

Use of Fonseca's Questionnaire to assess the prevalence and severity of Temporomandibular disorders among university students - a cross sectional study.

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Abstract

Aim: Temporomandibular disorders (TMD) are one of the main causes of non-dental orofacial pain. It has been reported that TMD occurred more frequently among individuals in stressful situations and that university students are more likely to have a high risk of anxiety related disorders. This study aims to assess the prevalence and severity of TMD in undiagnosed population consisting of students of different faculties in a university campus in Bengaluru using the Fonseca's questionnaire.

Material and Methods: Descriptive cross-sectional study conducted at a University Campus, Bengaluru. Completed forms of Fonseca's questionnaire were collected from the sample consisted of 300 students. The questionnaire had two main parts. First part collected demographic information and past relevant histories. Second part had Fonseca's 10 questions. The TMD severity was categorized as no TMD (0-15), mild TMD (20-40), moderate TMD (45-65) and severe TMD (70-100).

Results: 33.3% on the sample showed varying signs of TMD. There was no statistically significant differences found between the TMD and non TMD groups with respect to age and sex. But when comparing varying grades of TMD there was a statistically highly significant difference seen in relation to age of the subjects.

Conclusions:

A high prevalence of TMD was found in the university students with majority of the cases having milder signs of TMD.

Keywords: temporomandibular joint dysfunction; fonseca's questionnaire; stress.

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Introduction

Temporomandibular disorders (TMD) are one of the main causes of non-dental orofacial pain. The pain is generally located on the masticatory muscles, in the pre-auricular area and the temporomandibular joint (TMJs).[1] The term temporomandibular disorders is a collective term which includes all the problems involving painful orofacial disorders, complaints of pain in TMJ region and fatigue of

the craniocervicofacial muscles, especially masticatory muscles, limitation of mandible movement, and presence of articular clicking.[2] Many factors such as oral habits, fatigued masticatory muscles and premature loss of natural teeth have been linked to the disorder.[3] Other important aetiological factors include emotional stress and high anxiety levels.[4]

Previous studies of various populations have reported a high

prevalence of TMD.[5] The presence of TMD signs has been reported in more than 50% of non-patients, with the presence of at least one symptom being reported among more than 30% of subjects.[6] The variability in prevalence may be attributed to differences in the race of the population, in the sampling design and criteria, and in the methods used for collecting information.[7]

Due to the high prevalence and variability of the complaints, TMD

is diagnosed by associating signs and symptoms, as some characteristics may be frequent even in a non-patient population.[8]

It has been reported that TMD occurred more frequently among individuals in stressful situations.[9] It has been reported that university students are more likely to have a high risk of anxiety- and depression-related clinical disorders.[10] In a study on an Indian population, among all the participants examined sixty participants had no TMD (30%), 110 participants had mild TMD (55%); 28 patients had moderate TMD (14%) and two participants had severe TMD (1%).[11] In another study among adolescents in Haryana the prevalence of TMD signs and symptoms was 51%. Females had higher prevalence (57.1%) of TMD symptoms when compared to males (43.2%). TMD signs has shown a statistical significant relationship with overbite ($p = 0.007$) and bruxism ($p < 0.0001$) only.[12] The prevalence of TMD has been studied in a Brazilian university population, a Saudi Arabian university, etc.[13],[5] Since the factors associated with TMD are of a diverse nature, there are expected to be variations between different populations and across different demographics. Currently,

there are no published articles related to prevalence of TMD in students of different faculties in a given university in Bengaluru.

Several instruments for TMD diagnosis have been proposed, but there is no single appropriate diagnostic criterion. To address this issue, Schiffman and colleagues in 2014 proposed a new comprehensive tool known as the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD).[14] This diagnostic instrument is validated and considered a good method for diagnosing TMD in clinical studies. Despite the advantages, the DC/TMD is quite a cumbersome assessment tools in that it requires the individual to be present in order to render a TMD diagnosis, and it is difficult to use on large samples. Due to the need of simpler assessment procedures that can be widely applicable and to standardize research samples involving TMD patients, questionnaires have been created to address the main clinical TMD findings and assign clinical indexes for patient classification in terms of severity levels.[15] According to Oliveira, a simple self-administered questionnaire would offer the advantage of faster application and, thus, low cost.[16] An additional advantage is that a self-applied questionnaire

would provide a severity index with less influence from the examiner and less variability in the measures. The anamnestic index (AI) presented by Campos JA, et al. is one of the available instruments in Portuguese language for characterization of TMD symptoms, and it was developed to classify patients according to severity of those symptoms.[17] Anamnesis questionnaires have the limitation of providing data only on TMD symptoms and it cannot provide TMD diagnosis.

In 1992 Fonseca developed his anamnestic questionnaire based on many earlier indices. The Fonseca's anamnestic index (FAI) is a self-administered questionnaire that has been proposed as a low-cost, easily applied alternative TMD assessment tool for the non-patient population.[18]

Hence in this study we have evaluated, using the Fonseca's questionnaire (table 1), the prevalence and severity of TMD in undiagnosed Indian population consisting of students of different faculties in a university campus. The assessment of volunteers with undiagnosed TMD would help understanding its prevalence in the Indian university population. The aim of this study was to assess the prevalence and the severity of

TMDs in the students of different faculties in a university in Bengaluru using Fonseca's questionnaire.

Material and Methods

This was a descriptive cross-sectional study. The study was carried out between September 2019 and February 2020. The study subjects were students from various disciplines of professional and degree courses which included medical, dental, business management, commerce & finance and allied sciences.

Initially 340 undergraduate students from the university campus were randomly selected and were requested to answer the Fonseca's questionnaire. Prior to that, the volunteers received proper instructions about the goals of the research and experiment procedure, risk and benefits and signed an informed consent form. Questionnaires and a cover letter stating the instructions, rationale, and purpose of the survey were distributed to a conveniently selected sample of university students from the university campus. Subjects who were willing to participate in the study filled the questionnaire by hand and returned it in person. Participants were not given a time limit for completing the questionnaire. Informed consent was signed and collected from the sample. Since it was questionnaire-based study and no intervention was done, the

clearance was given after assessment of the study protocol and the study was approved by the university's ethical committee (Ramaiah University of Applied Sciences, Bengaluru). The research project protocol number was EC-2020/UG/076.

Participants having a history of TMJ trauma, receiving orthodontic treatment or treatment for TMD, and/or suffering from any immunocompromised disease were excluded from the study. The sample size estimated at 300 based on previous studies.[13],[19],[18] Sample size was calculated based on the previous studies using G* Power 3.1.2 software.[13] The minimum sample size was calculated, following these input conditions: power of 95% , alpha error of 0.05 and the effect size was 0.35. Initially the questionnaire was given to 340 students and based on the exclusion criteria and after removing incompletely filled questionnaires, we reached the sample size of 300.

The study tool used was the Fonseca's questionnaire (table 1) because it ensures collection of large quantity of information in a relatively short period of time. It evaluates the degree of TMD in the participant. It does not diagnose the presence of TMD. The questionnaire is framed in such a way that it assesses for the presence of pain in TMJ and head while chewing, parafunctional habits, limitations of movement, joint clicking, perception of

malocclusion and emotional stress. The Fonseca questionnaire is an already validated and standardized questionnaire for the evaluation of TMD in relation to various orofacial movements and exercises, with each question having a scale of calibration to answer ranging from yes, no and sometimes in order to assess the degree of severity. The questionnaire comprised two main parts. The first part collected demographic information and past medical, dental, TMJ, and facial trauma histories. The second part asked Fonseca's 10 questions. Participants were requested to select one answer: yes, no, or sometimes. Each "yes" answer was assigned a value of 10, each "sometimes" answer a value of 5, and each "no" answer a value of 0. The sum of the values for all 10 answers was used to classify each subject according to the criteria shown in Table 1.

Hence, the collective score of each questionnaire ranged from 0 to 100. Incomplete and partially completed questionnaires were excluded. A clinical index was described on the basis of collective score of key questions (Table 1). TMD severity was categorized as no TMD (0-15), mild TMD (20-40), moderate TMD (45-65) and severe TMD (70-100). The frequency and severity of TMD were compared in terms of students' gender, age and college. After collecting the data all the subjects who were diagnosed as having any stomatognathic system impairment either

TMD or orofacial pain were subjected to appropriate treatment.

Table 1 - Fonseca's questionnaire - Key questions in Fonseca's questionnaire and classification of TMD

Sl. no	Fonseca's key question	Yes	Sometimes	No
1.	Do you feel that it is difficult to open your mouth?			
2.	Do you feel that right and left movement of your jaw is difficult?			
3.	Do you feel muscular pain and feel tired while chewing?			
4.	Do you have headaches frequently?			
5.	Do you feel stiffness in your neck?			
6.	Do you feel pain in your ears or TMJ?			

7.	Do you hear any sounds of the TMJ clicking while chewing or opening your mouth?			
8.	Do you grind or clench your teeth?			
9.	Do you feel that your teeth do not articulate properly?			
10.	Do you feel that you are a tense or nervous person?			
Classification of TMD severity based on the key questions in Fonseca's questionnaire				
Score		Category		
Total between 0 and 15 points		No TMD		
Total between 20 and 40 points		Mild TMD		
Total between 45 and 65 points		Moderate TMD		
Total between 70 and 100 points		Severe TMD		

The data was collected and saved in excel format and then subjected to statistical analysis. Descriptive statistics and frequency analyses of the collected data were performed in the Statistical Package for Social Sciences (SPSS) software (version 17 SPSS, Chicago, Illinois, USA). Age of the participants was expressed as the mean± standard deviation (SD), and 95% confidence intervals were reported.

Chi-square tests for statistical significance were applied to the frequencies within each Fonseca’s severity category and to the frequencies of responses to each Fonseca’s question, with $p < 0.05$ regarded as statistically significant. The effect size was calculated using Cramers V table.

Results

Table 2 shows the distribution of socio demographic characteristics of the study participants. Table 3 shows the distribution of varying grades of TMD among study participants based on Fonseca Questionnaire Total Score. 66.7% of the subjects showed no signs of TMD while 33.3% showed varying signs of TMD. Table 4 includes the age and gender wise comparison of prevalence of TMD among study participants using Chi Square Test. There was no statistically significant differences found between the groups. Table 5 includes the age and gender

wise comparison of distribution of varying grades of TMD among study participants using Chi Square Test. There was a statistically highly significant difference seen in relation to age of the subjects with p value of 0.001.(figure 1).

The association between the individual parameters of Fonseca’s Questionnaire and the subjects

with and without temporomandibular disorders according to Fonseca Criteria using Chi Square Test is presented in table 6. In all the parameters there was a statistically significant difference seen. The responses which were positive for temporomandibular disorders according to Fonseca Criteria are shown in figure 2.

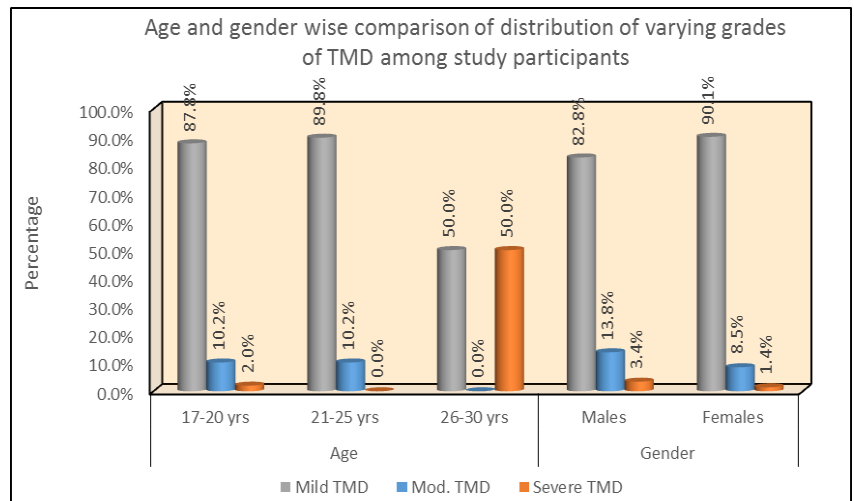


Figure 1: Age and gender wise comparison of distribution of varying grades of TMD among study participants

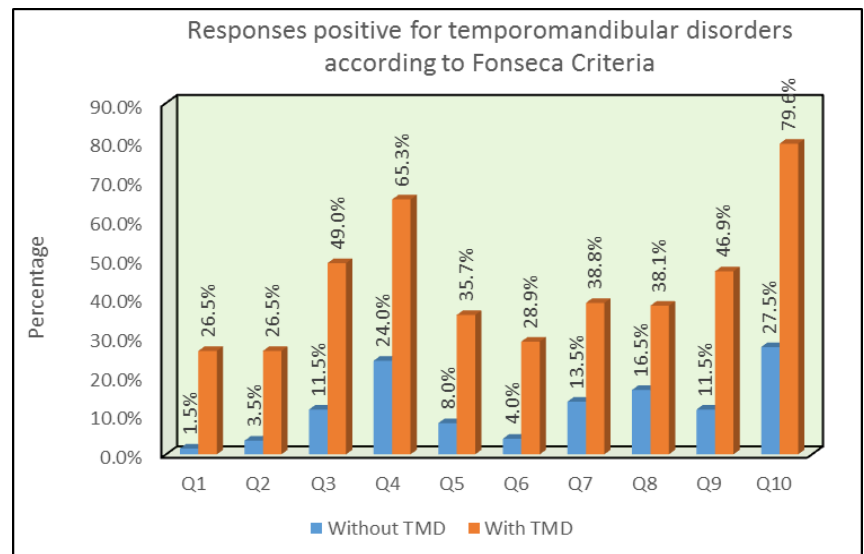


Figure 2: Responses positive for temporomandibular disorders according to Fonseca Criteria

Table 2- Distribution of Socio demographic characteristics of study participants. (others include Business

Variables	Category	n	%
Age	17-20 yrs	152	50.7%
	21-25 yrs	145	48.3%
	26-30 yrs	3	1.0%
Sex	Males	101	33.7%
	Females	199	66.3%
Faculty	Medical	101	33.7%
	Dental	99	33.0%
	Allied Science	32	10.7%
	Others	68	22.7%

Discussion

The distribution of socio demographic characteristics of the study participants is shown in Table 2. Majority of the subjects in this study were between 17-25 years and 66.3% were females. Among the subjects, 33.7% were medical students and 33% were dental students.

The distribution of varying grades of TMD among study participants based on Fonseca Questionnaire Total Score is presented in Table 3. 66.7% of the subjects showed no signs of TMD while 33.3% showed varying signs of TMD. In such a small sample of 300 subjects this prevalence of TMD can be considered to be high. Possible

among students' especially medical and dental undergraduates as supported by literature.[5] Also of the 33.3% showing signs of TMD, 29.3% showed only mild signs which indicates that majority of the TMD cases in this age range were in the initial stages of this disorder.

In another study done on an Indian population on the signs and symptoms of TMDs in Vidarbha population[11] using the Fonseca's questionnaire it was found that among all the participants examined sixty participants had no TMD (30%), 110 participants had mild TMD (55%); 28 patients had moderate TMD (14%) and two participants had severe TMD (1%). These values were for a general population and was not focused

these studies a higher prevalence of TMD was found compared to the results of this study. The possible reasons for the lower prevalence of TMD in this study could be the younger sample age in this study compared to studies on general population and hence the TMD could be in initial stages.

In a similar study on Brazilian undergraduates it was found that 53.21% of the participants had TMD.[13] Garcia et al, found that 61% of the 200 undergraduates evaluated had some sign of TMD.[13] Pedroni et al. found a prevalence of 68% of the evaluated volunteers, which is again higher than the present study.[8] The probable reasons could be different grading

methods and diagnostic tests used and population variations.

Table 4 includes the age and gender wise comparison of prevalence of TMD among study participants using Chi Square Test. There was no statistically significant differences found between the groups. Also, among those who did show signs of TMD between the ages of 17-20 and 21-25 years, there was almost a similar prevalence of TMD (50%), hence both age ranges had a similar risk of TMD. There was a higher prevalence of TMD in females (table 4) but this was not statistically significant. Similar gender based findings were found in other studies.[13] Women (63.11%) were the more affected than men (40.62%).[13] The high prevalence of TMD in women may be related to their different physiological characteristics, such as regular hormonal variations, muscle structures and different characteristics of the connective tissue.[15],[20]

Table 5 includes the age and gender wise comparison of distribution of varying grades of TMD among study participants using Chi Square Test. As observed in table 5 there was no difference seen with respect to sex. Interestingly, there was a statistically highly significant

difference seen in relation to age of the subjects with p value of 0.001.(figure 1) This can be interpreted as, the subjects in the age range of 17- 25 years if suffering from TMD, were more likely to have mild TMD rather than moderate or severe TMD. The sample size in the age range of 26- 30 years was very low to extrapolate the results to include them. (figure1)

The association between the individual parameters of Fonseca's Questionnaire and the subjects with and without temporomandibular disorders according to Fonseca Criteria using Chi Square Test is presented in table 6. In all the parameters there was a statistically significant difference seen. Hence the individual parameters of this questionnaire can be considered to be valid. The responses which were positive for temporomandibular disorders according to Fonseca Criteria are shown in figure 2.

In a study on TMD, nearly one-third of participants had a history of psychological stress.[18] In our study 79.6% of the people who had TMD reported that they felt they were tensed. These outcomes are in agreement with those of Pesqueira and colleagues[4] and Bonjardim and

colleagues[10] who asserted that stress and anxiety play important roles in TMDs by acting as predisposing or aggravating factors.

The limitations of this study are that of limited sample size, non-homogeneous ethnicity of the sample and possible errors in recording information in questionnaire such as underreporting, overreporting etc. Also the emotional factors were not considered which play a role in symptoms of TMD.

The Fonseca's questionnaire allows collecting a large quantity of information in a relatively short period and at low cost, it is easy to understand and has almost no influence from the examiner.[15] The potential uses could be regular public health and screening services, using this questionnaire, for a wide population coverage. With proper diagnosis and treatment, this could manage orofacial pain at early stages in a large contingent of people.

Table 3- Distribution of varying grades of TMD among study participants based on Fonseca Questionnaire.

Grades of TMD	FQTS Range	n	%
TMD Absent	0-15	200	66.7%
Mild TMD	20-45	88	29.3%
Mod. TMD	50-65	10	3.3%
Severe TMD	70-100	2	0.7%

Table 4- Age and gender wise comparison of prevalence of TMD among study participants using Chi Square

Variables	Category	Without TMD		With TMD		Effect size	RR	95% CI	OR value	P-Value
		n	%	n	%					
Age	17-20 yrs	103	51.5%	49	49.0%	0.03	0.97	0.74 to 1.28	0.402	0.82
	21-25 yrs	96	48.0%	49	50.0%					
	26-30 yrs	1	0.5%	2	1.0%					
Sex	Males	72	36.0%	29	28.6%	0.07	0.85	0.58to 1.25	1.628	0.20
	Females	128	64.0%	71	71.4%					

Table 5 - Age and gender wise comparison of distribution of varying grades of TMD among study participants using Chi Square Test (Management, Commerce & Finance students) severity

Variables	Categories	Mild TMD		Mod. TMD		Severe TMD		Effect Size	χ^2 value	P-Value
		n	%	n	%	n	%			
Age	17-20 yrs	43	87.8%	5	10.2%	1	2.0%	0.35	24.571	<0.001*
	21-25 yrs	44	89.8%	5	10.2%	0	0.0%			
	26-30 yrs	1	50.0%	0	0.0%	1	50.0%			
Sex	Males	24	82.8%	4	13.8%	1	3.4%	0.10	1.144	0.57
	Females	64	90.1%	6	8.5%	1	1.4%			

Table 6- Association between Fonseca's Questionnaire and temporomandibular disorders according to Fonseca Criteria using Chi Square Test. (participants using Chi Square Test (Management, Commerce & Finance students) severity)

Fonseca Items	Without TMD		With TMD		χ^2 value	Effect size	RR	95% CI	P-Value
	n	%	n	%					
Q1	3	1.5%	26	26.5%	46.910	0.41	13.96	4.3 to 45.18	<0.001*
Q2	7	3.5%	26	26.5%	35.426	0.36	6.10	2.72 to 13.6	<0.001*
Q3	23	11.5%	48	49.0%	40.907	0.44	3.14	2.00 to 4.9	<0.001*
Q4	48	24.0%	64	65.3%	47.838	0.50	2.01	1.46 to 2.77	<0.001*
Q5	16	8.0%	35	35.7%	35.613	0.37	3.5	2.01 to 6.07	<0.001*
Q6	8	4.0%	28	28.9%	37.916	0.37	5.68	2.67 to 12.01	<0.001*
Q7	27	13.5%	38	38.8%	24.638	0.30	2.31	1.48 to 3.61	<0.001*
Q8	33	16.5%	37	38.1%	16.987	0.32	1.90	1.25 to 2.89	<0.001*
Q9	23	11.5%	46	46.9%	46.424	0.45	3.05	1.93 to 4.81	<0.001*
Q10	55	27.5%	78	79.6%	72.223	0.57	2.03	1.52 to 2.70	<0.001*

Conclusion

This study aimed at assessing the prevalence and severity of TMD in a student population of different faculties in a university campus in Bengaluru using the Fonseca's questionnaire. Majority of the sample studies showed no signs of TMD while 33.3% showed varying signs of TMD. Majority of the cases had milder signs of TMD. Stress could be a predisposing factor for the development of TMD. Hence early screening during young age can help prevent the condition from progressing.

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