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Research paper

An additive effect of lateral pterygoid muscle release technique in temporo mandibular joint dysfunction (TMJD)

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Abstract

Introduction: Temporomandibular joint (TMJ) dysfunction (TMJD) is a group of related disorders of the muscles of mastication. Until now, no research has been conducted with particular attention to intra oral lateral pterygoid release along with conventional therapy.
Methods: The study was performed an experimental study and the samples were recruited in convenient sampling method. 30 patients were selected and divided them into two groups, Group A & B. The measurement of range of maximal mouth opening (MMO) and pain using the NPRS and TMD disability index was observed.
Results: All the outcome measures were analysed at baseline and after 4 weeks of treatment using appropriate statistical test. Level of significance was kept at 95%. Both the groups A and B, p values were <0.001, showing statistically signifacant difference in MMO, NPRS and TMDI score as compared to baseline.
Conclusion: The lateral pterygoid release technique along with ultrasound and conventional therapy is more effective in reducing pain, increasing range of mouth opening and reducing functional disability of TMJD than conventional therapy and ultrasound alone.

Keywords: *Temporomandibular Joint; Lateral Pterygoid Release Technique; Maximal Mouth Opening*

1. Introduction

Temporomandibular joint (TMJ) dysfunction (TMJD) is a group of related disorders of the muscles of mastication. TMJ dysfunction predominates in the 20-40 age groups [1] and is more prevalent in women [2]. It includes pain, impaired jaw function, malocclusion, deviation or deflection, limited range of motion, joint noise, and locking. Headache, tinnitus, visual changes, and other neurologic complaints may also accompany TMJD [3]. Medical treatment may include conservative measures such as non-steroidal anti-inflammatory drugs (NSAIDs), soft diet, jaw rest, moist heat, steroids, muscle relaxants and/or antidepressants. Failure of conservative methods may require the addition of injection therapy or surgery [4].
Physical therapies (PT) such as active and passive jaw movement exercises, correction of body posture and relaxation techniques have been effective in reducing the symptoms of TMJ disorders [5]. Conventional therapy such as active ROM exercises of temporomandibular joint, resisted exercises for temporomandibular musculature, mirror biofeedback and stick exercises are effective in reducing pain and increases mouth opening [6]. Various therapeutic exercises, as well as manual therapy do have a role in managing TMJD in all aspects. Yet, a dearth of research is found in efficacy and specificity of intraoral manual therapy techniques in management of TMJD because of complexity of the temporomandibular mechanics [7].
Temporomandibular disorder may be result of osteoarthritic degeneration, disk dislocation, or involuntary guarding of the muscles of mastication. Whatever may be the underlying pathology, temporomandibular joint musculature would suffer the most, and may it be due to pain or tightness. Considering the role of TMJ musculature in patho mechanics of TMJD, lateral pterygoid muscle seems to have a potential role in etiology of TMJD [8].
Considering the key role of lateral pterygoid muscle in mechanics of temporomandibular joint; it definitely deserves particular attention in treatment of TMJD. Various manual therapy techniques have been tried in management of TMJD. Till now, no research has been conducted with particular attention to intra oral lateral pterygoid release along with conventional therapy. Hence the aim of the study was to see the additive effect of lateral pterygoid release technique along with conventional therapy on pain, range of mouth opening and functional activity in subjects with TMJD.

2. Methods

The study was performed an experimental study and the samples were recruited in convenient sampling method. We had taken patients who are having temporo mandibular dysfunction from orthopedic physiotherapy department of C. U. SHAH Physiotherapy College, Surendranagar. Gujarat, India. 30 patients were selected and divided them into two groups, Group A & B. 15 subjects in group A & 15 in group B. Duration of the study was one year. Duration of the treatment of patient was 4 weeks (3 days in a week).
Inclusion criteria: Subjects who were diagnosed as having TMD by dentist or ENT surgeon, both gender patients, Pain intensity ranging between 3 to 8 and mouth opening at least 10 mm were included.
Exclusion criteria: Neuromuscular disorder affecting TM joint functioning, ankylosed TMJ, concurrent Medication, post-surgical

cases of temporo mandibular joint, Bilateral TMD, aversion to intraoral manual contact, neoplasic, vascular or infectious diseases affecting TM joint were excluded.

Outcome measures

Numerical Pain Rating scale (NPRS): The 11 point NPRS is a unidimensional measure of pain intensity in adults which provide an estimate of patients' pain intensity. The NPRS ranging from "0" represent "no pain" to "10" the worst pain imaginable was utilized to quantify the patient's pain.

Active range of maximum mouth opening: Maximal mouth opening will be measured with the subject in a seated position utilizing a 10-cm plastic ruler marked in millimeters. The patient will be asked to open mouth as wide as possible without causing an increase in pain or discomfort. At the end position of MMO, the distance between the upper and lower central incisors will be measured in millimeters.

TMJ disability index: The Steigerwald/Maher TMD disability questionnaire will also be utilized for data collection. This scale is divided into 3 components: the temporomandibular disability index, the temporomandibular symptom intensity scale, and symptom frequency scale. A higher score is indicative of greater disability.

Treatment protocol:

Both the groups (A&B) would receive conventional therapy in form of:

- Ultrasound for pain relief with 1w/cm2 1 MHz 5 minutes placement 2 cm distal from TM joint.
- Active ROM exercises for TM joint: Mouth opening, protraction, medial and lateral deviation, elevation depression 10 repetition, 3 sets each
- Stretching exercises for TM joint using ice cream sticks: Mouth opening with sticks for 5 min in supine position, pillow under shoulder blades Isometric exercises for TM joint musculature.
- Isometric exercises for TM joint musculature.
- Supine lying, chin tuck exercise, 10 repetitions, 5 sec hold.
- Manual resistance mouth opening, deviation & protraction, 10 repetitions, 5 sec hold, 3 sets each.
- Chewing soft objects to strengthen masticatory muscles.
- TMJ active exercises in front of mirror.

Along with all these exercises, subjects in group B would receive additional intra oral lateral pterygoid release:

Lateral pterygoid release technique:

- To access the lateral pterygoid, ask the subject to open mouth in comfortable range and palpate the coronoid process of mandible along with the tendon of temporalis.
- Then, ask the subject to shift their jaw towards the working side to get more space between coronoid process and last molar, and slide the working finger posteriorly and slightly medially.
- Apply steady, slow, receptive pressure to the lateral pterygoid while asking for small opening and closing movements to facilitate its release. The pressure will be maintained for 5-10 seconds.

The whole session will be repeated for three times.

Data collection procedure:

Consent would be taken from all the subjects fulfilling the selection criteria and willing to participate in the study. The sample population would then be randomly divided into two groups: A and B. The measurement of physical impairment data was performed at each treatment session and included range of maximal mouth opening (MMO) and pain using the NPRS and TMD disability index.

3. Results

The present study compared effectiveness of lateral pterygoid release technique along with ultrasound and conventional therapy and conventional therapy & ultrasound only on NPRS, MMO and TMDI in subjects with temporomandibular joint dysfunction. The study comprised of total 30 subjects with 15 subjects in each group. Data was analyzed using statistical software SPSS 20. Before applying statistical tests, data was screened for normal distribution. All the outcome measures were analysed at baseline and after 4 weeks of treatment using appropriate statistical test. Level of significance was kept at 95%. Changes in outcome measures were analyzed within group as well as between groups. Following Table:1 shows baseline characteristics of subjects in each group:

Table 1: Baseline Characteristics of Subjects in Group-A & B

Variables	Group A		Group B		P
	Mean	SD	Mean	SD	
NPRS	5.1333	1.64	5.0667	1.75	0.915
MMO	16.6000	3.62	17.666	3.77	0.436
TMDI	15.400	2.414	15.333	2.126	0.436

NPRS: To analyse the difference in the NPRS score after 4 weeks of intervention in both the groups, paired t-test was used. For both the groups A and B, p values were <0.001, showing statistically signifacant difference in NPRS score as compared to baseline. (Table 2 and Figure: 1)

Table 2: Pre and Post Scores of NPRS in Group-A & B

Group	Pre		Post		T	P
	Mean	Sd	Mean	Sd		
Group A	5.133	1.64	3.73	0.79	5.137	<0.001
Group B	5.06	1.75	2.00	0.84	8.26	<0.001

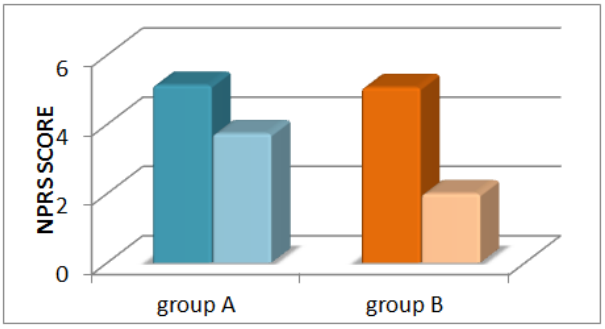

Fig. 1: Pre and Post Scores of NPRS in Group-A & B.

MMO: To analyse the difference in the MMO after 4 weeks of intervention in both the groups, paired t-test was used. For both the groups A and B, p values were 0.005 and <0.001 respectively, showing extremely significant difference in MMO as compared to baseline. (Table: Three and Figure: 2)

Table 3: Pre and Post Scores of MMO in Group-A & B

Group	Pre		Post		T	P
	Mean	Sd	Mean	Sd		
Group A	16.60	3.621	22.66	3.330	22.75	<0.001
Group B	26.25	3.221	29.26	3.110	24.75	<0.001

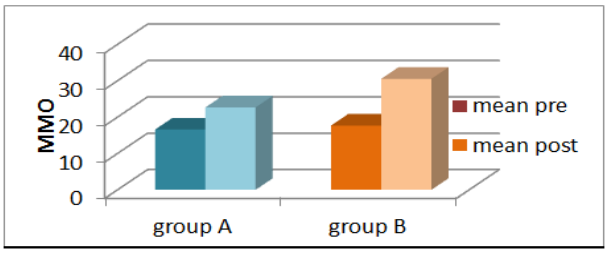

Fig. 2: Pre and Post Scores of MMO in Group-A & B.

TMDI: To analyse the difference in the TMDI score 4 weeks of intervention in both the groups, paired t-test was used. For both the groups A and B, p values were <0.001, showing extremely significant difference in TMDI score as compared to baseline. (Table 4 and Figure 3)

Table 4: Pre and Post Scores of TMDI in Group-A & B

Group	Pre		Post		T	P
	Mean	Sd	Mean	Sd		
Group A	15.40	2.12	9.266	1.759	18.34	<0.001
Group B	15.33	2.414	6.400	1.0556	22.55	<0.001

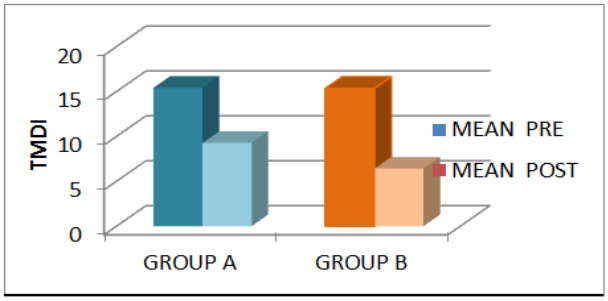

Fig. 3: Pre and Post Scores of MMO in Group-A & B.

4. Discussion

In the present study, there was comparison between ultrasound and the conventional therapy and ultrasound and the conventional therapy along with lateral pterygoid release technique on pain, mouth opening and functional activities in subjects with temporomandibular joint dysfunction. Result of the study were focused on the pain relief, increased mouth opening and improve function of the TM joint or reduction of disability based on temporomandibular joint disability index.

In the present study, the average age of the participants in group A is 23 years and in group B is 24 years. So there is no significant difference between the mean age of participants in both the groups. From the result we can said that temporomandibular joint dysfunction can occur in any age of group but it is more commonly seen 25 to 45 years of age group. The results are similar to an observational study done by Charles Green in which he concluded that most objectives signs of temporomandibular joint disorders like clicking, limiting jaw movement; occur less often in the elderly or at approximately the same rate in all adult age groups [9].

The 1st objective of the study was to see the efficacy of lateral pterygoid release technique along with conventional therapy in managing pain, range of mouth opening & functional activity in TMJD population. Ultrasound therapy helps in treatment of temporomandibular joint dysfunction [10].

The mechanism of ultrasound action is based on massage and thermal effect. Thermal effects of ultrasound may include increased blood flow vasodilatation, waste removal, acceleration of lymph flow, and stimulation of metabolism. It is estimated that thermal effects can occur with elevation of tissue temperature to 40-45° C for at least 5 min [11] Esposito et al [12] concluded a study that Pain relief is theorized to be related to washout of pain mediators by increased blood flow. The results of the current study prove that ultrasound in concomitant with steroids help fast relief of pain to great extent.

Conventional physiotherapy such as active ROM exercises of mouth, resisted isometric exercises, stick exercises, and mirror biofeedback are also helpful in reducing pain, increasing range of mouth opening [13] – [15]. Nicolakis, et al [16} who provided a six and twelve month follow-up supporting the use of manual therapy and exercise with a case series of twenty patients with TMD. Yoda, et al [17] compared an exercise program to education on the condition for patients with anterior disk displacement with reduction (ADDWR). The results demonstrated that the exercise group had statistically significant better outcomes for decreased pain and increased ROM (p=0.0001).

Lateral pterygoid release is helpful in decreasing pain, increasing mouth opening, and reducing discomfort of TMJ [18]. This therapy is used to decrease muscle tension and remove muscle adhesions that are found through palpation. Utilization of tension on the muscle being treated while actively moving the muscle from shortened to lengthened position with the goal of restoring proper muscle tone and length [19]-[20]. David Greenfieldet al. conducted a study in 2005 on "The lateral pterygoid release to restore normal jaw motion: a case report." and he concluded that lateral pterygoid release technique is useful to increase range of mouth opening and reduced pain in the temporomandibular joint dysfunction [21].

The second objective of the present study was to see the efficacy of lateral pterygiod release technique along with conventional therapy in managing pain, range of mouth opening and functional activities in TMJD population. There was significantly improvement in reducing pain, increasing mouth opening and reducing functional disability of TMJ in Group B after treatment.

The third objective of the present study was to compare the efficacy of conventional therapy alone and conventional therapy along with lateral pterygoid release technique in managing pain, range of mouth opening and functional activities in TMJD population. We already showed that the Group B was better in reducing pain, increasing range of mouth opening and reducing functional activities of TMJD population than Group A. And we already see the ultrasound and conventional physiotherapy is helpful in reducing pain increasing mouth opening and reducing disability of TM joint. And if we give lateral pterygoid release technique to the patient with the ultrasound and conventional therapy, the tightness of the lateral pterygoid is decreases and the range of mouth opening is increase, pain is decreases. So that patient's trouble is lessened in all activities of TM joint. So with reducing pain and increasing mouth opening, the disability of the TM joint is decreases more [22].

5. Conclusion

The result indicated that the lateral pterygoid release technique along with ultrasound and conventional therapy is more effective in reducing pain, increasing range of mouth opening and reducing functional disability of TMJD than conventional therapy and ultrasound alone

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