|  |  |  |
| --- | --- | --- |
| **A Comparative study on efficacy of three different treatment modalities for Temporomandibular joint pain and dysfunction**  **Abstract** |   |  |

**Aim:** The aim of the study is to investigate the efficacy of three treatment options (splint therapy, physical therapy, and pharmacologic therapy) in patients suffering from painful temporomandibular joint clicking.

**Materials and Methods:** 60 patients were included in the study suffering from temporomandibular joint disorders randomly divided into three treatment groups. Twenty patients which were given pharmacological treatment (group I), 20 patients will received TENS therapy (group II), and 20 patients will be given splint therapy (group III). In all the three groups, subjective and objective assessments were evaluated at the time of diagnosis, after the first week of initiation of therapy and every week for three months of follow up.

**Results:** There was gradual reduction seen in VAS scores, muscle tenderness, TMJ clicking and significant improvement in mouth opening in Group III therapy during the follow-up period as compared to Group I and Group II therapy.
**Conclusion:** The conventional soft occlusal splint therapy is a much safer and effective mode of a conservative line of therapy in comparison to long-term pharmacotherapy and TENS therapy in patients with myofascial pain dysfunction syndrome.

**Keywords:** Temporomandibular joint, Myofascial pain dysfunction syndrome, occlusal splint therapy, pharmacotherapy, TENS

**Introduction**

 Temporomandibular Joint (TMJ) is a ginglymoarthrodial joint, referring to its dual compartment structure and function (ginglymo- and arthrodial).1 The etiology of TMD is little understood, but associated with several factors including trauma, emotional stress, malocclusion, and parafunctional habits (clenching or bruxing).2 The most common signs and symptoms, are pain localized in the pre-auricular area or in the masticatory muscles; jaw motion abnormalities; articular sounds, such as click or crepitus, during mandibular movements.3 As a consequence of the multifactorial pathogenesis, therapeutic concepts must be interdisciplinary. Consequently, many different therapies-some conservative and reversible, others irreversible, including surgery and repositioning of the mandible, have been advocated for patients with TMJ dysfunction. Due to the difficulty in determining the etiology and the possibility that the symptoms are secondary to some other disorders of TMJ or muscles of mastication, initial treatment given should be reversible.4 Therefore, the purpose of the present study is to investigate the efficacy of three treatment options (splint therapy, physical therapy, and pharmacologic therapy) in patients suffering from painful temporomandibular joint clicking.

**Selection of patients**

Patients were selected for the study among the patients visiting the Department of oral medicine and radiology, SPPGIDMS, Lucknow, for the treatment for TMJ pain and clicking. 60 patients were selected after thorough examination that fulfilled the requirements on the basis of exclusion and inclusion criteria and are willing to participate in the study. Inclusion criteria were a chief complaint of acute pain (duration <3 months) in the joint on at least one side, and Presence of reciprocal joint clicking during jaw opening and closing that was eliminated on protrusive opening.5 Exclusion criteria were the presence of systemic diseases (i.e. rheumatic diseases), history of recent trauma, wearing of full dentures, and therapeutic co-interventions during treatment. All aspects of the study were approved by the Ethical Committee of the institution.

*Screening procedure*

Patients were made to sit comfortably on a dental chair. Clinical examinations were carried out wearing sterile hand gloves and mouth mask with patient seated appropriate to the procedure being performed. Recording of demographic data, general history, TMD history, and physical examinations were carried out in a systematic manner at the baseline visit.

The selected patients suffering from temporomandibular joint disorders will be divided randomly into three treatment groups. Twenty patients will be given pharmacological treatment (group I), 20 patients will received TENS therapy (group II), and 20 patients will be given splint therapy (group III). In all the three groups, subjective and objective assessments were evaluated at the time of diagnosis, after the first week of initiation of therapy and every week for three months of follow up.

*Group I* - will receive an orally administered combination of muscle relaxants and analgesics comprising of Ibuprofen 400 mg, Paracetamol 325 mg, and Chlorzoxazone 250 mg in two doses daily for a period ranging from 5-7 days initially. If the patients reported with recurrence of pain during their post treatment follow-up, they were advised to repeat the same treatment regimen.

*Group II* - will be given Transcutaneous Electrical Nerve Stimulation (TENS) therapy for a period of two weeks daily for 20 minutes at variable intensity.

*Group III* - will be treated with occlusal splint therapy for a period of three months (For every 1-2 week period). Patients will be instructed to wear the splint at night to take care of parafunctional habits if any.

**Statistics**

 The VAS scores, number of tender muscles, maximum comfortable mouth opening between the groups were compared with the help of the student's t-test (paired and unpaired tests). P < 0.05 was considered to be significant. TMJ tenderness between the groups was compared using the Wilcoxon matched pairs test. The Kruskal Wallis ANOVA test was used for the comparison of TMJ pain and dysfunction between all the groups.

**Results**

The study comprised of total 60 patients which were randomly divided into 3 groups i.e. Medicine, Splint, and TENS groups with 20 patients in each groups, out of which 29 were male (48.33%) and 31 were females (51.67%). The total mean age of male and female was 28 years (Medicine=28.7, Splint=28.1, TENS=27.3).

The comparison of different variables measured between the three groups at various time intervals. The VAS scores [Graph 1]; number of tender muscles [Graph 2] and TMJ clicking Graph 4] showed significant reduction in Group III (patients on occlusal splint therapy) compared to Group I (patients on pharmacotherapy) and Group II (patients on TENS) during the three months of treatment follow-up.

Also, it can be noted here that a significant increase in mouth opening [Graph 3] was observed in Group III (patients on occlusal splint therapy) compared to Group I (patients on pharmacotherapy) and Group II (patients on TENS). VAS scores for pain intensity [Graph 1] showed significant reduction in Group III immediately after seven days of therapy on the other hand, Group I and Group II showed no reduction in VAS scores immediately after seven days of therapy, but significant reduction was seen in the 3 rd month of treatment follow-up.

Though it was observed that the VAS score in the splint group was highly significant than other two groups, the difference between the groups was statistically highly significant.

**Discussion**

Among all of the factors that have been studied as potential causes for TMD, behavioral and psychologic factors have received the most significant amounts of attention during the past few years. There is now a reasonable body of scientific data suggesting that behavioral and psychologic factors are important in the development of some types of TMD, and particularly those associated with muscle pain and dysfunction.6 The success for a treatment of any disorder relies on two considerations: relieving of symptoms and treating the cause. In this view, various treatment modalities for TMD have been tried and tested over time. Choosing a specific conservative treatment modality for TMD patients depends on clinicians' expertise, patient presentation, and elimination of possible etiologic factors. Till date, no single treatment modality has been proven to be better than any other for TMD.
The present study evaluates the efficacy of three different treatment modality in the treatment of TMJ pain and dysfunction, being conservative treatment modalities.7

All the 3 groups showed significant reduction at each week intervals. In the existing study, significant pain reduction was observed in all the three groups. At the end of the treatment, pain reduction in **SPLINT GROUP** (90.48%) was slightly more than the **MEDICINE GROUP** (53.25%) and **TENS GROUP** (53.33%). The difference between the groups was statistically highly significant. Though there was statistically significant difference is seen between the treatment groups, **GROUP III THERAPY** was slightly more effective and highly significant than **GROUP I** and **GROUP II THERAPY** in relieving pain.

***TENS*** therapy is supposed to stimulate large, fast, myelinated, non-nociceptive neurons in the painful area, “closing the central gate” for those stimuli generated by pain specific fibers. This system, associated to the activation of an endogenous opioid system is supposed to be responsible for the analgesic effect of the TENS.8

***NSAIDs*** are known to be effective in the management of mild-to-moderate inflammatory conditions, particularly of the musculoskeletal system.9 Muscle relaxants are administered to reduce skeletal muscle tone and are often administered to patients with muscle tone and chronic orofacial pain to help prevent or alleviate the increased muscle activity.They are thought to decrease muscle tone without the impairment of motor function by acting centrally to depress polysynaptic reflexes.10 One probable explanation for this event is that as optimal effects were seen when the concentration of drugs was optimal in the body during treatment. When the therapeutic effects of the drugs wore off, the symptoms reappeared.11

**Tsuga et al,** 12 concluded that 87% of their patients had reduced TMJ pain; VAS reduction was seen in 50% of the patients. **Harkins et al,** 13 found that 74% of the patients with soft splints had reduction in facial myalgia. This is in agreement with the conclusions of **Raphael et al,** 14 who found that occlusal splints had decreased the VAS scores during a six-week follow-up study in patients with myofascial pain. In a prospective randomized study, **Ismail et al.** 15 demonstrated that, as well as splint therapy, physical therapy in combination with splint therapy was able to improve the VAS score and mandibular mobility of patients with arthrogenic TMD.

In all the three groups there was gradual but significant decrease in tenderness in all masticatory muscles and TMJs. The decrease in tenderness was slightly more in **SPLINT GROUP** than in **MEDICINE** and **TENS group** but the difference was statistically significant except for medial pterygoid muscle (p<0.05) at the follow-up visit. The reduction in muscle tenderness was significantly **(p < 0.05)** more in **SPLINT GROUP** than other group at the follow-up visit (70% reduction in **MEDICINE GROUP,** 60% in **TENS GROUP** and 75% reduction is seen in the **SPLINT GROUP** ).

This improvement can be explained by the fact that occlusal splints with equal-intensity contacts on all of the teeth, with immediate disclusion of all posterior teeth by the anterior teeth and condylar guidance in all movements. This will relax the elevator and positioning muscles and contribute to the reduction of abnormal muscle hyperactivity.16 **Kovaleski et al**, 17 have also shown significant reduction in clicking, TMJ and muscle tenderness in response to occlusal splint therapy when patients were followed up for two months. There are only few studies on TENS therapy evaluating the efficacy on muscles tenderness.

In the present study at the follow-up visit, the increase in mean mouth opening was 14.55% for **MEDICINE GROUP**, 11.13% for **TENS GROUP** and 18.89% for **SPLINT GROUP** and was statistically significant, although there was no significant difference between the groups. **GROUP III THERAPY** was slightly more effective and highly significant than **GROUP I and GROUP II THERAPY** in respect to maximum mouth opening. **Mehta N, et al.**18observed increase in the interincisal distance in patients with orofacial pain after TENS therapy, which is similar to our observation. Also, at the end of the follow-up period, further reduction in pain and tenderness was substantially more in **SPLINT GROUP**, whereas in other groups, it was very minimum. Thus it appears that **SPLINT THERAPY** is useful in relaxing the muscles of mastication, in relieving pain, and thus, in breaking the pain-tension-pain cycle of TMD. **Suvinen et al,**19have also shown improvement in mouth opening after splint therapy. Occlusal splint therapy decreased the pain and tenderness in the muscles and joints of the patients in the present study, apparently allowing an increase in their maximal mouth opening.

There was no report of serious side effects due to drug intake in any patient. In Group III, a few patients had initial side effects such as dryness of mouth, occasional feeling of tightness of the appliance, and a feeling of queasiness and presence of foreign object, which gradually decreased within few days.20

The present study supports the use of conventional soft occlusal splints in the safe management of patients with myofascial pain dysfunction syndrome.

**Conclusion**

The conclusion drawn from the findings of this study that conventional soft occlusal splint therapy is a much safer and effective mode of a conservative line of therapy in comparison to long-term pharmacotherapy and TENS therapy in patients with myofascial pain dysfunction syndrome. Furthermore, randomized blinded trials with appropriate control groups are necessary to validate the effectiveness of occlusal splint therapy in a larger study sample.

**References**

1. Rafael Poveda Roda, Jose V. Began, Jose Maria Diaz Farnandez, Sergio Hernandiz Began, Yolanda Jimenez Soriano. Review of temporomandibular joint pathology Part I: Classification, epidemiology and risk factors. Med Oral Patol Oral Cir Bucal 2007; 12:E292-8.
2. Azam S. Madani and Amirtaher Mirmortazavi. Comparison of three treatment options for painful temporomandibular joint clicking. Journal of Oral Science. (2011); 53: 3, 349-354.
3. Khurram Ataullah, Abid Ashar, Farrukh Mumtaz, Rabia Anees, Zille Fatima. Diagnosis Of Temporomandibular Disorders Based On Research Diagnostic Criteria. Pakistan Oral & Dental Journal (2009); 29:2.
4. Tsuga K, Akagawa Y, Sakaguchi R, Tsuru H. A short-term evaluation of the effectiveness of stabilization-type occlusal splint therapy for specific symptoms of temporomandibular joint dysfunction syndrome, J Prosthet Dent 1989;61:610-3.
5. Greene CS, Laskin DM. Meprobamate therapy for the myofascial paindysfunction (MPD) syndrome: a double-blind evaluation. JADA, March 1971;82: 587-590.
6. Rajendra.G. Deshpande, Swapnali Mhatre. TMJ Disorders and Occlusal Splint Therapy – A Review. International Journal of Dental Clinics 2010: 2 (2):22-29.
7. Andrew S. Kaplan, Leon A. Assael. Temporomandibular Disorders- Diagnosis and Treatment. W.B. Saunders Co, Philadelphia; 199.1
8. Gam AN, Thorsen J, Lonnberg F. The effect of low- level laser therapy on musculoskeletal pain: a metal-analysis. Pain. 1993,14:62-4.
9. Suvinen T, Reade P. Prognostic features of value in the management of temporomandibular joint pain-dysfunction syndrome by occlusal splint therapy. J Prosthet Dent 1989;61:355-61.
10. Dimitroulis G, Gremillion HA, Dolwick MF, Walter JH. Temporomandibular disorders: II Non- surgical treatment. Aust Dent J 1995;40:372-6.
11. Minakuchi H, Kuboki T, Matsuka Y, Maekawa K, Yatani H, Yamashita A. Randomized controlled evaluation of non-surgical treatments for temporomandibular joint anterior disk displacement without reduction. J Dent Res 2001;80:924-8.
12. Tsuga K, Akagawa Y, Sakaguchi R, Tsuru H. A short-term evaluation of the effectiveness of stabilization-type occlusal splint therapy for specific symptoms of temporomandibular joint dysfunction syndrome. J Prosthet Dent 1989; 61:610-3.
13. Harkins S, Marteney JL, Cueva O, Cueva L. Application of soft occlusal splints in patients suffering from clicking temperomandibular joints. J Craniomandibular Pract 1988; 6:71-5.
14. Raphael KG, Marbach JJ, Klausner JJ, Teaford MF, Fischoff DK. Is bruxism severity a predictor of oral splint efficacy in patients with myofascial face pain? J Oral Rehabil 2003;30:17-29.
15. Ismail F, Demling A, Hessling K, Fink M, Stiesch- Scholz M (2007) Short-term efficacy of physical therapy compared to splint therapy in treatment of arthrogenous TMD. J Oral Rehabil 34, 807-813.
16. Dylina TJ. A common-sense approach to splint therapy. J Prosthet Dent 2001; 86:539-45.
17. Kovaleski WC, Beaver De. J. Influence of occlusal splints on jaw position and musculature in patients with temporomandibular joint dysfunction. J Prosthet Dent 1975;33:321-7.
18. Mehta N, Kugel G, Alshuria A, Sands M, Forgeione A. Effect of Electronic Anesthesia T.E.N.S. on T.M.J. and Orofacial Pain. (Abstract 2054). J Dent Res 1994; 73: 358.
19. Suvinen T, Reade P. Prognostic features of value in the management of temporomandibular joint pain-dysfunction syndrome by occlusal splint therapy. J Prosthet Dent 1989; 61:355-61.
20. Nevarro E, Barghi N, Rey R. Clinical evaluation of maxillary hard and resilient occlusal splints. J Dent Res 1985; 1246:313.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Group | Male | % | Female | % | Total |
| Medicine group | 10 | 50.00 | 10 | 50.00 | 20 |
| Splint group | 10 | 50.00 | 10 | 50.00 | 20 |
| Tens group | 9 | 45.00 | 11 | 55.00 | 20 |
| Total | 29 | 48.33 | 31 | 51.67 | 60 |

|  |  |  |  |
| --- | --- | --- | --- |
| Group | Male | Female | Total |
| Mean | SD | Mean | SD | Mean | SD |
| Medicine group | 25.5 | 6.3 | 31.9 | 11.9 | 28.7 | 9.9 |
| Splint group | 32.2 | 9.6 | 23.9 | 4.3 | 28.1 | 8.4 |
| Tens group | 29.0 | 12.6 | 25.8 | 5.5 | 27.3 | 9.2 |
| Total | 28.9 | 9.8 | 27.2 | 8.4 | 28.0 | 9.0 |