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Original Article

To Determine the Effect of a Muscle Energy Technique and Therapeutic Jaw Exercises on the Range of Mouth Opening

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Abstract:

Objectives: To evaluate whether a specific muscle energy technique (MET) would have an effect on the vertical range of mouth opening compared to therapeutic jaw exercises and non interventional control group? **Subjects**: Twenty-one (N=21) subjects aged at least 20 years were recruited in the study. **Design**: An experimental design study. Pre-test and post-test match subject design. The participants were randomly divided into three groups (Group A, Group B and Group C). Group A received Therapeutic Jaw Exercises, Group B received specific MET and Group C was non-interventional control group. Instruments for jaw opening distance were obtained prior to the application of any therapy. All groups completed a Temporomandibular dysfunction checklist, to determine the symptoms of temporomandibular joint dysfunction, before the intervention, immediately after the intervention, 5 minutes after the intervention, 10 minutes after the intervention, 20 minutes after the intervention, 30 minutes after the intervention and one week post intervention. A questionnaire to determine the patient's own perception of pain was administered prior to the intervention, immediately after the intervention, 5 minutes after the intervention, 10 minutes after the intervention, 20 minutes after the intervention, 30 minutes after the intervention and one week post intervention. In this study only the outcome of range of jaw opening is discussed. **Data analysis**: The collected data was mean and standard deviation and has been analyze using STATA software. The t-test was used to analyze the difference in the vertical mouth opening improvements in Group A, Group B and Group C. Intra group analysis between pre-intervention, immediate after, 5 minutes, 10 minutes, 20 minutes, 30 minutes and one week after the intervention scores was also done for all the groups. A significance level of Pd"0.05 was fixed. **Results**: The result of my study showed that there is a gradual significant improvement in Group A and immediate significant improvement in Group B while there in no significant improvement in control group i.e. Group C. So, MET and therapeutic jaw exercises are useful techniques in improving TMJ range of opening. **Conclusion**: The results of my study supports the hypothesis, within the limitation of this study, that, the application of MET and Therapeutic Jaw Exercises improves the range of opening of the TMJ. The result of this study provides a base for further research as they presents valuable outcomes for practitioners treating TMJ dysfunctions.

Keywords: Muscle Energy Technique, Therapeutic Jaw Exercises, Temporomandibular Dysfunction.

Introduction

Temporomandibular dysfunction comprises an assortment of signs and symptoms including the pain on function, joint tenderness, restricted jaw movement, clicking, jaw locking and tenderness in muscles of mastication.1 Hypertonicity of the primary muscles of the mastication (masseter, medial and lateral pterygoids, temporalis), regardless of etiology, may reduces the mobility of temporomandibular joint (TMJ) resulting in a reduced range of mouth opening. This restriction is one of the sign of the temporomandibular dysfunction, as is pain, locking, headache and tinnitus. Studies has reported that 75% of the general population will have some type of TMD symptoms2 and it is estimated that more than 85 to 90% of people will display one or more of the TMD symptoms in their lifetime3,4,5.

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Aims and Objectives

To evaluate whether a specific muscle energy technique would have an effect on the vertical range of mouth opening on the TMJ compared to therapeutic jaw exercises and non interventional control group?

Operational Defination

Linear Technique of Measurement of Range of Mouth Opening

Range of mouth opening is the distance, which is measured from the incisal surface of the mandibular central incisor and the corresponding maxillary central incisor edge when the mouth is maximally opened, has been used extensively in research conducted by Carlson6. Although, in the previous research it has been determined that the measurement should include the amount of overlap between the upper and lower central incisors when the teeth are in occlusal position, plus the inter- incisally range of opening7-14 and as this study is an evaluation of mouth opening ability we considered the inter-incisal measure as the most appropriate measurement method. It is inexpensive, non-invasive easy to use and applicable for use in general practice4. An inter-incisal distance of less than 40 mm represent a restricted range of motion7,8,10,11,15,16 while normal range of mouth opening is expected in between 45 to 60mm in males and 40 to 55mm in females9. Mouth opening should be free of joint noise, smooth and without deviation7.

Therapeutic Jaw Exercises

Muscles exercises are of great value in the treatment of TMD. Therapeutic manual therapy and exercises have yielded favorable results in the rehabilitation of TMD13,23,25. Stretching exercises are designed to increase the range of motion of the mandible. The purpose of exercises for the masticator system are (1) to achieve the relaxation of the tense muscle, (2) to retain the coordination and rhythmic muscle function, (3) to increase mandible range of motion(isotonic exercises), (4) to increase muscle strength(isometric exercises). Such activity stimulates the muscle spindles and Golgi tendon organ reducing the excessive activity. The principle is that when a muscle is actively contracted, it's antagonists are reflexly relaxed. Therefore opening of the mouth against resistance tends to relax the contracted elevator muscles and vice versa for opening muscles. The fact that physical therapy is non invasive and does not appear to be fraught with irreversible changes makes it a very applicable vehicle in the area of clinical TMJ dysfunction management17,26.

Muscle Energy Technique

Muscle energy technique (MET) is a technique whereby the patient actively uses their muscles against a counterforce produced by the practitioner. The practitioner controls the intensity, time and direction. According to Greeman27, MET can be used "to lengthen a shortened, contracted or spastic muscles, to strengthen a physiologically weakened muscle or group of muscles, to reduce localized edema and relive passive congestion(the muscles are the pump of the lymphatic and venous systems), and to mobilize an articulation with restricted mobility."

They are used primarily by osteopath to treat muscles with excessive tension that limits joint motion28,29. However, the treatment of TMJ using MET has not commonly been documented, although it may have a beneficial outcome on the limited range of motion frequently associated with TMD34. Malone8 advocates the uses of "hold-relax" techniques (similar to muscle energy technique) on the mandible elevator (temporalis, massetor, medial and lateral pterygoids), to improve the functional mobility of TMJ, and range of mouth opening. MET treatment of TMJ must be considered as a valid treatment approach for TMD if it can be shown to improve functional range.

Hypothesis

Null Hypothesis: There will be no significant difference in mouth opening after giving the specific MET and TJE in TMD.

Alternative Hypothesis: There will be a significant difference in mouth opening after giving the specific MET and TJE in TMD.

Limitation of study

The small sample size was one of the major limitations of the study. Also, most of the participants belonged to the same community and were leading an active lifestyle. Thus, results obtained cannot be generalized for all population types.

Inclusion Criteria

With a restricted mandibular range of motion of 40mm or less measured inter-incisally.

- Temporomandibular Disorders as-
- Pain on function,
- Joint tenderness,
- Restricted jaw movement,
- Clicking,
- Jaw locking and
- Tenderness in muscles of mastication.
- Hypertonicity of the primary muscles of the mastication (massetor, medial and lateral pterygoids, temporalis).

All volunteer signed the informed consent prior to participating in the study.

Exclusion Criteria

Subjects were excluded if they had been found previously diagnosed a systemic arthropathy such as-

- Rheumatoid Arthritis,
- Malignant Tumor of the face or jaw,
- Previous history of jaw or TMJ surgery,
- Fracture of jaw or TMJ.
- Subjects have/had dental/orthodontic treatment within past seven days.

Design

An experimental design study. Pre-test and post-test match subject design.

Instruments and Special Testing Tools

Standard transparent measuring scale, MET and TJE.

Materials

Couch and mouth opener.

Protocol

A sample of volunteer participants (N=21) with a restricted mandibular range of motion of 40mm or less measured inter-incisally were recruited for study. Symptomatic and asymptomatic participants (age 25.14±09.41 range 20-58 years, males 10 and females 11) were recruited from the Subharti Dental College O.P.D, Subharti College of Physiotherapy O.P.D. and Jai Physiotherapy and Dental Clinic, SF-06, Ansal Galleria, Ansal Town, Meerut. These subjects were than randomly divided into 3 groups (i.e. Group A – TJE Group, Group B –MET Group and Group C – Control Group) each with an equal numbers of participants. The control group did not receive any treatment. Measurement of jaw opening were made pre-intervention, immediately after, after 5 minutes, after 10 minutes, after 20 minutes, after 30 minutes and one week after the application of intervention.

Procedure

The participants were divided into three groups randomly (i.e. Group A – Therapeutic Jaw Exercises, Group B – MET intervention Group and Group C – Control Group,) each with an equal numbers of participants. Then measurement of jaw opening were made pre-intervention, immediately after 5 minutes, 10 minutes, 20 minutes, 30 minutes and one week after the application of intervention.

Mandibular range of opening was measured inter-incisally by linear technique, and not including the degree of overlap between the teeth when in the closed position. This involved a measurement being taken with a transparent ruler as the participants opened their mouth to the maximum possible distance. The distance between the edges of the upper central incisors and the lower central incisors was determined as the inter-incisor range of opening6,8,10,15,16.

The TJE technique used in this study included stretching, guided opening and closing movements and manual opening of jaw. At the start of the treatment period all participants were given a presentation and practical demonstration of the exercise program by the treating practitioner. Patient used a clenched fist under the jaw to provide the resistance to opening. With fingers holding lower teeth, patient resisted closing the mouth. Using a clenched fist held on the side of the jaw, the patient resisted the side movement (lateral excursion). By placing the thumb on the top row of teeth and index finger on lower teeth the patient actively stretched the mouth open. All movements held for a couple of seconds. All the movements were repeated 10 times to complete one set. Five sets were required for each movement. This regime occurred once17,25.

The MET technique used in this study involved the treating practitioner placing gloved thumbs on the lower molars on both sides of the participants jaw, whilst the participants lay supine with the mouth open. The participants was asked to attempt closing the jaw using 20% of their total effort as the practitioner provided an equal resistance with the thumbs, so that no movement occurred. The treated