain, proprioceptive neuromuscular facilitation, and ischemic compression [1,11]. MET is a quality of healthcare process in which the participants' muscles contract in a precise, controlled manner against a reactionary force. A common technique for achieving muscle tonus release is MET (inhibition). The Golgi tendon impairs the affected muscle's isometric contraction, resulting in after isometric relaxation [1]. With MET, you can reduce muscular tone, promote better circulation, enhance weak musculature, and loosen joint limitations [12]. MET is an active muscle-based therapy strategy in which a subject's muscle(s) are contracted in a carefully regulated manner against a counterforce generated by the therapist. Reduce discomfort, stretch tight muscles and fascia, reduce muscle tonus, increase local circulation, strengthen weak musculature, and mobilize joint limitations using the MET. The MET is used to achieve tonus release in a muscle prior to stretching by applying an isometric contraction to the afflicted muscle and then relaxing afterward [13]. A MET for relaxing and extending a hypertonic, shortened muscle is post isometric relaxation (PIR). On postural muscles, this form of moderate stretching is often used. When these muscles grow short and tight, muscular imbalances can ensue. This can make joint motion difficult and limit range of motion. The upper trapezius and levator scapulae are two muscles in the upper body that fall into this category. When these muscles shorten, they can limit range of motion in the head, neck, and shoulder, as well as cause pain. MNP therapy options have lately developed from a passive to an active treatment approach. The MET is a type of advanced stretching technique that has been employed in both clinical and subclinical people [4]. In the instance of NP, one of the mobilization approaches that can be used is the Mulligan. Mulligan mobilization techniques (MMTs) encompass many modalities such as sustained natural epiphyseal glides (SNAGs) and natural epiphyseal glides that target the spine and are employed by most manual physical therapists. The application of this therapy strategy results in an immediate improvement in pain-free range of motion (ROM) in the affected joints. The literature suggests combining the MMT idea with numerous other manual therapy modalities as a successful therapeutic approach for a variety of orthopedic dysfunctions [14]. NAGS are more helpful than Maitland grade I and II mobilizations in improving NPRS and NDI scores in patients with nonspecific neck discomfort, according to Hussain et al. [15]. Gross and colleagues determined in 2015 that manual mobilization combined with strengthening exercises is particularly beneficial in reducing neck discomfort and improving quality of life [16]. A study published in 2002 found that manual corrective procedures are the most effective treatment for mechanical neck pain [17].

METHODS

Allocation of patients in two groups were through simple random sampling method. The research was conducted in Physiotherapy ward of Mayo Hospital Lahore. A total of 60 patients suffering from Neck Pain were randomized and divided into two groups. 30 patients undergone muscle energy technique (post isometric relaxation) and 30 patients undergone mulligan mobilization (natural apophyseal glides) were administered. Treatment frequency was for 4 times a week. The duration of treatment was 4 weeks in both groups. Data collected on the first day before the application of interventions and after four weeks, the end day of the application of intervention. Subjects were randomly assigned to 2 groups: Group A (the control group) received Muscle energy technique (Post-isometric relaxation) and Group B (the experimental group) received Natural Apophyseal Glides (NAGs).

Group A
(the control group)

Group A (the control group) received the METs for neck region. MET's was performed for three group of muscles.

1.For Upper Trapezius

Patient position- supine lying, Therapist position: supported the affected side's shoulder with one hand while placing the other hand at the affected side's ear and mastoid area. towards affected side. The stabilised shoulder was moved towards the ear (a shrug action) and the ear towards the shoulder with a small resisted effort (20% of available strength). 7-10 seconds of isometric contraction with proper breathing. For 30 seconds, this orientation was retained (post isometric relaxation)

2.For Levator Scapulae

Subject - supine lying, one hand supports the head, while

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the other rests on the shoulder on the affected side. The individual was then requested to take the head backwards towards the table against the therapist's unchanging resistance, while simultaneously doing a small (20 percent of available strength) shoulder shrug on the unaffected side. With proper breathing, an isometric contraction was held for 7-10 seconds. This position was hold for 30 seconds (post isometric relaxation)

3.For Sternocleidomastoid

The therapist put his contact hand on the ipsilateral mastoid on the temporal region, which was the SCM muscle's insertion site, and his stabilising hand on the sternum, which was the muscle's point of origin. The patient was instructed to rotate his head to the ipsilateral side, lift his head, and hold the contraction for 10 seconds before fully relaxing by inhaling and exhaling deeply. The clinician allowed for the barrier to dissolve before gently guiding the muscle to lengthen while keeping the upper cervical spine bent for 30 seconds.

Group B(the experimental group)

Group B (the experimental group) received the Natural apophyseal Glides (NAGs) for neck region. PT stride stance at side facing posteriorly with hip blocking seated patient shoulder. Patient's neck slightly flexed without any rotation or side bend. PT cradled head with forearm (using top arm) and chest, with other hand on back of head/neck. Middle phalanx of 5th finger (of top arm) hooked under SP with other thenar eminence (bottom arm) obliquely under 5th finger in position to mobilize parallel to facet plane. Taken up slack then oscillated (2-3/sec) mid to end range using bottom hand pushing through top hand in direction of eyeballs. Oscillated for 5-10 seconds and reassess.

RESULTS

Table 1 shows the demographic data of study. Group A having 9(40.9%) males and 13(59.1%) females while 16(69.6%) male and 7(30.4%) females enrolled in group B. *Man Whitney U test* was performed for assessing the intensity of pain between 2 groups. Mean of pain intensity was 8.27 in group A and 8.26 in group B pretreatment, mean of NDI was 41.36 in group A and 41.3 in group B pretreatment and mean of flexion was 36.23, extension mean was 21.30 in group A and flexion mean was 35.74, extension was 21.30 in group B. After the session intensity of pain was reduce in both groups, it was 4.00 in Group A and 2.43 in Group B, NDI scores were 20.00 in Group A and 12.17 in Group B while ROM was increased in both groups, mean of flexion was 44.68, extension mean was 42.95 in Group A and in Group B flexion mean was 68.48, and extension mean was 62.17. p-value was <0.01 which shows that both techniques were effective for managing the patients but group B patients show more remarkable results as compared to group A.

Variables	Control Group		Experimental Group		P-value
	At Baseline	After	At Baseline	After	
NPRS	8.27± 0.45	4.00± 0.69	8.26± 0.44	2.43± 0.501	0.00
NDI	41.36± 2.27	20.00± 3.45	41.30± 2.24	12.17± 2.53	0.00
ROM (Flexion)	36.23± 3.71	44.68± 4.90	35.74± 3.75	68.48± 4.87	0.00
ROM (Extension)	21.14± 6.15	42.95± 3.33	21.30± 6.25	62.17± 5.99	0.00

Table 1: Mean values of Experimental group and the control group

Variables	Control Group		Intervention Group		P-value
	Before	After	Before	After	
Pain	8.27± 0.45	4.00± 0.69	8.27± 0.45	4.00± 0.69	<0.01
NDI	41.36± 2.27	20.00± 3.45	41.36± 2.27	20.00± 3.45	
ROM(Flexion)	36.23± 3.71	44.68± 4.90	36.23± 3.71	44.68± 4.90	
ROM(Extension)	21.14± 6.15	42.95± 3.33	21.14± 6.15	42.95± 3.33	

Table 2: Mean values within Experimental group and the control group

DISCUSSION

Both of these strategies were utilized as interventions in the current study to treat patients with mechanical neck discomfort. Sedentary lifestyles have a higher number of cases than active lifestyles, hence life styles are important in developing neck illnesses with discomfort. The NPRS scale is used to assess changes in pain intensity and has proven to be a useful instrument for data gathering and analysis [18]. The Mulligan idea involves a variety of mobilising therapy strategies for the spine, including 'NAGs' (natural apophyseal glides), 'SNAGs' (sustained natural apophyseal glides), and 'SMWLMs' (sustained natural apophyseal glides) (spinal mobilizations with limb movements). In terms of pain intensity and neck functional status, group B exhibited substantial improvement, while in terms of ROM, both groups showed significant improvement. In comparison to the MET group, group B demonstrated greater outcomes after just one week in terms of rotation ROM and two weeks in terms of extension, while maximum range improved after the third week for side-bending and flexion. The advantages of Mulligan mobilization were demonstrated by a significant decrease in NDI and NPRS scores, confirming previous findings. The medical usefulness of Mulligan's mobilization techniques for increasing joint function has been proved, according to the research, with a number of theories for its action and reaction. Additional techniques, such as hypo algesic and sympathetic nervous system excitation effects, have been established in more recent studies.

The current study found that combining MET in the form of PIR with MM in the form of NAGs increased the therapy effect on pain, cervical ROM, and function in individuals with MNP. In terms of lowering pain and impairment and enhancing cervical ROM, NAGs with PIR were more

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successful than regular physical therapy. The biological principles that underpin MET are PIR and reciprocal inhibition. PIR refers to the effect of a muscle's or group of muscles' reduced tone after a brief interval following an isometric contraction. Pain alleviation following PIR may be due to the inhibitory Golgi tendon reflex, which is triggered during isometric contraction and leads to muscle reflex relaxation. Sympatho stimulation produced by somatic efferent is also caused by the activation of muscle and joint mechanoreceptors, as well as targeted stimulation of periaqueductal grey matter, which helps in lowering pain. As a result of the available research and statistical findings of data received following therapy, Mulligan mobilization technique NAGS was found to be more effective than MET in reducing pain and improving neck disability index modulation[19].

CONCLUSION

It is concluded that both Muscle Energy Technique and Mulligan Mobilization have found to be effective in reducing Neck Pain, Improving range of motion and reducing neck functional disability. However, the subjects treated with Mulligan Mobilization showed an additional benefit in terms of reduction of pain on NPRS and improving functional ability in terms of NDI. Hence it can be concluded that Mulligan Mobilization is an effective therapeutic option in the treatment of patients with Mechanical Neck Pain.

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