



## RESEARCH ARTICLE

# REVISED Temporomandibular joints disorders (TMDs) prevalence and their relation to anxiety in dental students [version 2; peer review: 2 approved]

Lujain Homeida, Emtenan Felemban, Wed Kassar, Mazen Ameen, Salwa Aldahlawi

Basic and Clinical Oral Sciences,, Umm-Al-Qura University, Makkah, 24382, Saudi Arabia

**v2** First published: 03 Mar 2022, 11:271  
<https://doi.org/10.12688/f1000research.76178.1>  
 Latest published: 27 Apr 2022, 11:271  
<https://doi.org/10.12688/f1000research.76178.2>

## Abstract

**Background:** Temporomandibular joint disorders (TMDs) are very common disorders affecting the population and causing pain. Researchers have reported a high prevalence of TMDs among university students due to increased distress. The aims of this study were to determine the frequency of TMDs in Umm al-Qura University (UQU) dental students using the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD), and to examine the relationship between anxiety, bruxism, and TMDs among those students.

**Methods:** The DC/TMD pain screener questionnaire was completed by dental students. Students who reported TMD pain or had at least one positive TMD symptom were invited to the dental clinic for a full TMJ evaluation. History of bruxism was documented and an ultra-brief tool for detecting anxiety and depression (Patient Health Questionnaire-4 PHQ) was completed by all students.


**Results:** A total of 240 students responded to the TMD pain screener in which 119 reported at least one TMJ symptom. Only 93 dental students presented to clinical examination in which 64.5% (n=60) of them had temporomandibular joint disorders. Disc displacement with reduction and local myalgia (38.7% & 32.25%, respectively) were the most frequent diagnosis. A total of 29% (n=27) of students had more than one diagnosis. Overall, 41 participants (44.09%) reported a positive response to the anxiety scale and (n=38) 40% of participants reported parafunctional habits. Both the history of bruxism and anxiety were significantly related to TMDs ( $P=0.0002$ ) and also significantly higher in women of higher academic years ( $P\leq 0.01$ ).

**Conclusions:** This study found a high prevalence of TMDs among UQU dental students. Disc displacement with reduction was the most prevalent disorder. Bruxism and anxiety were associated with painful TMDs.

## Open Peer Review

Approval Status  

	1	2
<b>version 2</b> (revision) 27 Apr 2022	 view	 view
<b>version 1</b> 03 Mar 2022	  view	

1. **Arwa Farag** , Tufts School of Dental Medicine, Boston, USA

2. **Mahnaz Fatahzadeh**, Rutgers School of Dental Medicine, Newark, USA

Any reports and responses or comments on the article can be found at the end of the article.

**Keywords**

TMD, DENTAL, STUDENTS, PAIN, STRESS , PARAFUNCTIONAL HABITS

**Corresponding author:** Lujain Homeida ([lahomeida@uqu.edu.sa](mailto:lahomeida@uqu.edu.sa))

**Author roles:** **Homeida L:** Conceptualization, Data Curation, Investigation, Methodology, Project Administration, Resources, Supervision, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Felemban E:** Investigation, Methodology, Visualization, Writing – Original Draft Preparation; **Kassar W:** Investigation, Methodology, Visualization, Writing – Original Draft Preparation; **Ameen M:** Formal Analysis, Investigation, Methodology, Software, Visualization, Writing – Original Draft Preparation; **Aldahlawi S:** Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing

**Competing interests:** No competing interests were disclosed.

**Grant information:** The author(s) declared that no grants were involved in supporting this work.

**Copyright:** © 2022 Homeida L *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**How to cite this article:** Homeida L, Felemban E, Kassar W *et al.* **Temporomandibular joints disorders (TMDs) prevalence and their relation to anxiety in dental students [version 2; peer review: 2 approved]** F1000Research 2022, 11:271 <https://doi.org/10.12688/f1000research.76178.2>

**First published:** 03 Mar 2022, 11:271 <https://doi.org/10.12688/f1000research.76178.1>

**REVISED Amendments from Version 1**

A new paragraph was added to the discussion comparing TMD prevalence between dental students and general population. New references were used and added to the end of the references list. We amended the inclusion and exclusion criteria of the subjects participated in the study. No changes to data or figures were made.

**Any further responses from the reviewers can be found at the end of the article**

**Introduction**

Temporomandibular joint disorders (TMDs) are a very common group of musculoskeletal disorders affecting the temporomandibular joint (TMJ) and the face causing pain. They are considered a significant public health burden in approximately 5% to 12% of the general population (National Institute of Dental and Craniofacial Research 2018, July). Painful TMD has a direct impact on the person's quality of life and daily activity (Schiffman, Ohrbach *et al.* 2014). The TMD has a multifactorial pathogenesis in which it involves physiological and/or psychological factors like emotional distresses. Chronic parafunctional habits can cause repetitive trauma to the masticatory system, which may result in painful TMD episodes (Schiffman, Ohrbach *et al.* 2014). Parafunctional habits including but not limited to bruxing and clenching are known to have a critical role in aggravation and progression of TMD (Chisnoiu, Picos *et al.* 2015). Furthermore, psychosocial distress is also considered an important comorbidity contributing to TMD (Schiffman, Ohrbach *et al.* 2014). Some individuals, when exposed to stressful situations, tend to activate the stomatognathic system by clenching or grinding their teeth and increasing masticatory muscle contraction in order to relieve their stress. This increased masseter activation during stress and decrease in a relaxing situation was highly associated with the presence of TMD in individuals under more stress (Calixtre, Gruninger *et al.* 2014).

Many studies have looked into the psychological stress among university students and its impact on student's academic achievement and well-being. High prevalence of mental issues between university students was reported (Adlaf, Gliksman *et al.* 2001). Stallman *et al.* evaluated mental stress among Australian universities students and found a high prevalence of mental health problems (19.2 %) and subsyndromal symptoms (67.4%) which were significantly higher than those of the general population (Stallman 2010). This supports that university student population live under more stress than the general population. Thus, the prevalence of TMDs is relatively high among university students of different specialties.

Binoleil *et al.*, assessed the prevalence of headaches and painful TMDs and examined the relationship between TMDs, headaches, and depression rates among dental and medical students. They reported higher depression scores in patients with painful TMD compared to patients without TMD (Benoliel, Sela *et al.* 2011). Furthermore, the relationship between stress level and painful TMD in students of health science was supported in few more studies locally (Alkudhairi, Al Ramel *et al.* 2018) and internationally where stress played an important role in TMD progression (Monteiro, Zuim *et al.* 2011, Wieckiewicz, Grychowska *et al.* 2014).

The Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) was first proposed in 1992 and has been used widely as diagnostic protocol for TMD research (Dworkin and LeResche 1992). However, more research was done over the years to improve its validity and clinical utility. In 2014, an evidence-based new Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) was published and was considered a valid and reliable screening tool for use in clinical and research settings and included important modifications to the original RDC/TMD (Schiffman, Ohrbach *et al.* 2014). An acceptable sensitivity and specificity for a definitive diagnosis are considered as sensitivity  $\geq 70\%$  and specificity  $\geq 95\%$ . DC/TMD has diagnostic algorithms used to diagnose the most common pain-related TMD and most common intra-articular disorders (Schiffman, Ohrbach *et al.* 2014). The Axis I diagnostic algorithm consists of two parts; a self-report instrument where it is used for pain screening. The second part is used for TMJ clinical examination. The DC/TMD Axis II protocol included instruments to evaluate pain behavior, psychological status, and psychosocial functioning (Schiffman, Ohrbach *et al.* 2014).

To the best of our knowledge, the prevalence of TMDs among Umm al-Qura University (UQU) dental students has not been evaluated. In this study, we aimed to determine the prevalence of TMDs in UQU dental students using Diagnostic Criteria for Temporomandibular Disorders (DC/TMD). Also, to examine the relation between anxiety, self-reported bruxism and TMDs among UQU dental students.

**Methods**

This cross-sectional study was approved from Umm Al-Qura University (UQU), College of Dentistry Institutional Review Board (IRB) # (98-18). This study took place at collage of Dental Medicine Umm al Qura University. Data were collected between July 2019 and December 2019.

### Screening dental students for TMDs

The UQU dental collage program starts at 2<sup>nd</sup> level and it involves 5 academic years followed by internship year. All UQU dental students (year 2 - internship year) were included in this study and were invited by email to fill The Research Diagnostic Criteria (RDC) three-items pain screener on TMD symptoms (Schiffman, Ohrbach *et al.* 2014). Non-dental students from UQU and dental student from other universities were excluded. All participants have given their consent to participate in the study. Demographic data were collected including age, gender, marital status and year of study. In addition, history of TMD diagnosis and history of parafunctional habits (bruxism), and the use of chronic medication was included. The response to each of the three questions was documented.

### TMJ clinical examination and diagnosis

The respondents who reported TMD pain or had at least one positive answer to one of the 3-items questionnaire were invited to have a full TMJ clinical examination in the specialty clinic at UQU teaching hospital. Detailed medical history was obtained and subjects with underlying rheumatoid conditions, generalized pain symptoms, connective tissue disorders were excluded from the study. The TMJ clinical examination included detailed assessment of the TMJ position and structure, range of motion measurements, and palpation of muscle of mastication following DC/TMD protocol. The clinical examination provided to all students was performed by one oral medicine/TMD specialist. Written informed consent was obtained from all participants prior to clinical examination.

The DC/TMD diagnostic criteria algorithms were followed to reach a TMD diagnosis. This included pain-related temporomandibular disorders (local myalgia, myofascial pain, myofascial pain with referral, arthralgia, and headache attributed to TMD) and intra-articular disorders (disc displacement with reduction, disc displacement with reduction with intermittent locking, disc displacement without reduction with limited opening, disc displacement without reduction without limited opening). History of bruxism was obtained and those who had painful TMD were referred to an oral medicine specialist clinic for further treatment.

### Anxiety and depression scale

During the clinical examination, a valid and ultra-brief tool for detecting anxiety and depression (Patient Health Questionnaire-4 PHQ) was completed by all participants (Kroenke, Spitzer *et al.* 2009). This four-items questionnaire (PHQ-4) consisted of two core anxiety and two core depression items. The total score of this scale ranges from 0-12 and categorized as normal (0–2), mild (3–5), moderate (6–8), and severe (9–12). This instrument is not diagnostic, however, is indicator for further assessment of possible clinical disorder warranting treatment.

### Data analysis

The data analysis was performed using *Statistical Package for the Social Sciences* version 22 (SPSS Inc., Chicago, IL, USA, RRID:SCR\_019096). Student T-test and chi-square analysis were used to relate the existence of TMD problem to age, gender, academic year, history of bruxism and anxiety level. Also, to compare the anxiety scores among male and female groups. Statistical significance was set at  $P \leq 0.05$ .

### Results

A total of 304 electronic questionnaires were sent via email to all dental students at Umm al-Qura university who were between 2<sup>nd</sup> year to the internship with a total of 6 academic years. A total of 240 questionnaires were completed and returned with a compliance rate of 78.9% (Homeida 2022). The demographics of respondents from the pain screening questionnaire can be found in [Table 1](#).

### Temporomandibular joint disorder pain screener results

Out of the 240 responders, 49.5% (n=119) reported either TMD pain or other TMD symptoms in the past 30 days. And 20.4% (n=49) reported TMJ pain that comes and goes. The majority of students 30% (n=72) reported jaw habits with 25% (n=60) had pain on opening, 16% (n=40) reported pain on chewing hard or tough food and 14% (n=35) had pain with jaw activities such as talking and yawning ([Table 2](#)).

### Prevalence of TMDs among dental students

All the responders who reported TMD pain or symptoms (n=119) were invited for a TMJ examination. A total of 93 (78%) subjects presented for clinical assessment. The demographics of the subjects received the clinical examination are presented in [Table 1](#). During TMJ clinical examination, more than half of the subjects 64.5% (n=60) had temporomandibular disorders (TMDs), while only 35.4% (n=33) students had normal TMJ findings at the time of the examination.

Disc displacement with reduction was the most frequent diagnosis 38.7%(n=36) followed by local myalgia 32.25% (n=30) and arthralgia 16.1% (n=15) ([Figure 1](#)). Interestingly, 29% (n=27) students had more than one diagnosis and

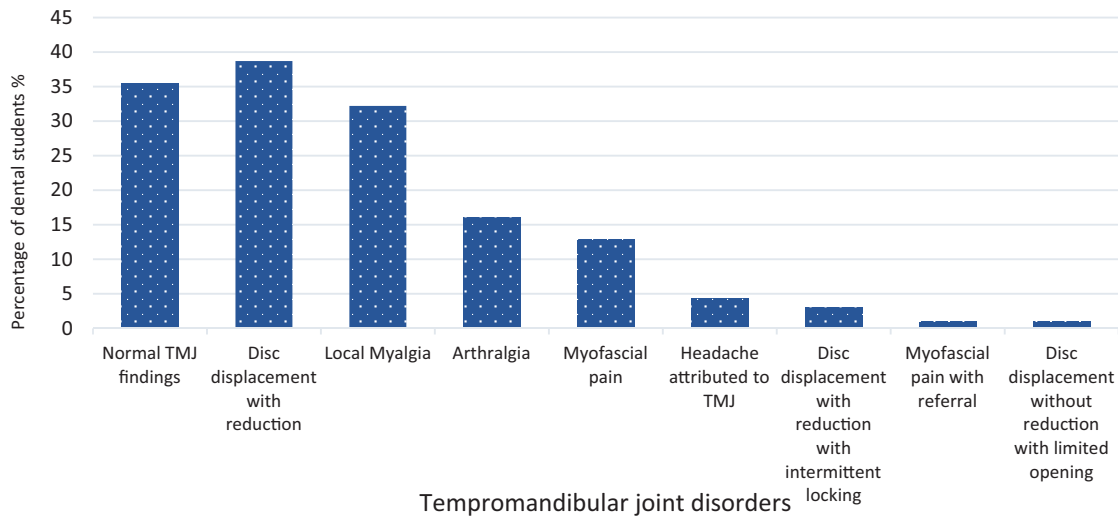
**Table 1. Demographic data of participants who responded positive to the pain screener and who presented for the temporomandibular joint (TMJ) clinical examination.**

	Respondents to pain screener (n=240)	Participants in TMJ clinical examination (n=93)
<b>Age</b>	22.38 ± 1.2 year	22.3 ± 1.25 year
<b>Gender</b>		
Male	131 (54%)	45 (48.4%)
Female	109 (46%)	48 (51.6%)
<b>Academic Year</b>		
2 <sup>nd</sup> year	11 (4.5%)	3 (3.2%)
3 <sup>rd</sup> year	46 (19.1%)	12 (12.9%)
4 <sup>th</sup> year	42 (17.5%)	14 (15.1%)
5 <sup>th</sup> year	56 (23.3%)	25 (26.9%)
6 <sup>th</sup> year	55 (22.9%)	27 (28%)
Internship year	30 (12.5%)	12 (14%)

**Table 2. Results of temporomandibular joint disorder pain screener (n=240).**

	Frequency n (%)
In the last 30 days, how long did any pain last in your jaw or temple area on either side?	
No pain	189 (78.7)
Pain comes and goes	49 (20.4)
Pain is always present	2 (0.8)
In the last 30 days, have you had pain or stiffness in your jaw on awakening?	
Yes	45 (18.7)
No	195 (81.2)
In the last 30 days, did the following activities change any pain (that is, make it better or it worse) in your jaw or temple area on either side? Chewing hard or tough food	
Yes	40 (16)
No	200 (83)
Opening your mouth or moving your jaw forward or to the side	
Yes	60 (25)
No	180 (75)
Jaw habits such as holding teeth together, clenching, grinding, or chewing gum	
Yes	72 (30)
No	168 (70)
Other jaw activities such as talking, kissing, or yawning	
Yes	35(14)
No	205 (86)

coexistence of disc displacement with reduction and local myalgia was found to be the most frequent combination in 19.3% (n=18) students (Table 3). Overall, the diagnosis of TMD was significantly higher in the female students compared to the male students ( $P \leq 0.022$ ). Both, pain-related disorders and intra-articular disorders were significantly higher in females with ( $P = 0.027$ ) and ( $P = 0.024$ ), respectively. Also, disc displacement with reduction showed a significant increase with the higher academic year ( $P \leq 0.01$ ).



**Figure 1. Percentage of dental students presenting with DC/TMD Diagnosis.** DC/TMD: Diagnostic Criteria for Temporomandibular Disorders.

**Table 3. Gender based distribution of TMDs, Anxiety scale and history of bruxism.**

	Female N (%)	Male N (%)	Total N (%)
<b>Total number of participants</b>	45 (48.3)	48 (51.6)	93 (100)
<b>Bruxism</b>	28 (30)	10 (10.7)	38 (40.8)
<b>TMDs</b>			
<i>Normal TMJ findings</i>	12 (12.9)	21 (22.5)	33 (35.4)
<i>Disc displacement with reduction</i>	22 (23.6)	14 (15)	38.7 (36)
<i>Local myalgia</i>	16 (17)	14 (15)	32.2 (30)
<i>Myofascial pain</i>	11 (11.8)	1 (1)	12.9 (12)
<i>Arthralgia</i>	5 (5.3)	10 (10.7)	16.1 (15)
<i>Headache attributed to TMD</i>	4 (4)	0	4.3 (4)
<i>Disc displacement with reduction with intermittent locking</i>	3 (3)	0	3 (3)
<i>Myofascial pain with referral</i>	1 (1)	0	1 (1)
<i>Disc displacement without reduction with limited opening</i>	1 (1)	0	1 (1)
<b>PHQ-4</b>			
<i>Mild</i>	16 (17)	4 (4)	20 (21.5)
<i>Moderate to severe</i>	20 (21.5)	1 (1)	21 (22.5)

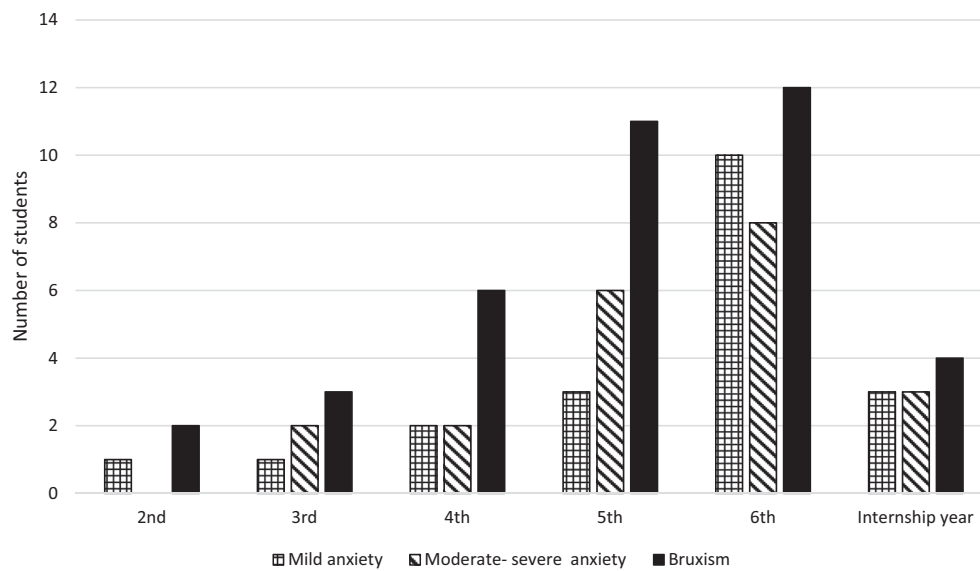
TMD: Temporomandibular disorders. PHQ-4: Patient Health Questionnaire-4.

**Anxiety and depression scale and history of parafunctional habits**

In total, 41 participants (44.09%) reported a positive response to the anxiety and depression scale. In which, 48.7% (n=20) had a mild score and 51% (n=21) had moderate to severe anxiety score (Table 3). Of the 41 subjects with a positive response to PHQ-4, 31 (73%) had been diagnosed with a painful TMDs. Moderate to severe anxiety was significantly associated with TMDs (P=0.006).

Overall, 40% of the participants (n=38) reported a parafunctional habit. Out of 38 (71%) with a history of bruxism, 27 had TMDs. Self-reported history of bruxism was significantly associated with TMDs in all students (P≤0.01).

Both the history of bruxism and the level of anxiety were significantly related (P=0.0002) and also significantly higher in females than males (P≤0.01). Besides, the anxiety level and history of bruxism significantly increased with higher academic years (P≤0.05). Those high scores of anxieties and bruxism were reversed in the internship year (Figure 2).



**Figure 2.** History of bruxism and anxiety levels significantly increased with higher academic years and declined in internship year.

## Discussion

The present study found that half of UQU dental students reported at least one TMD symptom. Moreover, the clinical examination found that 64% were diagnosed with at least one TMJ disorder and about 30% (one- third) had multiple diagnoses. Bruxism and high anxiety levels were related to TMDs in this student population.

Evidence suggests that TMD is a common complain among students. The prevalence of TMD reported by this study is higher than what has been reported by other studies in Saudi universities which ranged between 25-39% (Alkudhairi, Al Ramel *et al.* 2018, Srivastava, Shrivastava *et al.* 2021). Studies that addressed general university Saudi students also reported TMD prevalence of 20 to 50% (Zulqarnain, Khan *et al.* 1998, Habib, Al Rifaiy *et al.* 2015, Zwiri and Al-Omiri 2016, Srivastava, Shrivastava *et al.* 2021). All the above-mentioned studies with the exception of Srivastava *et al.* relied on self-administered questioners to identify subjects with TMDs and did not include TMJ clinical examination to confirm the diagnosis as the present study which may explain the difference in prevalence. When RDC/TMD algorithm was used to estimate the prevalence of TMD, 30 to 36% of dental students were found to have TMD (Fernandes Azevedo, Camara-Souza *et al.* 2018, Lövgren, Österlund *et al.* 2018). The present study used RDC/TMD pain screener to identify the subject with possible TMJ symptoms first, then, only those with positive responses to the pain screener were examined clinically for TMD diagnosis and that may explain the higher prevalence of TMDs.

Disc displacement with reduction was the most prevalent TMD disorder followed by myalgia. This finding concurs with a systematic review in which disc displacement of TMJ was highly prevalent TMD in the general population with prevalence ranging from 18 to 35% (Naeije, Te Veldhuis *et al.* 2013). Also, the finding of the increasing prevalence of disc displacement with age in this study is in alignment with other studies were disc displacement with reduction develops during childhood and adolescence and it's prevalence levels off towards adulthood (Marpaung, van Selms *et al.* 2019, Sankuratri, Verma *et al.* 2021). Although myalgia was the reported as the commonest diagnosed condition in some studies (Srivastava, Shrivastava *et al.* 2021), it was the second most prevalence condition in this study. On the other hand, females had a higher prevalence of TMDs compared to males. This findings was in alignment with other studies (Bagis, Ayaz *et al.* 2012, Naeije, Te Veldhuis *et al.* 2013, Wieckiewicz, Grychowska *et al.* 2014, de Melo Junior, Aroucha *et al.* 2019, Xie, Lin *et al.* 2019, Sankuratri, Verma *et al.* 2021, Srivastava, Shrivastava *et al.* 2021). Interestingly, 30% of the subjects had more than one TMDs diagnosis. Similar finding were reported by Azevedo 2018 *et al.* (Fernandes Azevedo, Camara-Souza *et al.* 2018) which highlights the importance of diagnosis and early management of TMDs.

Previous cross-sectional studies reported a significant increase in anxiety and depression scores among medical and dental students in different Saudi universities (Inam 2007, Aboalshamat, Hou *et al.* 2015, Basudan, Binanzan *et al.* 2017). In this study, 44% of the students with TMD symptoms reported a positive response to the PHQ-4 with half of them classified as having moderate to severe anxiety. Female dental students had a higher PHQ-4 mean score than male students which was in agreement with similar studies done on Saudi dental students (Inam 2007, Al-Saleh, Al-Madi *et al.* 2010, Benoiel, Sela *et al.* 2011, Al-Sowygh 2013). Overall, the rate of anxiety in women has been reported to be higher

than men (Kessler, Sonnega *et al.* 1995, Steel, Marnane *et al.* 2014, Xie, Lin *et al.* 2019). This could be explained by the slower processing in neurotransmitter serotonin which has a critical role in anxiety and depression. Besides, women are more sensitive to specific hormone such as corticotropin-releasing factor which has an important role in stress response (Bangasser, Curtis *et al.* 2010).

The majority of those students who showed moderate to severe levels of anxiety and depression were diagnosed with painful TMDs on clinical examination and therefore, anxiety was found to be related to TMDs. Other studies have conflicting results. stress and anxiety were positively associated with TMD in university students in general and dental students in particular (Ton, Mota *et al.* 2020, Jaiswal and Deshpande 2021). While Azevedo *et al.* found no association between anxiety and TMD (Fernandes Azevedo, Camara-Souza *et al.* 2018). Anxiety and stress in dental students can be caused by many external factors like exams, clinical requirements and academic assignments. This study was conducted during the academic year which could contribute to the higher prevalence of anxiety and TMDs.

In comparison to the general population, TMD prevalence ranges between 5–35% (Nadershah 2019, Schiffman *et al.* 2014). However, none of those studies reported on the association of TMD with stress, anxiety or psychological factors in general population. In general, anxiety disorders have been reported in 35% of chronic pain patients compared to only 18% of the general population (Poleshuck *et al.* 2009). In addition, Reissmann *et al.* compared patients diagnosed with TMD and general population without TMD related pain and reported that Trait anxiety is significantly associated with diagnoses of TMD pain. One point increase in the State-Trait Anxiety Inventory score related to an increase of the odds for pain-related TMD by the factor 1.04 (Reissmann *et al.* 2014). A similar finding reported by Kmeid *et al.* were TMDs was significantly associated with depression, anxiety, and stress among Lebanese population (Kmeid *et al.* 2020).

In general, oral parafunctional habits are known as a major contributor to TMDs and play an important role in its progression (Chisnoiu, Picos *et al.* 2015). In the present study, self-reported bruxism was significantly associated with TMDs. This finding concurs similar findings in Swedish dental students in which participants with TMD reported significantly higher oral parafunctional habits (Lövgren, Österlund *et al.* 2018). Moreover, the results of this study are in accordance with Jaiswal *et al.*, where they reported significant relationship between TMDs and parafunctional habits in Indian dental students (Jaiswal and Deshpande 2021).

History of bruxism and anxiety levels were found to be higher among the senior dental students at UQU. Similar findings were reported by other studies in which a statistical significant relationship between anxiety and the para-functional habit was revealed (Paterson, Lamb *et al.* 1995, Ahlberg, Lobbezoo *et al.* 2013). Most individuals who have anxiety disorders tend to relieve their stress by clenching and/or grinding their teeth and contracting masticatory muscle which leads to activation of the stomatognathic system (Calixtre, Gruninger *et al.* 2014). This increase in stress levels among final-years students can be due to more participants from those two academic years. However, it can be also explained by the higher clinical demands and more workload during these final clinical years. Declining of both bruxism and anxiety parameters was noted in participants from the internship year where there is a significant decrease in academic load and clinical requirements. Similar findings were reported by Ahuja (Ahuja, Ranjan *et al.* 2018).

### Limitation of the study

This is a cross-sectional study in which only association between variables is detected. Longitudinal studies are needed to prove causation. The absence of a control group for anxiety screening was regarded as a limitation for this study, as no clinical examination nor depression score was done for the participants who denied TMD pain or symptoms. Also, a comparison of TMDs prevalence with age-matched general population (non-dental students) was not considered in this study and it is recommended for future research projects.

### Conclusions

TMDs is highly prevalent among dental students. Disc displacement with reduction was the most predominant one. Greater prevalence was observed among females and higher academic years. Bruxism and anxiety were associated with painful TMDs.

### Data availability

#### Underlying data

Dryad: Temporomandibular Joints Disorders TMDs Prevalence and Its Relation to Anxiety in Dental Students. <https://doi.org/10.5061/dryad.kkwh70s62> (Homeida 2022).



This project contains the following underlying data:

- Pain screener results for 240 participants.xlsx
- TMD diagnosis results of 93 participants.xlsx

Data are available under the terms of the [Creative Commons Zero “No rights reserved” data waiver](#) (CC0 1.0 Public domain dedication).

## References

- Aboalshamat K, Hou XY, Strodl E: **Psychological well-being status among medical and dental students in Makkah, Saudi Arabia: a cross-sectional study.** *Med. Teach.* 2015; **37**(Suppl 1): S75–S81.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Adlaf EM, Gliksman L, Demers A, *et al.*: **The prevalence of elevated psychological distress among Canadian undergraduates: findings from the 1998 Canadian Campus Survey.** *J. Am. Coll. Heal.* 2001; **50**(2): 67–72.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Ahlberg J, Lobbezoo F, Ahlberg K, *et al.*: **Self-reported bruxism mirrors anxiety and stress in adults.** *Med. Oral Patol. Oral Cir. Bucal.* 2013; **18**(1): e7–e11.
- Ahuja V, Ranjan V, Passi D, *et al.*: **Study of stress-induced temporomandibular disorders among dental students: An institutional study.** *Natl. J. Maxillofac. Surg.* 2018; **9**(2): 147–154.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Al-Saleh SA, Al-Madi EM, Al-Angari NS, *et al.*: **Survey of perceived stress-inducing problems among dental students, Saudi Arabia.** *Saudi. Dent. J.* 2010; **22**(2): 83–88.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Al-Sowaygh ZH: **Academic distress, perceived stress and coping strategies among dental students in Saudi Arabia.** *Saudi. Dent. J.* 2013; **25**(3): 97–105.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Alkhudhairi MW, Al Ramel F, AlJader G, *et al.*: **A Self-Reported Association between Temporomandibular Joint Disorders, Headaches, and Stress.** *J. Int. Soc. Prev. Community Dent.* 2018; **8**(4): 371–380.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Bagis B, Ayaz EA, Turgut S, *et al.*: **Gender difference in prevalence of signs and symptoms of temporomandibular joint disorders: a retrospective study on 243 consecutive patients.** *Int. J. Med. Sci.* 2012; **9**(7): 539–544.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Bangasser DA, Curtis A, Reyes BA, *et al.*: **Sex differences in corticotropin-releasing factor receptor signaling and trafficking: potential role in female vulnerability to stress-related psychopathology.** *Mol. Psychiatry* 2010; **15**(9): 877–896-904.  
[Publisher Full Text](#)
- Basudan S, Binanzan N, Alhassan A: **Depression, anxiety and stress in dental students.** *Int. J. Med. Educ.* 2017; **8**: 179–186.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Benoliel R, Sela G, Teich S, *et al.*: **Painful temporomandibular disorders and headaches in 359 dental and medical students.** *Quintessence Int.* 2011; **42**(1): 73–78.  
[PubMed Abstract](#)
- Calixtre LB, Gruninger BL, Chaves TC, *et al.*: **Is there an association between anxiety/depression and temporomandibular disorders in college students?** *J. Appl. Oral Sci.* 2014; **22**(1): 15–21.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Chisnoiu AM, Picos AM, Popa S, *et al.*: **Factors involved in the etiology of temporomandibular disorders - a literature review.** *Clujul. Med.* 2015; **88**(4): 473–478.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- de Melo Junior PC, Aroucha J, Arnaud M, *et al.*: **Prevalence of TMD and level of chronic pain in a group of Brazilian adolescents.** *PLoS One.* 2019; **14**(2): e0205874.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Dworkin SF, LeResche L: **Research diagnostic criteria for temporomandibular disorders: review, criteria, examinations and specifications, critique.** *J. Craniomandib. Disord.* 1992; **6**(4): 301–355.  
[PubMed Abstract](#)
- Fernandes Azevedo AB, Camara-Souza MB, Dantas IS, *et al.*: **Relationship between anxiety and temporomandibular disorders in dental students.** *Cranio.* 2018; **36**(5): 300–303.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Habib SR, Al Rifaiy MQ, Awan KH, *et al.*: **Prevalence and severity of temporomandibular disorders among university students in Riyadh.** *Saudi. Dent. J.* 2015; **27**(3): 125–130.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Homeida L: **Temporomandibular joints disorders TMDs prevalence and its relation to anxiety in dental students.** *Dryad, Dataset* 2022.  
[Publisher Full Text](#)
- Inam SB: **Anxiety and Depression among Students of a Medical College in Saudi Arabia.** *Int. J. Health Sci. (Qassim)* 2007; **1**(2): 295–300.  
[PubMed Abstract](#)
- Jaiswal E, Deshpande S: **Temporomandibular Disorders in Dental Students of India: Prevalence, Severity and Associated Factors.** *Clin. Dent.* 2021; **XV**(4): 12–17.
- Kessler RC, Sonnega A, Bromet E, *et al.*: **Posttraumatic stress disorder in the National Comorbidity Survey.** *Arch. Gen. Psychiatry* 1995; **52**(12): 1048–1060.  
[Publisher Full Text](#)
- Kmeid E, *et al.*: **Prevalence of temporomandibular joint disorder in the Lebanese population, and its association with depression, anxiety, and stress.** *Head Face Med.* 2020; **16**(1): 19.
- Kroenke K, Spitzer RL, Williams JB, *et al.*: **An ultra-brief screening scale for anxiety and depression: the PHQ-4.** *Psychosomatics* 2009; **50**(6): 613–621.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Lövgren A, Österlund C, Ilgunas A, *et al.*: **A high prevalence of TMD is related to somatic awareness and pain intensity among healthy dental students.** *Acta Odontol. Scand.* 2018; **76**(6): 387–393.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Marpaung C, van Selms MKA, Lobbezoo F: **Temporomandibular joint anterior disc displacement with reduction in a young population: Prevalence and risk indicators.** *Int. J. Paediatr. Dent.* 2019; **29**(1): 66–73.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Monteiro DR, Zuim PR, Pesqueira AA, *et al.*: **Relationship between anxiety and chronic orofacial pain of temporomandibular disorder in a group of university students.** *J. Prosthodont. Res.* 2011; **55**(3): 154–158.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Nadershah M, *et al.*: **Prevalence of Temporomandibular Joint Disorders in Adults in Jeddah, Kingdom of Saudi Arabia: A Cross-sectional Study.** *J. Contemp. Dent. Pract.* 2019; **20**(9): 1009–1013.
- Naeije M, Te Veldhuis AH, Te Veldhuis EC, *et al.*: **Disc displacement within the human temporomandibular joint: a systematic review of a 'noisy annoyance'.** *J. Oral Rehabil.* 2013; **40**(2): 139–158.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- National Institute of Dental and Craniofacial Research: **Facial Pain.** 2018, July, July 2018. Retrieved 28. March, 2020.  
[Reference Source](#)
- Paterson AJ, Lamb AB, Clifford TJ, *et al.*: **Burning mouth syndrome: the relationship between the HAD scale and parafunctional habits.** *J. Oral Pathol. Med.* 1995; **24**(7): 289–292.  
[PubMed Abstract](#) | [Publisher Full Text](#)
- Poleshuck EL, *et al.*: **Psychosocial stress and anxiety in musculoskeletal pain patients with and without depression.** *Gen. Hosp. Psychiatry.* 2009; **31**(2): 116–122.
- Reissmann DR, *et al.*: **Temporomandibular disorder pain is related to the general disposition to be anxious.** *J. Oral Facial Pain Headache.* 2014; **28**(4): 322–330.

Sankuratri B, Verma RK, Iqbal A, *et al.*: **Assessment of Incidence of TMJ Disorders in Dental Graduates Competing for Post Graduation Exam: Original Research.** *Ann. Rom. Soc. Cell Biol.* 2021; **25**(6): 10837–10842.

Schiffman E, Ohrbach R, Truelove E, *et al.*: **Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for Clinical and Research Applications: recommendations of the International RDC/TMD Consortium Network\* and Orofacial Pain Special Interest Groupdagger.** *J. Oral Facial Pain Headache.* 2014; **28**(1): 6–27.

[PubMed Abstract](#) | [Publisher Full Text](#)

Srivastava KC, Shrivastava D, Khan ZA, *et al.*: **Evaluation of temporomandibular disorders among dental students of Saudi Arabia using Diagnostic Criteria for Temporomandibular Disorders (DC/TMD): a cross-sectional study.** *BMC Oral Health.* 2021; **21**(1): 211.

[PubMed Abstract](#) | [Publisher Full Text](#)

Stallman H: **Psychological distress in university students: A comparison with general population data.** *Aust. Psychol.* 2010; **45**(4): 249–257.

[Publisher Full Text](#)

Steel Z, Marnane C, Iranpour C, *et al.*: **The global prevalence of common mental disorders: a systematic review and meta-analysis 1980-2013.** *Int. J. Epidemiol.* 2014; **43**(2): 476–493.

[PubMed Abstract](#) | [Publisher Full Text](#)

Ton LAB, Mota IG, Martins APVB, *et al.*: **Prevalence of temporomandibular disorder and its association with stress and anxiety among university students.** *Brazilian Dent. Sci.* 2020; **23**(1). [Publisher Full Text](#)

Wieckiewicz M, Grychowska N, Wojciechowski K, *et al.*: **Prevalence and correlation between TMD based on RDC/TMD diagnoses, oral parafunctions and psychoemotional stress in Polish university students.** *Biomed. Res. Int.* 2014; **2014**: 472346.

Xie C, Lin M, Yang H, *et al.*: **Prevalence of temporomandibular disorders and its clinical signs in Chinese students, 1979-2017: A systematic review and meta-analysis.** *Oral Dis.* 2019; **25**(7): 1697–1706.

[PubMed Abstract](#) | [Publisher Full Text](#)

Zulqarnain BJ, Khan N, Khattab S: **Self-reported symptoms of temporomandibular dysfunction in a female university student population in Saudi Arabia.** *J. Oral Rehabil.* 1998; **25**(12): 946–953.

[PubMed Abstract](#) | [Publisher Full Text](#)

Zwiri AM, Al-Omiri MK: **Prevalence of temporomandibular joint disorder among North Saudi University students.** *Crania.* 2016; **34**(3): 176–181.

[PubMed Abstract](#) | [Publisher Full Text](#)

# Open Peer Review

Current Peer Review Status:  

---

Version 2

Reviewer Report 13 November 2023

<https://doi.org/10.5256/f1000research.133454.r176706>

© 2023 Fatahzadeh M. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.



## Mahnaz Fatahzadeh

Department of Diagnostic Sciences, Rutgers School of Dental Medicine, Newark, NJ, USA

This study is interesting and pertinent. Authors provide a concise background and explain the reason for performing this study, describe their scientific approach and adequately define inclusion and exclusion criteria. Data analysis seems reasonable. Although the study or its findings are not novel, the results are interesting and generally in line with previous reports. Authors explain their findings in a focused and clear manner in the discussion section.

Here are a few points to consider:

Title: The study population were dental students in UQU but it is not stated in the title.

In the results section of abstract, line 7: state what is meant by participants (students completing the initial survey or those who were examined).

Page 4, 1st paragraph: Since this study specifically investigates the prevalence of TMD in dental students in UQU, there is no need to mention dental students from other universities were excluded.

Please rephrase legend for clarity. For example, Table 1: Demographic of participants with positive response to the pain screener and those receiving temporomandibular joint (TMJ) clinical examination.

Please rephrase legend for figure 2 for clarity. For example, Figure 2; Distribution of self-reported history of bruxism and anxiety levels according to academic year of dental training among study participants

There are minor grammatical issues which could be easily addressed by editing and proof reading.

**Is the work clearly and accurately presented and does it cite the current literature?**

Yes

**Is the study design appropriate and is the work technically sound?**

Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**

Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**

Yes

**Are all the source data underlying the results available to ensure full reproducibility?**

Yes

**Are the conclusions drawn adequately supported by the results?**

Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Oral Medicine

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

Author Response 25 Nov 2023

**Lujain Homeida**

Dear reviewer,

Thank you so much for your comments. We appreciate the time you dedicated to providing your valuable feedback on our manuscript. All of your suggestions will be taken into consideration.

Thank you

**Competing Interests:** No competing interests were disclosed.

Reviewer Report 04 May 2022

<https://doi.org/10.5256/f1000research.133454.r136082>

© 2022 Farag A. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.



**Arwa Farag** 

Division of Oral Medicine, Department of Diagnostic Sciences, Tufts School of Dental Medicine,

Boston, MD, USA

The suggestions I provided in my previous review were addressed precisely.

**Is the work clearly and accurately presented and does it cite the current literature?**

Yes

**Is the study design appropriate and is the work technically sound?**

Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**

Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**

Yes

**Are all the source data underlying the results available to ensure full reproducibility?**

Yes

**Are the conclusions drawn adequately supported by the results?**

Yes

**Competing Interests:** No competing interests were disclosed.

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.**

---

Version 1

Reviewer Report 07 April 2022

<https://doi.org/10.5256/f1000research.80143.r126222>

© 2022 Farag A. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.



**Arwa Farag**

Division of Oral Medicine, Department of Diagnostic Sciences, Tufts School of Dental Medicine, Boston, MD, USA

Dear author,

Thank you for conducting this investigation. The study aimed to estimate the prevalence of TMDs among dental student and characterize the most common TMD diagnoses along with associated

symptoms/conditions. The methodology followed was optimal, starting from screening to comprehensive clinical assessment and self-reported questionnaires. Recruitment and inclusion of the study participants were done using the gold standard diagnostic criteria (RDC-TMD). All the utilized tools of assessment were reliable and previously validated for TMD population.

Below, I'm including minor points/comments, that I hope will further optimize this well-put-together manuscript.

Methodology:

In the exclusion criteria, author should specify that health history was obtained and those with underlying rheumatoid conditions, generalized pain symptoms, connective tissue disorders were excluded from the study.

Discussion:

It would be great if the author can provide some statistics/citations for prevalence of TMD (disc displacement/myalgia) along with stress and anxiety in the general population and compare them to this special population (dental students). This will provide insight, and clearly highlight, the increased prevalence of these conditions among dental students.

Thank you once again for allowing me the opportunity to review this work.

**Is the work clearly and accurately presented and does it cite the current literature?**

Yes

**Is the study design appropriate and is the work technically sound?**

Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**

Yes

**If applicable, is the statistical analysis and its interpretation appropriate?**

I cannot comment. A qualified statistician is required.

**Are all the source data underlying the results available to ensure full reproducibility?**

Yes

**Are the conclusions drawn adequately supported by the results?**

Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** OFP and OM

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have**

**significant reservations, as outlined above.**

Author Response 21 Apr 2022

**Lujain Homeida**

Response to TMD reviewer comments

Thank you for the comments and the review, below are our responses

**1 - in the exclusion criteria, author should specify that health history was obtained and those with underlying rheumatoid conditions, generalized pain symptoms, connective tissue disorders were excluded from the study.**

Thank you for the comment, the material and method section was amended as follows: under TMJ clinical examination and diagnosis the following sentence was added:

“Detailed medical history was obtained and subjects with underlying rheumatoid conditions, generalized pain symptoms, connective tissue disorders were excluded from the study”.

**2- It would great if the author can provide some statistics/citations for prevalence of TMD (disc displacement/myalgia) along with stress and anxiety in the general population and compare them to this special population (dental students). This will provide insight, and clearly highlight, the increased prevalence of these conditions among dental students.**

Thank you for this point. Most of the literature on TMD addressed specific population (patients, medical or dental students, or university students) very few literature addressed general population or included non TMD general population as a comparison group.

The following paragraph was added to the discussion.

'In comparison to the general population, TMD prevalence ranges between 5 – 35 % (Schiffman, Ohrbach et al. 2014, Nadershah 2019). However, none of those studies reported on the association of TMD with stress, anxiety or psychological factors in general population. In general, anxiety disorder have been reported in 35 % of chronic pain patients compared to only 18 % of the general population (Poleshuck, Bair et al. 2009). In addition, Reissmann et al. compared patients diagnosed with TMD and general population without TMD related pain and reported that Trait anxiety is significantly associated with diagnoses of TMD pain. One point increase in the State-Trait Anxiety Inventory score related to an increase of the odds for pain-related TMD by the factor 1.04 (Reissmann, John et al. 2014). A similar finding reported by Kmeid et al. were TMDs was significantly associated with depression, anxiety, and stress among Lebanese population (Kmeid, Nacouzi et al. 2020)'

**Competing Interests:** N/A

The benefits of publishing with F1000Research:

- Your article is published within days, with no editorial bias
- You can publish traditional articles, null/negative results, case reports, data notes and more
- The peer review process is transparent and collaborative
- Your article is indexed in PubMed after passing peer review
- Dedicated customer support at every stage

For pre-submission enquiries, contact [research@f1000.com](mailto:research@f1000.com)

**F1000Research**