The Short Term Effect of TheraBite® on Temporomandibular Dysfunction: A Case Study

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Introduction

Temporomandibular dysfunctions/disorders (TMDs) comprises of a complex and heterogeneous group of conditions which includes Temporomandibular joint (TMJ), soft tissue structures within the joint and the muscles of mastication [1,2]. TMDs are also referred to as craniofacial disorder [3]. It is seen that about 75% of adult population have at least one symptom associated with TMDs, and 30% have more than one symptom while 3-7% apply for treatment. There is estimation that 20-25% of the population is affected with TMDs, with female to male ratio being 3:1 to 6:1 [4]. It is more prevalent between the age group of 20-40 years [5]. Epidemiological studies have also shown that TMDs are most common in younger females of 18-45 years, which is during their reproductive age [6].

TMDs can be divided into two categories: muscular (extracapsular/myogenic) and articular (intracapsular). The Research Diagnostic Criteria for TMDs (RDC-TMDs) have classified TMDs by a dual-axis system. Axis I patients are found with masticatory muscle pain with/without limitation of mouth opening, axis II patients are found with internal derangement of the TMJ and axis III patients with arthralgia, osteoarthritis and osteoarthrosis. Axis II also assesses TMDs-related pain, parafunctional behaviours, psychological distress, and psychosocial dysfunction [7]. The RDC-TMD classification was developed for research purpose. This classification does not include less common conditions such as myositis, contracture and myospasm and TMJ conditions such as rheumatic disease, acute trauma, hyperplasia and neoplasia [5].

The aetiology of TMDs is little understood, but has been associated with many theories and factors. The earlier theories were based on biomedical model comprising of the mechanical displacement theory, the trauma theory, the biomedicine theory, the osteoarthritic theory, the muscle theory, the neuromuscular theory, the psychophysiologic theory, the psychological theory, the multifactorial theory and the biopsychosocial theory [8].

The signs and symptoms related to TMDs include the masticatory muscles or TMJ or both which are jaw pain, orofacial pain, limited mouth opening (trismus) and other ranges, headache, ear pain, clicking or grating of the joint, neck pain, tinnitus and pain in the intra oral structures [9-11].

Currently, for TMD various treatments are available from simple self-care practice, reassurance, conservative treatment, injections to surgeries. Conservative treatment includes pharmacological and non-pharmacological approaches. The non-pharmacological treatment includes hot and cold packs, electrotherapeutic modalities, manual treatment, acupuncture and mechanical devices [12-14]. The TheraBite® Jaw Motion Rehabilitation System® from Atos medical inc., is a portable system which utilizes repetitive passive motion and stretching to restore mobility and flexibility of the jaw musculature, associated joints and connective tissues.

Studies have showed the long term effect (12 weeks) of TheraBite® in post operated cases of head and neck cancer and coronoidectomy of TMJ. There is limited literature available about effectiveness of TheraBite® system in India especially in rural population due to limited availability and less awareness. Hence, there is a need to find out the short term effect of TheraBite® on TMD.

Case Report

History

A 30 year old female who was a housewife by occupation had pain over bilateral TMJ and had trismus since three months (Figure 1). She went to the dental department where painkillers and muscle relaxant were prescribed, but after a week patient found no relief, so she was advised for a panoramic view radiograph. Radiograph was normal and after the thorough clinical assessment she was diagnosed with myofascial pain dysfunction syndrome and was referred to Physiotherapy department for further management. There were no associated symptoms such as clicking of jaw, tinnitus, neck pain, headache or ear pain.

Figure 1: Pre intervention mouth opening.

Figure 2: Post intervention mouth opening.
On assessment Pain score was 8/10 on visual analogue scale and located to: over the TMJ joint bilaterally. Pain was aggravated by chewing, talking, yawning and relieved by rest.

Examination

Patient was thoroughly assessed by therapist: Measurement of pain pressure threshold (PPT) (Figure 4): The PPT was measured in kgs with algometer [baseline; tip 0.5 cm², application rate 1 kg/s]. Participant’s jaw was slightly opened; algometer was applied to the lateral pole of the condyle just anterior to tragus. The value of PPT was determined when the sensation of pressure was changed to pain. The participant indicated the threshold by raising the hand. Three measurements were made at each side with 2 minutes interval between trails and there was a mark fixed on the skin over the TMJ ensured precise relocation of the algometer [15].

Range of motion: Mouth opening (Figure 3). The participant was asked to open mouth as much as possible. Place the therabite scale between the central incisors and measure the maximum vertical distance during active mouth opening. lateral deviation to right- the participant is asked to lateral deviate the mandible to the right side and with the help of therabite scale measure the distance between the central incisors of upper and lower jaw, lateral deviation to left- same as above with the mandible deviated to the left side, protrusion- ask the participant to protrude the mandible as much as possible and with the help of therabite scale measure the horizontal distance between the incisors of upper and lower jaw.

Resisted Isometric Contraction (RIC): Mouth opening (the therapist places one hand below the mandible and one hand supporting the head and ask the participant to open the mouth as much as possible and the therapist applies resistance to the mandible) and bilateral lateral deviation (from the neutral position ask the patient to lateral deviate the jaw to the right and the therapist places 1 or 2 fingers to provide resistance to the movement. Repeat the same procedure for left side). The RIC for both mouth opening and lateral deviation was strong and painful.

Outcome measures: Before and after the intervention the following outcome measures were measured (Table 1).

<table>
<thead>
<tr>
<th>Outcome measures</th>
<th>Pre (day 1) A</th>
<th>Treatment B</th>
<th>Post (3 weeks)</th>
<th>Percentage change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. VAS</td>
<td>8/10</td>
<td>4/10</td>
<td>1/10</td>
<td>0/10</td>
</tr>
<tr>
<td>2. PPT</td>
<td>&lt;3 kgs</td>
<td>3.3 kgs</td>
<td>4.1 kgs</td>
<td>4.5 kgs</td>
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<tr>
<td>3. Range of motion</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>a. Mouth opening (mm)</td>
<td>25</td>
<td>30</td>
<td>36</td>
<td>40</td>
</tr>
<tr>
<td>b. Lateral deviation to right (mm)</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>c. Lateral deviation to left (mm)</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>d. Protrusion (mm)</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

Table 1: Before and after the intervention the following outcome measures were measured.

1. Pain on Visual analogue scale
2. Pain pressure threshold by algometer
3. Range of motion: A) mouth opening
   B) Lateral deviation to right and left side
   C) Protrusion

Treatment

Research design

A single case study design was used to achieve the objectives of this project. A-B-A design which was already described for single case study modified as A-B-C design for this study [16]. This approach has been used previously to study the effectiveness of manipulative physiotherapy in the treatment of cervicogenic headache [17] and tennis elbow [18]. During post treatment period (C) patient was permitted to continue with the Therabite exercise.

Protocol

The study was divided into three phases:

Phase (A): Pre-treatment assessment: Baseline outcome measures: Pain intensity was measured on Visual analogue scale, Pain pressure threshold by algometer, Range of motion: 1) mouth opening and 2) Lateral deviation to right and left side 3) Protrusion were recorded at the beginning of the study on the first day. Treatment was not given in this period (A).

Phase (B): Intervention Phase: The intervention was given for three weeks, six days in a week, morning session for the participant, where Ultrasound Therapy (participant was in supine position with head turned to one side. The dosage was continuous ultrasound set at 1.25 W/cm², with the applicator’s size of 5 cm in diameter for 3 minutes applied over the TMJ [19]) (Sonopulse 434; EnrafNonius, Delft, The Netherlands). An aquasonic gel that does not contain any pharmacologically active substance was applied. Ultrasound was then being applied to TMJ in circular movements with the probe at right angles to ensure maximum absorption of the energy. Therabite® Exercise was given. The participant was asked to keep the Therabite® pads between upper and lower jaw (Figure 5). This was carried for 6 days per week, 5 sessions per day with 5 stretches per session with 30 seconds hold [20]. One session was carried out in the department. Outcome measures were recorded at the end of each week for three weeks.

Phase (C): Post-treatment/home exercise programme. In the final
which leads to more micro friction and generation of more frictional intensity of US beams, the more continuous is the emission of the cycles of compression waves and rarefaction waves. The higher the penetrates soft tissues; it causes molecules to vibrate under repeated the range of human hearing; as the acoustic energy is absorbed it that is similar to the sound waves but of a higher frequency, beyond

patients. The length of time that the muscle is stretched during the rate of deformation, and the amount and duration of force per cycle. deformation that occurs is determined by the number of cycles, the tissue does not return to its original length, even when the load is removed. Plastic stretching is irreversible, and the stretching is reversible, and the tissue returns to the original length when the load is removed. Plastic stretching is irreversible, and the tissue does not return to its original length, even when the load is removed. Prolonged low load stretch results more of plastic elongation of the connective tissue. In cyclic muscle stretching, the amount of deformation that occurs is determined by the number of cycles, the rate of deformation, and the amount and duration of force per cycle. Reduced time interval helps to regain a functional range of motion that will be desirable economically and psychologically to the patient. But TheraBite is simple and easy to use. Squeezing the handle helps to separate the upper and lower jaw. The horse-shoe shaped surface which comes in contact with the teeth helps to spread the load across 10 anterior teeth at upper and lower jaw. This generates less force on the incisors. As there is squeezing and releasing of the handles it helps to stretch the tissues intermittently [21,22]. This intermittent stretching is cyclic in nature. As soft tissues are stretched, the elongation is in proportion to the magnitude of the locally applied load. There can be plastic or elastic deformation in the viscoelastic elements. Elastic stretching is reversible, and the tissue returns to the original length when the load is removed. Plastic stretching is irreversible, and the tissue does not return to its original length, even when the load is removed. Hence, mechanical stretching device i.e. TheraBite along with therapeutic ultrasound can be considered as a useful tool in the treatment for mandibular hypomobility.

Conclusion

TheraBite® is useful for increasing the mouth opening in TMD patients.

References


20. www.therabite.com


