MUSCLE ENERGY TECHNIQUE VERSUS MULLIGAN TECHNIQUE FOR TREATING NECK PAIN IN BREAST FEEDING WOMEN

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ABSTRACT

Background: Neck pain is common in the adult general population, disabling and costly Lifetime, which constituted a great problem facing the mother during breast feeding period. Conservative treatments used to manage neck pain are numerous and include usual medical care, various forms of exercise, massage, and acupuncture among others, but a lack of evidence regarding their relative efficacy was found.

Objective: The aim of this study was to compare the effectiveness of muscle energy technique (MET) and Mulligan technique on pain, functional disability and active cervical range of motion (ROM) on neck pain in breastfeeding women.

Methods: Thirty-two breast-feeding women suffering from neck pain according to inclusion and exclusion criteria, participated in this study. All participants were evaluated by Visual Analogue scale (VAS), Neck pain disability index (NDI) and digital goniometer. Patients were randomly divided into two equal groups. The first study group received Mulligan sustained natural apophyseal glide (SNAGS) plus strengthening exercise for deep neck flexor (DNF) muscles and advices to correct position, the second group received MET plus strengthening exercise for DNF muscles and advices to correct position.

Results: In the same group comparison there was a significant decrease in VAS and NDI as well as significant increase in all cervical ROM post treatment compared with that pretreatment in both groups (p > 0.001). While there was no significant difference between groups either pretreatment or posttreatment (p > 0.05).

Conclusion: Muscle energy technique and Mulligan SNAGS can be used as an alternative treatment along with strengthening exercise and advices for mechanical neck pain.

Key words: Muscle energy Technique, Mulligan SNAGS, Mechanical Neck Pain, VAS, NDI.

I. INTRODUCTION

Successful breast-feeding has been linked to better health outcomes for children, particularly the reduction of mortality and morbidity from infectious diseases (1). Lactation – the process of milk secretion from the breasts – is a complex physiological process. Successful breast-feeding relies on good physical and mental maternal health, as well as the intention to breast-feed (2).

During breastfeeding, lactating mothers adopt different positions that can cause musculoskeletal problems. It was found that 283 (70.8%) reported cross cradle hold (opposite arm) breastfeeding position, while 86 (21.5%) reported breastfeeding inside lying position. Also 31(7.9%) were those mothers who adopted other different BF
positions. Mechanical neck pain was reported in 147 (36.8%) women and mechanical low back pain was reported in 88 (22.0%) women (3). By adopting different postures to compensate pain during breastfeeding time in sitting, standing or lying cause mechanical change in cervical, thoracic and lumbar spine that alters the correct posture of the body. If it is not corrected it can cause long term deformities by disturbing normal curvature of spine and produces hyper kyphosis and hyper lordosis (4). The studies showed that poor knowledge and wrong position for breastfeeding influence their own health as well as baby's health (5). Chronic pain in the neck with weak cervical muscles affects quality of life of an individual (6). Poor Posture during work or sleeping position causes muscular spasm; which may persist for a long time and may become chronic (7).

Conservative treatments used to manage neck pain are numerous and include usual medical care (face to face interview, education, reassurance, medication, ergonomic and stay active advice), various forms of exercise, massage, and acupuncture among others, but a lack of evidence regarding their relative efficacy was found (8). Muscle energy techniques (MET) were originally developed to treat soft tissue, mobilize joints, stretch tight muscles and fascia, reduce pain and to improve circulation and lymphatic drainage (9). MET are 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 (10). MET is performed at the initial barrier of tissue resistance, rather than at the end of the range of motion (ROM) of a joint (11). The Mulligan Concept (MC) sustained natural apophyseal glide (SNAG) technique has been reported to create sympathoexcitatory effects (12), and increases in ROM (13) when treating musculoskeletal dysfunction at the spine. The use of thoracic SNAGs is recommended as a suitable manual therapy technique to treat patients classified with mechanical neck pain (MNP) due to the neurophysiological effects of SNAGs such as immediate hypoalgesia and an increase in pressure-pain thresholds (14).

II. MATERIALS AND METHODS

This pre-test - post-test randomized controlled study was conducted between March, 2021 and July 2021. The protocol of the study was approved by the Ethics Committee of the Faculty of Physical Therapy, Cairo University (No: P.T.REC/012/ 003147). Thirty-two patients, diagnosed as nonspecific neck pain (only females), participated in the study. They were selected from the outpatient clinics of Mansoura new general hospital Ministry of health.

Study population

Patients were eligible to participate in this study if they had the following criteria (1) Age was from 25 to 35 years, (2) All patients must in breastfeeding period at least 6 weeks after delivery, (3) Their BMI was less than 30 kg/m², (4) Their parity was not more than 3 times. While, patients were excluded if they exhibited one of the following criteria (1) Any contraindication to spinal mobilization, (2) Positive neurological examination, (3) Cervical spine surgery or stenosis, metabolic or systemic disorder or cancer (15), (4) Associated pathology of the upper cervical region or upper limb that may cause overlapping with the clinical finding as referred pain from costotransverse joint, rotator cuff tendonitis, and cervical rib syndrome (16).

Randomization

Enclosing assignment in sequentially numbered, opaque, sealed envelopes was used for the allocation concealment. An external independent person performed the envelopes’ opening process, who was unaware of the group allocation until data analyses were complete. Besides, he was not aware of the treatment technique and had no contact with the participants.

Outcome measures:

The patients were evaluated for (1) Cervical pain intensity by VAS, (2) Functional disability by NDI, (3) Cervical ROM by digital goniometer

Procedures

The details of the study protocol were demonstrated for each patient before the participation in the study to ensure complete satisfaction. All patients signed an institutionally approved informed consent.

Pain intensity
VAS was used to measure the level of pain intensity for each patient in both group (A & B) at the starting and after 4 weeks of the study course. VAS has sufficient validity and reliability for assessment of neck pain and uses a 10 cm long with 0 (no pain) and 10 (worst pain). Mother was asked to place a mark along the line to denote their level of pain(17).

functional disability level

NDI was used to measure patient functional disability level. The questionnaire consists of 10 items each of them is scored from 0 to 5. The total maximum score is therefore 50. The original report provided scoring interval for interpretation, as; (0-4) = no disability, (5-14) mild, (15-24) moderate, (25-34) sever, (above34) complete disability(18).

Cervical ROM

A new digital device (Easy Angle, Meloq AB, Stock holm, Sweden) used to measure the cervical ROM since it is portable, small, easy to handle, not expensive. (19).

The duration of intervention for each subject was 4 weeks (3 times / week).

Intervention

for patients in both groups

Advice to correct breastfeeding position: (1) The patients should face forward with their head straight and in line with their body, (2) Their lower back should have support while sitting to maintain normal curvature, (3) The chair should be comfortable, with armrests and use pillows – lots of them – to support their back and arms, (4) Mothers was advised to support their feet and avoid bending toward their baby, (5) They was instructed to Feel comfortable and secure which help their baby nurse happily and efficiently. Use their arms and hands and pillows to support their baby's head, neck, back, and hips – and keep them in a straight line. In the beginning, skin-to-skin contact was the best, using a blanket to keep their baby warm when necessary. Eventually, they could nurse their baby while swaddled with his arms at his sides.

Strengthening exercise for DNF: Each exercise was implemented three times per week for 4 weeks. This was repeated 10 times with 3–5 rest periods per session(20). (1) DNF endurance test was performed with the mother in crook-lying on a plinth. Her head was positioned in slight upper neck flexion by the examiner who places his left hand on the table just below the her occiput. The mother was asked to gently flex her upper neck and lift her head off the examiner's hand while retaining the upper neck flexion. The holding time was 30 seconds(21), (2) Cranio cervical Flexion with Cervical Flexion: The head and neck were flexed together on the thorax with the head flexed on the cervical spine, Mother in supine was asked to initiate craniocervical flexion first then lift the head off of the table (chin to chest) while continuing to hold the head in cranio cervical flexion(22), (3) Cervical Flexion with Neutral Cranio cervical flexion: the head and neck were flexed together on the thorax without the head flexed on the cervical spine, The mother was asked to lift the head so that it just clears the plinth without tucking in the chin or letting it protrude (22) (4) Cervico cervical flexion: Mother was asked to perform a "yes" like nod which is the anatomical action of the deep cervical flexors.

For group(A)

In addition to strengthening exercise for DNF muscles and advices to correct position, patients received specialized SNAGs technique adapted from Mulligan, the mother was in a supportive low back chair, thus cervical region was in a vertical position (Weight bearing position) with the therapist position was behind her, Then the therapist moved the spinous process up in the direction that must follow the apophyseal joint plane under treatment, that was, toward the eye ball. While sustaining this pain-free accessory glide, the mother was instructed to actively perform the physiological movement gradually until the end ROM with over pressure at the end of the range. she returned to the starting position actively while the therapist maintained the gliding, bilateral SNAGs technique through the spinous process were applied 3 sets per session, each set 5-10 repetitions .(23).

For group(B)
In addition to strengthening exercise for deep cervical flexors and advice to correct positions, patients received MET on tonic muscles in neck: (1) **Upper Trapezius Muscle**, the mother was asked to bend her neck forward, then rotate and bend it toward the ipsilateral side to check for an elastic barrier, and then to place it at a mid-point between the initial position and fully rotated position. The mother was then asked to breathe in, hold breath, and perform isometric contraction (20% of maximal force) in the direction that would allow the muscles point of origin to get closer to its insertion, while the therapist pressed on her in the opposite direction. The mother was then asked to breathe out 6-7 seconds later, and the muscle- including those with an elastic barrier-were stretched while she was in relaxed state. This process was repeated three to four times (24). (2) **Elevator Scapulae Muscle**, the head was turned fully into side flexion and rotation away from the side being treated. With the shoulder held caudally by the therapist’s hand and the head /neck in full flexion, side-flexion and rotation (each at its resistance barrier), all available slack was removed in the elevator scapulae, from both ends. The mother was asked to take the head backwards towards the table, and slightly to the side from which it was turned, against the therapist’s unmoving resistance, while at the same time, a slight (20% of available strength) shoulder shrug was asked for, and resisted. Following the 7-10 seconds isometric contraction and complete relaxation of all elements of this combined contraction, the neck was taken to further flexion, side-bending and rotation, where it was maintained, as the shoulder was depressed caudally with the subject’s assistance (breathe out, slide your hand towards your feet). The stretch was held for 30 second. From the new position, the process was repeated three to five times in one intervention session. (25). (3) **Sternocleidomastoid muscle** (SCM) :The mother lay in supine position and the therapist placed contact hand on the ipsilateral mastoid on temporal region, which is the insertion site of the SCM muscle, and his stabilizing hand on the sternum, which is the point of origin. The mother was asked to rotate her head to the ipsilateral side and lift her head and holds contraction for 10 seconds and then she relaxed fully by taking a deep breathe in and out. The therapist waited to feel the release of the barrier and then gently guide the muscle to lengthen, while keeping the upper cervical spine flexed, stretch held for 30 seconds (26).

**Statistical analysis**

Unpaired t-test were conducted for comparison of subject characteristics between groups. Normal distribution of data was checked using the Shapiro-Wilk test. Levene’s test for homogeneity of variances was conducted to test the homogeneity between groups. Unpaired t test was conducted for comparison of VAS, NDI and neck ROM between groups. Paired t test was conducted for comparison between pre and post treatment in each group. The level of significance for all statistical tests was set at p < 0.05. All statistical analysis was conducted through the statistical package for social studies (SPSS) version 25 for windows (IBM SPSS, Chicago, IL, USA).

**III. RESULT**

**Subject characteristics:**

Table (1) showed the subject characteristics of the group A and B. There was no significant difference between groups in the mean age, weight, height, and BMI (p > 0.05).

<table>
<thead>
<tr>
<th></th>
<th>Mean ±SD</th>
<th>MD</th>
<th>t- value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group A</strong></td>
<td><strong>Group B</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td>28.25 ± 2.46</td>
<td>28 ± 2.98</td>
<td>0.25</td>
<td>-0.97</td>
</tr>
<tr>
<td><strong>Weight (kg)</strong></td>
<td>66.75 ± 5.2</td>
<td>65.5 ± 5.11</td>
<td>1.25</td>
<td>-0.17</td>
</tr>
<tr>
<td><strong>Height (cm)</strong></td>
<td>161.37 ± 3.94</td>
<td>159.68 ± 4.39</td>
<td>1.69</td>
<td>0.55</td>
</tr>
<tr>
<td><strong>BMI (kg/m²)</strong></td>
<td>25.61 ± 1.55</td>
<td>25.43 ± 2.87</td>
<td>0.18</td>
<td>-0.68</td>
</tr>
</tbody>
</table>

SD, Standard deviation; MD, Mean difference; p value, Probability value

**Effect of treatment on VAS, NDI and cervical ROM**

**Within group comparison**
There was a significant decrease in VAS and NDI post treatment in both groups compared with that pretreatment ($p < 0.001$). The percent of decrease in VAS and NDI of group A was 66.67 and 70.17% respectively and that in group B was 70.49 and 77.22% respectively.

There was a significant increase in all cervical ROM post treatment in both groups compared with that pretreatment ($p < 0.001$). The percent of increase in flexion, extension, right bending, left bending, right rotation and left rotation of group A was 11.32, 13.69, 17.81, 19.46, 40.97 and 34.72% respectively and that in group B was 11.26, 11.44, 18.8, 22.97, 35.5 and 38.79% (table 2-3).

**Between group comparison**

There was no significant difference between groups pretreatment ($p > 0.05$). Comparison between groups post treatment revealed non-significant difference in VAS, NDI and cervical ROM ($p > 0.05$). (Table 2-3).

**Table 2. Mean VAS and NDI pre and post treatment of the group A and B:**

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>MD</th>
<th>t-value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VAS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pre treatment</td>
<td>5.43 ± 1.96</td>
<td>5.93 ± 1.81</td>
<td>-0.5</td>
<td>-0.74</td>
<td>0.46</td>
</tr>
<tr>
<td>Post treatment</td>
<td>1.81 ± 1.47</td>
<td>1.75 ± 1.29</td>
<td>0.06</td>
<td>0.12</td>
<td>0.89</td>
</tr>
<tr>
<td>% Of change</td>
<td>3.62</td>
<td>4.18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-value</td>
<td>66.67</td>
<td>70.49</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>$p = 0.001$</td>
<td>$p = 0.001$</td>
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<tr>
<td><strong>NDI (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre treatment</td>
<td>11.5 ± 6.1</td>
<td>13.43 ± 5.29</td>
<td>-1.93</td>
<td>-0.96</td>
<td>0.34</td>
</tr>
<tr>
<td>Post treatment</td>
<td>3.43 ± 3.05</td>
<td>3.06 ± 2.37</td>
<td>0.37</td>
<td>0.38</td>
<td>0.7</td>
</tr>
<tr>
<td>% Of change</td>
<td>8.07</td>
<td>10.37</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>t-value</td>
<td>70.17</td>
<td>77.22</td>
<td></td>
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</tr>
<tr>
<td>$p = 0.001$</td>
<td>$p = 0.001$</td>
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</table>

SD, Standard deviation; MD, Mean difference; p value, Probability value

**Table 3. Mean cervical ROM pre and post treatment of the group A and B:**

<table>
<thead>
<tr>
<th>ROM (degrees)</th>
<th>Group A</th>
<th>Group B</th>
<th>MD</th>
<th>t-value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean ±SD</td>
<td>Mean ±SD</td>
<td></td>
<td></td>
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<tr>
<td><strong>Flexion</strong></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Pre treatment</td>
<td>72.25 ± 9.62</td>
<td>68.31 ± 6.63</td>
<td>3.94</td>
<td>1.34</td>
<td>0.18</td>
</tr>
<tr>
<td>Post treatment</td>
<td>80.43 ± 7.92</td>
<td>76 ± 6.91</td>
<td>4.43</td>
<td>1.68</td>
<td>0.1</td>
</tr>
<tr>
<td>MD</td>
<td>-8.18</td>
<td>-7.69</td>
<td></td>
<td></td>
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<tr>
<td>% Of change</td>
<td>11.32</td>
<td>11.26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>t-value</td>
<td>-5.36</td>
<td>-8.69</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>$p = 0.001$</td>
<td>$p = 0.001$</td>
<td></td>
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<tr>
<td><strong>Extension</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Pre treatment</td>
<td>59.37 ± 5.65</td>
<td>59 ± 5.06</td>
<td>0.37</td>
<td>0.19</td>
<td>0.84</td>
</tr>
<tr>
<td>Post treatment</td>
<td>67.5 ± 3.11</td>
<td>65.75 ± 3.54</td>
<td>1.75</td>
<td>1.48</td>
<td>0.14</td>
</tr>
<tr>
<td>MD</td>
<td>-8.13</td>
<td>-6.75</td>
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<td></td>
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<tr>
<td>% Of change</td>
<td>13.69</td>
<td>11.44</td>
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<tr>
<td>t-value</td>
<td>-8.19</td>
<td>-7.73</td>
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<td>$p = 0.001$</td>
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<tr>
<td><strong>Right bending</strong></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pre treatment</td>
<td>33.68 ± 3.82</td>
<td>33.93 ± 4.12</td>
<td>-0.25</td>
<td>-0.17</td>
<td>0.86</td>
</tr>
<tr>
<td>Post treatment</td>
<td>39.68 ± 3.34</td>
<td>40.31 ± 2.44</td>
<td>-0.63</td>
<td>-0.6</td>
<td>0.55</td>
</tr>
<tr>
<td>MD</td>
<td>-6</td>
<td>-6.38</td>
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<td></td>
<td></td>
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<tr>
<td>% Of change</td>
<td>17.81</td>
<td>18.8</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>t-value</td>
<td>-9.02</td>
<td>-7.62</td>
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</table>
IV. DISCUSSION

This study was designed to investigate the effect of muscle energy technique versus mulligan technique on pain, functional disability and spinal range of motion of neck in breastfeeding women.

There was no significant difference between groups pretreatment (p > 0.05). Comparison between groups post treatment revealed non-significant difference in VAS, NDI and cervical ROM (p > 0.05).

The results of the current study showed that there was a significant decrease in VAS and NDI as well as significant increase in all cervical ROM post treatment compared to pretreatment in group(A) who received Mulligan SNAG.

One of the reasons of improvement in Mulligan group may be 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(27).

The observed improvement in pain reduction, and improved function in this study is supported by Hussein et al (28) who found that adding SNAG to the conventional program resulted in higher improvement in terms of repositioning error, pain, and function in the study that was applied on 42 participants with chronic nonspecific Low back pain.

The results of this study came in line with those of Buyukturan et al (29) who found that applying the mulligan mobilization technique( MMT) in older adults with neck pain has significant effects on pain, ROM, functional level, kinesiophobia, depression, and quality of life( QoL).

Menek et al (30) reported that Mulligan mobilization was more effective than general treatment methods for pain as well as normal joint motion ,the disability of the arm, shoulder and hand( DASH) scoring and some parameters of the short form health survey(SF-36) compared with general treatment methods .

Seo et al (31) found that significant improvement in pain, function, and ROM may be achieved by a combination of SNAGs and low level laser therapy to treat chronic low back pain.
The current study was in the same line with Shin and Lee (32) who reported that application of the SNAGs technique to middle-aged women with neck pain is considered effective in reducing the duration time of headache, and neck pain, as well as in development of neck function after applying a randomized control trial on 40 female with cervicogenic headache.

Conversely, the result of pervious study was opposing to Al Shehri et al (33), who reported that both SNAGS and Maitland’s improves the symptoms of Neck pain. Better improvement was shown by Maitland’s group than SNAGS group. Based on these results Maitland mobilization with conventional therapy should be the treatment of choice for Neck pain rather than SNAGS with conventional therapy. After conducting an experimental study on 50 patients complaining from neck pain.25 patients in Group A were given conventional therapy (Active, Isometrics exercises, moist hot packs) plus SNAG while Group B was given the same conventional therapy plus Maitland’s mobilization for 4weeks,3 sessions per week. The patient’s outcome measures were assessed by visual analog scale, NDI (Neck disability Index) and goniometry for cervical range of motion.

The results of the current study showed that there was a significant decrease in VAS and NDI as well as significant increase in all cervical ROM post treatment compared to pretreatment in group(B) this may be due to the hypoalgesia effect of MET. 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 periaqueductal gray in the midbrain, or non-opioid serotonergic and noradrenergic descending inhibitory pathways (34). Thus, MET has profound effect on pain and disability.

The result of the study matched with Phadke et al (35) who reported that VAS and NDI scores showed a significant improvement in both MET and stretching groups on the 6th day postintervention. However, both VAS and NDI scores showed better improvement in the MET group as compared to the stretching group.

Other study’s findings suggested that a combination of manual therapy and exercise (MET) is more effective than usual care on disability, pain intensity and global perceived recovery for treating patients with non-specific chronic neck pain(36).

El Laithy & Fouda (37) found that adding post isometric relaxation (PIR) technique to the conventional physical therapy treatment program was more effective in reducing pain and functional disability and increasing cervical ROM than the traditional treatment program alone in the study applied on 30 patients with chronic mechanical neck pain.

The current study was in the same line with Sbardella et al (38) who reported that the use of MET in acute or chronic non-specific neck pain could be a good therapeutic rehabilitative choice.

Shah & Shah (39) reported that MET was more effective than Ischemic compression technique in improving CROM in the study applied on 30 patients having upper trapezius trigger point in subjects with non-specific neck pain.

On contrary, Franke et al (40) reported that The meta-analyses provided low-quality evidence that MET provided no additional benefit when added to other therapies on the outcomes of chronic pain and disability in the short-term in the randomized controlled trials assessing the effect of MET on pain or disability in patients with non-specific LBP.

V. CONCLUSION

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

The authors declare that there is no any conflict of interests regarding the publication of this paper.

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