

# Trends of Occlusal Appliance Therapy among Resident Dental Surgeons

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## ABSTRACT

**Objective:** Current study was planned to assess the trends of occlusal appliance construction and selection, among the resident dental surgeons.

**Method:** Data was collected from 51 residents at Fatima Memorial Dental Hospital, which were given a questionnaire that had 20 questions. The frequency of each answer was calculated and compared between residents of different departments and was analyzed by SPSS version 20.

**Results:** The selection and construction of occlusal appliances among the residents was inappropriate. Soft occlusal appliances were the most selected and practiced appliance. Occlusal appliances need to be revisited in the literature with easy to practice guidelines.

**Keywords:** Occlusal appliances, Soft occlusal appliances, Temporomandibular joints.

## INTRODUCTION

The integrity of masticatory system lies in the harmony among the function of temporomandibular joints with the action of muscles and the occlusion of the natural dentition. Any discord in these can cause temporomandibular disorders (TMDs). Varying prevalence of TMDs has been reported. Munir et al have reported 19% prevalence with joint clicking being the most common sign.<sup>1</sup> Ilyas et al have observed signs of TMDs in young population; they reported that 70% females and 80% males showed signs of TMDs. The affected individuals also had parafunctional habits the unaffected individuals. They concluded that psychological stress was the most aggravating factor.<sup>2</sup> The exact etiology of TMDs is not known but some of the main possible etiological factors are Parafunction, muscular hypertrophy and disharmony, occlusal interferences, macro/micro trauma, psychological stress and anatomical defects of the joints.<sup>3</sup> The treatment of TMDs starts with controlling of these etiological factors. One of the most noninvasive, safest and reversible treatment modality is the occlusal appliances. Occlusal appliances are a type of removable prosthesis, which is usually made of acrylic, they are worn on teeth of one arch and contact the teeth of the other arch in the desired jaw relation to minimize the symptoms of TMDs and maximize the healing of the masticatory system.<sup>4</sup>

Different occlusal appliances have been used for the management of TMDs, they are found effective are reported in the literature.<sup>4,5</sup> However the literature has not reported the standardization of the construction and selection of these appliances, which is crucial in the success of the appliance. This the reason that highly variable results are reported in the literature on the outcome of the appliance wears. Due to similar reason a Cochrane review has found no effect of occlusal appliances on TMDs.<sup>6</sup> The review states that there is a lack of data and standardization across the literature.

The process of standardizing the construction of occlusal appliance selection and construction of these appliances starts with assessing the current knowledge of dentists. The assessment can be divided into knowledge of appliance selection and

knowledge of appliance construction. The aim of this study is to assess the knowledge of dentist about selection and construction of occlusal appliances in our hospital. This will provide an initial database for the improvement in provision of these appliances to the required patients. Current study was planned to assess the trends of occlusal appliance construction and selection, among the resident dental surgeons.

## METHODOLOGY

Informed consent was taken from 51 residents at Fatima Memorial Dental Hospital, which were given a questionnaire that had 20 questions. SECTION (A) had 5 questions which were about selection of appliance, SECTION (B) had 9 questions which were about construction of appliance and SECTION (C) had 6 questions for general preferences. The frequency of each answer was calculated and compared between residents of different departments and was analyzed by SPSS version 20.

## RESULTS

Response rate was 100% of 51 participants which comprised of 29 females and 22 males. The mean age of participants was 28.5 years. The distribution of participants according to specialty is shown below:

Table 1: Summary of Participants of study (n=51)

Speciality	No. of residents	Gender	
		Female n=27	Male n=24
Prosthodontics	11	4	7
Maxillofacial Surgery	07	1	6
Operative dentistry	14	11	3
Periodontology	10	4	6
Orthodontics	09	7	2

The frequency of response of all participants is summarized in Table 2.

Table 2: Summary of Responses

SECTION (A) : SELECTION OF OCCLUSAL APPLIANCE					
QUESTION	RESPONSE				
1. What is your preferred choice for occlusal appliance for TMDs associated with muscular disorder?	Stabilization appliance	Anterior positioning appliance	Soft occlusal appliances	Bite planes	Do not know
	40%	20%	33%	7%	0%
2. What is your preferred choice for occlusal appliance for a patient with TMD and pathological non carious occlusal wear?	Stabilization appliance	Anterior positioning appliance	Soft occlusal appliances	Dahl's Appliance	Do not know
	40%	20%	33%	7%	0%
3. What is your preferred choice for occlusal appliance for TMDs associated with disc	Stabilization appliance	Anterior positioning appliance	Soft occlusal appliances	Bite planes	Do not know

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displacement?	26%	36%	30%	10%	0%
4. What is your preferred choice for occlusal appliance for TMDs for an edentulous patient?	Stabilization appliance	Anterior positioning appliance	Soft occlusal appliances	Occlusal pivots	Do not know
	6%	0%	0%	18%	74%
5. What is your preferred choice for occlusal appliance for TMDs for a patient that complains of nocturnal para function habits?	Stabilization appliance	Anterior positioning appliance	Soft occlusal appliances	Bite planes	Do not know
	36%	12%	24%	28%	0%
<b>SECTION (B) : CONSTRUCTION OF OCCLUSAL APPLIANCE</b>					
6. What is your preferred choice for jaw relation record for a stabilization splint?	Centric Relation	Eccentric relation	Mouth just open in retruded contact position	Mouth just open and no teeth are touching	Do not know
	52%	18%	6%	24%	0%
7. What is your preferred choice for jaw relation record for an anterior positioning splint?	Centric Relation	Eccentric relation	Mouth just open in retruded contact position	Mouth just open and no teeth are touching	Do not know
	18%	20%	40%	12%	10%
8. What is your preferred choice for thickness of the jaw relation record for any appliance construction should be?	Depend on height of posterior teeth	2.0-2.5mm	Bite with minimum possible thickness with teeth not piercing the material	Only teeth occluding in centric relation should pierce the bite	Do not know
	6%	24%	50%	18%	2%
9. In your opinion, the Maximum intercuspation for a stabilization appliance should coincide with which jaw relation?	Centric relation	Canine guidance	Group function	Mouth just open	Do not know
	66%	26%	0%	0%	0%
10. In your opinion, the Maximum intercuspation for an anterior positioning appliance should coincide with which jaw relation?	Centric relation	Canine guidance	Group function	Mouth just open	Do not know
	28%	39%	33%	0%	0%
11. In your opinion, what should be the duration of wearing a stabilization appliance for muscular pain after waking up in the morning?	Night time wear and when symptoms/habits are recognized	Only when symptoms / habits recognized	Worn from awakening till night	Worn from noon till before sleep	Do not know
	0%	0%	24%	76%	0%
12. In your opinion, what should be the duration of wearing a stabilization appliance for muscular pain occurring after noon or in the evening?	Night time wear and when symptoms/habits are recognized	Only when symptoms / habits recognized	Worn from awakening till night	Worn from noon till before sleep	Do not know
	22%	24%	28%	28%	0%
13. In your opinion, what should be the duration of wearing an anterior positioning appliance?	Night time wear and when symptoms/habits are recognized	Only when symptoms / habits recognized	Worn from awakening till night	Worn from noon till before sleep	Do not know
	40%	20%	27%	13%	0%
14. In your opinion, what is the guide for taking a jaw relation for anterior positioning appliance?	Centric relation	Jaw protruded till edge to edge	Jaw protruded till symptoms decrease	Mouth just open and no teeth touching	Do not know
	30%	35%	15%	15%	5%
<b>SECTION (C) : GENERAL QUESTIONS</b>					
15. In your opinion, which of the following appliances can be worn during meals?	Stabilization appliance	Anterior positioning appliance	Soft occlusal appliances	Bite planes	Do not know
	0%	0%	30%	47%	23%
16. In your opinion, which type of an appliance is the nociceptive trigeminal inhibition tension suppression system is similar to	Stabilization appliance	Anterior positioning appliance	Soft occlusal appliances	Anterior Bite planes	Do not know
	0%	16%	4%	2%	78%
17. In your opinion nociceptive trigeminal inhibition tension suppression system is indicated in?	Migraine and headache	Joint clicking	Bruxism	Clenching	Do not know
	16%	2%	4%	0%	78%
18. In your opinion, Soft occlusal appliance is indicated for which of the following conditions?	Bruxism	High bite forces	During sports	When centric relation and maximum intercuspation do not coincide	Do not know
	40%	0%	24%	36%	0%
19. In your opinion, the occlusal contacts on Soft occlusal appliance are.	Wide spread and equal	Random and unequal	Light and wide spread	Only on anterior teeth	Do not know
	0%	22%	78%	0%	0%
20. Which of the following appliance has been your made the most?	Stabilization appliance	Anterior positioning appliance	Soft occlusal appliances	Bite planes	I do not make occlusal appliance in my practice
	21%	0%	60%	0%	19%

In the Section A: Selection of Appliance, Soft occlusal appliance was the most selected occlusal appliance by the participants. However the prosthodontic residents did not chose the soft occlusal appliance in any question. Table 3

Table 3: Most selected Appliance

Question	Percentage of Most selected Occlusal appliance with respect to speciality				
	Prosthodontics	Maxillo-facial surgery	Operative dentistry	Periodontology	Orthodontics
1. What is your preferred choice for occlusal appliance for TMDs associated with muscular disorder?	Stabilization Appliance	Soft Occlusal Appliance	Soft Occlusal Appliance	Soft Occlusal Appliance	Soft Occlusal Appliance
	90%	57%	45%	50%	45%
2. What is your preferred choice for occlusal appliance for pathological non carious occlusal wear?	Stabilization Appliance	Soft Occlusal Appliance	Dahl's Appliance	Dahl's Appliance	Soft Occlusal Appliance
	90%	57%	36%	50%	45%
3. What is your preferred choice for occlusal appliance for TMDs associated with disc displacement?	Anterior Positioning Appliance	Anterior Positioning Appliance	Stabilization Appliance	Stabilization Appliance	Stabilization Appliance
	100%	72%	32%	35%	67%
4. What is your preferred choice for occlusal appliance for TMDs for an edentulous patient?	Pivoting appliance	Do not know	Do not know	Do not know	Do not know
	82%	72%	82%	86%	100%
5. What is your preferred choice for occlusal appliance for TMDs for a patient that complains of nocturnal para function habits?	Stabilization Appliance	Soft Occlusal Appliance	Soft Occlusal Appliance	Posterior bite plane	Soft Occlusal Appliance
	100%	33%	33%	70%	36%

For the Section C: General Questions, Table 4 show the gender and department wise response for the most appliances made in practice. Soft occlusal splint was the most practiced appliance.

Table 4: Most Practiced Occlusal Appliance

Percentage of Most Practiced Occlusal Appliance with respect to speciality				
Prosthodontics	Maxillo-facial surgery	Operative dentistry	Periodontology	Orthodontics
Stabilization Appliance	Soft Occlusal Appliance	Soft Occlusal Appliance	Soft Occlusal Appliance	Soft Occlusal Appliance
100%	72%	77%	80%	100%

## DISCUSSION

The success of occlusal appliance therapy lies in the meticulous selection of the appliance and intricate detailing of its construction.<sup>7</sup> Unfortunately In the dental literature the occlusal appliances have been used with many names. For example the stabilization appliance has been referred to as Flat plane stabilization appliance, Michigan splint, orthopedic appliances, muscle relaxant appliances and many more titles the literature.<sup>5</sup> This creates a confusion and ambiguity among the data acquired from the literature. Okeson et al has described occlusal appliances according to their characteristic features and this description is scientific and self-explanatory.<sup>8</sup>

This study aimed to identify the ambiguities among the dental surgeons regarding the construction and selection of occlusal appliances for various diseases of TMDs and occlusion. The most shocking and worrying fact that can be derived from this study is that the soft occlusal appliance was the most used appliance for the treatment of TMDs and occlusion. Which in most literature is either ineffective or has significantly less impact on symptoms as compared to other appliances.<sup>9</sup> The use of soft appliance can only be explained due to the lack of knowledge and skill in making a hard acrylic appliance, furthermore it is easier to construct in laboratory and insert in the patient's mouth. There is a dire need of education among the dental surgeons about the soft occlusal appliances. This lack of knowledge and competence towards occlusal appliance is reflected in many other studies as well.<sup>10-15</sup> Thus to improve patient care for TMDs, betterment in undergraduate and post graduate training is required.<sup>10</sup>

The participants have also selected inappropriate jaw relations for appliances. For stabilization appliance the desired jaw relation selected was centric relation and for anterior repositioning appliance desired jaw relation selected was Mouth just open in retruded contact position. Inappropriate jaw relations can lead to worsen of symptoms, excessive chair side adjustments or even clinical failure.<sup>5,9</sup> The participants showed a lack of knowledge of management of TMDs of edentulous patients. Only the prosthodontic resident selected the occlusal pivots.

As highlighted earlier that there is a huge ambiguity across the literature that has reflected upon participants and may lead to failure of treatments and outcomes and reported in earlier literature.<sup>4,16,17</sup> A major loop hole in assessing the outcomes of occlusal appliance on management of TMDs is that the assessment is mostly subjective, which mostly relate to decrease of symptoms as reported by the patient.<sup>10,18</sup> Thus, there is a dire need of revisiting this important and crucial aspect of minimal intervention dentistry. A simple classification of occlusal appliances, an easy algorithm of selection of occlusal appliances and the concise occlusal characteristic of each appliance must be generated. A classification of TMDs has been proposed and is in accord with the code number that has been established by the American Academy of Orofacial Pain in cooperation with the International Headache Society.<sup>19</sup> This classification can aid in generating a classification for treatment modalities for TMDs.

## CONCLUSION

With the limited data of this study it can be concluded that

1. The selection and construction of occlusal appliances among the residents was inappropriate.
2. Soft occlusal appliances were the most selected and practiced appliance.

3. Occlusal appliances need to be revisited in the literature with easy to practice guidelines.

## REFERENCES

- 1 Khan M, Khan A, Hussain U. Prevalence of Temporomandibular Dysfunction ( Tmd ) Among University Students. *Pakistan Oral Dent J* 2015; 35: 382-386.
- 2 Muhammad Ilyas, Fariha Kifaya, Faryal Gul, Salman Khan, Sumaira Saeed AKD. PREVALENCE AND SEVERITY OF TEMPOROMANDIBULAR DISORDERS AMONG HOUSE OFFICERS AND POST-GRADUATE RESIDENTS OF PRIVATE AND PUBLIC SECTOR MEDICAL AND DENTAL HOSPITALS IN PESHAWAR , ABSTRACT : INTRODUCTION : *J Gandhara Med Dent Sci* 2020; : 2-7.
- 3 Chisnoiu AM, Picos AM, Popa S, Chisnoiu PD, Lascu L, Picos A et al. Factors involved in the etiology of temporomandibular disorders - a literature review. *Clujul Med* 2015; 88: 473-478.
- 4 Kyburz KS, Eliades T, Papageorgiou SN. What effect does functional appliance treatment have on the temporomandibular joint? A systematic review with meta-analysis. *Prog Orthod* 2019; 20. doi:10.1186/s40510-019-0286-9.
- 5 Dhannawat P, Shrivastav S, Ranjit K, Banerjee S. Different types of occlusal splint used in management of temporomandibular joint disorders- A review. *Eur J Mol Clin Med* 2020; 7: 1809-1815.
- 6 Al-Ani Z, Worthington H, Gray R, Sloan P DS. A Cochrane Systematic Review of Stabilisation Splint Therapy for Temporomandibular Pain Dysfunction Syndrome. *Cochrane Colloq* 2003; 31 Jul-3 A: Stavanger, Norway. 2003.
- 7 Greene CS, Menchel HF. The Use of Oral Appliances in the Management of Temporomandibular Disorders. *Oral Maxillofac Surg Clin North Am* 2018; 30: 265-277.
- 8 Okeson JP. *Management Temporomandibular Disorder and Occlusion*. 7th ed. Elsevier Ltd, 2013.
- 9 Abouelhuda AM, khalifa AK, Kim YK, Hegazy SA. Non-invasive different modalities of treatment for temporomandibular disorders: Review of literature. *J Korean Assoc Oral Maxillofac Surg* 2018; 44: 43-51.
- 10 Fouda AAH. No evidence on the effectiveness of oral splints for the management of temporomandibular joint dysfunction pain in both short and long-term follow-up systematic reviews and meta-analysis studies. *J Korean Assoc Oral Maxillofac Surg* 2020; 46: 87-98.
- 11 Gnauck M, Magnusson T, Ekberg EC. Knowledge and competence in temporomandibular disorders among Swedish general dental practitioners and dental hygienists. *Acta Odontol Scand* 2017; 75: 429-436.
- 12 Baharvand M, Sedaghat Monfared M, Hamian M, Jalali Moghaddam E, Sadat Hosseini F, Alavi KA. Temporomandibular Disorders: Knowledge, Attitude and Practice among Dentists in Tehran, Iran. *J Dent Res Dent Clin Dent Prospects* 2010; 4: 90-94.
- 13 Tegelberg A, Wenneberg B, List T. General practice dentists' knowledge of temporomandibular disorders in children and adolescents. *Eur J Dent Educ* 2007; 11: 216-221.
- 14 Aldridge RHS, Sánchez-Ayala A, Urban VM, Pavarina AC, Jorge JH, Campanha NH. A Survey of the Management of Patients with Temporomandibular Disorders by General Dental Practitioners in Southern Brazil. *J Prosthodont* 2016; 25: 33-38.
- 15 Lindfors E, Tegelberg A, Magnusson T, Ernberg M. Treatment of temporomandibular disorders - knowledge, attitudes and clinical experience among general practising dentists in Sweden. *Acta Odontol Scand* 2016; 74: 460-465.
- 16 Alkhatari AS, Alyahya A, Rodrigues Conti PC, Christidis N, Al-Moraissi EA. Is the therapeutic effect of occlusal stabilization appliances more than just placebo effect in the management of painful temporomandibular disorders? A network meta-analysis of randomized clinical trials. *J Prosthet Dent* 2020; : 1-9.
- 17 Guguvcevski L, Gigovski N, Mijoska A, Zlatanovska K, Arsova-Gigovska A. Temporomandibular disorders treatment with correction of decreased occlusal vertical dimension. *Open Access Maced J Med Sci* 2017; 5: 983-986.
- 18 Pficer JK, Dodic S, Lazic V, Trajkovic G, Milic N, Milicic B. Occlusal stabilization splint for patients with temporomandibular disorders: Meta-analysis of short and long term effects. *PLoS One* 2017; 12: 1-21.
- 19 JP O. *Orofacial Pain: Guidelines for Assessment, Diagnosis, and Management*. 3rd ed. 1996.