Research Article

JRAD Journal of Research and Advancement in Dentistry

J Res Adv Dent 2019;9:3:5-11.

The Prevalence of Signs of Temporomandibular Disorders in Relation to Different Occlusal Parameters among Population of Mangalore City, Karnataka, India: A Descriptive Study

Suja Mathew Jude[1*] Manoj Kumar Pulyodan[2] Sylvana Achammada[3] Archana Pai[4] Joseph Johny[5] Kanwardeep Sohi[6]

[1]Professor and Head, Department of Prosthodontics, Sree Anjaneya Institute of Dental Sciences, Calicut, Kerala, India.
[2]Professor and Head, Department of Conservative Dentistry and Endodontics, Sree Anjaneya Institute of Dental Sciences, Calicut, Kerala, India.
[3]Reader, Department of Prosthodontics, Sree Anjaneya Institute of Dental Sciences, Calicut, Kerala, India.
[4]Assistant Professor, Department of Pedodontics, Sree Anjaneya Institute of Dental Sciences, Calicut, Kerala, India.
[5]Assistant Professor, Department of Oral Medicine and Radiology, Sree Anjaneya Institute of Dental Sciences, Calicut, Kerala, India.
[6]Reader, Department of Prosthodontics, Shaheed Kartar Singh Sarabha Dental College, Ludhiana, Punjab, India.

ABSTRACT

Aim: The aim and objective of this study was to determine the prevalence of signs of temporomandibular disorder in adults and to correlate them to different occlusal parameters like Angles classification, type of eccentric occlusion , canine protected occlusion, group function occlusion, mutual protection, non- working side contacts, chewing side preference.

Methods and Material: 600 asymptomatic healthy subjects consisting of both men and women within the age group of 18 - 40 years, were included for the study. These subjects were examined clinically for the presence of temporomandibular disorder signs, which were correlated with each occlusal parameters. The collected data was analyzed by chi-square test for the correlation between the different temporomandibular disorder signs and different occlusal parameters.

Results: Subjects having one or more signs of temporomandibular disorder were 53.5% of which 55.2% were in females and 51% were in males. The prevalence of temporomandibular disorder signs in Angles classification was highly significant in Class II Division 2 followed by Class III.

Conclusion: There was a significant association between the prevalence of temporomandibular disorder signs in relation to non working side contacts and group function occlusion.

Keywords: Angles classification, Canine protected occlusion, Group function, Mutual protection, Temporomandibular disorder.

INTRODUCTION

The role of occlusion in the etiology and prevalence of temporomandibular disorders (TMD) has not been conclusively demonstrated. [1, 2] Confusion about the relationship between dental occlusion and the temporomandibular disorders (TMD) have been evident in the literature for many years. There are no data to confirm or deny the existence of a relationship between occlusal factors and TMD. [3,4]

There is a general agreement that the etiology of temporomandibular disorder is multifactorial which includes structural abnormalities, stress - induced muscle hyperactivity, and overloading from trauma. The role of occlusion seems to be particularly controversial. [5,6,7,8,9]

Received: Jan. 19, 2019**: Accepted**: Jan. 25, 2019
***Correspondence Dr. Suja Mathew Jude.**
Department of Prosthodontics, Sree Anjaneya Institute of Dental Sciences, Calicut, Kerala, India.
Email: smjdoc@rediffmail.com

pISSN 2278-0076
eISSN 2321-9270

Temporomandibular disorders (TMDs) can affect the structure and function of the temporomandibular joints (TMJs), the dentition and its supporting structures, and the neuromuscular system. Despite extensive discussion of problems in establishing the etiology of temporomandibular disorders (TMD), no agreement has so far been reached. So far, the relationship between occlusal condition and TMD has not been confirmed although there is a current trend toward making a weak correlation between occlusal interference and TMD. Several types of occlusal discrepancies have been considered as variable features of the norm. [10]The aim and objective of this study was to determine the prevalence of the signs of TMD in asymptomatic dentulous subjects and to correlate them to different occlusal parameters.

MATERIALS AND METHODS

Collection of Data

Inclusion criterea:

- 600 asymptomatic healthy subjects consisting of both men and women from population of Mangalore city, Karnataka included for the present study in the age range of 18-40 years.
- Subjects were unaware of temporomandibular joint disorders
- All the subjects had complete natural dentition with exception of absent third molars.

Exclusion criteria :

- History of previous trauma to TMJ
- Subjects with full coverage restorations .
- Previous history of orthodontic treatment
- Degenerative disorders of the TMJ which was diagnosed by bony changes in OPG

Written consent was taken of the patient prior to the study and the study period was for six months which was carried out by two calibrated examiners

Sample size estimation :

The study was a descriptive study (cross –sectional) and the sampling technique used was simple random sampling and sample size was achieved using random number generation technique

Each subject was examined for presence of any signs of TMD in the following manner:

Joint sounds

a) Hearing

Joint sounds were elicited manually by placing the fingertips over the lateral surface of joints bilaterally and having the patient open and close the mouth. Clicking in. the TMJ was noticed through auricular palpation with light anterior pressure.

b) Auscultation

The presence or absence of joints sounds (clicking, crepitus) in the TMJ were confirmed with a stethoscope auscultation over each joint during active opening and closing movement of the jaw.

Joint tenderness

Temporomandibular joint tenderness was evaluated by palpation of the pre-auricular and intra-auricular spaces during opening, closing and lateral movements of the mandible.

Muscle tenderness

Pain and muscle tenderness of muscles of mastication were determined by digital palpation.

Deviation of mouth opening

A deviation was observed by any shift of the jaw midline during initial mouth opening that disappeared with continued opening.

Restricted mouth opening

A restricted mouth opening was considered any distance less than 40mm which was measured using Vernier caliper .

DETERMINATION OF ECCENTRIC OCCLUSION

Mutual protection

Presence or absence of mutual protection was determined by a dental floss of nine inches which was passed distal to the last lower molars on both sides and it was looped around the facial surface of the molars to project outside the mouth.

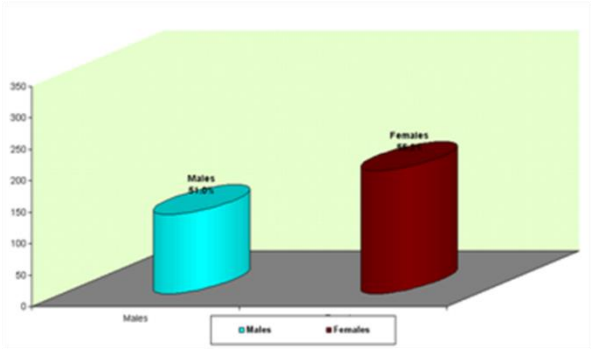


Fig 1: Graph showing the distribution of TMD signs in males and females.

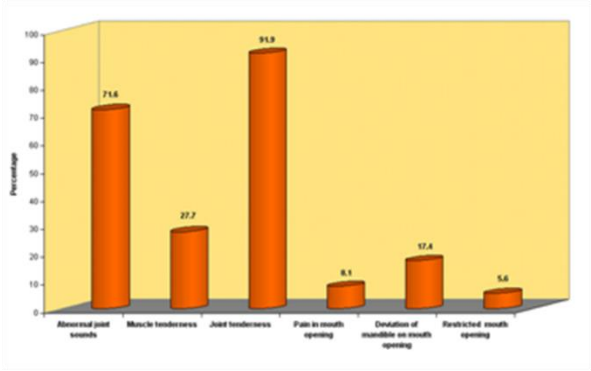
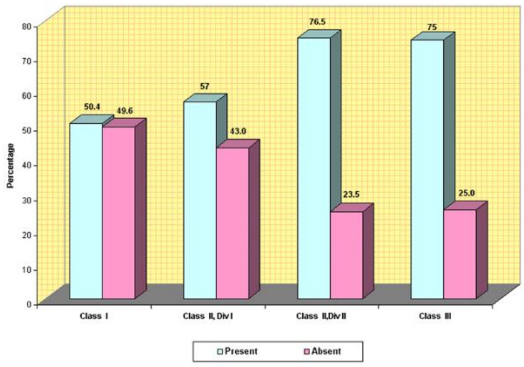


Fig 2: Graph showing the distribution of diffenent TMD signs.



The subject was made to occlude in centric and later protrude the mandible to assume the incisal edge to edge contact. At this time the dental floss was withdrawn by holding it between the operator's right and left fingers. When there was no disclusion during protrusion because of the presence of posterior tooth contacts, silk floss could not be easily withdrawn due to the resistance offered by the supracontacts.

When there was absence of posterior tooth contacts the dental floss was easily withdrawn and mutual protection was confirmed.

Canine – protected occlusion

The subject was asked to move the mandible laterally until the canines pass beyond cusp to cusp relation or 8-10mm, whichever came first.The canine – protected occlusion was observed by use of mouth mirror and considered when there was a contact only between the maxillary and mandibular canines in lateral movements on the working side and confirmed using shim stock (Arti-Fol – metallic articulating film, 12microns, Dr. Jean Bausch KG, (Germany).

Group function

The subject was asked to move the mandible laterally until the canines pass beyond cusp to cusp relation or 8-10mm, whichever came first. The group function occlusion was observed by use of mouth mirror and considered when there were multiple contact relations between the maxillary and mandibular teeth in lateral movements on the working side and was confirmed using shim stock (Arti-Fol – metallic articulating film, 12microns, Dr. Jean Bausch KG, Germany)

Detection of working side contacts

Articulating paper (Arti-Fol - articulating film, 12microns, Dr. Jean Bausch KG, Germany) was placed between the posterior teeth and the subject was instructed to clench the teeth. While a constant pulling force was maintained on the articulating paper, the subject moved the mandible in a mediotrusive direction. If the mandible moved less than 1mm and the articulating paper was disengaged, no mediotrusive contact existed. If the articulating paper continued to bind when the mandible moved beyond 1mm, a mediotrusive contact existed.

The mediotrusive contact was confirmed using Shim stock (Arti-Fol - metallic articulating film, 12microns, Dr. Jean Bausch KG, Germany).Dental floss method was also used to detect non- working side contacts.

Table 1: Showing distribution of different TMD in relation to non working side contacts.

NON WORKING SIDE CONTACTS	TMD SIGNS		Total
	Present	Absent	
Present	253 39.4%	245 43.9%+	498 41.5%
Absent	389 60.6%	313 56.1%	702 58.5%
Total	642 100.0%	558 100.0%	1200 100.0%

Table 2: showing distribution of different TMD in relation to mutual protection.

MUTUAL PROTECTION	TMD SIGNS		Total
	Present	Absent	
Present	369 57.5%	372 66.7%	741 61.8%
Absent	273 42.5%	186 33.3%	459 38.3%
Total	642 100.0%	558 100.0%	1200 100.0%

Table 3: Showing distribution of different TMD in relation canine protected occlusion.

CANINEPROTECTED OCCLUSION	TMD SIGNS		Total
	PRESENT	ABSENT	
PRESENT	319 49.7%	352 63.1%	671 55.9%
ABSENT	323 50.3%	206 36.9%	529 44.1%
Total	642 100.0%	558 100.0%	1200 100.0%

Table 4: showing distribution of different TMD in relation to group function.

GROUP FUNCTION	TMD SIGNS		Total
	PRESENT	ABSENT	
PRESENT	358 55.8%	171 30.6%	529 44.1%
ABSENT	284 44.2%	387 60.4%	671 55.9%
Total	642 100.0%	558 100.0%	1200 100.0%

RESULTS

The collected data was analyzed by chi-square test for the correlation between the different temporomandibular disorder signs and different occlusal parameters. The percentage of subjects having one or more signs of temporomandibular disorder was 53.5% of which 55.2% were seen in females and 51% were seen in males. [Graph-1] No significance was observed in the prevalence of temporomandibular disorder between males and females.

The most commonly observed sign was joint tenderness (91.9 %), followed by abnormal joint sounds (71.6 %), muscle tenderness (27.7%), deviation of mandible on mouth opening (17.4 %), pain on mouth opening (8.1 %) and restricted mouth opening (5.6 %). [Graph 2]

In the case of prevalence of temporomandibular disorder signs in relation to Angles classification.[Graph-3] Temporomandibular disorder signs in relation to Class I Angles classification was observed as 50.4%, Class II Div 1 as 57% , Class II Division 2 76.5 % followed by Class III 75 %. Although they were few in number, the prevalence of temporomandibular disorder signs in Class II Division 2 (76.5 %) was highly significant.

Table I shows the prevalence of temporomandibular disorder signs in relation to non working side contacts. Among 600 subjects, 39.4 % had prevalence of temporomandibular disorder signs in relation to non working side contacts. This value showed a significant association of the prevalence of temporomandibular disorder signs in relation to non working side contacts.

Table II shows the prevalence of signs of temporomandibular disorder in relation to mutual protection. The percentage of subjects with mutual protection who did not present with signs of TMD was 66.7 %. This showed that there was no significant association in the prevalence of signs of temporomandibular disorder in relation to mutual protection.

Table III shows the prevalence of signs of temporomandibular disorder in relation to canine protected occlusion. Total percentage of canine protected occlusion was 55.9 % of which 49.7% subjects had canine protected occlusion with temporomandibular disorder signs. This showed a significant association in the prevalence of signs of temporomandibular disorder in relation to canine protected occlusion.

Table IV shows the prevalence of signs of TMD in relation to group function occlusion. Total

percentage of group function was 44.1 % of which 55.8% of the subjects had group function with temporomandibular disorder signs. This showed a significant association in the prevalence of signs of TMD in relation to group function.

DISCUSSION

Temporomandibular disorder is considered as a multi factorial disease process that may manifest as a variety of signs and symptoms. Epidemiologic studies indicate that large proportions of the general population exhibit signs and symptoms of temporomandibular disorders. [11] Occlusal discrepancies or disharmonies may represent a major factor in the development of temporomandibular disorders. [12] **[13] [14]**

Studies have revealed that subjects in the range of 20 to 40 year old have higher prevalence of TMD than in other age-groups and females showed higher prevalence of TMD than men .[15]This study examined the prevalence of signs of temporomandibular disorder in a sample of 600 subjects composed of men and women. The subjects appeared healthy from both general and oral aspects.

In this study temporomandibular disorder signs in relation to Class I Angles classification was observed as 50.4%, Class II Div 1 as 57% , Class II Division 2 76.5 % followed by Class III 75 %. Although they were few in numbers, the prevalence of TMD signs in Class II Division 2 (76.5 %) was highly significant followed by Class III (74.4%). (p=.001 vhs). Malocclusions may cause neuromuscular dysfunction and reflex mandibular positioning, and disharmonies in chewing patterns thereby creating ischemic circulatory effects.[16]Studies have shown that class II and class III malocclusion, anterior open bites, cross bites, deep bites and non-working side contacts can lead to TMD signs and symptoms.Authors have stated that subjects with normal occlusions had the lowest prevalence of TMD signs compared with those with treated or untreated class II division1 malocclusions, and treated class II division 1 patients had a lower prevalence of TMD signs/symptoms than untreated cases which could be due to improvements in dental occlusion and occlusal stability. [17]

Even though non working side contact is essential for the stability of complete denture they were traumatic to natural dentition causing temporomandibular disorders, periodontal involvement and excessive wear. Occlusal factors such as retruded contact position and intercuspal position slides or the presence of non-working side contacts are considered to be primary etiologic factors of temporomandibular disorders.

According to EMG studies non workingside interferences can lead to complex neuromuscular reflex activity compared to other functional interferences which are highly destructive for joint and dental structure due to the amount and direction of force generated.[18]

In this study the total percentage of canine protected occlusion was 55.9 % of which 49.7% subjects had canine protected occlusion with temporomandibular disorder signs. This showed a significant association in the prevalence of signs of temporomandibular disorder in relation to canine protected occlusion. Canines act as natures stress breakers to protect the periodontium and supporting structures from lateral stress during eccentric movements. Canine has a good crown - root ratio, capable of tolerating high occlusal forces, the shape of the palatal surface of the canine is concave and is suitable for guiding lateral forces.

According to this study, the total percentage of group function was 44.1 % of which 55.8% of the subjects had group function with temporomandibular disorder signs. This showed a significant association in the prevalence of signs of temporomandibular disorders in relation to group function. This suggests that group function occlusion is not a protective factor against signs of temporomandibular disorder. When group function is considered there is an increase in magnitude of load in balancing condyle in extreme lateral displacement of the jaw. For canine-protected occlusion to function properly the anterior teeth must be healthy. Kawano M et al [19] stated that for favorable functioning of TMJ, anterior teeth guidance harmonized with TMJ as posterior guidance would be desirable. Few limitations of the study were the small sample size and the limited duration of the study. Follow ups were not conducted in this study. Further research is needed

on larger samples size with subjects from different racial and geographic locations.

CONCLUSION

In this study the prevalence of temporomandibular disorder signs in Angles classification was highly significant in Class II Division 2 although they were few in number, followed by Class III. There was a significant association between the prevalence of temporomandibular disorder signs in relation to non working side contacts. There was no significant association of the signs of temporomandibular disorder in relation to mutual protection. Group function was more associated with various signs of temporomandibular disorder than canine protected occlusion.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

1. Raustia AM, Pirttiniemi PM, Pyhtinen J. Correlation of occlusal factors and condyle position asymmetry with signs and symptoms of temporomandibular disorders in young adults. Cranio 1995; (3):152-6.

2. Chisnoiu AM, Buduru S, Lascu L, Vesa SC, Picos AM, Pascu L, Chisnoiu R. Influence of occlusal characteristics on temporomandibular joint disorder development –a cross-sectional study. HVM Bioflux 2015;7(3):197-201.

3. Kawano M, Fujisawa M. Occlusal Factors associated with Temporomandibular Disorder based on a Prospective Cohort Study of Young Adults. Prosthodont Res Pract . 2006 ;5 : 72-79

4. Celic R, Jerolimov V, Knezovic-Zlataric D. The Relationship between Occlusal Interferences and Temporomandibular Disorders. Acta Stomatol Croat. 2003; 37(1):47-50

5. Barbosa GAS, Badaró Filho CR, Fonseca RB, Soares CJ, das Neves FD, Neto AJF.The role of occlusion and occlusal adjustment on temporomandibular dysfunction. Braz J Oral Sci. 2004; 3(11): 589-94.

6. Cordray, F.E. The Relationship between Occlusion and TMD. Open J Stom . 2017: 7, 35-80.

7. Higdon SJ. Occlusion and Temporomandibular Disorders: Is There a Causal Relationship? A Critique of the Existing Scientific Literature. EC Dental Science. 2017;14(6): 274-289.

8. Haralur SB. Digital Evaluation of Functional Occlusion Parameters and their Association with Temperomandibular Disorder. J Clin Diag Res. 2013; 7(8): 1772–1775.

9. Chokalingam S, Sumathi A. Malocclusion and TMJ disease- A review of literature. IOSR J Dent Med Sci. 2014; 13(1):71-73

10. Hagag G, Yoshida K, Miura H. Occlusion, prosthodontic treatment, and temporomandibular disorders: a review. J Med Dent Sci. 2000; Mar: 47(1):61.

11. Solberg WW, Woo MW, Houston JB. Prevalence of mandibular dysfunction in young adults. J Am Dent Asso1979 ; 98: 25-34

12. Gelb H, Bernstein I. Clinical evaluation of temporomandibular disorders. J Prosthet Dent 1983; 49: 234-43

13. Agnė Dzingutė, Gaivilė Pileičikienė, Aušra Baltrušaitytė, and Gediminas Skirbutis . Evaluation of the relationship between the occlusion parameters and symptoms of the temporomandibular joint disorder . Acta Med Litu. 2017; 24(3): 167–175

14. Robert J. A. M. de Kanter, Pasquale G. F. C. M. Battistuzzi, ,Gert-Jan Truin. Temporomandibular Disorders: “Occlusion” Matters!Pain Res Manag. 2018; 8746858.Published online 2018 May 15

15. RacichMJ.Orofacial pain and occlusion : is there a link ? An overview of current concepts and the clinical implications. J Prosthetic Dent 2005;93:189-96.

16. Hansson T, Nilner M. A study of the occurrence of symptoms of disease of the temporomandibularjoint , masticatory

musculature and related structures. J Oral Rehabil 1975 : 2; 313-8

17. Celic R, Jerolimov V, Panduric J .A study of the influence of occlusal factors and parafunctional habits on the prevalence of signs and symptoms of TMD. Int J Prosthodont. 2002 ;15(1):43-8.

18. Belser UC, ,.Hanam AG. The influence of altered working side occlusal guidance on masticatory muscles and related jaw movement. J Prosthet Dent. 1985; 53:406-13.

19. Kawano M, Fujisawa M. Occlusal Factors associated with Temporomandibular Disorderbased on a Prospective Cohort Study of Young Adults.Prosthodont Res Pract2006;5: 72-79.