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RESEARCH ARTICLE

TO COMPARE THE EFFECT OF MUSCLE ENERGY TECHNIQUE AND STATIC STRETCHING ON NECK DISABILTY INDEX

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ABSTRACT

Background: Neck pain is a common problem which can lead to difficulty in activities. There is lack of evidence to allow conclusions to be drawn about the effectiveness of Muscle energy technique (MET) when compared with stretching exercises on neck disability index. It would be interesting to study if these two techniques yield comparable outcomes and if one technique is superior to the next which should be the alternate choice of therapy.

Subjects and methods: 45 patients with subacute mechanical neck pain were randomly assigned to group1, group 2 and group 3.

Intervention: Group 1 received 6 sessions of Muscle Energy Technique and 10 sessions of conventional physiotherapy. Group 2 received 6 sessions of static stretching and 10 sessions of conventional physiotherapy. Group 3 received 10 sessions of conventional physiotherapy. All groups were treated for 2 weeks.

Outcome measures: Neck disability index scores (NDI).

Results: Paired t-test was used for within group analysis. ANOVA followed by post hoc analysis was employed for between group comparisons. No significant difference ($p > 0.05$) was found on NDI scores between the 3 groups. Statistically significant improvements were found in all the 3 groups for NDI scores ($p < 0.05$).

Discussion and conclusion: The results of this study indicates that both the muscle energy technique and static stretching are equally effective in reducing the neck disability as there is no significant difference between two groups. The MET and static stretching groups demonstrated superior treatment effects to the conventional physiotherapy group on NDI scores.

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INTRODUCTION

Neck is the most common site of non traumatic musculoskeletal pain (El-Metwally *et al*., 2007). Roughly two thirds of the general population have neck pain at some time in their lives, and the prevalence is highest in middle age (Binder, 2007). Prevalence of neck pain has an increasing trend upto 50 years followed by a decline and it has found to be more in females (Cagnie *et al*., 2007). With upto 37% of individuals developing persistent symptoms, neck pain is a condition that places a large economic burden on the health care system (Nagrale *et al*., 2010).

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Neck pain as defined by Mersky is the pain "anywhere within the region bounded superiorly by superior nuchal line, inferiorly by an imaginary line through the tip of first thoracic spinous process and laterally by saggital plane tangential to the lateral borders of the neck (Leaver *et al*., 2007). Most patients who present with neck pain have 'non-specific (simple) neck pain,' where symptoms have mechanical or postural basis (Binder, 2007). Aetiological factors are poorly understood and are usually multifactorial, including poor posture, anxiety and depression, neck strain, occupational injuries, or sporting injuries (Binder, 2007). Neck pain with limitation of mobility is a common complaint (Cassidy *et al*., 1992). Limited range of motion and a subjective feeling of stiffness may accompany neck pain, which is often precipitated or aggravated by neck movements or sustained neck postures (Hoving *et al*., 2002).

Conservative treatment methods that are frequently used in general practice include analgesics, rest, or referral to a physical therapist or manual therapist (Hoving *et al*., 2002). Although many interventions are accepted as standard of care for mechanical neck pain, substantial evidence regarding the effectiveness of nonoperative interventions is lacking (Walker *et al*., 2008). Muscle energy technique (MET) is a method of treatment that involves the voluntary contraction of a subject's muscle(s) in a precisely controlled direction, against a counterforce provided by the operator (Fryer and Ruszkowski, 2004). MET may be used to decrease pain, stretch tight muscles and fascia, reduce muscle tonus, improve local circulation, strengthen weak musculature and mobilise joint restrictions (Fryer and Ruszkowski, 2004). The effect of MET – or similar isometric techniques, such as contract-relax and proprioceptive neuromuscular facilitation– has been examined on muscle extensibility, particularly the hamstring complex. Few studies, however, have examined the effect of MET on spinal range of motion (ROM) (Fryer and Ruszkowski, 2004).

Stretching involves the application of manual or mechanical force to elongate (lengthen) structures that have adaptively shortened and are hypomobile (Sullivan, 2007). Stretching is considered important because it is believed to provide many physical benefits including improved flexibility, injury prevention, improved muscle or athletic performance, improved running economy, promotion of healing, and possibly decreased onset of muscle soreness (Hertling and Kessler, 1996). 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 normal resting muscle length (James *et al*., 2004). Janda suggests that before any attempt is made to strengthen weak muscles, any hypertonicity in their antagonists should be addressed by appropriate treatment which relaxes (and if appropriate lengthens) them- for example, by stretching using MET. Relaxation of hypertonic muscles leads to an automatic restoration of tone to their antagonists, once inhibitory hypertonic effects have been removed (Chaitow, 2006).

MATERIALS AND METHODS

Subjects

45 patients with subacute mechanical neck pain were randomly assigned to 3 groups. All the subjects were screened for inclusion and exclusion criteria. The research work was carried out at the outpatient department of physical therapy of Indian Spinal Injuries Centre and Charak Palika Hospital. The inclusion criteria was age between 18 – 43 yr (Fryer and Ruszkowski, 2004), mechanical neck pain of subacute duration (6week-3month) (Borghouts *et al*., 1999), NDI < 40%, VAS (Visual analog scale) (5mm– 74mm), unilateral tightness (of upper trapezius & levator scapulae), ability to read and understand english. Subjects were excluded if they had fracture of the cervical spine (Nagrale *et al*., 2010; Strunk and Hondras, 2008), neck pain with radiation into arms or upper extremity or associated with headaches or facial pain, diagnosed with serious pathology (Nagrale *et al*., 2010; Strunk and Hondras, 2008) like malignancy, infection, inflammatory disorder, osteoporosis, diagnosed cases of disc prolapse, stenosis (Ylinen *et al*., 2007), vbi, spondylolisthesis, sprain and strain, diagnosed pregnancy (Strunk and Hondras, 2008; Ylinen *et al*., 2007; Groeneweg *et al*., 2010) any deformity (eg. Torticollis (Ylinen *et al*., 2007), sprengel's deformity, scoliosis), history of surgery of the cervical spine during the previous 12 months (Nagrale *et al*., 2010), patients who are taking analgesics or currently taking physiotherapy treatment (Strunk *et al*., 2008; Ylinen *et al*., 2007). A duly signed consent was obtained from the patients after thorough explanation of the procedure. Descriptive data for age, sex, height, weight, duration of symptoms and medications were obtained from the patient. Physical examination measures included cervical range of motion measurements (Norkin *et al*., 1985) and special tests commonly used to identify cervical impairments. Baseline measurements were taken for all patients for NDI scores. Measurement of NDI: NDI captures perceived disability in patients with neck pain (Cleland *et al*., 2008). It was filled by the patient himself/herself. It took about 5 minutes to fill the scale. Intervention: Patients in group 1 received 6 treatment sessions of MET for upper trapezius (Nagrale *et al*., 2010) and levator scapulae (Chaitow, 2006) muscle (3times a week) and 10 sessions of conventional physiotherapy. Patients in group 2 received 6 treatment sessions of static stretching of upper trapezius (Dutton, 2008) and levator scapulae (Dutton, 2008) (3 times a week) and 10 sessions of conventional physiotherapy. Dosage (David and Nieman, 1995) for streching: 3-5 repititions held for 10-30 sec. Patients in group 3 received 10 treatment sessions of conventional physiotherapy (Chhabra *et al*., 2008) (for 2 weeks) consisting of 20 min application of hot pack to neck region along with postural advice. The independent variables for the study included MET, static stretching and conventional physiotherapy. Dependant variable of the study was NDI score.

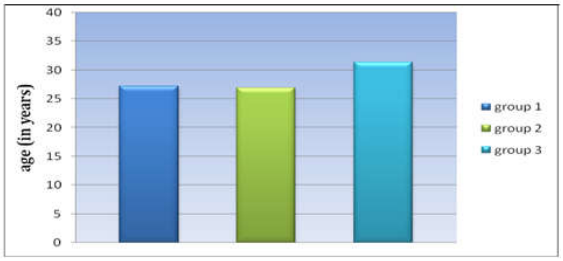
Data Analysis

The data was managed on an excel spread sheet and was analyzed using Statistical Package of Social Sciences (SPSS) for windows version 17.0. Analysis was done for 42 subjects who completed the study. The outcome variable of the study included neck disability scores. Descriptive statistics were computed for studied variable. The statistical test used was paired t-test for comparing the pre intervention and post intervention scores for all the 3 groups separately. The paired t-test was used to evaluate the effect of all the three types of intervention separately in the 3 groups. One way ANOVA was performed to check the homogeneity of subjects before intervention and also to find the significance of improvement between groups. When interactions were detected, a post hoc analysis with Bonferroni adjustment was employed. Statistical significance was set at $P < 0.05$. P value > 0.05 was considered as non significant difference while P value $\leq$ 0.005 was considered to have represented a significant difference. Value of confidence interval was set at 95%. The graphical representation of findings was done using MS-Excel 2007 version.

RESULTS

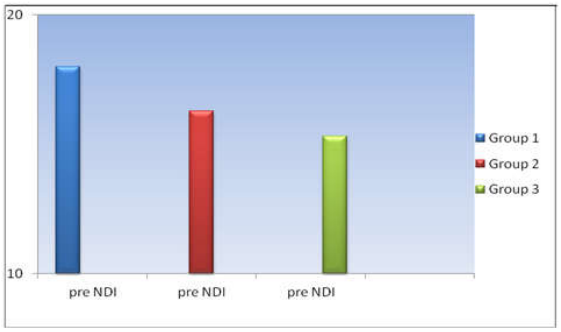
45 subjects were recruited for the study and were randomly assigned to 3 groups: group 1- MET (MET + conventional physiotherapy), group 2 – Static stretching (static stretching +

conventional physiotherapy), and group 3 – conventional group (conventional physiotherapy). 42 subjects completed the study and 3 subjects were dropped out as they could not complete all treatment sessions due to personal reasons. 10 treatment sessions were completed in all 42 subjects. The results obtained from ANOVA applied on demographic data showed that there were no significant differences in the mean age between the three groups as shown in Graph1. In all there were 28 females and 14 males who completed the study.



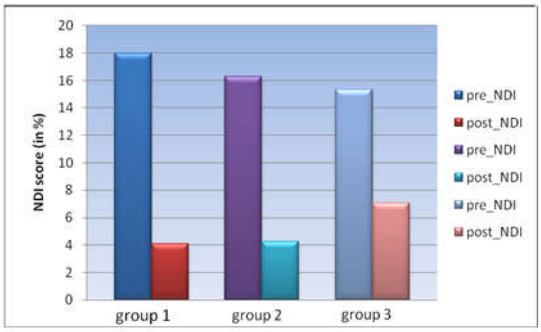
Graph 1. Comparison of age between groups

No baseline differences were found on the outcome measure (NDI scores). Significance level was set at 95%. Graph 2 shows the baseline comparison of the outcome measure.



Graph 2. Baseline comparison of NDI for group1,2,3

Comparison for the pre test and post test NDI scores for all 3 groups is shown in graph 3.



Graph 3. Comparison of pre and post NDI scores between groups

Paired t-test for the pre and post test comparisons for group 1 revealed a significant improvement (p=.000) in the NDI scores. Paired t-test for the pre and post test comparisons for group 2 revealed a significant improvement (p=.000) in the NDI scores. Paired t test for the pre and post test comparisons for group 3 revealed a significant improvement (p=.000) in the NDI score.

One way ANOVA for between group comparisons revealed no significant difference (p = .079) for NDI score. To determine which group was significantly different from the others, post hoc tests were conducted. Further post hoc analysis revealed no significant difference between the MET and Static stretching group for the outcome measure

DISCUSSION

The aim of the current study was to compare the effectiveness of muscle energy technique and static stretching in patients with subacute mechanical neck pain on neck disability. Data analysis revealed that post intervention there was statistically significant reduction in disability scores within the groups. However, between groups analysis revealed that both the techniques and conventional group were equally effective in reducing disability. Within group analysis revealed statistically significant reduction in neck disability scores in all the 3 groups. MET group and static stretching group showed a greater improvement of 77.17% and 73.75% respectively than the conventional group (53.72%). Result of our study for MET group is supported by previous studies done over neck area using NDI (Nagrale *et al*., 2010; Strunk and Hondras, 2008; Lamba and Pant, 2011) and other functional scales (Sharma *et al*., 2010; Rajarajeswaran, 2010) and over back area using Modified Oswestry Disability Scale (Patil *et al*., 2010; Naik *et al*., 2010) where disability reduced significantly following MET. Naik *et al*. (2010) demonstrated significant decrease in disability level (as per MODQ) in the group treated with MET and hot pack. Result for static stretching group is supported by Ylinen *et al*. (2007) who demonstrated significant reduction in disability in the stretching group. Between group analysis revealed no significant difference between MET and static stretching for reducing disability. The result of our study is quite different from the study done by Lamba *et al*. (2011) who found significant difference in reducing disability between two groups.

Their results can be due to additive effects of ischaemic compression which was given in both the groups. Hoving *et al*. (2002) determined the effectiveness of manual therapy, physical therapy and continued care by general practitioner and demonstrated insignificant differences in disability scores among groups. However their study was different from our study as they gave multimodal therapy due to which generalisation of which technique is effective is difficult. The effects of conventional group (hot pack + postural advice) cannot be overlooked. On within group analysis the patients in the conventional group also showed significant improvements in NDI scores. However, between group analysis revealed no significant difference for reducing disability. Further post hoc analysis for pain scores revealed significant difference between MET and conventional group but no significant difference between static stretching and conventional group. Advice on the correction of postural abnormalities is important in preventing recurrence of pain (Barry and Jenner, 1995). Advice on posture can lead to easing of muscle activity at the neck easing the pressure and strain, reducing the incidence of neck pain. In a study done by Chhabra *et al*. (2008), the subjects showed marked reduction in pain intensity when compared to baseline value. There was not much significant difference in

the disability scores and neck range of motion between two groups (SNAGS versus conventional physiotherapy). Moist heat therapy is known to have effects on pain and spasm and thus can attribute to pain relief and improved tissue extensibility in all three groups. Heat is used in therapy because of its effect on the physical properties of connective tissue: increased extensibility of collagen, decreased joint stiffness, relieved muscle spasm, and pain relief (Henricson *et al*., 1984).

Heat, however, may reduce pain, which is explained by the gate inhibition effect (Henricson *et al*., 1984). Increased connective tissue temperature decreases connective tissue resistance to stretch and promotes increased soft tissue extensibility (Lentell *et al*., 1992) and create less tissue damage compared with a similar stretch at lower temperatures. (James *et al*., 2004) In a study done by Patil *et al*. (2010), significant difference was found between MET and control group for decreasing disability and increasing spinal ROM and insignificant difference for reducing pain. IFT was used in their study in the control group instead of hot pack. Therefore differences in their results from our study can be attributed to the added effects of IFT modality. Walker *et al*. (2008) demonstrated statistically significant short term and long term improvements in pain and disability scores in MTE group when compared to MIN group. But their results can't be compared with our results as they gave MET and stretching in the same group and compared it with general practitioner care. However it has been seen that in mechanical neck pain many muscles are found to be shortened. Majority of the studies however give intervention to the upper trapezius only and see its efficacy. In our study we took both upper trapezius and levator scapulae as both are found to be commonly involved. Moreover it is very difficult for the patient to co-operate in stretching of many muscles in short duration.

Clinical relevance of the study

This study investigated the comparative effectiveness of MET and static stretching in patients with mechanical neck pain on disabilty. Since neck pain is a common problem within our society this study would benefit this population in managing their symptoms. Both the techniques can be used for the treatment of mechanical neck pain as statistically significant improvement was seen (in reducing the disability) implying effectiveness of both the techniques. Physical therapist should be trained to incorporate the use of these techniques in their profession and practice wherever feasible as these provide the patient with holistic improvement of functional outcome. Lastly, this study adds to the scarce body evidences available in this respect.

Limitations of the study

The present study failed to sustain the sample size of 45 patients which was sanctioned at the beginning of this study. Secondly, patients in the present study had low levels of pain intensity. Third limitation is that we recruited only those patients who could read and understand English which greatly limits the generalization of the results to whole of the population. Lastly, intervention was given only to upper trapezius and levator scapulae muscle.

Recommendations of future research

Future researches with greater sample size is recommended. Future research is required to determine long lasting effects of the treatment by taking follow up assessments for longer duration. Giving intervention to other group of muscles (of neck) which might give more beneficial results is recommended.

Conclusion

The results of this study indicates that both the treatment techniques, muscle energy technique and static stretching are equally effective in reducing the neck disability as there is no significant difference between the two groups.

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