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Research Article

Effect of MET versus Ultrasound Therapy in TMJD Patients

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Abstract:

Objective: To compare the Effect of MET versus Ultrasound Therapy in TMJD Patients

Background: Temporomandibular disorder is a major cause of nondental pain in the orofacial region and is considered to be a sub classification of musculoskeletal disorders. In many patients with temporomandibular dysfunction the most common complaint is not about temporomandibular joints but rather the muscles of mastication. Therefore the terms TMJ dysfunction or TMJ disorder are actually inappropriate of many of these complaints. It is for this reason that the American dental association adopted the term "temporomandibular disorder

Study design: Experimental design

Methods: A total of 40 subjects were recruited (39 males and 1 female),(4 patients of MET group discontinued their treatment because of personal reasons) in the study of myofascial pain dysfunction syndrome diagnosed by the dental practitioner as per inclusion and exclusion criteria from the different dental clinics. 20 subjects were placed in the ultrasound group (group A) and 16 subjects in the muscle energy technique group (group B).

Results: significant improvement of pain on within group analysis of VAS for both group A ($p < .05$) and group B ($p < .05$. Groups analysis which states no significant result for VAS ($p > .05$. Between groups analysis which states no significant result for VAS ($p > .05$).

Conclusion: The conclusion of the study states that ultrasound and MET both are effective therapies for MPDS. MET shows more significant results compared with ultrasound for mandibular mouth opening

Keywords: MET, ultrasoundtherapy, Temporomandibular, VAS, pterygoidmuscle

INTRODUCTION

Temporomandibular joint dysfunction is defined as a collective term embracing a number of clinical problems that involves the masticatory muscles, temporomandibular joint and associated structure or both.[15] Temporomandibular disorder is a major cause of nondental pain in the orofacial

region and is considered to be a sub classification of musculoskeletal disorders. In many patients with temporomandibular dysfunction the most common complaint is not about temporomandibular joints but rather the muscles of mastication. Therefore the terms TMJ dysfunction or TMJ disorder are actually inappropriate of many of these complaints. It is for this reason that the American dental association adopted the term "temporomandibular disorder".[23]

TMJ syndrome is divided into three categories Myofascial pain dysfunction syndrome (MPDS), Internal derangement (ID), Degenerative joint disease (DJD).[15] TMJ pain and tenderness when palpated both laterally in the pre-auricular area and via the external auditory meatus, masticatory muscle tenderness (lateral pterygoid, masseter and temporalis), clicking and jaw locking and trismus.[14]

The MPD syndrome is consider the most common cause of TMJ pain and may be a psychophysiologic disease primarily involving the muscles of mastication[33]. MPD is believed to be a stress related disorder (Van Selms MK)[32]. There is an increase in mandibular muscle tension in tandem with teeth grinding/clenching resulting in spasm, pain and dysfunction. Clinical signs of myofacial dysfunction include limitation of jaw opening (normal range is atleast 40mm as measured from lower to upper anterior teeth), palpable spasm of facial muscles, clicking or popping in the TMJ, tenderness on palpation of the TMJ via the external auditory meatus, crepitus over joint (in advanced disease) and lateral deviation of the mandible.[15]

Masseter muscles are the power muscle of the jaw, exerting the major force in biting and chewing. Trigger points in the masseter muscle cause pain in several places. The trigger point in the deep layer right in front of the ear is especially important as a cause of pain in the temporomandibular joint. Masseter trigger points can also increase muscle tension to such an extent that it restricts opening of the jaw, cause pain in upper and lower teeth, also in front of the face, under the eyes and over the eyebrows.[27]

The pterygoid muscle are well hidden by lower jaw bone, their trigger point are the main cause of pain in the temporomandibular joint of the jaw. The medial pterygoid muscle causes pain in the temporomandibular joint and the ear, back of the mouth, hard palate and tongue and make it hurt to swallow and difficult to open the mouth wide. The function of this muscle is to help close the jaw. The lateral pterygoid is the number one myofascial source of pain and temporomandibular dysfunction. Trigger point in this muscle refer pain to cheek. The function of lateral pterygoid muscle is to help the diagastric muscles open the jaw.[27]

Temporalis is also a chewing muscle, its trigger points contribute to headaches in the front and sides of the head and also cause pain and hypersensitivity in the upper teeth.[27]

Therapeutic ultrasound is not a new form of treatment. Ultrasound treatment accelerate heating, increase the extendability of collagen fibers, decrease joint stiffness, provide pain relief, improve mobility and reduce muscle spasm.[7,9]

During ultrasound therapy cell membrane permeability is increased by altering sodium and potassium ion gradient. This increased permeability improves gas exchange and promotes healing. Ultrasound decreases inflammation, increases vasodilation and waste removal, accelerates lymph flow and stimulates metabolism. The heating effect of ultrasound impairs conductivity of an insonated nerve and thus decreases the sensation of pain.[9]

Muscle energy technique is an approach which targets the soft tissue primarily to lengthen a shortened, contracted or spastic muscle; to strengthen a physiologically weekend muscle or group of muscles; to localized edema, to relieve passive congestion and to mobilize an articulation with resisted mobility (Philip Greenman) and it also makes a major contribution towards joint mobilisation.[4]

Post isometric relaxation and reciprocal inhibition are two forms of MET especially in relation to the work of Karel Lewit. The term PIR refers to effect of subsequent reduction in tone experienced by a muscle, or group of muscles, after brief periods during which an isometric contraction has been performed.[4]

The previous researcher showed that effectiveness of MET and ultrasound on MPDS in TMJD. Both the treatment showed individually effective but no one as compared both of these two techniques. Thus the present study has been postulated.

Aims and Objectives

To compare the effect of MET and ultrasound therapy in TMJD patients.

Statement of question

Which of these procedures produce more beneficial effect on pain and range of motion on TMJ.

Hypothesis

Ultrasound or MET have significant effect on ROM and pain in subjects with TMJ dysfunction.

Operational definition

Muscle energy technique

Muscle energy is a technique whereby the patient actively uses their muscles against a counterforce produced by practitioner. The practitioner controls the intensity, timing and direction.

Methodology

Sample

A total of 40 subjects were recruited (39 males and 1 female),(4 patients of MET group discontinued their treatment because of personal reasons) in the study of myofascial pain dysfunction syndrome diagnosed by the dental practitioner as per inclusion and exclusion criteria from the different dental clinics. 20 subjects were placed in the ultrasound group (group A) and 16 subjects in the muscle energy technique group (group B).

Design

Experimental design

Inclusion criteria

- Subjects with temporomandibular joint dysfunction as diagnosed by the dental practitioner.
- Both Unilateral and bilateral joint involvement.
- Subjects between ages of 20-59 yrs.
- Mandibular opening is less than 40mm.

Exclusion criteria

- History of fracture around TMJ
- Any history of malignancy
- History of trigeminal neuralgia
- RA and OA of TMJ
- Any injection therapy around TMJ
- History of analgesics

Instrumentation

- VAS
- Measuring scale
- Ultrasound machine and ultrasonic gel
- Gloves

Outcome measures

- Pain
- ROM

Figure 3.1: Shows gloves and measuring scale

Figure 3.2: Shows ultrasound machine

Protocol

Group A- Ultrasound group received ultrasound of 1 MHz, and an intensity of 0.75 to 2 W/cm ^{2} for 5 minutes for a period of 4 weeks (3 times in a week)in a continuous mode.

Group B- muscle energy technique group received muscle energy technique using PIR to relax the short tight muscle for a period of 4 weeks (3 times in a week).

Procedure

Subjects were informed about the purpose and procedure of the study prior to the participation and informed consent was obtained from them. Subjects were assessed and screened initially as per the screening and the assessment format. Based on this assessment, subjects were randomly divided into two groups.

Group A

Ultrasound group received ultrasound (International electro medical company) of 1 MHz, and an intensity of 0.75 to 2 W/cm ^{2} (1st week 0.75, 2nd weeks 1 , 3rd week 1.5 and 4th week 2 W/cm^2) for 5 minutes for a period of 4 weeks(3 times in a week)[10] in a continuous mode.

Group B

Received muscle energy technique for temporomandibular joint using PIR to relax

the short tight muscle for a period of 4 weeks (3 times in a week).

The muscle was first passively stretched to a point just the onset of resistance to further movement, from this position the patient carried out a prolonged gentle isometric contraction against minimal resistance of about 10 sec., then was told to let go, the relaxation phase should last as long as the isometric contraction phase and when the operator sensed that the patient had fully relaxed, the patient was told to take a deep breath and exhale completely. During exhalation the muscle was extended further after isometric contraction and allowed the operator to extend it further without applying force. From this new position, the procedure was repeated.[20]

Technique 1:

The subject was asked to open her/his mouth to a comfortable limit (where 1st Bind is noted).Then therapist gives counter pressure in order to prevent open mouth from closing. This requires thumb to be placed along the superior surface of the mandibular molar teeth while subject performs isometric contraction. The effort has maintained for 10 sec. After the attempt it would be taken to its new barrier (by the subject's own effort) before repeating. The procedure was repeated three times with rest period of 15-20 sec in between.

Technique 2:

The subject sits with the head turned towards one side (left). The therapist stands behind him and stabilizes the head against his chest. The subject opens his mouth, allowing the chin to drop, and the therapist cradles the mandible with his left hand, so that the fingers are curled under the jaw, away from him. The therapist draws the jaw gently towards his chest, and when the slack has been taken up, the patient offers a degree or resistance to its being taken further, laterally. Then to contract isometrically for 10 seconds and relax .Then the jaw is taken to a new barrier with the subject's effort. The procedure will repeat three times.

Mandibular mouth opening measurement

Pre, after 2 weeks and post therapy interventions mandibular mouth opening were taken. Normal mouth opening is 4 cm. The subject was instructed open your mouth as wide as possible without causing pain or discomfort, the intercisal distance by placing one end of the ruler against the incisal edge of one of the central incisors, and the other end against the incisal edge of the opposing maxillary incisor (Nancy walker).[21]

Shows Mouth opening measurement

Visual analog scale measurement

A straight line placed horizontally or vertically on a paper. The end points of the line are labeled with descriptive or numeric terms to anchor the extremes of the scale. The VAS is 10 cm long. The patient is asked to bisect the line at a point representing self-assessed position on the scale.

Results

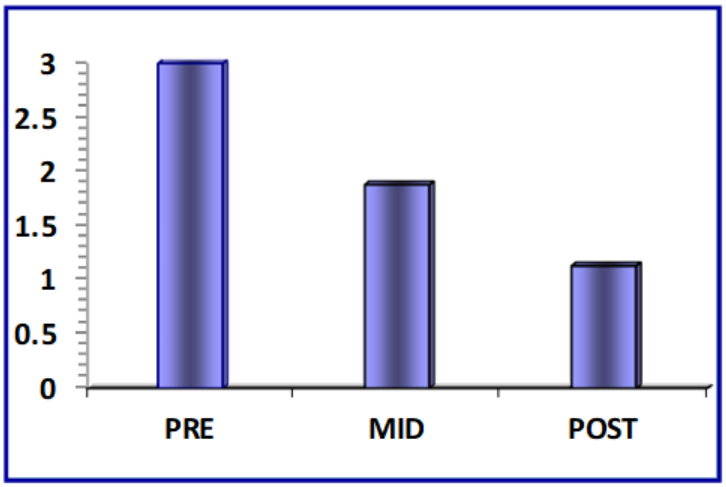
The data was analyzed for the 36 subjects, 20 in ultrasound group and 16 in MET group.

Table 5.1 showed significant improvement of pain on within group analysis of VAS for both group A ($p < .05$) and group B ($p < .05$).

Table 5.1: Within group analysis of VAS for both groups

Variables	Mean rank			P
	Pre therapy	After 2 weeks	Post therapy	
Group A	3.00	1.88	1.13	.000
Group B	3.00	1.84	1.16	.000

Graph 5.1: Group A within group of VAS



Graph 5.2: Group B Within group of VAS

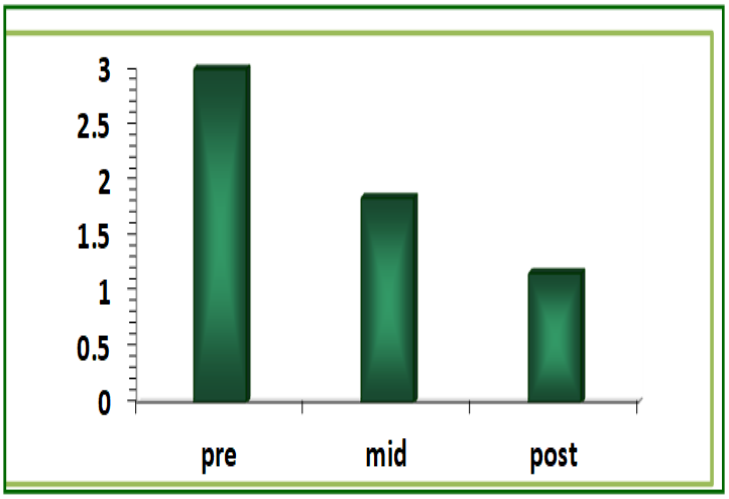


Table 5.2 showed between groups analysis which states no significant result for VAS ($p > .05$).

Table 5.2: Between groups analysis for VAS

VAS	Mean rank		Z	P
	Group A	Group B		
pre therapy	3.00	3.00	-1.361	.174
after 2 weeks	1.88	1.84	-.526	.599
post therapy	1.13	1.16	.000	1.000

Graph 5.3: Shows between group comparisons of Pain

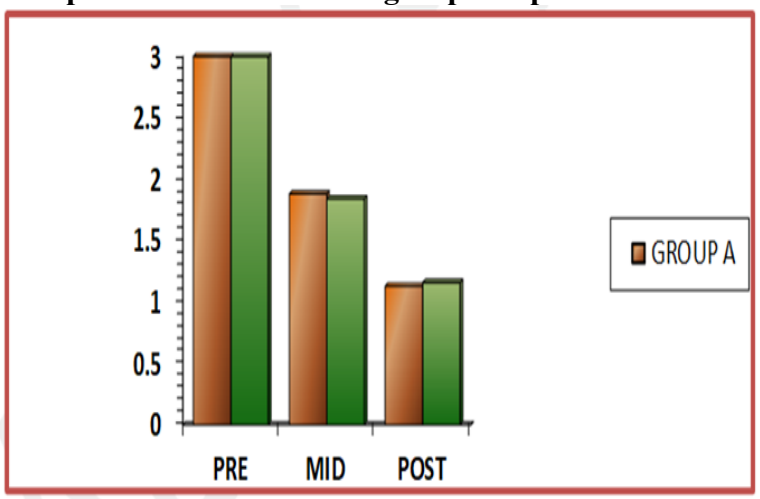
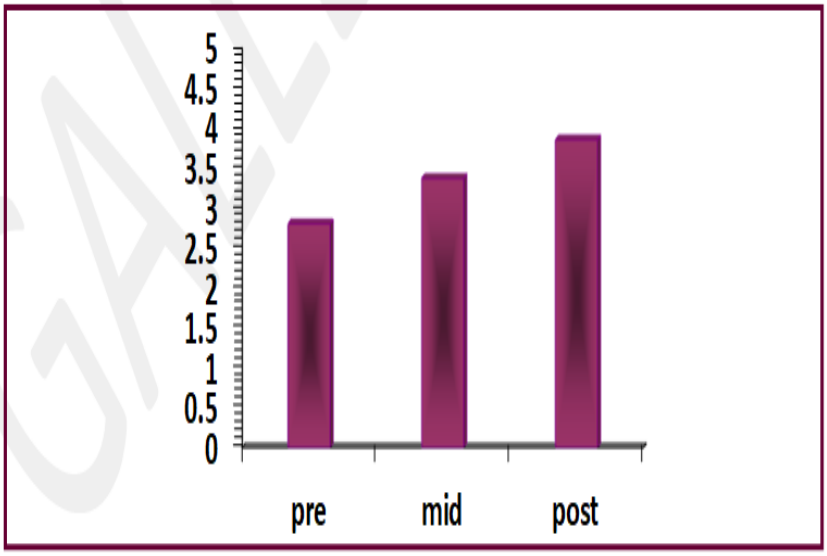


Table 5.3 showed significant improvement of mouth opening on within group analysis of mouth opening for both group A ($p < .05$) and group B ($p < .05$).

Table 5.3: Within group analysis of MMO for both 2 groups

Variables	Mean ± standard deviation			p value		
	Pre therapy	After 2 weeks	Post therapy	pre	Mid	Post
Group A	2.80 ± 0.6427	3.37 ± 0.5391	3.85 ± 0.3817	.000	.000	.000
Group B	3.06 ± 0.6117	3.88 ± 0.5524	4.36 ± 0.3772	.000	.000	.000

Graph 5.4: Shows within group analysis of Group A MMO



Graph 5.5: Shows within group analysis of Group B MMO

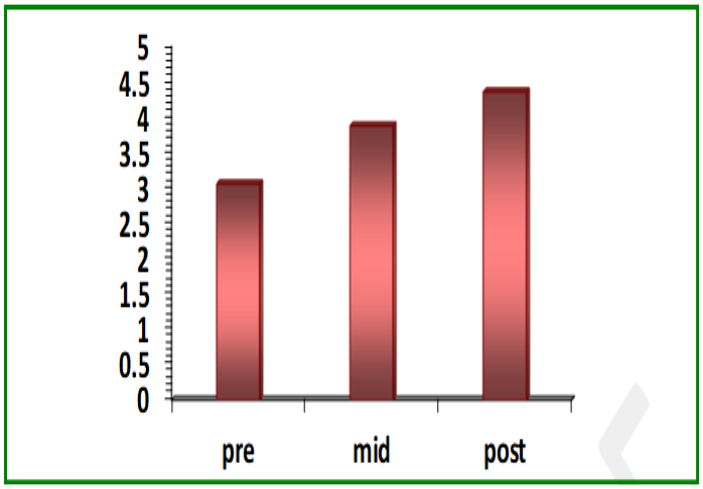
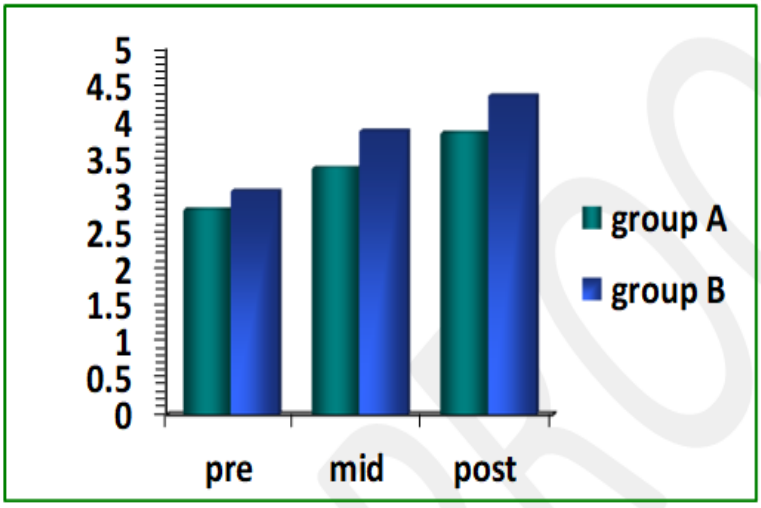


Table 5.4 showed between group analysis which show significant improvement of mouth opening in MET (p <.05).

Table 5.4: Between group analysis for MMO

MMO	Mean- Group A	Mean- Group B	T	P
pre therapy	2.80	3.06	-1.25	.218
after 2 weeks	3.37	3.88	-2.32	.026
post therapy	3.85	4.36	-3.35	.002

Graph 5.6: Shows between group comparisons of MMO



Discussion

In the present study we compare the effect of ultrasound and muscle energy technique on pain and mandibular mouth opening on the patients of temporomandibular joint dysfunction. Patients with TMJD have pain on muscle palpation or mandibular movements (or both), joint sounds and a limited mandibular range of motion (Kaplan AS and Assael LA). Subjects were divided into two groups, group A was given the ultrasound therapy and group B was given the muscle energy technique. The pain and mandibular mouth opening was measured

three times (pre therapy, after 2 weeks and post therapy) by VAS and measuring sca respectively.

Repeated measures test were used to analysis the data within group for MMO which shows a significant improvement in both the groups. Independent t test were used to compare between the groups for MMO which shows significant result of MET. Wilcoxson signed ranks used for VAS between the group which shows no statistically significant difference and friedman's test within the groups which shows significant improvement in both the groups.

The results of the study indicate that the therapeutic ultrasound can alleviate the symptoms of the MPDS. This finding supports the earlier contentions of Erickson and Grieder et al and suggests that therapeutic ultrasound units might be valuable in the dental office. The effectiveness of ultrasound could be explained by its spasmolytic action on the muscles which reduce hypertonicity or tension. The ultrasound permits deeper penetration by avoiding absorption of the energy in subcutaneous fat (Erickson RI, Aldes JH et al)15. Talaat evaluated the effectiveness of analgesics, SWD and US on MPDS patients and concluded US is the best among them in reducing MPDS symptoms.[29]

MET reduces tension in the jaw muscles and subsequently reduces pain, be it localized or referred to the face and head (Royder). The MET stimulates the muscle spindles and Golgi tendon organs reducing excessive activity (Bell).25 PIR has been abolished trigger points in muscles and also relieved painful ligaments and periosteum in the region of attachment. In isometric contraction phase only few motor units of the muscle activate and remaining motor unit of that muscle and other muscles are inhibit and the patient first relaxes the muscle completely, which takes several seconds then stretched only so far as relaxation allows, avoiding any increase in tension.[20]

The comparison of the use of ultrasound and MET in the treatment of MPDS shows greater improvement with MET on MMO, it has some advantages, with MET therapist has no need to use any kind of machine, the duration of treatment is quite less and the patient can follow the exercise himself if not able to come to the therapist or not a cost effective method of treatment.

However, Gray RJM compared four physical modalities (SWD, megapulse, US, soft laser) on TMJPDS with placebo treatment and concluded no statistically significant difference in success rate between any of the four tested treatment, each individually was significantly better than placebo treatment, this shows a contradictory results.

Limitations and Future Research

Limitations of the study

- The duration of the study was short
- Limited parameter of outcome measures was used which may bias the results

Future research

- The study can be undertaken using a larger sample size.
- The MET can be comparing with other therapies like trigger point therapy.
- The study can be undertaken with increase the duration of the study.

Conclusion and Clinical Significance

The conclusion of the study states that ultrasound and MET both are effective therapies for MPDS. MET shows more significant results compared with ultrasound for mandibular mouth opening.

Clinical significance

It is a cost effective treatment and take short duration treatment.

References

1. Anderson N. the effect of specific muscle energy technique technique on the range of opening of the temporomandibular joint. Master thesis, Victoria university.
2. Burns DK, Wells MR. Gross range of motion in the cervical spine: the effects of osteopathic muscle energy technique in asymptomatic subjects. *J Am Osteopath Assoc*. 2006 Mar; 106(3):137-42.
3. Bush FM et al. Pain assessment in temporomandibular disorder. *Cranio.* 1989; 7: 137-143.
4. Chaitow L. (2nd edition) muscle energy technique, Churchill livingstone
5. Chaitow L. Soft tissue manipulation, healing arts press. Rochester, Vermont.
6. Dworkin SF et al. Epidemiology of signs and symptoms in temporomandibular disorders: clinical signs in cases and controls. *J Am Dent Assoc.* 1990; 120: 273-281.
7. Dyson, M. C., Franks, C., and Sucking, J,: stimulation of healing of varicose ulcers by ultrasound. *Ultrasound* 1976; 14: 232.
8. Emshoff R. Clinical factors affecting the outcome of arthrocentesis and hydraulic distension of the temporomandibular joint. *Oral Surg Oral Med Oral Patho Oral Radiol Endod*. 2005; 100(4):p 409-14.
9. Esposito CJ, Veal SJ, Farman AG (1984). Alleviation of myofascial pain with ultrasonic therapy. *J Prosthet Dent.* 1984 Jan; 51(1):106-8.
10. Evcik D, Aksoy O. correlation of temporomandibular joint pathologies, neck pain and postural differences. *J Phys. Ther.* Sci. 2000: 12; 97-100.
11. Fregni F et al (2006) A randomized, sham-controlled, proof of principle study of transcranial direct current stimulation for the treatment of pain in fibromyalgia. *Arthritis Rheum*. 2006; 54(12):p 3988-3998.
12. Gavish et al. Oral habits and their association with signs and symptoms of temporomandibular disorders in adolescent girls. *J Oral Rehb.* 2000; 27: 22-32.
13. Graff-Radford SB. Temporomandibular disorders and headache. *Dent Clin North Am.* 2007 Jan; 51(1):129-44, vi-vii.
14. Gray, RJ, Quayle, AA, Hall, CA, Schofield, MA. Physiotherapy in the treatment of temporomandibular joint disorders. *British Dental Journal*. 1994; vol-176, No.7:p 257-261.
15. Hegde V. A review of disorder of TMJ. *Journal of Indian Prosthodontic Society*. 2005; vol – 5: p 56 – 61
16. Huddleston Slater JJ, Lobbezoo F, Van Selms MK, Naeije M. recognition of internal derangements. *J Oral Rehb*. 2004; 31: 851-854.
17. Karibe H., Goddard G., and Gear RW. Sex differences in masticatory muscle pain after chewing. *J Dent Res.* 2003; 82(2): 112-116.
18. Kimos P, Biggs C, Mah J, Heo G, Rashiq S, Thie NM, Major PW. Analgesic action of gabapentin on chronic pain in the masticatory muscles: a randomized controlled trial. *Pain*. 2007 Jan; 127(1-2): p 151-60.
19. Kulekcioglu S., Sivrioglu K., Ozcan O., and Parlak M. effectiveness of low level laser therapy in temporomandibular disorder. *Scand J Rheumatol.* 2003; 32: 114-118.
20. Lewit K., Simons DG. Myofascial pain: relief by post isometric relaxation. *Arch Phys Med Rehb.* 1984; 65 (8): 452-456.
21. Nancy walker, Richard W. Bohannon, Denis Cameron. Discriminant validity of TMJ ROM obtained with ruler. *JOSPT*. 2000; 30(8):484-494.

22. Nicolakis P et al. effectiveness of exercise therapy in patients with myofascial pain dysfunction syndrome. *J Oral Rehb.* 2002; 29: 362-368.
23. Okeson JP. Temporomandibular disorders in the medical practice. *J Fam Pract.* 1996; Oct; 43(4):p 347-56
24. Page P., Frank C. C., Lardner R. Assessment and treatment of muscle imbalance- The Janda approach (Human Kinetics).
25. Rajadurai V. the effect of muscle energy technique on temporomandibular joint dysfunction: a randomized clinical trial. *Asian J.Sci.Res*. 2011; 4: 71-77.
26. Scott J., and Huskisson EC. Graphic representation of pain. *Pain.* 1976; 2: 175.
27. Simons D.G. The trigger point therapy workbook. New Harbinger Publication,Inc
28. Sullivan S.B.O. (4th ed). Physical rehabilitation, philadelphia
29. Talaat AM, el-Dibany MM, el-Giaf A. Physical therapy on management of MPDS. *Ann Otol Rhinol Laryngol.* 1986 May-Jun; 95(3 Pt 1): 225-8.
30. Trott PH, Goss AN. Physiotherapy in diagnosis and treatment of myofascial pain dysfunction syndrome. *Int J Oral Surg.* 1978 Aug; 7(4): 360-365.
31. Uyanik JM, Murphy E. Evaluation and management of TMDs, part 1. History, epidemiology, classification, anatomy, and patient evaluation. Dent Today 2003; 22: 140-145.
32. Van Selms MK, et al. craniomandibular pain, oral parafunctions, and psychological stress in a longitudinal case study. J Oral Rehb 2004; 31: 738-745.
33. Wexler GB, Steel PA. Psychological factors and temporomandibular outcomes. Cranio 1998; 16: 72-77.
34. Wilson E., Payton O, Donegan – Shoaf, Deck. Muscle energy technique in patients with low back pain. J Ortho Sports Phys Ther. 2003; 33(9): 502-512.