Original Article

Assessing Prevalence of Temporomandibular Disorders among University Students: A Questionnaire Study

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Aim: The aim of this study is to assess the prevalence of temporomandibular disorders (TMDs) among university students.

Objectives: The etiology of TMD is of multifactorial, and our study is designed to assess the prevalence of TMD in an institution within a university. Various parameters including trauma, malocclusion, stress assessment - its correlation with the timing, the duration of TMD in meeting the deadlines, and examinations have been assessed.

Materials and Methods: A standard questionnaire-based study with modified Fonseca anamnestic index is used. The questionnaire study was conducted with a statistically calculated sample size of 402 students within a university. The data were analyzed statistically for significance and correlations. Statistical analysis was performed using SPSS for Windows release 14.0 (SPSS Inc., Chicago, IL, USA). Differences at the 5% level were accepted as being statistically significant.

Results: TMD and its associated symptoms are frequent among students of health and science studies. Female predominance is seen. There was also an increased prevalence of symptoms in people who described themselves as being tense. The relationship between orthodontic therapy and TMDs were also evaluated, and the duration of therapy is found to be significant. There was a significant association between history of trauma and presence of TMDs.

Conclusions: TMD and its associated symptoms are frequent among students of health and science studies. A simple anamnestic index is of use in identifying and classifying temporomandibular joint disorder in patients according to the severity of the disorder. Females showed a greater prevalence of signs and symptoms of TMD than males. Longitudinal studies are recommended to identify and follow-up the prevalence and health-care needs of patients with TMDs.

Keywords: Prevalence of temporomandibular disorder, temporomandibular disorders, temporomandibular joint Disorder

INTRODUCTION

Temporomandibular disorders (TMDs) represent a generic designation for a subgroup of orofacial pain disorders. This group comprises issues in the temporomandibular joint (TMJ) region, muscle fatigue, especially of the masticatory muscles, impaired jaw movement, and articular sounds.[1] The etiology of temporomandibular disorders is multifactorial. The most commonly cited factors are emotional tension, occlusal interferences, teeth loss, postural deviation, masticatory muscular dysfunction, internal and external changes in TMJ structure, either alone or in combination.[2-3]

The combination of psychological, structural, and postural factors leads to the derangement the functional balance between the three elements of the stomatognathic...
system, namely, dental occlusion, masticatory muscles, and TMJ.\textsuperscript{[4]} The association of pain as an important symptom has led to an increase in the investigations of epidemiology, etiopathogenesis of TMDs.

The importance of the epidemiology of TMDs is due to its complex etiology, wide age range of manifestations, and the knowledge that its treatment requires multiple diagnostic methods and therapeutic approaches to completely alleviate its signs and symptoms.\textsuperscript{[6]} The prevalence of symptoms is variable, and almost always TMD is diagnosed by associating signs and symptoms. A large number of epidemiological studies have been conducted on the epidemiology of TMDs on patient and nonpatient populations. Studies have revealed that around 60\%--75\% of the subjects will manifest one TMD sign and 35\% TMD symptom, and TMD signs are present in 50\%--75\% of the population at some moment in life, whereas an estimated 35\% exhibit mild symptoms.\textsuperscript{[7-9]} Graue \textit{et al.}\textsuperscript{[10]} stated that girls were more prone for developing TMDs usually peaking at 16 years age.

One inherent difficulty faced by investigators of TMDs was the identification of etiological factors which hindered sample standardization. To obtain and compare results from different clinical studies for the severity of TMD, there was a need for a reliable and simple questionnaire. The anamnestic and clinical indices proposed by Helkimo\textsuperscript{[11]} in 1974 which were obtained from clinical observations were widely used. Fonseca\textsuperscript{[12]} in 1992 modified Helkimo’s indices and developed his anamnestic questionnaire, classifying TMD as light, moderate, or severe, or non-TMD. The advantages of Fonseca’s questionnaire includes self-administration, short time of application, low cost, and less influence from the examiner and less variability in the measures.\textsuperscript{[13]}

This study evaluated the prevalence and severity of TMDs in undiagnosed undergraduate students in Tamil Nadu with the help of Fonseca’s questionnaire. Five questions which addressed the previous history of TMJ issues and orthodontic therapy were added.

**Materials and Methods**

**Subject Selection**

This study was carried out between December 2016 and February 2017. The study sample consisted of 402 students (135 males, 267 females, age range 18–25) of SRM University, Kaatankulathur. Ethical approval was obtained from the Institutional Ethics Committee, SRM Kaatankulathur Dental College, and the subjects were required to sign an informed consent before their participation in the study. Information about TMDs was given to all the participating subjects.

**Questionnaire**

The questionnaire developed by Fonseca\textsuperscript{[12]} was used to evaluate the degree of TMD in the participants. The questionnaire is framed of ten questions, evaluating for the presence of pain in TMJ, head, and while chewing, parafunctional habits, limitation of movements, joint clicking, perception of malocclusion, and emotional stress. Along with the ten questions in the original questionnaire, five additional questions were incorporated and administered to the participants [Figure 1]. The additional questions focused on history of orthodontic therapy, trauma, or any treatment done for TMDs. The volunteers answered with “yes,” “no,” and “sometimes” and only one answer to be marked for each question as instructed.

**Data Analysis**

The results were analyzed using the frequency distribution of the data obtained. The Fonseca’s questionnaire is an anamnestic index, which classified participants into mild TMD, moderate TMD, severe TMD, or normal. Statistical analysis was performed using SPSS for Windows release 14.0 (SPSS Inc., Chicago, IL, USA). Differences at the 5\% level were accepted as being statistically significant.

**Results**

A total of 402 students participated in this study. Sex predilection with TMJ disorder is analyzed shown in Table 1. Seventy-seven percent of the study population (65\% of female participants [202] and 35\% of male participants [109]) did not have any TMJ symptoms. Regarding the presence of TMDs, 85\% of the participants were scored to have mild TMD, 12\% were scored to have moderate TMDs. However, there was no statistical significance elicited ($P = 0.431$) from the sex-wise statistical analysis.

The age-wise prevalence distribution is shown in Table 2. Similar to sex-wise distribution, there was no significant association between age and TMDs ($P = 0.316$). Pearson’s correlation with TMJ disorder prevalence and
age was done. Correlation of ($r=0.090$) with significance ($P=0.070$) is obtained. This showed that age as a factor was not significant in the prevalence of TMJ disorder.

The prevalence of TMJ Disorder symptoms is elaborated in Table 3. The most common symptom presented in the study population was difficulty in opening mouth, pain while chewing, ear aches/TMJ pain, and TMJ clicking while chewing or opening the mouth. Difficulty in opening the mouth is seen in about 83 students (21.2%) of which the TMJ score varied, mild score seen in 75 students (18.7%), moderate in eight students (2%), and severe in two students (0.5%). Pain while chewing seen

### Table 1: Sex-wise prevalence of temporomandibular joint disorder

|         | Normal, n (%) | Mild, n (%) | Moderate, n (%) | Severe, n (%) | Total, n (%) | Chi-square test | P       |
|---------|---------------|-------------|-----------------|--------------|--------------|----------------|---------|
| Male    | 109 (35.0)    | 24 (30.8)   | 2 (18.2)        | 0            | 135 (33.6)   | 2.757          | 0.431 (NS) |
| Female  | 202 (65.0)    | 54 (69.2)   | 9 (18.8)        | 2 (100)      | 267 (66.4)   |                |         |

NS=Not statistical significance association between age and sex with score levels at 95% ($P>0.05$)

### Table 2: Age-wise prevalence of temporomandibular joint disorder

| Age (years) | Score level | Chi-square test | P       |
|-------------|-------------|-----------------|---------|
| <18         | Normal       | 6 (1.9)         | 0       |
|             | Mild         | 0               |         |
|             | Moderate     | 0               |         |
|             | Severe       | 0               |         |
|             | Total        | 6 (1.5)         | 17.043  | 0.316 (NS) |
| 18-19       | Normal       | 92 (29.6)       | 0       |
|             | Mild         | 21 (26.9)       |         |
|             | Moderate     | 6 (54.5)        | 0       |
|             | Severe       | 1 (50)          |         |
|             | Total        | 113 (28.1)      |         |
| 20-21       | Normal       | 69 (22.2)       | 0       |
|             | Mild         | 18 (23.1)       |         |
|             | Moderate     | 6 (54.5)        | 0       |
|             | Severe       | 0               |         |
|             | Total        | 93 (23.1)       |         |
| 22-23       | Normal       | 107 (34.4)      | 3 (27.3) |
|             | Mild         | 27 (34.6)       | 1 (50)   |
|             | Moderate     | 3 (27.3)        | 0       |
|             | Severe       | 138 (34.3)      |         |
| 24-25       | Normal       | 22 (7.1)        | 1 (9.1)  |
|             | Mild         | 8 (10.3)        | 0       |
|             | Moderate     | 0               |         |
|             | Severe       | 32 (8.8)        |         |
| >25         | Normal       | 15 (4.8)        | 1 (9.1)  |
|             | Mild         | 4 (5.1)         | 0       |
|             | Moderate     | 0               |         |
|             | Severe       | 20 (5.0)        |         |

NS=Not statistical significance association between age and sex with score levels at 95% ($P>0.05$)

### Table 3: Factors significantly elicited in various levels of temporomandibular joint disorder

| Question number | Questions                  | Score level | Chi-square test | P       |
|-----------------|----------------------------|-------------|-----------------|---------|
| Q1              | Difficulty in mouth opening| Absent      | 271 (67.4)      | 61.489  | 0.0001*** |
|                 |                            | Sometimes   | 38 (9.5)        | df=6    |
|                 |                            | Present     | 2 (0.6)         |         |
| Q3              | Pain while chewing         | Absent      | 251 (80.7)      | 118.906 | 0.0001*** |
|                 |                            | Sometimes   | 58 (18.6)       | df=6    |
|                 |                            | Present     | 2 (0.6)         |         |
| Q6              | Ear ache/TMJ pain          | Absent      | 270 (86.8)      | 119.218 | 0.0001*** |
|                 |                            | Sometimes   | 40 (12.9)       | df=6    |
|                 |                            | Present     | 1 (0.3)         |         |
| Q7              | TMJ clicking               | Absent      | 222 (71.4)      | 96.225  | 0.0001*** |
|                 |                            | Sometimes   | 78 (25.1)       | df=6    |
|                 |                            | Present     | 11 (3.5)        |         |
| Q10             | Tense person               | No          | 197 (63.3)      | 102.920 | 0.0001*** |
|                 |                            | Sometimes   | 92 (29.6)       | df=6    |
| Q11             | Meeting deadlines          | Did not influence | 272 (87.5) | 124.462 | 0.0001*** |
|                 |                            | Sometimes influenced | 32 (10.3) | df=6    |

$n=$Is the number of students, $\%=$Is the percentage to the study population. Score levels of TMD-mild, moderate and severe TMD (based on is the total score of the first 11 questions in the questionnaire). ***There is a statistical significance association between Question 1, Question 3, Question 6, Question 7, Question 10, and Question 11 with score levels at 95% ($P<0.05$). TMJ=Temporomandibular joint, TMD=Temporomandibular disorders
in 49 students (53.84%), ear aches/TMJ pain seen in 34 students (37.3%), and TMJ clicking seen in 63 students (69.2%). There is a statistical significant association ($P = 0.0001$) for all the above-mentioned symptoms in the study population.

The result analysis of the questions that were added to the original questionnaire is shown in Table 4. Ninety-two (22.8%) students of 402 (77.2%) have undergone/undergoing orthodontic therapy, of which 24 students had TMJ disorder (26%). There is no statistical significance elicited ($P = 0.270$). However, the duration of orthodontic therapy does have a statistical significance ($P = 0.0001$) with TMJ disorder.

**DISCUSSION**

This study aimed to evaluate the prevalence of signs and symptoms of TMD in university students through frequency distribution of data obtained using a questionnaire. The Fonseca’s questionnaire was utilized in this study because it ensures collection of a large quantity of information in a relatively short period. It is also easy to understand and has almost no influence on the investigator data analyzer.

The results of this study revealed the presence of at least mild TMD in the subjects who reported any TMJ disturbance. Common symptoms reported were difficulty in mouth opening and pain/discomfort. In addition, the duration of orthodontic therapy had a significant impact on the presence of TMDs.

In our study, the prevalence of TMD in females was almost twice as that of males. This is similar to the results done in the previous studies by Graue et al.,[10] Solberg et al.,[14] Klineberg et al.,[15] Shiau and Chang.[16] This high prevalence among females could be due to the physiologic uniqueness such as regular hormonal variations, different characteristics of the connective tissue, and muscular structure.[17-19]

The mild TMD symptoms were the most prevalent category reported by the participants in this study. This was similar to the studies performed by Dekon et al.[20] and Pedroni et al.[17] using the Fonseca questionnaire in a sample of Brazilian college students.

The most common symptoms elicited by the participants in this study included difficulty in mouth opening, masticatory pain, pain in the auricular region, clicking in the TMJ during chewing, or mouth opening. There was also increased the prevalence of symptoms in people who described themselves as being tense. This is of clinical significance as emotional stress is considered to be important characteristic of TMD. This finding is in accordance with the previous investigations as emotional stress influencing changes of the muscular activity and occlusion.[21,22] This data corroborating the relationship between emotional stress and development of TMDs could of great importance in early diagnosis and management of these disorders. Students in the health and science colleges are more probable candidates for developing TMDs.[23] A possible explanation is that the curriculum

| Question number | Questions | Score level | Chi-square test | $P$ |
|-----------------|-----------|-------------|----------------|-----|
| Q12A Orthodontic treatment | No | Normal, $n$ (%) | Mild, $n$ (%) | Moderate, $n$ (%) | Severe, $n$ (%) | Total, $n$ (%) |
| | Yes | 243 (78.2) | 59 (75.6) | 8 (72.7) | 0 | 310 (77.2) |
| | | 68 (21.8) | 19 (24.4) | 3 (27.3) | 2 (100) | 92 (22.8) |
| Q12B Duration of orthodontic treatment | No <6 months | 249 (80.1) | 58 (74.4) | 8 (72.7) | 0 | 315 (78.4) |
| | Yes 1-2 years | 9 (2.9) | 3 (3.8) | 2 (18.2) | 2 (100) | 16 (40) |
| | | 9 (2.9) | 1 (1.3) | 0 | 0 | 10 (2.5) |
| | Yes 2-3 years | 27 (8.7) | 7 (9.0) | 0 | 0 | 34 (8.5) |
| | More than 3 years | 1 (0.3) | 1 (1.3) | 1 (9.1) | 0 | 27 (6.6) |
| Q13 Injury to the chin | No | 297 (95.5) | 69 (88.5) | 9 (81.8) | 0 | 375 (93.3) |
| | Yes | 14 (4.5) | 9 (11.5) | 2 (18.2) | 2 (100) | 27 (6.7) |
| Q14B Treatment for TMD | No | 293 (94.2) | 69 (88.5) | 10 (90.9) | 0 | 372 (92.5) |
| | Yes | 18 (5.8) | 9 (11.5) | 1 (9.1) | 2 (100) | 30 (7.5) |

***There is a statistical significance association between Question 12a, Question 12b, Question 14a, and Question 14b with score levels at 95% ($P<0.05$). NS=Not statistical significance association between age and sex with score levels at 95% ($P>0.05$). TMD=Temporomandibular disorders
of these institutions possesses a greater study load which could directly lead to greater levels of anxiety and stress.

The emotional influence of stress on the muscles of mastication has been studied. When the individual is submitted to an emotional overload, clenching of teeth may be initiated which in turn produces circulatory changes in the muscles of mastication or compression on the pain receptors as a consequence of fluid increase in the muscle compartment. Some authors have reported that the parafunctional habits are one of the most important factors in the etiology of TMDs.

The relationship between orthodontic therapy and TMDs were also evaluated using the additional questions in the questionnaire. This was an extra component incorporated into the study to evaluate the presence of and extent of involvement of orthodontic therapy on the TMJ. Twenty-six percent of the students reported the presence of different symptoms of TMDs. A study by Biligiç and Gelgörgü revealed that in children aged between 7 and 12 years many subjects with TMD had malocclusions. TMDs were associated most commonly with posterior crossbite, anterior open bite, Angle Class II and III malocclusions, and maxillary overjet. Although this was not statistically significant, further investigations can divulge conclusive information on the presence or absence of a relationship between TMDs and orthodontic therapy. The other factors that were added into the questionnaire included trauma to chin or jaw and previous history of treatment for TMDs. There was a significant association between history of trauma and the presence of TMDs, (40% of students with history of trauma reported TMD symptoms), and this result is similar to the previous findings which linked head and neck trauma with TMJ symptoms such as joint pain, restricted mouth opening, and tenderness of the masticatory muscles.

One meta-analysis performed to evaluate the prevalence of in revealed that one in six children and/or adolescents possess at least one clinical signs of TMDs.

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**CONFLICTS OF INTEREST**
There are no conflicts of interest.

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