



Prevalence of Temporomandibular Disorders and Some of Its Risk Factors, According to the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD)

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Abstract

Introduction: After odontogenic pain, Temporomandibular Disorders (TMD) are the most important causes of pain in the oral and maxillofacial region. Generally, it is believed that biological, psychological and social factors reduce the adaptive capacity of the masticatory system resulting in TMD. The aim of this study was to evaluate the prevalence of TMD and some of its common risk factors including anxiety, depression and oral parafunctions in girls aged 15 to 18 years old in Isfahan.

Materials and Methods: 15 educational centers were randomly selected in Isfahan, Iran. A total of 311 female high school students between aged 15 and 18 years old were randomly assigned to participate in this study and parts of both Axis I (including personal information, pain screening and symptoms) and Axis II (including PHQ-4 for Depression and Anxiety and OBC for Oral Behavior Checklist) from the DC/TMD was distributed among students.

Result: Of the students participating in this study with an average age of 16.38 years, the prevalence of TMD was 28.3%, the mean age was 16.38. The frequency of anxiety level (mild, moderate and severe) in the population was 59.4%. There was a significant correlation between TMD and students' anxiety levels. Likewise, the percentage of depression level (mild, moderate and severe) in the studied population was estimated to be 54.9% and there was a significant relationship between TMD and depression level in students. The prevalence of oral parafunctions (mild, moderate and severe) in the studied population was 88.1% and there was a significant correlation between the presence of TMD and the level of oral parafunctions among students.

Conclusion: The results of this study suggested a high prevalence of TMD among young females and we found a significant correlation between TMD and psychological factors, (such as anxiety and depression), as well as oral parafunctions.

Keywords: Prevalence; Temporomandibular disorders; Anxiety; Depression; DC/TMD questionnaire

Introduction

Temporomandibular Disorder (TMD) is a general term representing any pain in Temporomandibular Joint (TMJ), masticatory muscles and adjacent structures [1]. TMD is the second common orofacial pain with the prevalence of 3% to 15% [2] and it's a common disorder in modern societies [3,4] caused by pathological and psychological factors [5-8]. Psychological factors like anxiety, stress, and depression as psychological factors and also oral para-functional habits are the main reasons for TMD that mentioned in studies [9,10]. Patients suffering from neurological disorders usually reduce their tension by teeth grinding and jaw clenching which may increase the risk of TMD [11,12].

Previous researches showed disk displacement was more prevalent among young patients than elders and degenerative TMD was more in elders [13]. Hence, to achieve a comprehensive vision about the prevalence of TMD, we consider a group of young females at the end of the growth stage and sexual development. Students mostly affected by psychological factors such as anxiety

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and depression [10]. Therefore, students have more remarkable TMJ disorders [14], caused by poor education, financial crisis, ergonomic position during studying, exams, scientific articles, independence in future, SAT exams etc [9]. Additionally, students mostly face the social, emotional, physical and familial crisis [8,14]. It should be noted that in Iranian society SAT exam for college is one of the most important reasons for psychological disorders [15] gender is another factor affecting TMD [13,16]. Tsang et al. [17] studied 85,023 participants from 17 different countries and found that 62% of the female gender and 38% of the male gender have TMD. The pathogenesis of this condition might be attributed to the fluctuating sex hormones of female gender (e.g. estrogen) and the nature of the pain mechanism in women, which render them more vulnerable to pain and the residence of more estrogen and progesterone receptors are found in intra-articular cartilage in women having TMD Claiming [14].

In addition to physiological factors, consideration of psychological and behavioral factors are as important as psychological factors in the treatment of TMD and other painful conditions in women is important [14,18].

In 1934 for the first time Cosen et al. Studied TMD from the Otolaryngological perspective. This study was the beginning of further studies on TMD in order to diagnose the etiology and proper treatment methods for this disorder. There were two major flaws with previous studies:

1. Lack of unanimity in the methodology in the evaluation of TMD, ergo, the difference in the results despite the similarity of the study group is the consequence of this disorder in the researchers' methodology.

2. There was no general agreement on the evaluation of one or all of the sign and symptoms. To compensate these shortcomings, in 1992 Ricahard Ohrbach released research diagnostic criteria for Temporomandibular disorders (RDC/TMD) [19]. Screening people who are prone to social stress as well as effective dental care and counseling a psychologist together can together help patients with treatment of TMD.

Hence, the aim of this study was to evaluate the prevalence of TMD and some of its common risk factors among female students aged between 15 to 18 years old in Isfahan city in accordance with the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD). Since there were a few studies assessing TMD on Iranian people and due to high prevalence of the psychological factors (like peer pressure and school pressure), at young people this study was considered.

Materials and Methods

This descriptive cross-sectional study was approved by the Regional Committee for Medical Research Ethics committee (REK-number 396474). Participants were given the DC/TMD questionnaire. The DC/TMD analysis is an updated version of the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) introduced by Schiffman et al. in 2014. The study focused on the DC/TMD axis I and axis II diagnoses. In the first section, screening and clinical examinations of TMD, and in the second section, psychosocial risk factors of TMD evaluated. In this study, parts of both axis presented to students participating in the project. From Axis I, individual information, pain screening, and symptoms selected; and from Axis II, PHQ-4 (Depression and Anxiety Survey)

and OBC related to oral hygiene checklist chosen. Validity and reliability of the translation of parts of the DC/TMD questionnaire, which is jointly in the RDC/TMD questionnaire, was approved by Balke et al. from the University of Heidelberg in Germany in 2005 [20]. Personal information included age, grade, and family income. The screening section filled by participants, included three yes/no questions. The evaluation methodology explained by the algorithm of the questionnaire. The first question scored from 0 to 2 (a=0, b=1, c=2) and the other 2 questions scored as a=0 and b=1. The DC/TMD Symptom Questionnaire consists of 14 questions, focusing on the pain in the jaw, temples, and ears or in front of the ears, headache, joint noises, and locking of the jaw involved. This part of the questionnaire was completed in an interview to provide more accurate information to the subjects by showing the anatomical areas. The PHQ-4 section includes 4 questions answered with "almost every day/more than a week/somedays/never," and scored from 0 to 4. The total score of the answers classified into three categories: Severe (9), moderate (6), mild (3). The last part of the oral health checklist included 21 questions and assessed oral parafunction habits. Questions contain parafunctional habits during sleep (answered with: Never, rarely, sometimes, more often, always) and parafunctional habits during the day (answered with: Never, rarely, sometimes, more often, always), and scored from 0 to 4. If the total score is between 0 and 16, oral habits considered normal, and if between 17 and 24, a person has occasional TMD pains. If the total score was 25 to 62, the probability of TMD was 17 times higher than other people and warned of signs of starting TMD.

All the clinical examinations were conducted from September 2017 to February 2018 after obtaining the necessary licenses from the education departments of each district of Isfahan. Data analysis performed by IBM SPSS Statistics 22 Software. Data analysis based on the aspect ratio formulas of the incidence of TMD, the prevalence of anxiety and depression, as well as the prevalence of oral parafunctional habits. The Mann-Whitney test used to investigate the association between TMD and anxiety, TMD and depression, TMD, and any oral parafunctional habits. An independent t-test used for the relationship between oral parafunctional habits (as a separate variable). Age and family income are also assessed through t-test and Mann-Whitney tests, respectively. Also, cluster analysis used to control the effect of family income and population of each cluster.

Results

In this study, 311 female students with a mean age of 16.4 ± 1.03 years participated. The demographic data of the subjects studied showed in Table 1. Only 25% of participants responded to family income questions.

Frequency distribution of TMD and level of anxiety, depression and oral traumatic habits in students are presented in Table 2.

As shown in the table, 88 (28.3%) of students had TMD. 126 (40.5%) of the students reported normal anxiety levels, and 185 (59.5%) had anxiety in three levels: Mild (22.5%), moderate (23.2%) and severe (13.8%).

140 (45%) of students reported normal depression levels and 171 (55%) of them had depression in three levels: Mild (27%), moderate (15.8%) and severe (12.2%).

It should be noted, only 37 (11.9%) students had normal parafunctional habits and 274 (88.1%) of them had parafunctional habits in three levels: Mild (32.5%), moderate (55.3%) and severe

Table 1: Frequency distribution of age educational level and family income in participants.

Variable		Number	Percent
Age(years)	15	77	24/7
	16	87	28
	17	97	31/2
	18	50	16/1
Education level(grade)	9	72	23/2
	10	66	21/2
	11	118	37/9
	12	55	17/7
Family income	Poor	22	28/2
	Average	35	44/8
	Good	13	16/7
	Excellent	8	10/3

Table 2: Frequency distribution of Anxiety level, Depression level and Oral parafunction in participants.

Variable		Number	Percent
TMD	Without TMD	223	71/7
	With TMD	88	28/3
Anxiety level	Normal	126	40/5
	Mild	70	22/5
	Moderate	72	23/2
Depression level	Severe	43	13/8
	Normal	140	45
	Mild	84	27
Oral parafunction	Moderate	49	15/8
	Severe	38	12/2
	Severe	1	0/3
Oral parafunction	Normal	37	11/9
	Mild	101	32/5
	Moderate	172	55/3
	Severe	1	0/3

(0.3%).

Among subjects with TMD, the distribution of diagnostic criteria for symptoms of TMD studied separately. Frequency distribution of these symptoms presented in Table 3. The most frequent symptom was a headache (75.9%) and the least frequent was jaw locking in closed mouth position (10%).

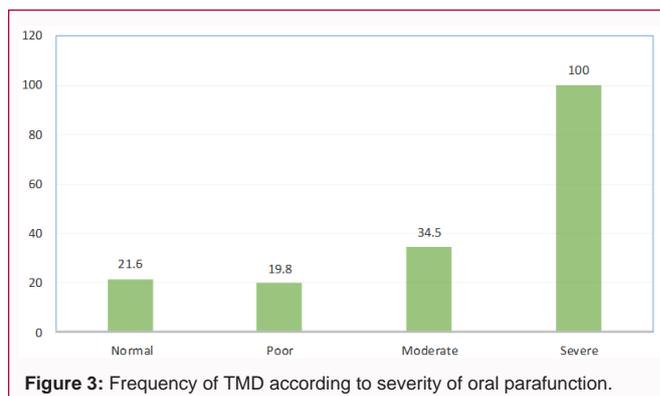
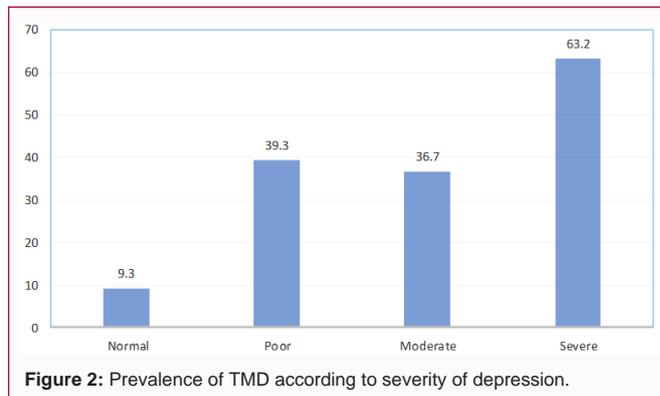
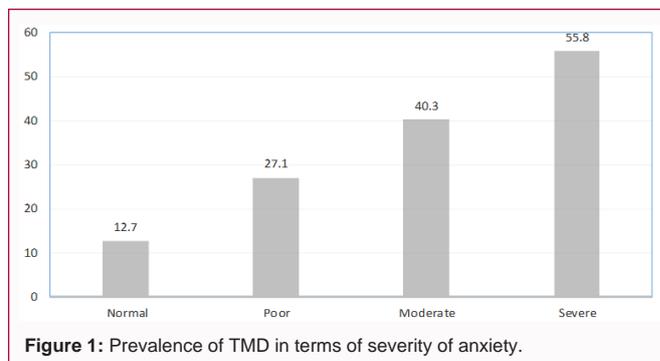
In examining the relationship between the TMD and the anxiety level in students by the Mann-Whitney test (Chart No.1), it showed that the level of anxiety in subjects with TMD was significantly higher than those without TMD (P value <0.001).

In considering the relationship between the TMD and the depression level in students using the Mann-Whitney test (Chart No.2), it illustrated that the level of depression in subjects with TMD was significantly higher than those without TMD (P value <0.001).

In studying the relationship between the TMD and the parafunctional habits in pupils using the Mann-Whitney test (Chart No.3), it demonstrated that the parafunctional habits in subjects with TMD were significantly higher than those without TMD (P value =0.006).

Table 3: Frequency distribution of clinical measures of TMD.

Clinical measures	Number	Percent
Pain	57	64/7
Headache	67	76/1
Articular sounds	47	53/4
Jaw locking in closed mouth	9	10/2
Jaw locking in open mouth	10	11/3



Independent t-test showed that there was no significant difference between the mean age of students in both groups with and without TMD (P value =0.27).

The Mann-Whitney test showed with increasing family income, the rate of TMD in student's decreases.

Discussion

The aim of this study was to evaluate the prevalence of TMD and some of its risk factors among female students aged between 15 to 18 years old in Isfahan city according to the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD). The prevalence of

TMD in this study was 28.3%, which is extensively similar to studies conducted at the age range of youth and adolescents using RDC/TMD or DC/TMD.

Marpaug et al. [21] studied on people aged between 12 to 18 in a self-report study TMD had the prevalence of 20%. In addition, they found a significant relationship between TMD and other risk factors such as gender, age, stress, parafunctional habits like bruxism and lip biting. Fernades [22] in 2014 surveyed on 1094 teenage students and Micheloni [23] in 2015 studied 1307 students using RDC/TMD questionnaire, they reported the prevalence of 25.5 and 30.4% accordingly.

In 2017 Jussila et al. [24] reported 18.5% prevalence of TMD using a DC/TMD self-report questionnaire. Although, 34.2% had shown symptoms of TMD in clinical examination Loster [25] studied 260 people aged between 16 to 19.5 years old using a RDC/TMD questionnaire. TMD had a prevalence of 26.5%. The result of this study was so close to ours. Moreover, Rantala [26] found out that 27% of participants had TMD using the same method.

De Sena et al. [27] did a systematic review in 2013. They showed 16% to 68% of the volunteers had sign and symptoms of TMD. This difference in statistics was due to different sampling and the use of different diagnostic tools including jaw index, Helkimo index, RDC/TMD and etc. The most important justification for the difference in the prevalence of our study with previous studies is the difference in the TMD diagnostic tool and data collection method. The subjects were only girls, and since the prevalence is the female, the statistics are slightly higher than other studies that have studied both genders.

Different causes affect the chronic TMD pain, including psychological factors that we examined in this study, were anxiety and depression, respectively 59.4% and 54.9%.

There was also a significant relationship between these factors and TMD prevalence in our study. The results were consistent with other studies. The study of Staniszewski et al. [28] in Norway in 2018 assessed the association of anxiety and depression with TMD, so that, the anxiety and depression score in the TMD group was significantly higher than the control group. In 2018, Paulino [29] studied the prevalence of TMD sign and symptoms and their association with the psychological factors and para-functional habits and their impact on the quality of life of the students by studying 303 students aged 15 to 19 years. TMD had a prevalence of 56.4% such a way that 39.6% of them need clinical intervention. This study reported a prevalence of anxiety, stress, and depression of 40.3%, 82.5%, and 10.6%, respectively, and a significant correlation was found between these indices and TMD. It should be noted that the difference in the prevalence of our study is due to the difference in the tool used to measure these indicators (HADS-A and HADS-D for depression, anxiety and stress, DMF index for TMD). Haghghat et al. in 2003 investigated the effect of psychological factors before and after the relaxation therapy on the TMD on 25 patients. The elimination of psychological factors was significantly reduced TMD symptoms and stated that relaxation therapy for these patients due to a significant relationship between TMD and psychological factors is effective. Because, without any side effects, they can be combined with other therapies, in addition to increasing patient collaboration and reducing pain and discomfort which increases the efficacy of the overall TMD treatment process.

In this study, the prevalence of oral parafunctional habits was

88.1%, and in subjects with TMD, the parafunctional oral hygiene habits of the TMD group were significantly higher. Fernades [22] in 2014 investigated on 1094 teenage students using DC/TMD questionnaire, TMD had a prevalence of 25.5%. Although, there was a significant relationship between TMD and bruxism. In a study by Winocur et al. [30] in 2006, the parafunctional habits were significantly higher in subjects with TMD.

In almost all of the articles, the prevalence of TMD in women has been higher than that of men [31-34] which is the reason for our focus was on girls and the TMD survey among them. Considering the age in this study is that children and adolescents with TMD will have related physiological processes during their craniofacial growth. However, if the diagnosis is suspended, the TMJ will cause irreversible damage [35]. In this study, there was no significant relationship between age and TMD. Similarly, in 2014 Karibe et al. [36] conducted a study aimed at comparing pain, sleeping problems and treatment outcomes in different age groups, and concluded that subjective symptoms in TMD disorder. There is no significant difference in age groups.

Further investigations should study a broader age range to examine the impact of age on the prevalence of TMD. Also, the prevalence in boys of the same age should compare with girls. A clinical examination should be conducted to investigate TMD symptoms in later studies. Additionally, an interdisciplinary collaboration with psychologists to identify the harmful factors in high school and attempt to reduce or eliminate these symptoms.

Our limitations were the education centers participating in the study which did not provide a proper space and time to review the TMD clinical symptoms.

Conclusion

The results of this study showed that the prevalence of TMD in young girls is significantly related to the psychological factors and oral habits.

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Author Contributions

M.S; Designed and wrote the paper and collected the data under supervision of Dr A.H. A.R and SH.R co-wrote the paper and M.H; collected the data.

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