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Effect of muscle energy technique vs exercise for subjects with temporomandibular joint dysfunctions.

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Abstract

Objectives: To determine the effectiveness of muscle energy technique on range of mouth opening and pain in subjects with temporomandibular joint dysfunctions.

Materials and methods: 40 subjects aged 20 to 30 years both male and females were recruited into the study. Double blinded randomized controlled trial design was carried out for 4 weeks duration.Subjects with temporomandibular joint dysfunctions were assessed and examined bydental surgeon and referred to physiotherapy OP department. Subjects were randomly assigned to Group A and Group B. Group A (N - 20) received Muscle energy techniqueand Group B (N - 20) received Active ROM exercises alone. Pre and post treatmentmeasures were recorded by dental surgeon and treatment provided by physiotherapist tomake the study double blinded randomized trial. Outcome measures were recorded usingVAS scale and Inter incisal distance in mm.

Results: Statistical significance were obtained withmuscle energy technique group A, while no significance achieved in general ROM exercise group in this study.

Key words: Muscle energy technique, ROM exercise, VAS scale

Introduction:

Temporomandibular joint dysfunction (TMD), is an umbrella term for a group of pathologies affecting the masticatory muscles, the temporomandibular joint (TMJ) and its related structures[1]. Although, traditionally viewed as a syndrome, the recent studies supports that TMD is a cluster of related disorders in the masticatory system, which has many common features[2,3]. The term has been used synonymously with a host of other terms including TMJ disorders, TMJ dysfunction syndrome, craniomandibular disorders and myofacial pain dysfunction syndrome[25]. TMD is considered a musculoskeletal disorder of the masticatory system that affects more than 25% of the general population[2]. Studies reported thatone or more symptoms of TMD will be exhibited by 85 to 90 percentage of population in their lifetime and 5 to 6% will have clinically significant TMD related jaw pain[10].

Epidemiological studies in specific population showed that about 75% of population have at least one sign of joint dysfunction (tenderness, joint sounds etc.) and about 33% have at least one symptom (face pain, joint pain, muscle pain etc.)[21,23]. Clinical studies have revealed that a small percentage of people have problems severe enough to seek care for TMD . Mostlywomen are affected than men in the ratio of about 8:1. TMD accounts for large percent of non-dental pain in the oro-facial region, with pain being one of the most frequently presenting symptoms[24]. Usually involving the muscles of mastication (temporalis, masseter and themedial and lateral pterygoid), the pre-auricular area and/or the temporomandibular joint. TMD usually have a wide range of

symptoms including restricted mouth opening, locking, clicking and commonly joint and muscle pain. It is also commonly associated with other factors affecting the head and neck regions such as headache, ear-related symptoms and cervical spine disorders [9]. Patients with chronic TMD frequently report of depression, poor sleep quality and low energy[7]. Chronic TMD interferes with normal social activity, interpersonal relationships and ability to maintain employment[17].

Management of TMD often involves a multidisciplinary approach; dentists, orthodontists, physical therapists, physicians and psychologists work together[6].

Current treatment of TMD includes behaviour modification,pharmacological intervention, nutritional counselling, occlusal therapy, physical exercise therapy and, orthodontics, prosthetics, orthotics and surgery. Considering the complexity of TMD, certain patients may benefit from more than one treatment modality at any one time[9]. Physical therapy interventions including electrophysical modalities, exercise and manual therapy techniques are potentially effective in managing TMD.Electrophysical modalities include interventions such as ultrasound, microwave, laser and TENS[16]. Physical therapy interventions often include therapeutic exercises for the masticatory or cervical spine muscles toimprove strength and mobility in the region[19]. Manual therapy helps toreduce pain and restore mobility[16]. The Maitland technique and Muscle energy technique are most widely used technique for musculoskeletal disorders.

Muscle energy technique(MET):

Muscle Energy Techniques (MET) are used to treat muscles with excessive tension, which limitmotion and cause pain[4]. MET can be used to strengthen a physiologically weakened muscle, to lengthen a shortened or spastic muscle and also to reduce localized oedema and to relieve passive congestion. MET is useful in, improving joint motion by reducing tension in the jaw muscle and subsequently reducing pain, be it localized or referred to the face and head. MET is of a valuable therapeutic use in resolution of themusculoskeletal component of TMJ pain and dysfunction. As MET works both on the TMJ andthe muscles of mastication (mainly the temporalis and masseter) it is considered to be more appropriate in treating both the limitation of mouth opening as well as the muscular component (strain and/or hypertonicity) of TMD[4].

Materials and methods:

.The participants of this study were adults aged 20-30 years of both sexes, were diagnosed by the dentists as having unilateral TMD based on their clinical findings and imaging techniques.

The sample size included in the study were 50 participants using simple random sampling method, each receiving a self-reportingquestionairre by mail. Out of 50 participants in the study, 40 participants returned the survey, a response rate of 80% Participants completed demographic questions such as age, gender and marital status andspecific informationabout the level of impairment of their report of TMJ pain. The participants were enquired about the frequency of their TMJ pain. The examination included observation, palpation, pain assessment and range of mouth opening (inter-incisal distance) assessment. The participants fulfilled the following inclusion and exclusion criteria.

Inclusion criteria

- Pain in temporomandibular joint

- Unilateral pain
- Reduced mouth opening as measured interincisal distance < 40mm
- Symptoms < 3 months

Exclusion criteria

- Degenerative Temporomandibular joint
- Infective temporomandibular joint
- Inflammatory temporomandibular joint
- Malignancy
- History of dislocation and surgeries of temporomandibular joint
- Ankylosis of temporomandibular joint
- Hypermobile temporomandibular joint

Patients were explained about the purpose of the study, types of evaluation and intervention procedures to undergo as part of the study. They were assured that their identity will be concealed, and informed that the results of the study will be shared among other professionals and even may be published in scientific journals. The subjects were asked for their queries regarding the purpose of the study and their anxieties and doubts were cleared. A written informed consent was obtained. Participants were treated with MET which includes post isometric relaxation and reciprocal inhibition, thrice a week for 4 weeks. The time period of each contraction was 10 seconds and was repeated for about 5 times.

Evaluation was done for the level of self-reported pain and TMJ range of mouth opening, in case of each subject, before the commencement of interventions and at the end of each week of interventions. Pain was measured using Visual Analogue Scale (VAS scale), which is a 10 cm horizontal line. The left end in the line was marked 0 which represents no pain at all and the right end of the line was marked 10, which signifies the worst pain experienced by the subject. The subjects were asked to mark the intensity of the pain perceived on the scale. The TMJ range of motion was measured as the Maximum Mouth Opening (MMO) and measurement was taken with a flexible intra-oral ruler as the participant actively opened his/her mouth to the maximum possible distance. The distance between the upper central incisors and the lower central incisors was determined as the inter-incisor range of opening[14] (Figure 1 & Figure 2).

Statistical analysis: The collected data were analyzed using parametric tests as it is interval in nature. The intra group pre and post-test data for MMO were analyzed using paired t-test, while the post test intergroup data were analyzed with unrelated t-test. The visual analog scale data were analyzed using non-parametric tests as it is ordinal in nature. Wilcoxon signed rank test is used to analyse the intra group pre and post-test VAS scores and Mann Whitney U test is used to analyse the post-test inter group VAS scores . The statistical significance of the p-valuefor data was fixed at 0.05.

Result:

The study consisted of 40 participants (n = 40), with a gender distribution of 21 females (55%)and 19 males (45%). The age of the participants ranged between 20 and 30 and the mean was25.5+2.96. The mean duration of symptoms for the participants was 47.7+23.85 days. Withinsame group, the

comparison of pain as measured by VAS at the end of each week of intervention(Table 1). The gradual and definitive reduction in the self reportedpain on a week-on-week basis is reflected in the median values.

The median score for the pre-test by VAS was 7, which reduced to 6 at the end of week 1, 4 at the end of week 2, 3 at the end of week 3, 1 at the end of week 4 of the intervention period (Table 2). The results showed that there is a reduction in the level of pain at the end of each week and at the end of the 4 week intervention period is statistically significant ($p<0.05$).

Similarly, the MMO scores show that there is considerable increase between the pre test value

and post test value. Moreover the MMO scores recorded at the end of each week of intervention also shows gradual improvement. The pre test mean MMO score was 21+1.26 (Table 3). At the end of week 1, the mean MMO scores showed a remarkable improvement with the value of (25.95+1.28). This improvement was maintained in subsequent weeks as can be seen from the values measured at the end of each week.

It shows that the Mean Difference (MD) between the pre test score and the score at the end of

week 1 is 4.95. The statistical analysis (t-value = 56.18) reveals that the improvement in MMO value is statistically significant (p-value = 0.00). The improvement in MMO value at the end of week 2 when compared to the pre test value showed a MD of 8.85, which was statisticallysignificant (t-value - 67.41, p-value = 0.00). At the end of week 3 the MMO scores showed aMD of 13.25 when compared to the pre test value, which on statistical analysis (t-value =85.08)showed a significant improvement (p-value = 0.005). The MD in MMO at the end of week 4when compared to the baseline was 17.85 and on analysis (t-value = 107.13) it showed asignificant improvement (p-value = 0.005).

The post test MMO score at the end of the 4 week intervention period when compared to the pretest score showed a MD of 22.45, which on statistical analysis (t-value = 132.25) revealed a significant improvement (p-value =0.005) (Table 4).

Discussion:

MET reduces tension in the jaw muscles and subsequently reduces pain, be it localized or referred to the face and head[20]. In thispresent study the maximum mouth opening has increased, it is similar to the findings by Anderson. The muscle energy technique thus stimulates the muscle spindles and Golgi tendon organs reducing excessive activity. Stretching of the muscle fibers stimulates the Golgi tendon receptors, which have an inhibitory influence on muscle tension, leading to muscle relaxation[19]. When a particular muscle isactively contracted, its antagonists are reflexively relaxed. Therefore, opening the mouth against resistance is inclined to relax contracted elevator muscle and vice versa for opening muscles[20], which can increase the ROM. However findings of present study did not support the work of Gosling and Frois[7] and Freshwater and Gosling[9] The reduction in pain by MET is similar to the findings by Lewit and Simons[5] and Brodin[3]. Although, Brodin's work whichis involved in the treatment of lumbar spine rather than TMJ, it is reasonable to assume that the mechanisms involved in both are similar. The possible reason for this discrepancy is that both the studies involved only a single session of MET which may not have been adequate in bringing about more positive results for the study clinically.

Limitations of the study:

- The study duration was short, only 4 weeks and the results apply to short term only, which might differ in the longer run
- No long term follow up was done to ascertain the differences in long term gains in the protocols
- Sample size taken for this present study is small and bigger sample might have led to some differences in the results
- Limited parameter of outcome measure was used which might bias the results Conclusion;

This study showed that, muscle energy technique demonstrated a significant reduction in TMJ pain and increase in TMJ range of motion as measured by Maximal mouth opening after four weeks of intervention in TMD. However, due to the lack of control group, small sample size and a dearth in the literature supporting the findings of this study, the results should be interpreted with caution.

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Table 1: Pretest and week wise VAS

Test	VAS score
Pre test	7
Week 1	6
Week 2	4
Week 3	3
Week 4	1

Table 2: Pre - Post test comparison of VASscore

Pre test and Week wise comparison	Mean difference	Z- value	P - value
Pre test week 1	1	-4.13	0.00*
Pre test week 2	2	-3.98	0.00*
Pre test week 3	3	-3.97	0.00*
Pre test week 4	4	-3.96	0.00*

Table 3: Pretest and week wise mean and standard deviation of maximum mouth opening

Test	Mean	SD
Pre test	21.00	1.26
Week 1	25.95	1.28

Week 2	29.85	1.42
Week 3	34.25	1.48
Week 4	38.85	1.22

Table 4: Pre Post test comparison of Maximal mouth opening

Pre test and Week wise comparison	Mean difference	Z- value	P - value
Pre test week 1	4.95	56.18	0.00*
Pre test week 2	8.85	67.41	0.00*
Pre test week 3	13.25	85.08	0.00*
Pre test week 4	17.85	107.13	0.00*