

Effectiveness of Soft Occlusal Splint Therapy in Patients With Temporomandibular Joint Disorders: A Crosssectional Study



Medical Science

KEYWORDS: Temporomandibular joint disorders, Soft occlusal splints, Trismus.

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ABSTRACT

Background and objectives: Temporomandibular joint disorders have been a highly debated topic in recent years and are associated with signs and symptoms of the masticatory muscles and the joint or both. A variety of treatment modalities has been described in literature for its management and the conservative method is most preferred. The aim of present study is to evaluate the effectiveness of soft occlusal splint therapy in the management of temporomandibular joint disorders. *Materials and methods:* 50 subjects with signs and symptoms of temporomandibular joint disorders were included in the study, out of which 28 (56.0%) subjects were males and 22 (44.0%), were females with age ranging from 21-31 years. Soft occlusal splints were given to the patients for about three months and evaluated for temporomandibular joint clicking, reduced mouth opening, mandibular deviation and tenderness of temporomandibular joint after one week of initiation of therapy and every month for three months. *Results:* There was a significant (88%) increase in mouth opening and decrease in the preauricular tenderness (92%), TMJ noises (84%) and mandibular deviation (88%) in subjects after soft occlusal splint therapy. *Conclusions:* Soft occlusal splints can be used effectively as a conservative treatment modality in reducing sign and symptoms related to the temporomandibular joint disorders. It is more cost effective and easy to fabricate.

INTRODUCTION:

The stomatognathic system is a functional unit that performs masticatory tasks such as swallowing food, speaking and esthetics. This system consists of three main components i.e. TMJ, masticatory muscles and dentition. These components are interrelated and coordinated by the central nervous system¹. The TMJ functions uniquely, in that the condyle both rotates within the fossa and translates anteriorly along the articular eminence. It provides hinging movement in one plane and therefore can be considered as ginglymoid joint². However, at the same time it also provides for gliding movements, which classifies it as arthroïdial joint. Thus it has been referred as "ginglymodiarthroïdial joint", a combination of the terms ginglymoid (rotation) and arthroïdial (translation)³. The TMJ syndrome involving the temporomandibular joint was first described by Dr. James Costen, an otolaryngologist in 1934¹, 3, however scientific investigation of disorders began in the 1950s. American Dental Association President's Conference on Temporomandibular Disorders (ADA, 1983) defined TMD as – a group of orofacial disorders characterized by pain in the pre-auricular area, TMJ, or muscles of mastication, limitations and deviations in mandibular range of motion and TMJ sounds during jaw function⁴.

Although the etiology of TMJ disorders remains unclear but it is likely to be multifactorial. Temporomandibular joint disorders are not "cured" but are managed instead, treatment of TMJ disorders starts with conservative therapies which are simple and do not invade the tissues of face, jaw and joints⁵. Use of Occlusal splints is one of the most widely accepted conservative therapy for signs and symptoms of temporomandibular joint disorders⁶. Occlusal splint therapy may be defined as "the art and science of establishing neuromuscular harmony in the masticatory system by creating a mechanical disadvantage for parafunctional forces with removable appliances." The soft and resilient material help in distributing the heavy load that occurs during parafunctional habits¹. In this context, the present study was conducted to evaluate the effectiveness of soft occlusal splint therapy as a conservative treatment modality in patients with temporomandibular joint disorders.

Material and Method

The present study was conducted in the Department Of Oral

Medicine and Radiology, Teerthanker Mahaveer Dental College and Research Centre, Moradabad, Uttar Pradesh, to evaluate the effectiveness of soft occlusal splints as a conservative treatment modality in patients with temporomandibular joint disorders, after taking approval from institutional ethics committee. The study sample consisted of 50 subjects, out of which 28 (56.0%) subjects were males and 22 (44.0%) were females with age ranging from 21-31 years. Patients complaining of joint sounds (clicking & popping), mandibular deviation, reduced mouth opening (trismus), and presence of tenderness in temporomandibular joint were included in this study and patients having occlusal disharmony, undergoing orthodontic treatment, full denture wearer and undergoing treatment from a psychiatrist for psychological disorders were excluded from the study. Relevant history and clinical findings were recorded for each subject and proforma was filled. An alginate impression of maxillary arch was taken using stainless steel perforated trays and casts were prepared using dental stone. Soft occlusal splint was fabricated from 3mm thick soft polyvinyl sheet using vacuum forming pressure molding machine which is thermally controlled (Figure 1). Soft, clear sheet was adapted to the maxillary cast in the machine and it was taken out and the outline of the appliance was then cut off with help of surgical blades or scissors at the level of interdental papilla on buccal and labial surfaces of teeth and the posterior palate (Figure 2). Then separated from cast with a laboratory knife and chair side occlusal adjustments were made by warming the occlusal surfaces of the splints with alcohol torch. A functional imprint was obtained in centric occlusion by bilateral centric relation manipulation. Soft occlusal splint was inserted in the patient mouth and recalled after one week and every month for 3 months for the follow up (Figure 3). The subjects were evaluated for improvement of signs and symptoms i.e. Interincisal distance, Mandibular deviation, Tenderness, Joint noises during opening or closing.

Results:

The statistical analysis was done using Statistical Package for the Social Sciences (SPSS) version 20.00 Statistical Analysis Software, paired t test and McNemar test were done for comparison. Out of 50 subjects of the study group, 44.0% (22) were females and 56.0% (28) were males (Pie diagram: 1). The age distribution of the subjects in the study is shown in

Table 1, the mean age being 25.7 + 2.27 years. The comparison of interincisal at baseline and at after 3 months showed significant improvement in the mouth opening (Bar diagram I). on the status of mandibular deviation after 3 months and of Occlusal splint therapy, 88% of subjects showed absence and mandibular deviation (Bar diagram II). Bar diagram III shows comparison of status of preauricular tenderness, at baseline, preauricular tenderness was absent in 1 (2%) subjects and present in 47 (94%) subjects. After 3 months, preauricular tenderness was absent in 47 (94%) subjects and present in 4(8.00%) subjects. Comparison of status of joint noises in study group at the baseline the joint noises were absent in 2 (4.00%) subjects and present in 46 (92.00%) subjects. After 3 months of recall, joint noises were absent in 46(92%) subjects and present in 6(12%) of the subjects. The p value was 0.00001 suggesting statistically highly significant (Bar diagram IV).

Discussion:

The treatment of a disease is successful only when its signs and symptoms are recognized and relieved properly. Temporomandibular joint disorders are multifactorial disease so, for its successful treatment, various treatment modalities are tried ranging from most conservative treatment modalities as soft occlusal splint, physiotherapy to surgical methods. But still no single treatment has been proven to be better than any other for temporomandibular joint disorders. According to the glossary of prosthodontics term “occlusal splint is defined as any removable artificial occlusal surface used for diagnosis or therapy affecting the relationship of the mandible to the maxilla”³. It may be used for Occlusal stabilization, redistribution of occlusal forces preventing wear and mobility of teeth, reducing bruxism and other parafunctional habits, repositioning of condyle and treating masticatory muscle pain. Thus this study was conducted to evaluate the effectiveness of soft occlusal splint therapy as a conservative treatment modality in patients with temporomandibular joint disorders.

In the present study, there was significant increase in the interincisal distance with mean value of 32.42 + 6.65mm at the baseline and 35.28 +1.54 mm after 3 months with mean difference of -2.8600 + 6.0373 mm with the p value being 0.0016, suggesting statistically highly significant which is in accordance with Suvinen et al who reported 7.4 mm improvement in mouth opening after splint therapy. The increase in interincisal distance is probably due to the soft occlusal splint therapy, that decreases the pain and tenderness in muscle and joints, apparently allowing an increase in their maximal mouth opening.

The joint noises as compared to the base lines and after 3 months of soft occlusal splint therapy showed significant reduction in joint noises. At baseline, joint noises were present in 92% (46) of subjects and 12 % (6 subjects) were without joint noises. After 3 months, there was improvement in 84% of subjects and 12% subjects did not respond to the treatment. Similar studies were conducted by Mona M.S et al¹⁵ who reported significant reduction in joint noises after 3 months, Venkatesh Naikamasur et al¹ and Kovalski et al, reported significant reduction in TMJ clicking after 3 months. The occlusal splint allows a muscle to function more efficiently during contact and be less active during postural functions. Hence, the vertical dimension increases from the occlusal contact on insertion of a splint, muscular effort decreases resulting in the relaxing of the muscles and hence relaxing the temporomandibular joint.

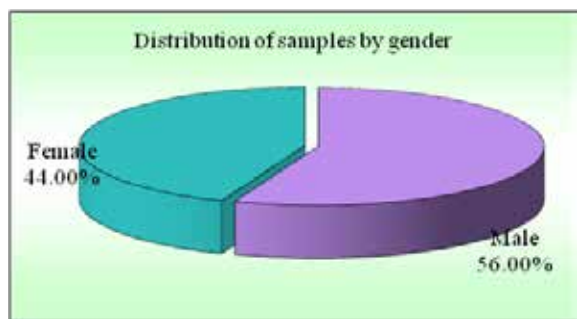
In the current study, out of 50 (100%) subjects, significant improvement was noticed in status of mandibular deviation

after 3 months. At baseline, 90% of subjects showed mandibular deviation and 6% did not show the deviation. After 3 months, 88% of subjects showed improvement in mandibular deviation with p value being 0.00001 which was statistically highly significant. To compare the result of mandibular deviation there was no literature available, thus it was not possible to compare with other studies.

In the present study, 92% of subjects showed significant reduction in preauricular tenderness, 84% subjects showed reduction in TMJ noises, 88% of subjects showed improvement in mandibular deviation and -8.8217% change was noticed in mouth opening and after 3 months, thus suggesting that there is improvement in signs and symptoms of TMDs. The result of the present study is encouraging; the soft occlusal splints are effective in the treatment of temporomandibular disorders. Therefore, soft occlusal splints can be recommended for management of TMDs. However the present study has certain limitations such as VAS (Visual Analogue Scale) has not been used to assess the pain in TMJ and there was no control group with blinding during the evaluation of patient, therefore it is necessary to conduct blind trials with appropriate control groups to evaluate the effectiveness of occlusal splint therapy. Therefore, further research are advisable with larger samples including control group to investigate proper benefits of soft occlusal splints in reducing signs and symptoms of temporomandibular joint disorders

Conclusion

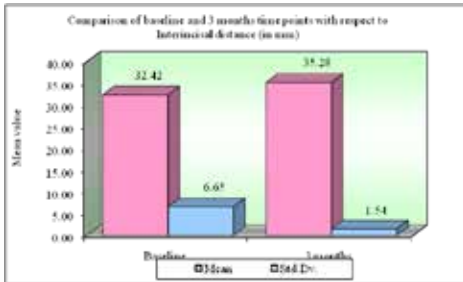
Occlusal splint therapy is often a challenge for both the dentist and patient. Occlusal related disorders are often difficult to diagnose, as the symptoms presented by the patients may be variable. Once the cause of Occlusal related disorders identified, this reversible, non-invasive therapy provides both diagnostic information and relief with the symptoms. Soft Occlusal splint therapy is much safer and effective mode of conservative line of treatment when compared to other treatment modalities. Occlusal splint therapy is advantageous as it has better patient compliance, better results, fewer side-effects because it is reversible and non-invasive. These are also less expensive and easier to fabricate than heat cured splints. Therefore soft occlusal splint therapy can be recommended for management of temporomandibular joint disorders.



Pie diagram 1: Distribution of samples by gender and Pie diagram.

Age groups	No of samples	% of samples
21-25yrs	26	52.0
26-30yrs	22	44.0
31+yrs	2	4.0
Total	50	100.0
Mean age	25.76	
SD age	2.27	

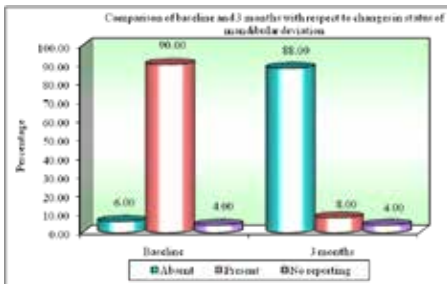
Table 1: Distribution of samples by age groups



Bar diagram 1: Comparison of baseline and 3 months time period with respect to interincisal distance (in mm).



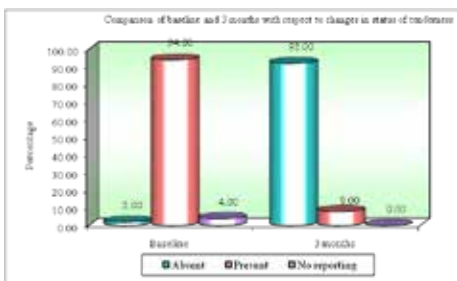
Figure 2: Polyvenyl sheet adapted on maxillary cast



Bar diagram 2: Comparison of baseline and 3 months with respect to changes in status of mandibular deviation



Figure 3: Lateral view of occlusal splint (right)



Bar diagram 3: Comparison of baseline and 3 months with respect to changes in status of tenderness

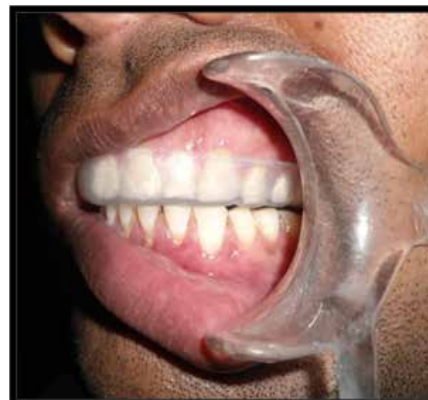
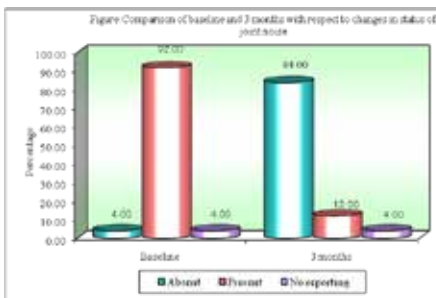


Figure 4: Lateral view of occlusal splint (left)



Bar diagram 4: Comparison of baseline and 3 months with respect to changes in status of joint noise



Figure 1: Vacuum former

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