TO STUDY THE EFFECT OF MUSCLE ENERGY TECHNIQUE VERSUS MULLIGAN SNAGS ON PAIN, RANGE OF MOTION AND FUNCTIONAL DISABILITY FOR INDIVIDUALS WITH MECHANICAL NECK PAIN: A COMPARATIVE STUDY

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ABSTRACT

Background: Mechanical Neck Pain is a common condition in general population. It still constitutes a major burden on patients in terms of pain, disability, loss of income, and on society in terms of healthcare costs and time of work. A wide variety of treatment protocols for mechanical neck pain are available, however, the most effective management remains an area of debate.

Objective: Aim of the study is to compare the effectiveness of Muscle Energy Technique and Mulligan SNAGS on pain, functional disability and active cervical range of motion for individuals with mechanical neck pain.

Methodology: 40 subjects according to inclusion and exclusion criteria were randomly divided into two groups for the study, Muscle Energy Technique plus conventional therapy and Mulligan SNAGS plus conventional therapy.

Results: The results were analyzed by Paired t-test or Wilcoxon signed ranks test (Intra-group Comparison) and unpaired t-test or Mann-Whitney U test (Inter-group Comparison) comparing Muscle Energy Technique and Mulligan SNAGS groups for post-treatment effects. Both the groups showed equal effectiveness regarding VAS, NDI and Cervical ROM.

Conclusion: Muscle energy Technique and Mulligan SNAGS can be used as alternate treatment along with conventional therapy for mechanical neck pain.

Keyword: Muscle energy Technique (MET), Mulligan SNAGS, Mechanical Neck Pain, VAS, NDI.

INTRODUCTION

Neck pain is a common musculoskeletal disorder in the era of technology. The International Association for the Study of Pain (IASP) has defined 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 first thoracic spinous process, and laterally by sagittal plane tangential to the lateral border of neck [1].

Mechanical Neck Pain is a common complaint; with appoint prevalence of nearly 13% and lifetime prevalence of nearly 50%. Pain and Impairment of the Neck is common. It is estimated that 22% to 70% of population will have neck pain...
sometime in their lives. Prevalence of neck pain increases with age and is most common in women [2].

Mechanical neck pain can result from hypertonic posterior cervical muscles that may occur due to sustained partial neck flexion when reading, writing, operating a computer terminal for prolonged periods, sewing, by holding a stooped posture or by gross trauma [3].

The aetiology of mechanical neck pain is poorly understood and mostly multifactorial, including poor posture, depression, anxiety, neck strain and occupational or sporting activities [5,6]. Some researchers state that any event or condition (e.g. incorrect posture, ageing, acute injury, congenital or developmental defects) which leads to altered joint mechanics or muscle structure or function, can result in mechanical neck pain [5].

Many types of therapeutic modalities that have been applied fall into several categories: physical interventions, thermal modalities, electrical treatment, exercise therapies, meridian therapies, laser therapy, traction, and behavioral treatment [4].

Although many interventions are accepted as standard of care for mechanical neck pain, substantial evidence regarding the effectiveness of no operative interventions is lacking.

Muscle Energy Technique (MET) is a type of manual therapy which was founded by Dr Fred L. Mitchell Sr., an osteopathic physician. According to Green man MET “involves the voluntary contraction of the patients muscle in a precisely controlled direction, at varying levels of intensity, against a distinctly executed counterforce applied by the operator” [6].

MET uses muscles and soft tissues for its effects; nevertheless, the impact of these methods on joints is clearly profound since it is impossible to consider joints independently of the muscles which support and move them [7].

The other advanced technique is Mulligan’s mobilization in the form of SNAGs. The concept has its foundation built on Kaltenborn’s (1989) principles of restoring the accessory component of physiological joint movement [8].

The opportunity to develop new approaches to treat mechanical spinal pain has arisen as there is question over the efficacy of common conventional therapies.

So, the intent of the study is to compare the efficacy of muscle energy technique and Mulligan SNAGs on pain, functional disability and cervical ROM in individuals with mechanical neck pain.

METHODOLOGY

Study design: Comparative study.

Study setting: Various outpatient physiotherapy departments.

Sampling technique: Simple Random sampling.

Study duration: 6 days a week for 2 weeks.

Study sample: 40 Patients of Mechanical Neck Pain randomly allocated and divided into 2 groups.

Group A (Joint MET): 20 patients

Group B (Mulligan SNAGs): 20 patients

Inclusion criteria: Subjects diagnosed with Mechanical neck pain as per Schalkwyk and Smith diagnostic criteria [11], Age between 18 to 45 years for both males and females [1], Mechanical neck pain since < 3 months [1].

Exclusion criteria [1,12]: Cervicogenic headache, Radiculopathies, Steoporosis, Whiplash associated disorders, Previous cervical spine surgeries, Vascular Diseases of neck and progressive neurological deficit, Vertebrobasilar insufficiency, Diagnosed pregnancy, Any deformity (eg.Torticollis, sprengel’s deformity, scoliosis), Un-cooperative patient.

Procedure: The proposed title and procedure was being approved by ethical committee members and patients were taken with written consent who fulfilled inclusion and exclusion criteria. Pre and Post measurement of all 3 Outcomes (VAS, NDI and ROM) were taken.

Group A were given MET plus conventional therapy (moist heat pack and Isometric Neck Exercises), Group B were given Mulligan SNAGs plus conventional therapy.

Therapeutic intervention:

Conventional therapy for both groups: Conventional therapy in form of moist heat pack and Isometric Neck Exercises were given once a day for 6 consecutive days a week for 2 weeks.
Moist heat pack: Moist heat pack to neck region was given for period of 15 to 20 minutes, before intervention [9].

Isometric Neck exercise: Isometric exercises were performed in the seated position by resistance applied by the therapist at the forehead (cervical flexion, extension, rotation and side-bending) for 10 sec holds for 10–15 repetitions, after intervention 1.

Interventional therapy for both groups: Interventional therapy was given once a day for 3 days a week for 2 weeks to the subjects of both the groups.

Treatment Group A – Muscle Energy Technique [6,10]:

For Lower cervical vertebrae (C3- C7),
For example C3-C4, patient was taken in supine position with neck slightly flexed passively by the therapist.

The right middle finger was placed over the right pillars of C3-C4 and the neck taken to the maximum position of side-bending rotation to the right, engaging the barrier.

The left hand was placed over the patient’s left parietal and temporal areas.

With this hand offering counterforce, the patient was invited to side-bend and rotates to the left, for 5 seconds.

Post isometric relaxation of these muscles following the 5-7-second mild contraction, after which the neck was taken to its new barrier, and the same procedure repeated 2 or 3 times.

For Upper Cervical vertebrae (C1-C2),
The patient lies supine and the therapist passively flexed the subject’s head and neck approximately 45º until a sense of resistance was palpatated.

If the direction of restriction was at left, then rotated the head to the left until a restrictive barrier was palpatated.

The subject was then instructed to gently push into the practitioner’s hand (rotate to the right) for 5 seconds, followed by 5 seconds of relaxation for 3 times.

Fig. 2: MET for Upper cervical vertebrae.

Treatment Group B – Mulligan SNAGS:

Rotation and Lateral flexion:
Indications: painful and/or limited Rotation or lateral flexion
Position: Patient sitting upright with head in neutral.
Contact: medial border distal phalanx of one thumb on articular pillar, other thumb reinforces it to provide the mobilization force.
Glide: up toward the eyeball in the plane of the facet.
Movement: rotates or laterally flexes the head towards painful side while therapist maintains glide.

Extension and Flexion
Indications: painful and/or limited extension or flexion.
Position: patient sitting upright with head in neutral.
Contact: Medial border distal phalanxes of one thumb on spinous process, other thumb reinforce sit to provide the mobilization force.
Glide: up centrally toward the eyeballs in the plane of the facets.
Movement: extends or flexes while therapist maintains glide.
The technique was repeated 6 times. For progression repetitions of the SNAG was increased from 6 to 10.

**Fig. 3:** SNAGs for Flexion-Extension.

The post interventional measurements were recorded on the end of 2 weeks of treatment in the form of VAS, NDI and active cervical ROM. Thus, Obtained pre and post interventional measurements of all 3 outcome measures, such as VAS, NDI and active cervical ROM were subjected to the statistical analysis.

**RESULT**

Data was analysed using SPSS software version 20 and Microsoft Excel 2007.

**Table 1:** Tests used to compare outcome measures within and between groups.

<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Tests used to compare within group A</th>
<th>Tests used to compare within group B</th>
<th>Tests used to compare between group A and B</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS</td>
<td>Paired t test</td>
<td>Paired t test</td>
<td>Unpaired t test</td>
</tr>
<tr>
<td>NDI</td>
<td>Wilcoxon signed ranks test</td>
<td>Wilcoxon signed ranks test</td>
<td>Mann-Whitney U test</td>
</tr>
<tr>
<td>ROM</td>
<td>Wilcoxon signed ranks test</td>
<td>Wilcoxon signed ranks test</td>
<td>Mann-Whitney U test</td>
</tr>
</tbody>
</table>

**Table 2:** Shows the Intra-group comparison of Visual Analogue Scale (VAS).

<table>
<thead>
<tr>
<th>Groups</th>
<th>Pre Treatment</th>
<th>Post Treatment</th>
<th>t' value</th>
<th>p' value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean VAS</td>
<td>±SD</td>
<td>Mean VAS</td>
<td>±SD</td>
<td></td>
</tr>
<tr>
<td>GROUP’A’</td>
<td>6.64 ±1.26</td>
<td>3</td>
<td>1.28</td>
<td>25.43</td>
</tr>
<tr>
<td>GROUP’B’</td>
<td>6.82 ±0.75</td>
<td>2.4</td>
<td>0.58</td>
<td>35.45</td>
</tr>
</tbody>
</table>

**Table 3:** Shows the Inter-group comparison of Visual Analogue Scale (VAS).

<table>
<thead>
<tr>
<th>GROUP’A’</th>
<th>GROUP’B’</th>
<th>t' value</th>
<th>p' value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.73 ±0.71</td>
<td>4.3 ±0.4</td>
<td>2.78</td>
<td>0.16</td>
</tr>
</tbody>
</table>

**Table 4:** Shows the Intra-group comparison of Neck Disability Index (NDI).

<table>
<thead>
<tr>
<th>GROUP’A’</th>
<th>GROUP’B’</th>
<th>t’ value</th>
<th>p’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean NDI</td>
<td>±SD</td>
<td>Mean NDI</td>
<td>±SD</td>
</tr>
<tr>
<td>GROUP’A’</td>
<td>30.78 ±9.09</td>
<td>12.72 ±3.28</td>
<td>-3.72</td>
</tr>
<tr>
<td>GROUP’B’</td>
<td>32 ±6.56</td>
<td>13.47 ±3.56</td>
<td>-3.82</td>
</tr>
</tbody>
</table>

**Table 5:** Shows the Inter-group comparison of Neck Disability Index (NDI).

<table>
<thead>
<tr>
<th>GROUP’A’</th>
<th>GROUP’B’</th>
<th>U’ value</th>
<th>p’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>±SD</td>
<td>Mean</td>
<td>±SD</td>
</tr>
<tr>
<td>GROUP’A’</td>
<td>18.05 ±6.38</td>
<td>155.5</td>
<td>0.571</td>
</tr>
<tr>
<td>GROUP’B’</td>
<td>18.52 ±6.08</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 6:** Shows Intra-group comparison of cervical ROM of Group A.

<table>
<thead>
<tr>
<th>ROM</th>
<th>GROUP’A’</th>
<th>GROUP’B’</th>
<th>t’ value</th>
<th>p’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (Degrees)</td>
<td>±SD</td>
<td>Mean (Degrees)</td>
<td>±SD</td>
<td></td>
</tr>
<tr>
<td>Flexion</td>
<td>37.39 ±6.1</td>
<td>43.94 ±4.1</td>
<td>-1.23</td>
<td>0.01</td>
</tr>
<tr>
<td>Extension</td>
<td>39.72 ±5.2</td>
<td>50.72 ±4.2</td>
<td>-0.73</td>
<td>0.001</td>
</tr>
<tr>
<td>Lt. Side Flexion</td>
<td>32.44 ±4.2</td>
<td>39.83 ±3.4</td>
<td>-1.4</td>
<td>0.001</td>
</tr>
<tr>
<td>Rt. Side Flexion</td>
<td>33.67 ±4.6</td>
<td>39.5 ±3.2</td>
<td>-1.02</td>
<td>0.001</td>
</tr>
<tr>
<td>Rt. Rotation</td>
<td>56.67 ±7.7</td>
<td>68.61 ±4.3</td>
<td>-0.45</td>
<td>0.001</td>
</tr>
<tr>
<td>Lt. Rotation</td>
<td>57.89 ±7.4</td>
<td>69.6 ±5.1</td>
<td>-1.54</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Table 7:** Shows Intra-group comparison of cervical ROM of Group B.

<table>
<thead>
<tr>
<th>ROM</th>
<th>GROUP’B’</th>
<th>GROUP’B’</th>
<th>U’ value</th>
<th>p’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (Degrees)</td>
<td>±SD</td>
<td>Mean (Degrees)</td>
<td>±SD</td>
<td></td>
</tr>
<tr>
<td>Flexion</td>
<td>38.42 ±6.8</td>
<td>47 ±3.58</td>
<td>-3.44</td>
<td>0.001</td>
</tr>
<tr>
<td>Extension</td>
<td>41.58 ±4.6</td>
<td>53.42 ±3.3</td>
<td>-3.82</td>
<td>0.001</td>
</tr>
<tr>
<td>Lt. Side Flexion</td>
<td>33.37 ±4.8</td>
<td>40.42 ±3.3</td>
<td>-3.83</td>
<td>0.001</td>
</tr>
<tr>
<td>Rt. Side Flexion</td>
<td>30.81 ±3.5</td>
<td>39.74 ±2.8</td>
<td>-3.73</td>
<td>0.001</td>
</tr>
<tr>
<td>Rt. Rotation</td>
<td>54.37 ±5.8</td>
<td>67.42 ±4.1</td>
<td>-3.82</td>
<td>0.001</td>
</tr>
<tr>
<td>Lt. Rotation</td>
<td>61.89 ±7.3</td>
<td>71.89 ±3.8</td>
<td>-3.81</td>
<td>0.001</td>
</tr>
</tbody>
</table>

**Table 8:** Mean difference of cervical ROM of between the groups.

<table>
<thead>
<tr>
<th>ROM</th>
<th>GroupA’</th>
<th>GroupB’</th>
<th>U’ value</th>
<th>p’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (Degrees)</td>
<td>±SD</td>
<td>Mean (Degrees)</td>
<td>±SD</td>
<td></td>
</tr>
<tr>
<td>Flexion</td>
<td>8.11 ±4.2</td>
<td>8.57 ±3.4</td>
<td>130.5</td>
<td>0.215</td>
</tr>
<tr>
<td>Extension</td>
<td>11 ±3.9</td>
<td>11.84 ±4.2</td>
<td>148</td>
<td>0.282</td>
</tr>
<tr>
<td>Lt. Side Flexion</td>
<td>7.39 ±3.4</td>
<td>8.94 ±3.6</td>
<td>125</td>
<td>0.16</td>
</tr>
<tr>
<td>Rt. Side Flexion</td>
<td>5.83 ±2.8</td>
<td>7.05 ±3.9</td>
<td>137.5</td>
<td>0.305</td>
</tr>
<tr>
<td>Rt. Rotation</td>
<td>11.94 ±4.9</td>
<td>13.05 ±5.2</td>
<td>156</td>
<td>0.647</td>
</tr>
<tr>
<td>Lt. Rotation</td>
<td>12.11 ±4.1</td>
<td>10 ±5.5</td>
<td>120</td>
<td>0.125</td>
</tr>
</tbody>
</table>
DISCUSSION
In present Study, when the mean reduction values of VAS, NDI and ROM were analyzed within the groups, it was statistically significant in both the groups. But when comparison was done between that, both the groups were equally effective in reducing pain and disability and improving ROM.

Pain declined in both the groups after the treatment. Moist heat therapy which is a superficial entity helps to relieve pain by reducing spasm and also produce a relaxing effect. By reducing viscosity of viscoelastic collagen, heat increases tissue extensibility and makes connective tissue less resistant active or passive stretch [14].

Isometric Neck Exercises increase intramuscular co-ordination by enhancing motor unit activation synchronization and/or firing rate within a given muscle. A static contraction generates higher level of tension than concentric contraction. This will lead to increase in muscle strength and improve mobility [15].

One of the reasons of improvement in VAS score in Group A may be the hypoalgesia effect of MET. Some studies suggest MET and related post-isometric techniques reduce pain and discomfort when applied to the spine or muscles. The mechanisms are not known, but may involve central and peripheral modulatory mechanisms, such as activation of muscle and joint mechanoreceptors that involve centrally mediated pathways, like the PAG in the midbrain, or non opioid serotonergic and noradrenergic descending inhibitory pathways [16]. Thus MET has profound effect on pain and disability.

The present study gives similar result as a study conducted by Viswas Rajadurai (2011) [17] suggesting that MET reduces tension in the jaw muscles and subsequently reducing pain and improving Maximal Mouth Opening (MMO) in patients with Temporomandibular Dysfunction. Where Gupta S.etal (2008) [1] also suggested that Postisometric relaxation is more effective in decreasing pain and disability and increasing cervical Range Of Motion(ROM)in nonspecific neck pain.

In Mulligan SNAGS potentially, the accessory glide component could ameliorate any of these problems by either separating the facet surfaces or releasing the entrapped meniscoid, or by allowing the entrapped meniscoid to return to its intra- articular position, or perhaps by stretching adhesions. The other mechanism such as in the gate control theory. In addition, descending pain-inhibitory systems may be activated, the end range positioning in movement with the SNAG may engage these inhibitory systems and reduce pain and disability [18].

A systemic review by BillVetal(2006) [19] on Mulligan’s mobilization with movement, positional faults and pain relief, found that it has rapid ameliorative effects on pain and function during and initially after a single treatment application and also after a course of treatment. On the other hand Reid SA et al (2007) [20]stated that that Mulligan SNAGS are clinically and statistically very effective in reducing neck pain in subjects of cervicogenic dizziness. It has significant immediate and sustained effect in reducing dizziness and disability too.

Now for the improvement of ROM other possible mechanism rather than pain mechanism is explained by some researchers.

Mulligan proposed that when an increase in pain-free range of movement occurs with a SNAG it is primarily the correction of a positional fault at the zygapophyseal joint, although a SNAG also influences the entire spinal functional unit [13].One study conducted by Maria Moutzouri (2008) [21], examined the effect of Lumbar SNAGS in asymptomatic subjects and did not found any significant improvement in lumbar flexion ROM.

On the other hand Self SNAGS were also found to be effective in treatment reducing pain and disability and improving cervical ROM in the study conducted by Shilpi Chhabra et al (2008),among Computer professionals.

CONCLUSION
The result of the present study showed that subjects of both the groups were improved after the study intervention by reducing their
pain and disability and increasing ROM. Hence, concluded that the Muscle energy technique and Mulligan SNAGS are equally effective for reduction of pain and disability and increase in the ROM. These techniques were very simple and easy to apply on mechanical neck pain patients. So, it can be further recommended to include in Mechanical neck pain treatment regime.

Conflicts of interest: None

REFERENCES


