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Prevalence of temporomandibular disorders in dental students: A survey in Indore city

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Abstract

Temporomandibular disorder (TMD) is a group of conditions producing abnormal, incomplete, or impaired function of the temporomandibular joint. The aim of the study was to evaluate the prevalence of Temporomandibular Disorder (TMD) in dental students. The present survey included a TMD questionnaire and Scale that included a convenience sample of 600 undergraduate and postgraduate dental students of both genders. Descriptive statistical analysis was done. The Experimental sample shows result of 600 students, 112 within the TMD groups and 488 within the control group. Stress showed a highly significant value and was the primary cause for TMD. MDS students were more in stress (63%). The most common sounds found was clicking sounds and affected muscle was lateral pterygoid (27%), showing prevalence in Females. Hence, TMDs are not self-limiting and do not resolve with time. They may increase with time along with increase in stress level.

Keywords: Helkimo index, muscles, temporomandibular disorder, temporomandibular joint

Introduction

Temporomandibular disorder (TMD) is a group of conditions producing abnormal, incomplete, or impaired function of the temporomandibular joint. Temporomandibular disorder (TMD) is a wide ranging term used to describe a number of related disorders, involving the temporomandibular joint (TMJ), masticatory muscles, and occlusion, with common symptoms such as pain, restricted movement, muscle tenderness, and intermittent joint sounds^[1].

TMD consist of clinical signs and symptoms that involve imbalance between structures of the stomatoganthic system involving masticatory muscles, TMJ and associated structures^[2].

The most frequent sign of TMD is sound in TMJ region,^[3] and the most frequent symptoms of TMD include restricted and painful mandibular movement, and pain in TMJ^[4]. (A review of studies of mandibular dysfunction in nonpatients has been published by Helkimo^[5].)

TMD has been postulated to be caused by trauma, bruxism, malocclusion, poor posture, emotion, arthritis, stress etc. Among these factors stress is one of the most prevalent factor and it has been shown to affect the student population as well^[6]. Hence a survey was planned to determine the prevalence of Temporomandibular Disorder in dental students.

The present survey included a TMD questionnaire and scale to check a number of clinical symptoms and severity of pain. The specific target symptoms of TMD were analyzed including pain, pain on palpation, joint dysfunction and limited range of mandibular movements. In addition to the overall symptom severity of the temporomandibular disorder, the prevalence of psychological factors and stress were also surveyed. These parameters were applied and categorized on dental students as per their age, sex and duration of problem. The purpose of this investigation was to establish the prevalence of signs and symptoms of Temporomandibular disorder in a sample population of dental students with use of questionnaires and clinical examinations, and to analyze the data for statistically significant association.

Materials and methods

The study was approved by the Ethics Committee of the College of Dental Science and Hospital, Indore. All students of the institution were permitted to participate in the research.

This was a cross-sectional study that includes undergraduate and postgraduate students of both genders. A sample size estimation total number of 600 students with the age group of 17-28 years were randomly selected. Data were collected from September 2017 to November 2017. The goals and benefits of the study were explained to participants and informed consent was taken. A pre-structured questionnaire was prepared concerning demographic characteristics. Clinical Examination was done using diagnostic instruments which included mouth mirror, william probe, divider, ruler and stethoscope.and a divider and ruler for measuring interincisal distance.

The inclusion criteria were

1. Dental students
2. Absence of pain of dental origin.

The exclusion criteria was

1. Clinically diagnosed TMD with treatment and students with any gross pathology of ear were excluded from the study.

Sample Size Estimation

$$\text{Sample size} = (Z^2 \times [p] \times [1-p]) / C^2$$

Where Z = Z value for the confidence level chosen

p = Percentage having a particular disease / problem etc. and it is expressed as a percentage

C = Confidence interval (CI) expressed, expressed as a decimal.

The minimal sample size for the study was 354 according to the formula. Thus a sample size of 600 were chosen for the present study.

Subjects also were questioned verbally regarding their stress conditions and awareness of sounds in the joints and bruxism. Patterns of mouth opening, sounds on condylar movement, and palpation of muscles and joints were the main features of the functional examination.

Interincisal distance with the mouth wide open and vertical overbite were measured to the nearest millimeter.

A stethoscope was used to confirm and differentiate four types of sounds in temporomandibular joint and occlusal sounds.

Tenderness in muscles and joints was verified by bimanual palpation.

The participant was required to differentiate between discomfort and pain. Only pain was recorded as tenderness.

Questionnaire

The Helkimo Index required a questionnaire - based survey for registration of subjective symptoms and signs. Includes

answers to question in "Yes" or "No" and severity of pain measuring in scale. [Table- A]

Data Collection and Analysis

Questionnaire was received and analyzed using Helkimo Index (1979) Table A:

Clinical dysfunction index Di according to code

Code: 0 points = dysfunction group 0 = absence of clinical symptoms = Di 0

1 – 4 points = dysfunction group 1 = minor dysfunction = Di I

5 – 9 points = dysfunction group 2 = moderate dysfunction = Di II

10 – 13 points = dysfunction group 3 = severe dysfunction = Di III

15 – 17 points = dysfunction group 4 = severe dysfunction = Di III

20 – 25 points = dysfunction group 5 = severe dysfunction = Di III

Symptoms of temporomandibular joint (TMJ) dysfunction

1. Impaired mobility
2. Altered function
3. Painful function
4. Muscle pain
5. TMJ pain

Impaired mobility

Vertically Horizontally

IED: 30 – 39 mm slightly impaired movement 4 – 6 mm slightly impaired movement

IED: ≤ 29 mm severely impaired movement ≤ 3 mm severely impaired movement

IED: ≥ 40 mm normal range of movement ≥ 7 mm normal range of movement

Statistical Analysis

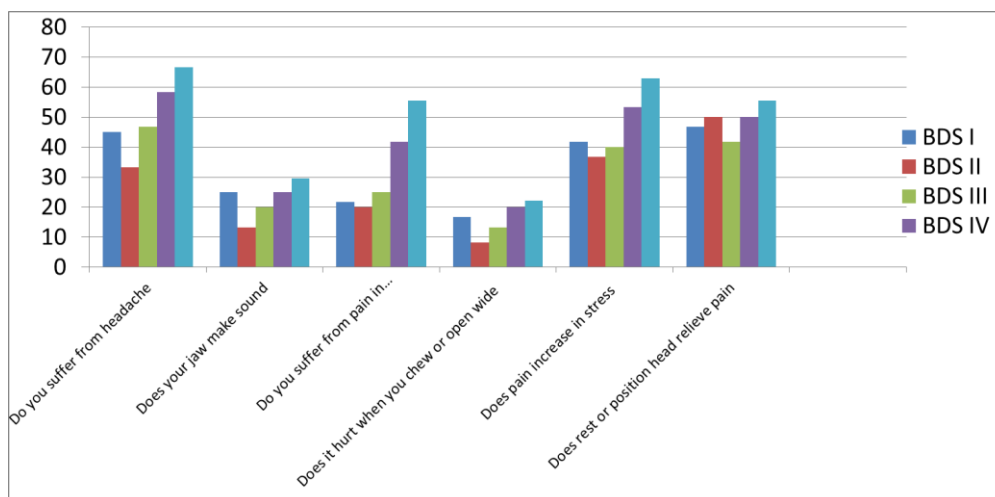
To determine whether there was a correlation between the incidence of symptoms and signs of TMJ dysfunction, stress factors with TMD, a chi-square test using SPSS Software was used.

Frequency counts were made on the collected data. Chi-square tests, and correlation coefficients were used to determine significant associations between variables.

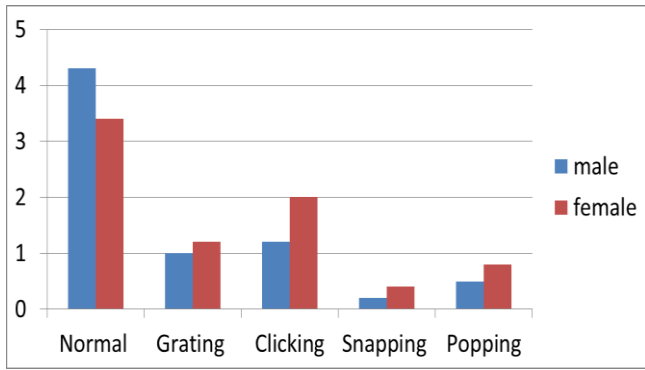
The null hypothesis was that the stress does not cause the temporomandibular disorder problem in Dental students.

Results & Discussion

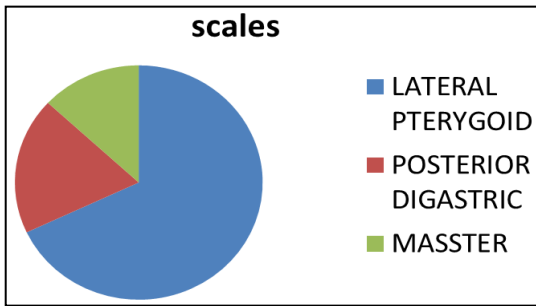
Tables and Figures



Graph 1: Distribution of Signs and symptoms of TMD in dental students.



Graph 2: Types of sound in TMD in men and women. Chi-square test values showed difference in men and women ($p < 0.01$)



Graph 3: Shows the muscles that more frequently reported to Tenderness.

Results

The frequency of symptoms derived from questionnaire shows that the 600 subjects (dental students) were aware of the symptoms.

Among the study group, 112 students (18.6%) were found to have signs and symptoms, i.e. headache, jaw sound, pain in neck, forehead, shoulder, face, eyes, ear, limited mouth opening, pain in stress. 488 students (81.3%) were signs and symptoms free. [Table -1]

76 females were affected among symptomatic patient who account for 19% of the females population whereas only 36 (17%) males were having symptoms. [Table-1]

Table 1: Sample Characteristic, Number and sex distribution

	Males	Percentage	Females	Percentage
With signs and symptoms	36	17%	76	19%
Without signs and symptoms	173	83%	315	81%
Total	209		391	

Stress showed a highly significant value and was the primary cause for TMD as the students pursued higher studies. The clinical symptoms like pain in Temporomandibular Joint increases when students were in stress.

MDS students were more in stress having TMD (63%), followed by the BDS Final year students (53%), then the first year students (41%), then the third year (40%), and the least stress in second year students (36%). [Table -2]

Table 2: Does pain increase in stress

Classes	Yes	No	Chi square value
MDS	76 (63.3)	44 (36.7)	23.66 P = <0.001 HS
BDS IV	64 (53.3)	56 (46.7)	
BDS III	48 (40.0)	72 (60.0)	
BDS II	44 (36.7)	76 (63.3)	
BDS I	50 (41.7)	70 (58.3)	

*values in parenthesis are percentages

On clinical examination, the most common sounds found in TMD was clicking sounds which is 2.67% in males and 6.67% in females, followed by grating then popping and snapping sounds. The clinical sign i.e. sound is not significant value ($p = 0.86$) while comparing the gender of the students. [Table -3]

Table 3: Symptoms in male and female.

Classes	Male	Female	Chi square value
Grating	10 (1.67)	20 (3.33)	1.25 P = 0.869 NS
Clicking	16 (2.67)	40 (6.67)	
Snapping	4 (0.67)	6 (1.00)	
Popping	6 (1.00)	10 (1.67)	
Without symptoms	173 (28.83)	315 (52.50)	

*values in parenthesis are percentages

The most common symptoms among these was headache which is highly significant ($p < 0.001$ HS) means that TMD was commonly associated with headache, which account for 66.7% in MDS students and least in BDS second year i.e. 33.3%. [Table -4]

Table 4: Do you suffer from headache.

Classes	Yes	No	Chi square value
MDS	80 (66.7)	40 (33.3)	31.73 P = <0.001 HS
BDS IV	70 (58.3)	50 (41.7)	
BDS III	56 (46.7)	64 (53.3)	
BDS II	40 (33.3)	80 (66.7)	
BDS I	54 (45.0)	66 (55.0)	

*values in parenthesis are percentages

During the study many students were aware of the sound produced by the TMJ. It is a significant value $p < 0.005$ indicating that TMD was associated with abnormal jaw sound among the symptomatic students. [Table-5]

Table 5: Does your jaw make sound.

Classes	Yes	No	Chi square value
MDS	36 (30.0)	84 (70.0)	10.88 P = <0.005 Significant
BDS IV	30 (25.0)	90 (75.0)	
BDS III	24 (20.0)	96 (80.0)	
BDS II	16 (13.3)	104 (86.7)	
BDS I	30 (25.0)	90 (75.0)	

*values in parenthesis are percentages

Students were having the history of pain in joint, ears, upper teeth, lower teeth, eyes, face, shoulder, forehead, neck, which is of radiating, Sharp or dull, constant or intermittent, sudden or gradual had recorded. 55.8% in MDS Student and least 20% in BDS I year student. It is Highly significant value $p < 0.001$ showing TMD in students. [Table-6]

Table 6: Do you suffer from pain in neck, forehead, shoulder, face, eyes, and ear.

Classes	Yes	No	Chi square value
MDS	67 (55.8)	53 (44.2)	52.12 P = <0.001 HS
BDS IV	50 (41.7)	70 (58.3)	
BDS III	30 (25.0)	90 (75.0)	
BDS II	26 (21.7)	94 (78.3)	
BDS I	24 (20.0)	96 (80.0)	

*values in parenthesis are percentages

Among the study group, the students get experience pain on wide mouth opening and also on chewing hard food. 22.5% reduced mouth opening and dysfunction is found in MDS students and least 10% in BDS II year students Mouth opening was significant value in TMD $p < 0.005$. [Table -7]

Table 7: Does it hurt when you chew or open wide.

Classes	Yes	No	Chi square value
MDS	27 (22.5)	93 (77.5)	11.02 P = <0.005 Significant
BDS IV	24 (20.0)	96 (80.0)	
BDS III	16 (13.3)	104 (86.7)	
BDS II	10 (8.3)	110 (91.7)	
BDS I	20 (16.7)	100 (83.3)	

*values in parenthesis are percentages

On evaluation it was found that rest or postural changes does not relieve the much pain. It was not significant with TMD $p = 0.269$. [Table -8]

Table 8: Does rest or position head relieve pain.

Classes	Yes	No	Chi square value
MDS	67 (55.8)	53 (44.2)	5.18 P = 0.269 NS
BDS IV	60 (50.0)	60 (50.0)	
BDS III	50 (41.7)	70 (58.3)	
BDS II	60 (50.0)	60 (50.0)	
BDS I	56 (46.7)	64 (53.3)	

*values in parenthesis are percentages

Females were commonly affected more than males because of estrogen levels and being more prone to stress.

The muscles that more frequently reported tenderness were the lateral pterygoid (27%), posterior digastric (7.5) %, and superficial portion of the masster (5.2%).

Persons who reported an awareness of bruxism more frequently had tenderness in the superficial masseter muscles (8.7% vs 1.9%, $P < .05$) and limited opening (8.7% vs 2.2%, $P < .05$).

Study of the frequency data for men and women disclosed many significant differences. The most frequently observed stress and headache, was reported more commonly by women (15.4% vs 9.5%, $P < .05$). Although the responses to the questionnaire did not disclose a significant difference between men and women in subjective awareness of sounds.

Clinical examination showed that women had smaller mouth openings than men ($P < .01$) and a higher incidence of sounds in the TMJ ($P < .001$). Women showed a generally higher frequency of tenderness in muscles, especially in the lateral pterygoid muscles.

Discussion

This study determined the prevalence of temporomandibular disorder in dental students by use of a self-reported questionnaire based survey. A broad spectrum of clinical criteria for the TMJ disorder was considered but stress was found to be the most prevalent factor.

Among the study group, 112 students (18.6%) were found to have signs and symptoms, i.e headache, jaw sound, pain in neck, forehead, shoulder, face, eyes, ear, limited mouth opening, pain in stress. 488 students (81.3%) were signs and symptoms free which was in accordance with the study done by Mutlu *et al* in 2002^[15] and Rani *et al* in 2017^[21] but less than the prevalence found by Modi *et al.* in 2012^[17].

Females were preceded in the prevalence of Temporomandibular disorder (19%) than in males (17%) which were in accordance with the study conducted by Johansson *et al* in 2003^[16] found that prevalence of TMD and its signs and symptoms in two countries in Sweden, and measures the pain, joint sound jaw opening, bruxism among the males and females and done cross-sectional study with questionnaire and found more prevalence in females.

McFarlane TV *et al* in 2002^[14] done study in general medical

practice patients in England found that prevalence of orofacial pain was more in females (30%) than in men (21%).

Goulet *et al* in 1995^[13] done retrospective study in France and found the pain in jaw and concluded that females showed prevalence of disorder in all age groups.

In the present study 63.3% post graduate students surveyed reported to be in stress and reported signs and symptoms of temporomandibular disorder.

As the workloads increase and postural irregularities during working on patients may induce the temporomandibular disorder in students. The results of the present study were in accordance with several previous studies done. Increased stress levels are believed to result in poor habits including bruxism, clenching, and even excessive gum chewing. These lead to muscular overuse, fatigue and spasm and subsequent pain.^[3]

The majority of symptomatic individuals was aware of only one symptom. Clicking sounds which was 2.67% in males and 6.67% in females, followed by grating then popping and snapping sounds, which was in accordance with the study done by Gopal *et al.*^[19]

Headache which was highly significant ($p < 0.001$ HS) means that TMD was commonly associated with headache, which account for 66.7% in MDS students and least in BDS second year i.e. 33.3%. were most likely to be isolated symptom, and pain on chewing and pain on maximum opening were most often accompanied by other symptoms. These findings support the results of Christensen^[7] in which pains developed in subjects with experimental bruxism similar to those reported by patients with functional disorders.

The present study has determined the prevalence of Temporomandibular Disorders in Dental students - A Survey in Indore city by the questionnaire. Future studies are necessary to identify those symptoms that pose the greatest threat to the dental student's population so as to limit the chances of spontaneous recovery.

Conclusions

The study concluded that the incidence of temporomandibular disorder in a population of 600 dental students is 18.6 %.

Stress was the highly significant value which can cause the temporomandibular disorder. TMJ sound were significantly related to symptoms of TMJ dysfunction. Women showed a higher prevalence. Subjects who had bruxism were more likely to have tenderness in masseter muscles and limited opening.

TMDs are not self-limiting and they do not resolve with time. They may increase with time along with increase in stress level.

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