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ASSOCIATION AND CORRELATION BETWEEN TEMPOROMANDIBULAR DISORDERS AND PSYCHOLOGICAL FACTORS IN A GROUP OF DENTAL UNDERGRADUATE STUDENTS

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Abstract

Aims/Objectives: To evaluate the prevalence and severity of temporomandibular disorders (TMD) and presence of psychological factors (i.e., anxiety and depression levels) in dental undergraduate students. Second purpose was to assess the association and correlation between TMD degree and psychological factors viz. anxiety and depression. *Materials and methods:* The sample comprised of 400 Dental undergraduate students aged 18- 25 years, including both the genders. TMD degree was evaluated using an anamnestic questionnaire (modified version of Helkimo's anamnestic index). Morphologic occlusion was evaluated according to Angle classification. The Hospital Anxiety and Depression Scale (HADS) was used to assess of levels of anxiety (HADSa) and depression (HADSd) in the dental undergraduate students. *Results:* Onbasis of the TMD anamnestic index, 74% of students were TMD free. 24.5% of subjects presented with mild degree of TMD and only 1.5% of subjects presented with moderate degree of TMD. According to the results obtained from HADSa, 35.3% of subjects presented with mild anxiety level, 13.8% with moderate anxiety level, and only 1.3% with severe anxiety level. According to the results obtained from HADSd, 10.3% of subjects presented with mild depression level and only 2.3% with moderate depression level. A definite association between TMD degree and Anxiety level (HADSa) was found. A definite association between TMD degree and Depression level (HADSd) was found. There was significant association between TMD degree and occlusion. *Conclusions:* On the basis of anamnestic index, this study revealed a 26% TMD prevalence in the dental undergraduate students included in the study; majority of cases being of mild degree. Both anxiety and depression were found to be associated with TMD degree/severity. Both anxiety and depression are weakly correlated with TMD in the present study.

Key Words: Temporomandibular disorder (TMD); anxiety; depression; occlusion; stress; psychological factors

Introduction

Temporomandibular joint (TMJ), an articulation between mandible and cranium is one of the most complex and unique joints in the human body. TMJs form an essential part of human's complex and highly refined functional unit called masticatory system.

The expression Temporomandibular disorders (TMD) is a generic designation for a subgroup of orofacial pain disorders. This classification comprises the pain complaints in the temporomandibular joint (TMJ) region, muscle fatigue, especially of the masticatory muscles, impaired jaw movement, and articular sounds (Oliveira *et al.,* 2006). TMD is a cluster of analogue disorders that are characterized by pain and symptoms of dysfunction. Since TMD is no longer considered to be one syndrome, with a common aetiology or as a syndrome with a multifactorial aetiology, the differential diagnosis is of particular importance (De Boever *et al.,* 2000).

TMD is the most common cause of oro-facial pain of non-dental origin. Its etiology is multi-factorial, still poorly understood and can easily be misrepresented. There are initiating factors, predisposing factors and perpetuating factors and consequently no single 'cause'. A variety of possible etiological factors have been studied, such as occlusion, depression, stress, and anxiety. Okeson identifies five factors associated with TMD: occlusal factors, trauma, emotional stress, deep pain input and parafunctional activities, but these have been the subject of much debate and enthusiastic treatment (Durham, 2008).

Approximately 60-70% of the general population has at least one sign of such disorder at some stage in their life, however, only about 5% actually seek treatment (Macfarlane *et al.*, 2001).

The incidence of TMD has recently increased in among younger persons and that prevalence rates among older persons will increase in future years (Dworkin *et al.*, 1990). Although TMD can occur at any age, patients most

commonly present in early adulthood. TMD is considered to be 1.5- 2 times more prevalent in women than in men and 80% of patients treated for this disorder are women. The gender difference was most prominent in the 20 – 40 years age group and was lowest in children, adolescents and the elderly (Bonjardim *et al.,* 2009).

The importance of psychological factors in the etiology of TMD has usually been emphasized; they are believed to predispose the individual to chronicity (Gatchel *et al.,* 1996).

The prevalence of the signs and symptoms of temporomandibular disorders (TMD) has increased considerably in the past decades. The higher frequency of unavoidable factors like emotional stress plus other factors can account for this fact (Conti *et al.*, 2003).

Thus, keeping all the above in mind, this study was carried out to find out the prevalence and severity of TMD and psychological factors (i.e., anxiety and depression levels) in the sample of dental undergraduate students of this institute and then also to assess the association and correlation between the TMD degree and psychological factors.

Materials and Methods

This prospective study was conducted in the Department of Oral Medicine & Radiology of our institution. The sample comprised a total number of 400 Dental undergraduate students of Dr. D. Y. Patil Dental College, aged 18- 25 years, including both the genders.

Method of data collection

- The TMD degree was evaluated using an anamnestic questionnaire (modified version of Helkimo's anamnestic index).
- Morphologic occlusion was evaluated according to Angle classification (classes I, II, and III).
- The Hospital Anxiety and Depression Scale (HADS) (by Zigmond and Snaith), a 14-item self-administered rating scale developed specifically to identify anxiety and depression in non-psychiatric medical outpatients, was used to assess of levels of anxiety (HADSa) and depression (HADSd) in the dental undergraduate students.

Anamnestic questionnaire

The presence and severity of TMD was determined using a self-administered anamnestic questionnaire composed of 10 questions regarding common TMD symptoms. This questionnaire is a modified version of Helkimo's anamnestic index and has been previously used by Conti *et al.* (1996); it has demonstrated a high efficiency in obtaining a diagnosis and is easy to apply. This anamnesis index used to measure TMD degree provides a substantial amount of information in a short period of time and is sensitive and

useful for identifying the TMD degree in the studied population.

The ten questions in the questionnaire were as follows:

1. Do you have difficulty in opening your mouth?
2. Do you have difficulty in moving or using your jaw?
3. Do you have tenderness or muscular pain when chewing?
4. Do you have frequent headaches?
5. Do you have neck aches or shoulder pain?
6. Do you have pain in or about the ears?
7. Are you aware of noises in the jaw joints?
8. Do you consider your bite ''normal''?
9. Do you use only one side of your mouth when chewing?
10. Do you have morning facial pain?

The number and frequency of positive responses were used to categorize the subjects into different groups according to severity of symptoms. The symptoms were transposed into a severity classification according to the number and frequency of positive responses. The scoring system was as follows:

Score "0" – absence of symptoms
Score "1" – occasional occurrence
Score "2" – presence of dysfunction
Score "3" – severe pain/ bilateral symptoms (According to Conti *et al.* (1996), the score "3" could only be given for questions 4, 6, and 7 of the anamnestic questionnaire, mentioned above)

The sum of the scores was used to group the subjects into four categories as follows:

- Score 0- 3 :- TMD free (T0)
- Score 4-8 :- Mild TMD (T1)
- Score 9-14 :- Moderate TMD (T2)
- Score 15 – 23 :- Severe TMD (T3)

Occlusal examination

Morphological occlusion was evaluated according to Angle's classification (Molar classes I, II, and III).

Hospital Anxiety and Depression scale (HADS)

The level of anxiety and depression was self-rated using the Hospital Anxiety and Depression scale (HADS). The scale was first used in a study by Zigmond and Snaith. The main characteristic of HADS is that items covering somatic symptoms of anxiety and depression have been eliminated. The use of this well documented psychometric tool gives us a clear indication of the severity of the mental disorder. HADS consists of seven items for depression (HADSd) and seven items for anxiety (HADSa). The HADS only takes 2 to 5 minutes to complete. Subjects' answers were given scores 0 to 3. By defining the cutoff values, the HADS

subscales (HADSa and HADSd subscales) give indication of the severity/level of the mental disorder (Anxiety level and depression level):

- 0-7 : normal
- 8-10: mild
- 11-14: moderate
- 15- 21: severe disorder

Using statistical analysis it is possible to draw an inference as to the clear association of TMD with stress related disorders namely anxiety and depression and correlate the severity of TMD with the increase of stress, thus recognizing the merits of psychological screening of young adults with a confirmed diagnosis of TMD.

Scores obtained through these questionnaires were computerized and was subjected to statistical analysis. Thus, results were obtained.

Results

- Out of 400 students, the percentage of female participants was 74.8% and percentage of male participants was 25.3%.
- The study sample included the students with age ranging from 17 to 27 years with a mean age ± standard deviation of 20.01 ± 1.438. The ages 18 to 22 years were found to be most prevalent/ prominent in the study sample.
- Out of the 400 dental undergraduate student participants, 21.8% were from I year, 12.5% were from II year, 32.3% were from III year, 30 % were from IV year and 3.5% were interns.
- When the TMD anamnestic index for the whole sample was considered, 74% of subjects (students) were TMD free. 24.5% of subjects presented with mild degree of TMD and only 1.5% of subjects presented with moderate degree of TMD.(Fig. 1)
- According to the results obtained from HADSa, 35.3% of subjects presented with mild anxiety level, 13.8% with moderate anxiety level, and only 1.3% with severe anxiety level.(Fig. 2)
- According to the results obtained from HADSd, 10.3% of subjects presented with mild depression level and only 2.3% with moderate depression level.(Fig. 3)
- The majority of the student participants i.e., 89 % of students exhibited Angle's ClassI occlusion, 10 % exhibited ClassII& 1 % classIII.
- The Chi-square test was used to find the association between TMD degree & Anxiety level (HADSa). The Chi-square value was 60.520. Therefore, there was found to be a definite association between TMD degree and Anxiety level (HADSa), which is statistically significant (p = 0.000).

- The Chi-square test was also used to find the association between TMD degree & Depression level (HADSd). The Chi-square value was 42.925. Thus, there was found to be a definite association between TMD degree and Depression level (HADSd) which is statistically significant (p = 0.000).
- The Chi-square test was used to find the association between TMD degree & Occlusion. The Chi-square value was 9.542. Therefore, there was found to be a significant association between TMD degree and occlusion (p = 0.049).
- The Chi-square test was used to find the association between TMD degree & Gender. The Chi-square value was 0.707. Thus, there was found to be no significant association between TMD degree and gender (p = 0.702).
- Pearson correlation coefficient was used between variables TMD &HADSa score. Correlation Coefficient value, r = 0.232. Therefore, there was found to be a weak positive correlation between the two variables i.e. between TMD & anxiety level, which was statistically significant.
- Pearson correlation coefficient was used between variables TMD &HADSd score. Correlation Coefficient value, r = 0.233. Therefore, there was found to be a weak positive correlation between the two variables i.e. between TMD & depression level, which was statistically significant.
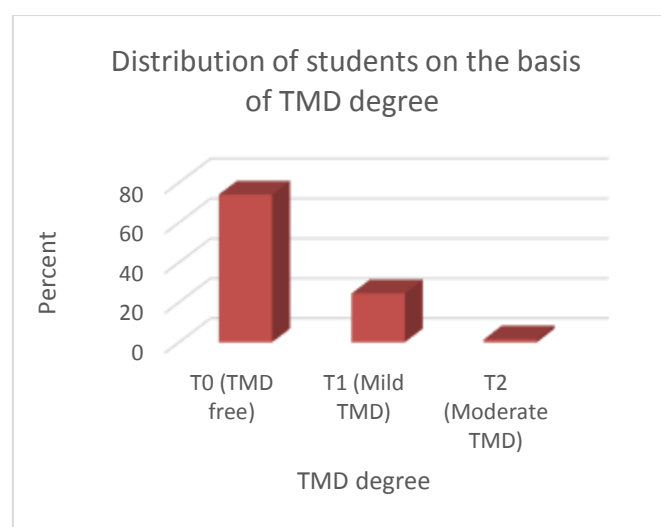

Fig. 1: Distribution of students on basis of TMD degree.

Discussion

A total of 400 dental undergraduate students were included in this study, out of which 299 (74.8%) were females and 101 (25.3%) were males. The students' age ranged from 17 to 27 years, the mean age being 20±1.438 years. The variability in the percentage of female and male students included in the study is possibly on account of higher number of female students getting admitted in the dental

undergraduate course. Majority of the participant students were from the third and fourth year of dental undergraduate course (32.3% from third year and 30% from fourth year). This population group, on the basis of previous reports of TMD (Clark and Mulligan, 1984), represents individuals mostly seeking treatment, and the subjects were readily available.
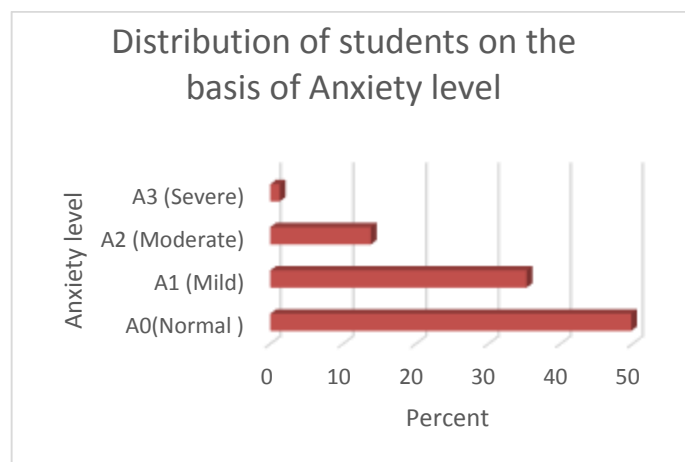

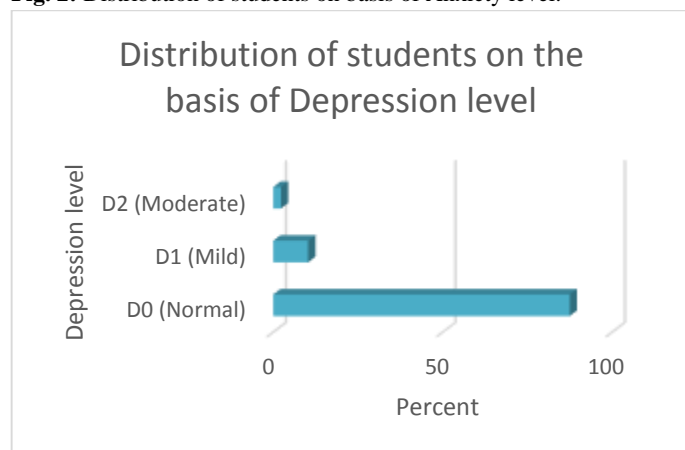**Fig. 2:** Distribution of students on basis of Anxiety level.

Fig. 3: Distribution of students on basis of Depression level.

The anamnestic questionnaire was used to evaluate TMD degree. This provided a substantial amount of information in a short period of time and was sensitive and useful for identifying the TMD degree in the studied population. This index proved to be a simple tool that could be easily understood by the students, thus reducing the influence, if any, of the investigator on the individuals and their answers (Conti *et al.*, 2003). The clinically determined prevalence of TMD (which gives the point prevalence) might be lower than that determined by using the questionnaire (which gives the period prevalence).[10] For the purpose of this study, only the period prevalence of TMD was considered.

In this study, on the basis of anamnestic index, total 26% of students had some degree of TMD; 24.5% of students having mild TMD and only 1.5% having moderate degree of TMD. These values were less than that reported by Conti *et al.* (2003); 34% subjects had mild degree of TMD and

only 3.5% had moderate degree of TMD. They had also used the same questionnaire to evaluate TMD in university students. Thus, in comparison, this present study revealed a lower TMD prevalence in students. Only lower percentage of students i.e., 1.5% of subjects who presented with moderate degree of TMD needed some care or treatment. In contrast, Bonjardim *et al.* (2009) had reported high prevalence of TMD (50%) in student population (aged 18-25 years).

Kawala *et al.* (2011) conducted a study in similar age group (19-26 years), but in only young adult males (army recruits). They had found relatively rare TMD prevalence (20.3%) in their study population, possibly suggesting that young, generally healthy males demonstrate highly efficient adaptive systems, therefore the presence of many factors predisposing them to the dysfunctions, such as malocclusions, oral habits, stress due to change of living or work conditions and individual predisposition, have little influence on the stomatognathic system. Kawala *et al.* (2011).

In this present study, the percentage of females with TMDis 26.76%and percentage of males with TMD is 23.76%. Thus, in this study percentage of females with TMD is just very slightly higher than that of males, which was not statistically significant. These findings (in regards to gender) are similar to that reported by Bonjardim *et al.* (2009), Widmalm *et al.* (1994) and Sonmez *et al.* (2001).

Many other previous studies in comparison have shown much higher prevalence of TMD signs and symptoms in females than in males (Oliveira *et al.*, 2006).

On the other hand, Otuyemi *et al.* (2000) in their study in 308 medical and dental students (207 males and 101 females) randomly selected from a Nigerian University (their ages ranging from 17 to 32 years with a mean age of 23 ± 3•0 years), revealed the lack of sex differences in reported symptoms and clinical signs of TMD. They were assessed according to the criteria of Helkimo (1974).

In this present study, there is found to be a statistically significant association between morphologic occlusion (Angle's molar classification) and TMD degree (p=0.049). In contrast, according to most of the previous studies and reviews, the contribution of occlusion to etiology of TMDs (as a sole cause or dominant factor) appears small or none (De Boever *et al.* 2000; Bonjardim *et al.*, 2009) For example, Gesh *et al.* (2004) had reported a weak association between malocclusion and the functional and clinical parameters of occlusion as well as subjective TMD. Moreover, no particular morphologic or functional occlusal factor became apparent. Gesh *et al.* (2004) also reported that the occlusal factors that were found were partly protective for TMD, i.e., subjects with these occlusal parameters (i.e., angle class II malocclusion, deep bite, anterior crossbite) showed fewer signs and symptoms of TMD. McNamara and

others reviewed the role of morphologic and functional occlusal factors with respect to development of TMDs and found only a weak relation between them Gary *et al.*, (2009).[6]

According to the results of this study using HADS scale, 35.3% of students presented with mild anxiety level, 13.8% with moderate anxiety and only 1.3% with severe level of anxiety. As for depression levels, 10.3% of students presented with mild depression and only 2.3% with moderate depression. Bonjardim at al. (2005 & 2009) in two separate studies had found presence of anxiety and depression, although mild intensity, in adolescents and young adults. This shows that there is evidence of common presence/occurrence of psychologic disturbances in general adolescent and young adult population (of this institute).

Several clinical studies suggest that psychological factors may play an important role in the etiology and maintenance of temporomandibular disorder (TMD) signs and symptoms (Bonjardim *et al.*, 2005).

Here, a statistically significant association was observed between TMD degree and anxiety level (p=0.000) as well as between TMD degree and depression level (p=0.000). These results are in accordance with Bonjardim *et al.* (2005) who found an association between the number of TMD subjective symptoms and HADSa/HADSd (p < .01). In their study also both HADSa and HADSd were associated with an increasing number of TMD subjective symptoms. Minghelli *et al.* (2011) showed that the Jean Piaget-Algarve Health School students (aged 18 to 43 years), from various health courses, present a high TMD prevalence, and revealed a significant association between this dysfunction and anxiety or depression levels. So their findings are also in accordance with the present study. Bonjardim *et al.* (2009) found statistically significant association between TMD degree and HADSa but not with HADSd.

In present study, statistically, levels/scores of both anxiety and depression are having weak positive correlation with TMD degree/scores, which was statistically significant (r = 0.232 and r = 0.233 respectively). In other words, both anxiety and depression were found to be weakly correlated with TMD in the present study. However, in the above mentioned study of Bonjardim *et al.* (2005) only anxiety was correlated with clinical signs of TMD.

Gatchel *et al.* (1996) found a psychological comorbidity in patients with acute and chronic TMD. As important, the detection of possible psychological disorders in patients with acute TMD (especially anxiety disorders) will be valuable in preventing the development of chronicity and predicting treatment problems and complications in these patients. The importance of psychological factors in the etiology of TMD has been emphasized[29], they are believed to predispose the individual to chronicity (Gatchel *et al.,* 1996).

Anxiety and depression play an important role in TMD, acting as a predisposing or aggravating factor.

It is important to note that anxiety and depression may not only result from and predispose patients to TMDs, but that patients may present with mental disorders unrelated to TMDs. (De Leeuw, 2008).

Psychological factors such as stress, anxiety may affect pain perception, with anxious subjects paying more attention to pain and thereby amplifying the perceived intensity. Bonjardim *et al.* (2005).

Psychological factors are important in TMD, which is the most common cause of chronic facial pain. TMD are often associated with somatic and psychological complaints, including fatigue, sleep disturbances, anxiety, and depression. Bonjardim *et al.* (2005). It has been observed that small elevations in anxiety, depression and somatization have been consistently identified in TMD patients. (Dahlstrom, 1993).

Considering that stress is associated with psychological disturbances such as anxiety and depression (Gameiro, 2006), we can say that there appears to be a relationship between stress and degree of TMD in this present study.

Conclusions

From this study the following conclusions can be drawn:

1. On the basis of anamnestic index, this study revealed a 26% TMD prevalence in the dental undergraduate students of this institute; majority of cases being of mild degree. Although a larger percentage of females (26.76%) than males (23.76%) had some symptoms of TMD, the difference was not statistically significant.

2. Morphologic malocclusion (molar class, Angle's classification) was found to be statistically associated with TMD.

3. Half of the students included in study presented with anxiety, although majority with mild intensity. Only 12. 6 % of students had depression that too mild to moderate intensity.

4. In this study both anxiety and depression were associated with TMD degree/severity.

5. Both anxiety and depression are weakly correlated with TMD in the present study (which was found to be statistically significant).

Thus, the outcome of this study emphasizes the importance of diagnosing persons suffering from anxiety and depression. This will help in identification of those who are predisposed to TMD. Furthermore, recognizing the extent of anxiety and depression will help in both predicting as well as correlating with the severity of TMD. The study outcome suggests the importance of recognizing the merits of psychological screening of adolescents and young adults with a confirmed diagnosis of TMD, where indicated.

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