Original Article

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

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ABSTRACT

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 and TMD symptoms 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

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system, namely, dental occlusion, masticatory muscles, and TMJ.[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.[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.[7-9] Graue *et al*.[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 indexes proposed by Helkimo[11] in 1974 which were obtained from clinical observations were widely used. Fonseca[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.[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[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
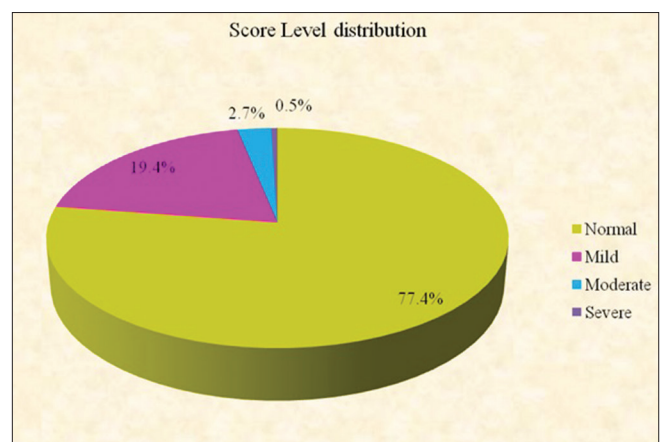

Figure 1: Temporomandibular disorder score distribution

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 (81.8)	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*
	Normal, *n* (%)	Mild, *n* (%)	Moderate, *n* (%)	Severe, *n* (%)	Total, *n* (%)		
<18	6 (1.9)	0	0	0	6 (1.5)	17.043	0.316 (NS)
18-19	92 (29.6)	21 (26.9)	0	0	113 (28.1)		
20-21	69 (22.2)	18 (23.1)	6 (54.5)	0	93 (23.1)		
22-23	107 (34.40)	27 (34.6)	3 (27.3)	1 (50)	138 (34.3)		
24-25	22 (7.1)	8 (10.3)	1 (9.1)	0	32 (8.8)		
>25	15 (4.8)	4 (5.1)	1 (9.1)	0	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*
		Normal, *n* (%)	Mild, *n* (%)	Moderate, *n* (%)	Severe, *n* (%)	Total, *n* (%)		
Q1	Difficulty in mouth opening							
	Absent	271 (67.4)	59 (14.7)	4 (1.0)	0	334 (83.1)	61.489	0.0001***
	Sometimes	38 (9.5)	16 (4.0)	4 (1.0)	2 (0.5)	60 (14.9)	df=6	
	Present	2 (0.6)	3 (0.7)	3 (0.7)	0	8 (2.0)		
Q3	Pain while chewing							
	Absent	251 (80.7)	39 (50)	3 (27.3)	0	293 (72.9)	118.906	0.0001***
	Sometimes	58 (18.6)	33 (42.3)	5 (45.5)	0	96 (23.9)	df=6	
	Present	2 (0.6)	6 (7.7)	3 (27.3)	2 (100)	13 (3.2)		
Q6	Ear ache/TMJ pain							
	Absent	270 (86.8)	52 (66.7)	5 (45.5)	0	327 (81.3)	119.218	0.0001***
	Sometimes	40 (12.9)	17 (21.8)	1 (9.0)	0	58 (14.4)	df=6	
	Present	1 (0.3)	9 (11.5)	5 (45.5)	2 (100)	17 (4.2)		
Q7	TMJ clicking							
	Absent	222 (71.4)	24 (30.8)	4 (36.4)	0	250 (62.2)	96.225	0.0001***
	Sometimes	78 (25.1)	28 (35.9)	3 (27.3)	0	109 (27.1)	df=6	
	Present	11 (3.5)	26 (33.3)	4 (36.4)	2 (100)	43 (10.7)		
Q10	Tense person							
	No	197 (63.3)	17 (21.8)	0	0	214 (53.2)	102.920	0.0001***
	Sometimes	92 (29.6)	28 (35.9)	4 (36.4)	0	124 (30.8)	df=6	
	Yes	22 (7.1)	33 (42.3)	7 (63.6)	2 (100)	64 (16.0)		
Q11	Meeting deadlines							
	Did not influence	272 (87.5)	50 (64.1)	0	0	322 (80.1)	124.462	0.0001***
	Sometimes influenced	32 (10.3)	17 (21.8)	3 (27.3)	2 (100)	54 (13.4)	df=6	
	Highly influenced	7 (2.3)	11 (14.1)	8 (72.7)	0	26 (6.5)		

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

Table 4: Influence and correlation of orthodontic therapy, injury to chin/jaw and treatment for temporomandibular disorders with the severity levels of temporomandibular disorders

Question number	Questions	Score level					Chi-square test	P
		Normal, *n* (%)	Mild, *n* (%)	Moderate, *n* (%)	Severe, *n* (%)	Total, *n* (%)		
Q12A	Orthodontic treatment						7.585	0.270 (NS)
	No	243 (78.2)	59 (75.6)	8 (72.7)	0	310 (77.2)		
	Yes	68 (21.8)	19 (24.4)	3 (27.3)	2 (100)	92 (22.8)	df=6	
Q12B	Duration of orthodontic treatment						60.494	0.0001***
	No	249 (80.1)	58 (74.4)	8 (72.7)	0	315 (78.4)	df=12	
	<6 months	9 (2.9)	3 (3.8)	2 (18.2)	2 (100)	16 (4.0)		
	1-2 years	9 (2.9)	1 (1.3)	0	0	10 (2.5)		
	2-3 years	27 (8.7)	7 (9.0)	0	0	34 (8.5)		
	More than 3 years	17 (5.5)	9 (11.5)	1 (9.1)	0	27 (6.6)		
Q13	Injury to the chin						35.415	0.0001***
	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)	df=3	
Q14B	Treatment for TMD						27.982	0.0001***
	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)	df=3	

***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.[24] Some authors have reported that the parafunctional habits are one of the most important factors in the etiology of TMDs.[25,26]

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 Bilgiç and Gelgör[27] 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.[27] 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.[28,29] 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.[30]

CONCLUSION

The following conclusions can be arrived at from this study:

1. A simple anamnestic index is of use in identifying and classifying TMJ and TMD symptoms in patients according to the severity of the disorder
2. TMD and its associated symptoms are frequent among students of health and science studies
3. There was a greater prevalence of signs and symptoms of TMD in females than in males
4. Identification and follow-up of the prevalence and health-care needs of patients with TMDs are recommended with longitudinal studies.

REFERENCES

1. de Oliveira AS, Dias EM, Contato RG, Berzin F. Prevalence study of signs and symptoms of temporomandibular disorder in Brazilian college students. Braz Oral Res 2006;20:3-7.
2. Dworkin SF, LeResche L. Research diagnostic criteria for temporomandibular disorders: Review, criteria, examinations and specifications, critique. J Craniomandib Disord 1992;6:301-55.
3. Oliveira AM. Caracterização multifatorial de uma população de portadores de desordens temporomandibular [tese de doutorado]. Piracicaba: Faculdade de Odontologia de Piracicaba da UNICAMP; 2002.
4. Silva FA. Tratamento das alterações funcionais do sistema estomatognático. Rev Assoc Paul Cir Dent 1993;47:1055.
5. Bonjardim LR, Gavião MB, Pereira LJ, Castelo PM, Garcia RC. Signs and symptoms of temporomandibular disorders in adolescents. Braz Oral Res 2005;19:93-8.
6. Boever JA, Steenks MH. Epidemiology, symptomatology and Etiology of craniomandibular dysfunction. In: Steenks MH, de Wijer A, editors. Temporomandibular joint dysfunctions From the Point of View of Physiotherapy and Dentistry. 1st ed. Sao Paulo, Brazil: Livraria Editora Santos; 1996. p. 35-43.
7. Schiffman E, Fricton JR. Epidemiology of TMJ and craniofacial pain: Diagnosis and management. In: Kraus SL, editor. The TMJ Disorders Management of the Craniomandibular Complex. New York: Churchill Livingstone; 1998. p. 23-38.
8. Olivares HA, Saucedo FL, Nova AP. Temporomandibular joint disorder prevalence in resident physicians at the specialties hospital La Raza national medical center. Rev Odontol Mex 2016;20:e8-12.
9. Habib SR, Al Rifaiy MQ, Awan KH, Alsaif A, Alshalan A, Altokais Y. Prevalence and severity of temporomandibular disorders among university students in Riyadh. Saudi Dent J 2015;27:125-30.
10. Graue AM, Jokstad A, Assmus J, Skeie MS. Prevalence among adolescents in Bergen, Western Norway, of temporomandibular disorders according to the DC/TMD criteria and examination protocol. Acta Odontol Scand 2016;74:449-55.
11. Helkimo M. Studies on function and dysfunction of the masticatory system. II. Index for anamnestic and clinical dysfunction and occlusal state. Sven Tandlak Tidskr 1974;67:101-21.
12. Fonseca DM. Craniomandibular Dysfunction (DCM): Diagnosis by the Anamnesis [Master's Dissertation]. Bauru: Faculty of Dentistry of Bauru of USP; 1992.
13. Nomura K, Vitti M, Oliveira AS, Chaves TC, Semprini M, Siéssere S, *et al.* Use of the Fonseca's questionnaire to assess the prevalence and severity of temporomandibular disorders in Brazilian dental undergraduates. Braz Dent J 2007;18:163-7.
14. Solberg WK, Woo MW, Houston JB. Prevalence of mandibular dysfunction in young adults. J Am Dent Assoc 1979;98:25-34.
15. Klineberg I, McGregor N, Butt H, Dunstan H, Roberts T, Zerbes M. Chronic orofacial muscle pain: A new approach to diagnosis and management. Alpha Omegan 1998;91:25-8.
16. Shiau YY, Chang C. An epidemiological study of temporomandibular disorders in university students of Taiwan. Community Dent Oral Epidemiol 1992;20:43-7.
17. Pedroni CR, De Oliveira AS, Guaratini MI. Prevalence study

of signs and symptoms of temporomandibular disorders in university students. J Oral Rehabil 2003;30:283-9.

18. Celic R, Jerolimov V, Knezovic Zlataric D. Relationship of slightly limited mandibular movements to temporomandibular disorders. Braz Dent J 2004;15:151-4.

19. Magnusson T, Egermark I, Carlsson GE. A longitudinal epidemiologic study of signs and symptoms of temporomandibular disorders from 15 to 35 years of age. J Orofac Pain 2000;14:310-9.

20. Dekon SF, Fajardo RS, Zavanelli AC, Beleeiro RP, Pelisser J. Estudo. Comparative study between anamnestic index of TMD and inventory Of trait-state anxiety (IDATE). JBA J Bras ATM occlusion Dor Orofac 2002;2:224-7.

21. Solberg WK, Clark GT, Rugh JD. Nocturnal electromyographic evaluation of bruxism patients undergoing short term splint therapy. J Oral Rehabil 1975;2:215-23.

22. Choudhary SH, Kale LM, Mishra SS, Sodhi S, Muley PB, Pandey ND. An institutional survey for knowledge-based and self-awareness assessment in temporomandibular joint disorders among dental students. Indian J Dent Res 2016;27:262-7.

23. Ryalat S, Baqain ZH, Amin WM, Sawair F, Samara O, Badran DH. Prevalence of temporomandibular joint disorders among students of the university of Jordan. J Clin Med Res 2009;1:158-64.

24. Christensen LV. Facial pain and internal pressure of masseter muscle in experimental bruxism in man. Arch Oral Biol 1971;16:1021-31.

25. Austin DG. Special considerations in orofacial pain and headache. Dent Clin North Am 1997;41:325-39.

26. Bezerra BP, Ribeiro AI, Farias Alcione B, Farias Alan B, Fontes L, Nascimento S, *et al*. Prevalence of temporomandibular joint dysfunction and different levels of anxiety among college students. Rev Dor 2012;13:1-6.

27. Bilgiç F, Gelgör IE. Prevalence of temporomandibular dysfunction and its association with malocclusion in children: An epidemiologic study. J Clin Pediatr Dent 2017;41:161-5.

28. Choi YS, Choung PH, Moon HS, Kim SG. Temporomandibular disorders in 19-year-old Korean men. J Oral Maxillofac Surg 2002;60:797-803.

29. Klobas L, Tegelberg A, Axelsson S. Symptoms and signs of temporomandibular disorders in individuals with chronic whiplash-associated disorders. Swed Dent J 2004;28:29-36.

30. da Silva CG, Pachêco-Pereira C, Porporatti AL, Savi MG, Peres MA, Flores-Mir C, *et al.* Prevalence of clinical signs of intra-articular temporomandibular disorders in children and adolescents: A systematic review and meta-analysis. J Am Dent Assoc 2016;147:10-8.e8.