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The Impact of Past Stress on the Temporomandibular Joint: A Survey among First and Fifth Stage Dental Students at Dijlah University College

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ABSTRACT

The present study aims to assess the prevalence of temporomandibular disorder symptoms among dental students at Dijlah University College and to investigate their association with sex, parafunctional habits, psychological stress, and anxiety. Additionally, it seeks to identify possible risk factors for the development of temporomandibular disorders, with a focus on students in the first and fifth stages of the dentistry program.

A cross-sectional study was conducted on a total of 434 dental students at Dijlah University College in Baghdad, Iraq. The sample included 167 fifth-stage students and 267 first-stage students, comprising 196 males and 238 females. Data was collected using a structured questionnaire developed by researchers, administered over a period of approximately four months, from December 1, 2023, to March 10, 2024.

The results indicated a significant correlation between temporomandibular joint disorders and gender, with a higher incidence observed in females compared to males. Additionally, the prevalence of temporomandibular joint pain was significantly higher among fifth stage students compared to first stage students. However, the intensity of pain was significantly higher in stage one students than in stage fifth students.

TMD is significantly (P<00) more prevalent in females than males. While TMJ pain is more common among fifth-stage students, its severity is greater (P<00) in first-stage (preclinical) students.

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1- INTRODUCTION

The temporomandibular joint (TMJ) is a ginglymoarthrodial joint, derived from the terms ginglymus and arthrodia. Ginglymus refers to a hinge joint that moves in one plane (backward and forward), while arthrodia denotes a gliding joint responsible for sliding movements. The TMJ plays a vital role in essential functions such as mastication and speech, making its complex structure, functional mechanisms, adaptability, symptomatology, pathological conditions, and radiographic imaging features subjects of significant interest in the field of dentistry [1]. Temporomandibular disorders (TMD), according to the American Academy of Orofacial Pain, refer to a collection of conditions characterized by pain, with or without dysfunction, in the masticatory muscles, the temporomandibular joint (TMJ), and related anatomical structures [2].

Patients with TMD may suffer from pain localized to the TMJ area and masticatory muscles, otalgia, joint noises such as clicking or crepitus, mandibular deviation or misalignment, restricted mouth opening, muscular fatigue, headaches, and dental attrition [3]. TMD has a multifactorial etiology, involving genetic and behavioral factors, direct and indirect trauma, psychological influences, as well as postural and parafunctional habits. However, the exact role and impact of these etiological factors remain controversial and are not yet fully understood [4]. The biopsychosocial model has garnered significant attention in recent years, prompting extensive discourse regarding the contribution of emotional factors to the etiology of temporomandibular disorders (TMD) [5]. Emotional distress, including stress, anxiety, and depression, has been linked to the manifestation of temporomandibular disorder (TMD) signs and symptoms across diverse populations. Among these factors, stress and anxiety are particularly implicated in elevating masticatory muscle activity and promoting the emergence of parafunctional habits, which may result in microtrauma to the temporomandibular joint (TMJ) and associated muscular injuries [6, 7].

Most studies tend to focus either on TMJ-related pain or bruxism, yet they often involve a mixed group of patients presenting with various overlapping conditions. These typically include individuals with definite or suspected TMJ disorders, habitual jaw clenching in response to stress or functional disturbances, and those experiencing diurnal and/or nocturnal bruxism. As a result, true TMJ disorders are rarely examined in isolation, since they are frequently influenced by confounding factors such as clenching and bruxism [8]. Age and gender have also been investigated; however, it remains unclear whether they act as causative factors or merely coincide with the disorder [9]. Several factors place college students at risk of developing TMD, with study-related stress being one of the most significant. Multiple elements may contribute to this stress, including examinations, completing academic tasks, meeting parental expectations, adjusting to the transition from high school to university life, and forming new relationships with peers [10, 11]. The present study aims to assess the prevalence of TMD signs and symptoms among dental students at Dijlah University College. It also investigates the correlation between TMD and various contributing factors, including gender, parafunctional habits, and psychosocial variables such as emotional stress, anxiety, and depression. Additionally, the study seeks to identify key risk factors for TMD among first- and fifth-stage students and to determine the most common etiological contributors. Emphasis is placed on examining the impact of psychological stress and other stress-inducing factors on the development and manifestation of TMD.

2- MATERIAL AND METHODS

The study was designed as a cross-sectional survey and was conducted from December 1, 2023, to March 10, 2024. The teaching clinics of the Dentistry Department at Dijlah University College were selected as the study site. The study involved 267 first stage and 167 fifth-stage dental students. Participants were asked to complete a pretested questionnaire developed by the researcher, aiming to compare the prevalence of TMJ problems between the two stages. The study also examined the impact of stress on TMJ disorders, with a focus on gender and academic level. The questionnaire began with a demographic section, which included gender, age, and stage of study. The second section comprised 16 yes/no questions addressing TMD symptoms and potential associated factors. The study was approved by the Ethical and Scientific Committee of the Dentistry Department at Dijlah University College. Written consent was obtained from each participant after a full explanation of the study's aims. Students were assured that all data would remain confidential and be used solely for research purposes.

Statistical Analysis

SPSS software version 26 was used to analyze the data. The descriptive statistics included the mean with standard deviation and frequency with percentage. The Chi-square (X^2) test with a significance level of less than 0.05 was performed to evaluate the association between variables.

3- RESULTS

The study enrolled 434 college students, with an average recorded age of 20.1 years. Males accounted for 45.2% of the participants, and 62.2% of all participants were students in their first academic stage. (Table 1) presents the demographic data.

Table (1): distribution of studied cases according to demographic variables

Variables		N	%
Gender	Male	196	45.2%
	Female	238	54.8%
Grade	First	267	62.2%
	Fifth	164	37.8%

Table 2 presents the prevalence of TMJ symptoms among the study participants. A total of 15% of the subjects reported experiencing jaw joint pain, with 25% of these individuals indicating pain on the right side, 14.1% on the left side, and 60.9% experiencing pain bilaterally. The highest percentage (64.9%) of the college students reported experiencing mild pain. TMJ-related noises were reported by 18.9% of the participants. Of these individuals, 59.2% experienced noise during mouth opening, 7% during mouth closing, and 33.8% during both actions .Parafunctional habits were observed as follows: 29.6% of the participants exhibited nail-biting, 16.7% reported teeth clenching, 13% reported teeth grinding, 52.9% engaged in lip or object biting, and 60.9% had a chewing gum habit. Additionally, 6.8% of the participants reported experiencing jaw locking or displacement, while 14.8% reported stiffness in the jaw joint. Pain in or around the ears or cheeks were noted by 20.3% of the subjects. Headache and/or neck pain were reported by 54.6% of the participants, with 29.3% experiencing mild pain, 26.3% experiencing moderate pain, and 4.4% experiencing severe pain. Severe morning pain was reported by 22.5% of participants, while the pain was worst in the afternoon and at night for 22.8% and 53.7% of participants, respectively. Furthermore, 10.9% of the participants had a history of head trauma, 14.5% reported a recent change in bite, and 5.1% had received treatment for TMJ disorders. A history of other joint problems was reported by 25.3% of the participants.

Table (2): Distribution of studied cases according to response to TMD factors

Variables		N	%
Jaw joint Pain		65	15.0%
Side	Right	16	25.0%
	Left	9	14.1%
	Right and Left	39	60.9%
Pain Severity	Mild	50	64.9%
	Moderate	25	32.5%
	Sever	2	2.6%
TMJ noises		80	18.9%
Jaw Movement	Open	42	59.2%
	Close	5	7.0%
	Open and Close	24	33.8%
Nail biting		126	29.6%
Clenching		69	16.7%
Grinding		54	13.0%
Biting objects		226	52.9%
Chewing gum		262	60.9%
Jaw locked		29	6.8%
Stiff jaw		63	14.8%
Pain around ears		87	20.3%
Headache / neck Pain		237	54.6%
Pain Severity	No Pain	174	40.1%
	Mild	127	29.3%
	Moderate	114	26.3%
	Sever	19	4.4%
Pain Time	Morning	55	22.5%

	Afternoon	58	23.8%
	Night	131	53.7%
Head trauma		47	10.9%
Bite change		63	14.5%
Recent treatment		22	5.1%
Other joints Problem		110	25.3%

Table (3) shows that the rate of chewing gum among females (68.1%) was significantly higher than that among males (52.1%) (P = 0.001). The occurrence of pain in or around the ears was also significantly higher among females (27.7%) compared to males (11.3%) (P = 0.001). Similarly, the prevalence of headache or neck pain was significantly greater among females. In terms of pain severity, a higher percentage of females reported mild pain (31.5%) compared to males (26.5%), moderate pain (32.4%) compared to males (18.9%), and severe pain (5.5%) compared to males (3.1%), with all differences being statistically significant (P = 0.001). The other joint problems were significantly higher among females.

Table (3): Association of studied variables according to gender

Variables		Male		Female		
		N	%	N	%	p value
Grade	First	114	58.2%	156	65.5%	0.114
	Fifth	82	41.8%	82	34.5%	
Jaw joint Pain	Yes	26	13.3%	39	16.4%	0.365
Side	Right	7	25.9%	9	24.3%	0.845
	Left	3	11.1%	6	16.2%	
	Right and Left	17	63.0%	22	59.5%	
Pain Severity	Mild	24	75.0%	26	57.8%	0.200
	Moderate	8	25.0%	17	37.8%	
	Sever	0	0.0%	2	4.4%	
TMJ noises	Yes	35	18.4%	45	19.3%	0.816
Jaw Movement	Open	22	66.7%	20	52.6%	0.484
	Close	2	6.1%	3	7.9%	
	Open and Close	9	27.3%	15	39.5%	
Nail biting	Yes	55	28.6%	71	30.3%	0.703
Clenching	Yes	26	14.1%	43	18.8%	0.200
Grinding	Yes	23	12.3%	31	13.6%	0.696
Biting objects	Yes	98	50.8%	128	54.7%	0.419
Chewing gum	Yes	100	52.1%	162	68.1%	0.001*
Jaw locked	Yes	16	8.2%	13	5.5%	0.265
Stiff jaw	Yes	30	15.4%	33	14.3%	0.764
Pain around ears	Yes	22	11.3%	65	27.7%	0.001*
Headache / neck Pain	Yes	81	41.3%	156	65.5%	0.001*
Pain Severity	No Pain	101	51.5%	73	30.7%	0.001*
	Mild	52	26.5%	75	31.5%	
	Moderate	37	18.9%	77	32.4%	
	Sever	6	3.1%	13	5.5%	
Pain Time	Morning	23	25.8%	32	20.6%	0.492
	Afternoon	18	20.2%	40	25.8%	
	Night	48	53.9%	83	53.5%	
Head trauma	Yes	26	13.3%	21	8.9%	0.142
Bite change	Yes	26	13.3%	37	15.5%	0.516
Recent treatment	Yes	9	4.6%	13	5.5%	0.681
Other joints Problem	Yes	39	19.9%	71	29.8%	0.018*

Table (4) shows that TMJ pain was significantly more common among fifth-stage students (55.4%) than first-stage students (44.6%) (P = 0.002). Mild pain was more frequent in the fifth stage (58%), while moderate (68%) and severe pain (100%) were more common in the first stage (P = 0.041). TMJ noises were higher in the fifth stage (57.5%) (P = 0.001). In contrast, nail biting (75.4%), lip/object biting (74.8%), and chewing gum (70.6%) were more prevalent among first-stage students (P = 0.001). TMJ stiffness/tiredness was higher in the fifth stage (54%) (P = 0.004). Headache/neck pain occurred more in the first stage (56.5%) (P = 0.008), with higher severity reported across all levels: mild (52%), moderate (57%), and severe (84.2%) (P = 0.001). Morning and afternoon pain were more common in the fifth stage (56.4% and 53.4%, respectively), while nighttime pain was more reported by the first stage (63.4%) (P = 0.016). Other joint problems were also more frequent in the first stage (72.7%) (P = 0.008).

Table (4): Association of studied variables according to grade

Variables		First		Fifth		
		N	%	N	%	P value
Jaw joint Pain	Yes	29	44.6%	36	55.4%	0.002*
Side	Right	9	56.3%	7	43.8%	0.388
	Left	5	55.6%	4	44.4%	
	Right and Left	15	38.5%	24	61.5%	
Pain Severity	Mild	21	42.0%	29	58.0%	0.041*
	Moderate	17	68.0%	8	32.0%	
	Sever	2	100.0%	0	0.0%	
TMJ noises	Yes	34	42.5%	46	57.5%	0.001*
Jaw Movement	Open	16	38.1%	26	61.9%	0.994
	Close	2	40.0%	3	60.0%	
	Open and Close	9	37.5%	15	62.5%	
Nail biting	Yes	95	75.4%	31	24.6%	0.001*
Clenching	Yes	42	60.9%	27	39.1%	0.786
Grinding	Yes	34	63.0%	20	37.0%	0.991
Biting objects	Yes	169	74.8%	57	25.2%	0.001*
Chewing gum	Yes	185	70.6%	77	29.4%	0.001*
Jaw locked	Yes	21	72.4%	8	27.6%	0.252
Stiff jaw	Yes	29	46.0%	34	54.0%	0.004*
Pain around ears	Yes	57	65.5%	30	34.5%	0.543
Headache / neck Pain	Yes	134	56.5%	103	43.5%	0.008*
Pain Severity	No Pain	123	70.7%	51	29.3%	0.001*
	Mild	66	52.0%	61	48.0%	
	Moderate	65	57.0%	49	43.0%	
	Sever	16	84.2%	3	15.8%	
Pain Time	Morning	24	43.6%	31	56.4%	0.016*
	Afternoon	27	46.6%	31	53.4%	
	Night	83	63.4%	48	36.6%	
Head trauma	Yes	29	61.7%	18	38.3%	0.950
Bite change	Yes	33	52.4%	30	47.6%	0.085
Recent treatment	Yes	14	63.6%	8	36.4%	0.888
Other joints Problem	Yes	80	72.7%	30	27.3%	0.008*

4- DISCUSSION

A cross-sectional study was conducted on 434 dental students at Dijlah University College in Baghdad, Iraq, including 167 fifth-stage students and 267 first-stage students (196 males and 238 females). The results showed that the prevalence of TMD symptoms, pain severity, parafunctional habits (such as chewing gum), and other joint problems were significantly higher among female students compared to males. Furthermore, based on the stage of the study, parafunctional habits (chewing gum, biting objects) and the occurrence of other joint problems were significantly more common among first-stage students than among fifth-stage students.

The prevalence of TMJ pain, TMJ noises, and TMJ stiffness/tiredness was significantly higher among fifth-stage students compared to first-stage students. Mild TMJ pain was more common in the fifth stage, whereas moderate pain was significantly more frequent in the first stage. Severe pain occurred exclusively in the first stage, indicating a highly significant difference. Additionally, both the occurrence and severity (mild, moderate, and severe) of headache/neck pain were significantly higher among first-stage students. Regarding the timing of pain, morning and afternoon pain were more frequently reported by fifth-stage students, while nighttime pain was significantly more prevalent among first-stage students.

A previous study conducted in Japan in 2013 on first-year university students (n = 1,930) showed no difference in the presence of TMD between genders [12]. In contrast, the present findings, along with a cohort study conducted in Brazil using Fonseca's Anamnestic Index, found a significant association between TMD and the female gender [13].

The impact of anxiety on the pain threshold within the masticatory muscles was documented by Nomura et al. (2007). It has also been observed that college students tend to exhibit elevated levels of anxiety and stress, attributable to the critical role these years play in shaping their future professional trajectories. Therefore, selecting young college students as subjects in the present study was intentional, as they are considered a high-risk group for anxiety and stress. These findings are comparable to those of a study conducted in Iraq, which assessed the prevalence of TMD among 208 males and 278 female undergraduate dental students using an email-based questionnaire. The current results showed that more than a third of the students were suffering from mild TMD, with no statistically significant association with gender.

However, age and academic grades were significantly associated with TMD severity. Pain or discomfort in the neck region was significantly more prevalent among female students. Furthermore, students aged over 20, particularly those engaged in clinical training, exhibited a higher prevalence of TMD compared to their counterparts under 20 in the earlier years of study [14]. Multiple studies have documented a high prevalence of TMD among individuals in the age range of 2^{nd} to 3^{rd} decades [15].

The result of this study agrees with the previous study, as it showed that there is an association between grade, gender and TMD. The higher prevalence of temporomandibular disorders (TMD) in females compared to males is likely attributed to physiological differences, including hormonal fluctuations and a lower pain threshold in females [16].

The presence of TMJ pain was significantly higher among fifth-stage students compared to first-stage students. However, the intensity of the pain was significantly higher in the first stage. The current result may be explained by to the parafunctional habits is high among first-stage students, as well as the increased stress levels they experience when transitioning into the university environment. Other studies have suggested that students frequently experience heightened levels of stress and anxiety upon entering the clinical practice. The stress were established as risk factor linked to the development of TMD [17].

A limitation of this study is that the assessment of temporomandibular disorders (TMD) relied on self-reported data rather than clinical evaluations. Furthermore, the respondents were from a narrow age range, which may limit the generalizability of the findings. The study was conducted at a single institution, and incorporating participants from other universities would improve the external validity of the results.

4- CONCLUSION

There is a significant association between TMD and gender, with a higher occurrence rate of TMD in females compared to males. The prevalence of TMJ pain was significantly higher among fifth-stage students than first-stage students, while the severity of pain was significantly greater in first stage (preclinical) students compared to those in the fifth stage.

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تأثير الإجهاد السابق على المفصل الفكي الصدغي : مسح بين طلاب طب الأسنان في المرحلتين الأولى والخامسة في كلية دجلة الجامعية.

الـخلاصـة

أُجريت هذه الدراسة على 434 من طلاب كلية طب الأسنان، وتضمنت 167 طالبًا من المرحلة الخامسة و267 من المرحلة الأولى (196 ذكرًا و238 أنثى) في كلية طب الأسنان بجامعة دجلة في بغداد / العراق. تم استخدام استبيان تم صياغته من قبل الباحث، واستمرت الدراسة لمدة أربعة أشهر، من 1 كانون الأول 2023 إلى 10 آذار 2024.

تهدف الدراسة الى تقييم مدى انتشار أعراض اضطرابات الفك الصدغي وارتباطها بالجنس والعادات السيئة، بالإضافة إلى دراسة تأثير الضغط النفسي والقلق لدى هؤلاء الطلبة. كما تسعى إلى معرفة عوامل الخطر المحتملة لاضطراب المفصل الفكي الصدغي بين طلاب المرحلة الأولى والمرحلة الخامسة لغرض إكتشاف مدى إرتباط اضطرابات المفصل الفكي الصدغي بهذه العوامل.

أظهرت نتائج الدراسة المقطعية للطلبة المشاركين (والذين كان متوسط أعمارهم مابين 20,1 ± 2,19 سنة) وجود ارتباط كبير بين اضطرابات المفصل الفكي الصدغي والجنس، حيث كان معدل حدوث اضطرابات المفصل الفكي الصدغي أعلى بكثير لدى الإناث مقارنة بالذكور. كما كان انتشار ألم المفصل الفكي الصدغي أعلى بشكل ملحوظ في المرحلة الخامسة مقارنة بالمرحلة الأولى، بينما كانت شدة الألم في المرحلة الأولى أعلى بكثير منها في المرحلة الخامسة.