

Assessment of Temporomandibular Dysfunction and Stress in Moroccan Dental Students

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Abstract

Objective: This study aimed to evaluate the temporomandibular dysfunction (TMD) and their severity in a non-consulting population: the Faculty of Dental Medicine of Casablanca (FDMC) students, according to the stress undergone during exam periods.

Method: A total of 209 FDMC students were involved in the study. The sample consisted of 141 women and 68 men, with an average age of 20.6 years. An initial evaluation was conducted on 09-10, January 2017. The questionnaires including the Fonseca anamnestic index (FAI) and the Moroccan version of the perceived stress scale (MVPS) were distributed to students during the exam period just after they left the classrooms exam. All students who responded to the first part of the study were invited to participate in the second part of the work that took place over 5 days from 07 February 2017 (outside exam periods).

Result: Among the students 31% were classified as having no TMD, 46% had a mild form, 16% moderate, and 7% severe TMD. The main stress for female students is 24.09, while the average stress for male students is 19.22. There was a decrease in the severity of TMD from 27.86 to 25; and a decrease in the average stress from 22.85 to 19.17.

Discussion: The results of this study revealed a high prevalence of TMD among FDMC students. Women are more severely affected. The severity of TMD increases in proportion to the main of Stress. A low but statistically significant correlation was observed between TMD and STRESS.

Keywords: Fonseca Anamnestic Index; Perceived Stress Scale; Moroccan Version Of The Perceived Stress Scale; Temporomandibular Joint Disorders; Stress, Psychological

Abbreviations

TMD: Temporomandibular Dysfunction; FDMC: Faculty of Dental Medicine of Casablanca; FAI: Fonseca Anamnestic Index; MVPS: Moroccan Version of the Perceived Stress Scale; RDC/TMD: Research Diagnostic Criteria for Temporomandibular Disorders; DC/TMD: Diagnostic Criteria for Temporomandibular Disorders; PSS10: Perceived Stress Scale 10; FQ: Fonseca Questionnaire; TMJ: Temporomandibular Joint

Introduction

The dentist is confronted in his daily practice with a semiological polymorphism associated with temporomandibular dysfunction (TMD) and several therapeutic possibilities. This is mainly due to the multiplicity of factors that come into play in the pathophysiology of TMD.

Even we agree today that the aetiology of this dysfunction is multifactorial, stress was considered for a long time as a preponderant factor in the appearance of the TMD. This link between stress and the development of TMD remains a controversial topic in the scientific literature.

Nowadays, the terminology used by the Academy of Orofacial Pain is TMD, or CMD (temporomandibular or cranio-mandibular dysfunction). This abbreviation corresponds to the pains and disorders of the functioning of the manducatory apparatus in relation to a muscular and/or articular anomaly and having a psychological component [1].

To define psychological stress, Lazarus and Folkman [2] proposed in 1991 a transactional model that states: "Psychological stress is a special relationship between the person and their environment, assessed as exceeding their abilities and endangering their well-being". This transactional model is based on taking into account the interaction that exists between the individual and his environment: the individual does not passively admit the situation but he chooses various cognitive, affective, behavioural and psychosocial strategies to cope with it. Strategies developed by the individual in response to a stressful situation, can slow down or accelerate the evolution of the pathological process. Thus, the psychology of health supports the study of the mediating role of these transactions (perceived stress, perceived control, social support, coping...) able to modulate the appearance or the evolution of an illness [3].

The role of stress and personality in the aetiology of TMD has been carefully examined. Psychological studies have shown that patients with functional disorders of the temporomandibular region have psychological profiles and psychological dysfunctions similar to those with other chronic musculoskeletal disorders, such as tension headaches and arthritis or back pain. It is undeniable that psychological and psychosocial factors are important in understanding TMD, but there is less evidence that these factors are etiological. Although studies have indicated the role of stress in the aetiology of TMD, the question of whether psychological factors caused dysfunctions or reflect the impact of these dysfunctions on the person remained unknown, largely because of the absence Longitudinal incidence studies designed to test the relationship between the onset of pain due to dysfunction and the development of psychological and psychosocial factors [4].

Several TMD evaluation tools have been proposed in the literature. However, no universal diagnostic criteria have yet been established. Dworkin and Leresche [5] have proposed the RDC/TMD (The Research Diagnostic Criteria for Temporomandibular Disorders), which has been used in several clinical and epidemiological studies. More recently, Schiffman, *et al.* 2014 [6] proposed a new comprehensive version of the RDC/TMD, known as the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD). They claimed that DC/TMD included a valid and reliable screening questionnaire, as well as the most common DTM diagnostic algorithms including those related to pain. Despite their advantages, RDC/TMD and DC/TMD were rather bulky assessment tools because they require the individual to be present to diagnose dysfunction, and they were difficult to use on large samples.

A self-administered questionnaire that includes the Fonseca anamnestic index (FAI) has been proposed as a low-cost, easy-to-use alternative DTM assessment tool for the non-consulting population [7]. The use of FAI to detect the signs and symptoms of TMD offers the advantage of being easily used by general practitioners or epidemiologists. Thus, the FAI would serve as a preliminary tool for detecting TMD.

Aim of the Study

The aim of this study was to evaluate the TMD and their severity in a non-consulting population: the students of the Faculty of Dental Medicine of Casablanca (FDMC) according to the stress undergone during exam periods and out of this period.

Methods

To meet the above objectives we conducted a descriptive study. The target population of the study included all FDMC students (from 1st to last study year 752 students according to the report of the faculty council of 9 March 2017). Students who did not wish to participate in the study were excluded. Those who agreed to participate in the study completed the self-administered questionnaire. Prior to this, all participants were informed about the purpose of the study, and about the anonymity and confidentiality of the data collected. Their informed consent has been obtained.

A sample of 310 first- to fifth-year university students participated in our study, representing 41% of the total FMDC student population.

An initial evaluation was conducted from Monday, January 09 to Tuesday, January 10, 2017. The questionnaires were distributed to students during the exam period just after they left the exam classrooms.

The students who responded to the first part of the study were invited to participate in the second part of the work that took place over 5 days from 07 February 2017 (out of the exam periods).

The questionnaire consisted of three main components:

- 1- First Component: Collected demographic and history of trauma, medical and dental health.
- 2- Second part: Was a Fonseca questionnaire, which follows the characteristics of a multidimensional evaluation. It consists of 10 questions, including verification of the presence of pain in the temporomandibular joint (TMJ), head, back and during chewing, parafunctional habits, movement limitations, joint rattling, perception of malocclusion and the feeling of emotional stress.
 1. The participants were informed that the 10 questions should be answered with “yes”, “no” or “sometimes” and only one answer should be marked for each question. Each answer “yes” was assigned a value of 10, each “sometimes” answers a value of 5 and each “no” answers a value of 0. The sum of the values for all 10 responses was used to rank each subject according to the criteria presented in tables 1 below [7].
- 3- Third component: Consisted of the Moroccan version of the perceived stress scale whose responses for each item vary according to a five-point Likert scale ranging from 0 (never) to 4 (very often), and which evaluate the level of perceived stress during the last month.

Total Score	TMD Class
Total between 0 and 15	No
Total between 20 and 40	Mild
Total between 45 and 65	Moderate
Total between 70 and 100	Severe

Table 1: The severity of TMD based on the Fonseca Anamnestic Index (FAI).

The 10-item PSS10: Perceived Stress Scale, were composed of two part, the first gathering six negative items measuring the perception of stress, while the second contained four positive items, measuring stress coping. The total score of the stress is obtained by the sum of the different items, responses and it varied from 0 to 40. A high score indicates a high level of perceived stress [8,9].

The Medical Informatics Laboratory of the Faculty of Medicine and Pharmacy of Casablanca did data analysing using SPSS version 20. Quantitative variables were described in terms of number and percentage. The qualitative variables were compared using a Spearman test.

Result

For our study 310 questionnaires were distributed, a total of 209 usable questionnaires were obtained, a response rate was 67.47%. The study included 141 female students (67.5%) and 68 men (32.5%) a gender ratio was 2.07. The average age of responding students is 20.6 years (standard deviation 1.9759 years) with extremes ranging from 17 to 32 years.

During the examination period

Table 2 showed the prevalence of responses to the Fonseca Questionnaire (FQ). The most common symptoms of TMD (obtained by the sum of YES and SOMETIMES) were: headache (59.4%), if considered tense or nervous (58.4%), pain in the neck (45.5%), the habit of squeezing or crushing (44%) and the clicking of TMJ (40.1%).

Questions	Yes	No	Sometimes
	N (%)	N (%)	N (%)
1. Is it hard for you to open your mouth?	14 (6.7)	169 (80.9)	26 (12.4)
2. Is it hard for you to move your mandible from side to side?	13 (6.2)	184 (88)	12 (5.7)
3. Do you get tired /muscular pain while chewing?	38 (18.2)	148 (70.8)	23 (11)
4. Do you have frequent headaches?	71(34)	85 (40.7)	53 (25.4)
5. Do you have pain on the nape or stiff neck?	62 (29.7)	114 (54.5)	33 (15.8)
6. Do you have earaches or pain in craniomandibular joints?	27 (12.9)	150 (71.8)	32 (15.3)
7. Have you noticed any TMJ clicking while chewing or when you open your mouth?	49 (23.4)	125 (59.8)	35 (16.7)
8. Do you clench or grind your teeth ?	60 (28.7)	117 (56)	32 (15.3)
9. Do your feel your teeth do not articulate well?	44 (21.1)	145 (69.4)	20 (9.6)
10. Do you consider yourself a tense (nervous) person?	75 (35.9)	87 (41.6)	47 (22.5)

Table 2: Participants' responses to Fonseca's questionnaire.

The percentage of participants with different levels of TMD based FAI is shown in figure 1. 31% were classified as having no dysfunction, while 7% were classified as having a serious dysfunction.

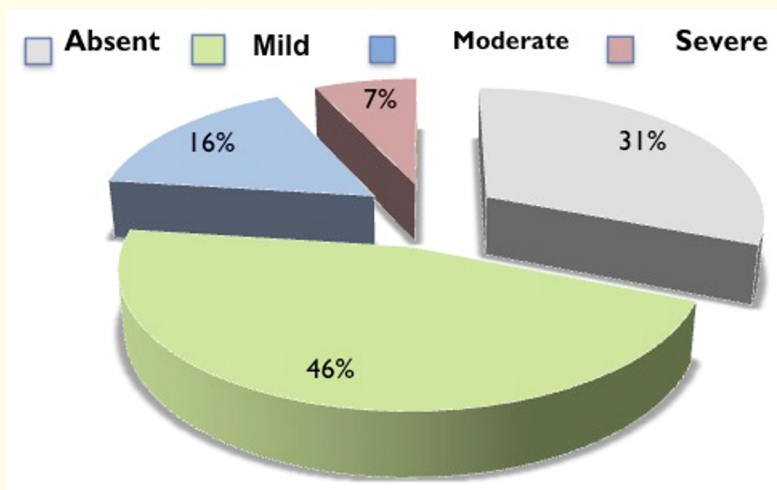


Figure 1: Classification of the severity of TMD.

The frequency of positive responses to FQ was higher and statistically significantly different among women than in the male group (Figure 2).

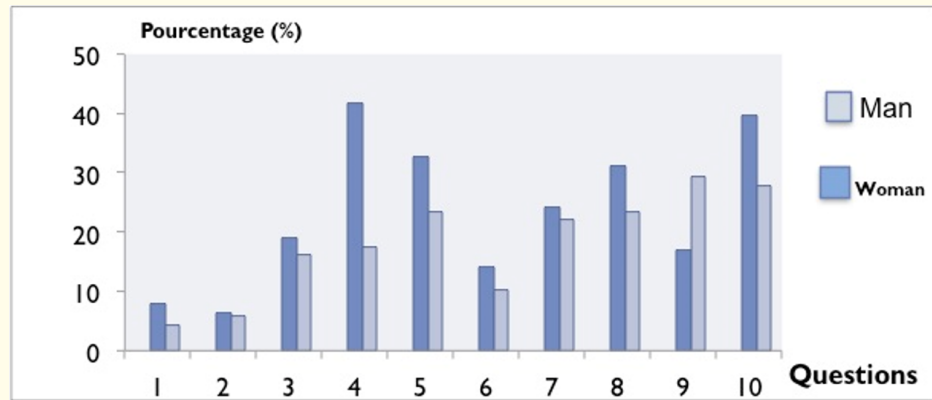


Figure 2: Positive answers (yes) from participants to each of the 10 questions of the Fonseca questionnaire.

Table 3 showed the stress level of participants over the past month. The average stress for female students was 24.09 (standard deviation 7.04) with extremes ranging from 06 to 40, while the average stress for male students is 19.22 (standard deviation 6.58) with extremes ranging from 03 to 34. The average perceived stress level for all students (both sexes combined) over the past month was 22.5.

	Mean of Stress
Female	24,09
Male	19,22
All participants	22,5

Table 3: Perceived stress level during the last month.

Figure 3 showed the severity of TMD according to the stress level. Participants with no dysfunction had a stress average of 20.6. Those with a light TMD had an average of 22.86. The average stress for students with moderate TMD was 23.9. Subjects with severe forms of TMD had an average of 25.9.

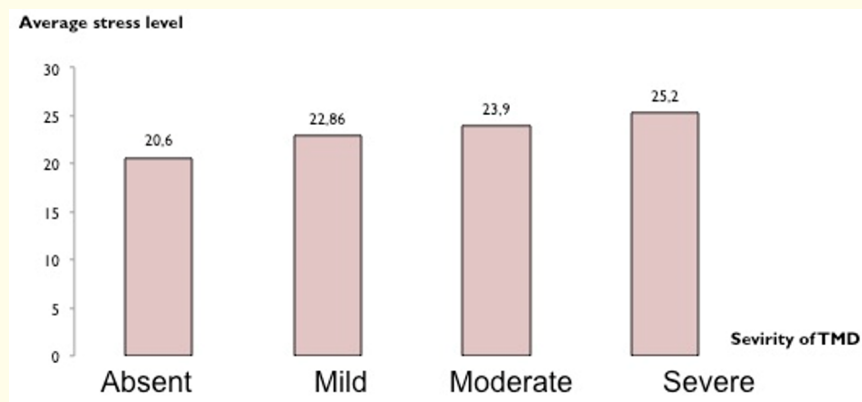


Figure 3: Classification of TMD according to the level of stress.

Outside the examination period

The main of TMD decreased from 27.86 during the examination period to 25 out of the examination period. ($p < 0.001$) (Table 4). The mean of stress during the exam period was 22.85 and increased to 19.17 outside of the exam period. This decrease is statistically significant ($p < 0.001$) (Table 4).

	During the exam period	Outside the examination period	p
Mean of CMD	27, 86	25	< 0,001
Mean of Stress	22, 85	19, 17	< 0,001

Table 4: Severity of TMD and stress during and outside the examination period.

Tables 5 illustrated the correlation between TMD and stress during and outside the examination period. We noted Spearman’s correlation coefficients (ρ) and degrees of significance p . The TMD were statistically significant correlated to stress with coefficients of $\rho = 0.241$ during the exam period and $\rho = 0.257$ outside the exam period.

	Stress
TMD	$\rho = 0, 241$
During examinations period	$p < 0, 01$
TMD	$\rho = 0, 257$
Outside examinations period	$p < 0, 001$

Table 5: Correlation between TMD and stress during examinations period and outside of it.

Discussion

This study highlighted the relationship between TMD and stress during examination periods and outside this period in a student population of FDMC. This work showed that, there is a low but statistically significant correlation between TMD and stress.

Our study confirms that the severity of TMD actually increases proportionately with the level of stress. A decrease in the severity of TMD was also observed between the two times of the study, as the severity level of TMD increased from 27.86 during the examination period to 25 outside this period. Similarly, the average stress level decreased from 22.85 to 19.17. Our research has shown that women are more susceptible to psychological stress than men, and if stressful situations significantly increase the severity of TMD, it seems that women are more severely affected by this condition.

In Saudi Arabia, the study conducted by Syed Rashid Habib (13/10), which assessed the prevalence and severity of TMD in university students at Riyadh, found a rate of response was 66.6%. The rate of response in our study was 67.47%, this rate was perceived as satisfactory.

According to our study, the most common symptoms of TMD (obtained by the sum of the YES and SOMETIME responses) were: have headaches (59.4%), if considered tense or nervous (58.4%), pain on the nape or stiff neck (45.5%), the habit of clenching or grinding teeth (44%) and temporomandibular joint (TMJ) clicking (40.1%). A Portuguese survey (17 /11) of 3260 children and adolescents in Portugal showed that the most common symptoms of TMD were: if considered tense or nervous (52%), have headaches (36.8%), the habit of squeezing or grinding teeth (27.3%), pain on the nape or stiff neck (17.7%). Similarly, the study conducted in 2007 on population of students in Brazil (20 /12), showed marked characteristics among all participants with TMD: 76.72% considered themselves tense; 71.55%

reported squeezing or grinding their teeth; 65.52% reported TMJ clicking; 64.66% reported frequent headaches; and 61.21% reported pain on the nape or stiff neck.

It can be concluded that the signs and symptoms usually present in patients were as follows:

- Frequent headaches
- Reduced mobility and neck stiffness
- Tightening or bruxism (grinding of teeth)
- TMJ clicking
- State of nervousness.

According to our study 31% were classified as having no dysfunction, while 7% were classified as having a serious dysfunction. In table 6, we compared the severity levels of TMD of the students in our sample with those of the study conducted by Kariny NOMURA in 2007 (20/12) that evaluated the prevalence and severity of TMD in university students in Brazil, the Beatriz Minghelli (Portugal) survey (17/11) in 2014 and the Syed Rashid Habib study [10]. Participants in our study were more severely affected, which may be explained by the period of time our study was conducted (during examination period).

	Absent	Mild	Moderate	Severe
Syed Rashid Habib [12]	53,20%	36,10%	9,60%	1,10%
Nomura K [14]	46,79%	35,78%	11,93%	5,50%
Minghelli B [13]	74,80%	22,40%	2,50%	0,30%
Our study	31%	46%	16%	7%

Table 6: Degree of TMD severity in four studies.

The prevalence of positive responses to Fonseca questions was higher and statistically significantly different among women than among men. Girls therefore showed a high prevalence of TMD (71.72%). And these results are consistent with the results of other studies in different populations. Indeed, according to Minghelli, *et al.* [11] 61,5% of girls have a sign of TMD. In addition, the study conducted in Brazil reported that women were the most affected group, with 63.11% suffering from TMD [12].

The high prevalence of TMD in girls may be explained by physiological characteristics, particularly hormonal variations and the structure of connective and muscle tissue. The hyperlaxity of these tissues, linked to oestrogen levels, explains why they have a low capacity to withstand functional pressure, leading to TMD. Leresche, *et al.* [13] found a variation in the severity of clinical pain in women with TMD during the menstrual cycle, where the high severity of pain coincided with the period of high oestrogen concentrations.

Other epidemiological studies show that the increased intensity of TMD can be observed between the ages of 20 and 40, i.e. in young and middle-aged adults, more commonly in women than in men Genetic predisposition and hormonal factor can play an essential role, especially in puberty, the reproductive period and menopause, which are characterized by hypersensitivity in women [14].

According to our study, the main stress for female students were 24.09, while the male students were 19.22. The main perceived stress level for all students (both sexes combined) over the past month is 22.5. Comparable data have not been found in the literature due to the lack of studies that measure the STRESS variable. Nevertheless, based on the answer to Fonseca’s 10th question, the Brazilian study [12] reported that 76.72% of these participants considered themselves nervous. In Portugal [11], 86.3% responded positively to this question. In Saudi Arabia [10], participants’ medical histories revealed that 30.5% of students were subject to stress.

A study conducted in Poland [14] by Stocka Anna, which evaluates the effect of stress on chewing muscle function in young adults, used the PSS stress scale10, and divided the study group into 3 subgroups: 29% with low stress, 40% with medium stress, and the remaining 31% with high stress.

It can be hypothesized that university students are increasingly subject to stress.

The impact of academic stress on the health of university students has already been discussed in the literature [15]. The university setting would be an ideal context to study the mental health of young adults. University students often experience role transitions, moving away from the parental home for the first time, living with other students without parental supervision. These changes may increase the risk of depression [15,16].

Our study showed that the severity of TMD increases with stress levels. Comparable data have not been found in the literature. However, it can be hypothesized that stress could be considered as a factor contributing to the appearance and development of TMD.

The analysis of the first questionnaire and its comparison with the results obtained by the second shows a decrease in the level of severity of TMD from 27.86 to 25. Similarly, the main stress level decreased from 22.85 to 19.17. This result is consistent with the fact that the stress level increased during the examination period. And it will confirm our hypothesis that stress has a particular involvement in the development of TMD.

A Japanese study conducted in 2015 [17], involving 175 students at Nayoro University, whose objective was to show the relationship between personality type and TMD, found that a high probability of TMD was correlated with susceptibility to emotional stress ($p < 0.001$). Students with an increased probability of TMD had high scores of bruxism and TABP (Type A Behavior Pattern). On the other hand, students with resilience to stress had lower scores of DTM and bruxism. Overall, a weak but statistically significant association was also observed in this study between TMD and stress.

Some studies indicate that minimal cognitive-behavioural interventions and self-regulation training contribute significantly to patient recovery [18].

The patient's anxieties and fears should be lessened and eliminated by informing the patient that the pain associated with a TMD was as benign as that associated with headaches and musculoskeletal pain from another part of the body. Thereafter, it is a good idea to make the patient aware of factors that can cause, aggravate and maintain pain. Hence the importance of correcting harmful habits, using self-regulation to better manage pain and counter the harmful effects of stress, anxiety and psychological distress, restoring activity levels and correcting misconceptions about the cause and recurrence of symptoms. Thus, relaxation and stress management techniques can be used when the relapses of pain coincide with high levels of tension and stress. The same applies to avoidance strategies aimed at countering the harmful effects of parafunctional oral habits, such as nocturnal and diurnal bruxism, onychophagia, mania and mandibular tics [19].

Joanna Biegańska and M Pihut 2014 [20] developed a psychoeducational program, the aim of which was to provide patients with basic information on the contribution of stress to the appearance of TMD and to educate them on the most commonly used methods in psychology to cope with stress. This program has improved patients' quality of life. These cognitive behavioural interventions and many others were applicable to university students, who, according to several studies, are subject to increasing psychological fragility. The stress perceived by the student is the result of an imbalance between multiple demands and the individual's ability to adapt to them.

The aetiologies are multiple and several factors combine: personal factors; family factors; social factors; and professional ones. To avoid the negative consequences of the accumulation of this high stress, it is important to provide practical advice on subjective stress management while improving the student's experience in terms of objective conditions and prospects for the future. Indeed, the period of study is nothing more than the preparation for a professional career full of constraints and obligations, which is increasingly stressful physically and nervously.

Conclusion

The results of this study revealed a high prevalence of TMD among FMDC students. Women are more severely affected. The severity of TMD increases in proportion to the main of Stress. A weak but statistically significant association appears to be between TMD and STRESS. Cognitive interventions should therefore be adopted to improve the overall health and quality of life of students.

Conflict of Interest

The authors have no conflict of interest to declare.

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