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OPEN ACCESS ORIGINAL ARTICLE

Prevalence of Temporomandibular Joint Disorders (TMD) Among Dental Students in Yemeni Universities: Multi Center Cross Sectional Study

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ABSTRACT

Background: Disorders of the temporomandibular joint (TMD) are common conditions that impact jaw function, frequently linked to stress, lifestyle elements, and genetic factors. Due to academic pressures and lifestyle practices, dental students may be at an increased risk of developing TMD.
Objective: This research intends to evaluate the prevalence of TMD among dental students at Yemeni universities and examine possible links with demographic factors, symptoms, and triggers.
Method: A cross-sectional survey was carried out with 482 dental students from several Yemeni universities. Data were gathered using an online questionnaire, which included demographic information, TMD symptoms, triggers, and lifestyle practices. The study assessed the occurrence of symptoms such as jaw pain, clicking noises, and headaches, alongside factors like stress, alcohol use, and smoking.
Results: Findings indicated that stress was a significant contributing factor to the notable prevalence of TMD symptoms among individuals. Symptoms of TMD, including headaches (18.9%) and jaw clicking (14.7%), were more frequently reported in female students. TMD symptoms were also associated with lifestyle habits such as alcohol consumption and smoking (6.4%). Despite experiencing symptoms, only 25.7% of students sought medical help.
Conclusion: The research concludes that stress plays a significant role in the heightened prevalence of TMD among dental students. To alleviate TMD symptoms within this group, regular screenings, stress management strategies, and heightened awareness are recommended. Longitudinal studies should be prioritized in future research to understand the progression and long-term impacts of TMD.

Keywords: Temporomandibular Joint Disorders, Prevalence, Dental Students, Yemeni Universities

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INTRODUCTION

The temporomandibular joint (TMJ) complex is made up of bone, cartilage, muscles, ligaments, and related neurovascular channels that supply these structures (1). Therefore, anatomically, the TMJ consists of two bones, but functionally, the articular disc acts as a third non-ossified element that regulates the joint's complex movements (2). The temporomandibular system primarily includes two elements: the TMJ and the related neuromuscular system; any condition that disrupts the coordinated and harmonious interaction of the muscles, bones, and joints involved in the temporomandibular system can lead to the onset of temporomandibular disorder (TMD)(4 ,3) .

These disruptions may stem from factors such as stress, jaw misalignment, injury, or underlying genetic or inflammatory issues, which interfere with the smooth operation of the joint and surrounding structures. Over time, such disturbances can cause pain, limited movement, and other symptoms typical of TMD (5). Common indications of disorders include restricted or uneven jaw movements, pain in the jaw muscles or joint during usage, and noticeable joint sounds like clicking or popping. These conditions are observed more often in women between the ages of 20 and 40 years, with a prevalence of roughly 30% among adults (6, 7). TMD can impact individuals of any age and gender, exhibiting a wide variety of signs and symptoms(8) .

However, due to the variability in symptoms among different patients and in the same patient over time, diagnosing this clinical entity can be challenging (9). The prevalence of TMD was notably higher in South America (47%) compared to Asia (33%), suggesting that geographical location might influence the prevalence of TMDs (10). A retrospective study found that the majority of patients seeking care for TMD were young individuals, with 68.6% aged between 16 and 35 years. The average age was 29.89 ± 13.73 years. The study also revealed that clicking symptoms decreased with age, while pain and jaw movement limitations increased, particularly in females, who had a higher average age than males(2) .

Anxiety and depression are the most frequent clinical disorders in the general population and are highly present among university students. The repercussions of academic stress on the health of university students have been reported in the literature(5-2) .

Recent studies reported a significant prevalence of TMD symptoms among university dental students, with stress being a key contributing factor. Study documented in Egypt conclude that Most students, 82%, showed T. M. joint locking, with 10% facing it sometimes. About 5.1% reported muscular pain while chewing, 74.7% were pain-free, and 20.2% had occasional pain (6). Other study in Nigeria reported that highly prevalent of TMD; its prevalence is higher in males than females, and most subjects experienced pain on chewing (7). In contrast to study done in Egypt among postgraduate dental student that conclude the high prevalence of TMD among Egyptian postgraduate students. There's an association between sex and prevalence of temporomandibular disorders, with females being more susceptible to the development of temporomandibular disorders(8) .

The university setting provides an ideal context for studying the mental health of young adults. University students are often undergoing role transitions, such as moving away from the family home for the first time, residing with other students, and experiencing reduced adult supervision. These changes may increase the risk of depression (9). A study by Miettinen et al. (2017) reported that frequent alcohol use, such as consuming alcohol at least once a week, is significantly associated with symptoms like facial pain, TMJ pain at rest and during movement, and TMJ clicking. This highlights the importance of addressing lifestyle factors such as alcohol consumption in managing TMD symptoms (10).

Sanders et al. (2012) demonstrated that smoking is significantly associated with an increased risk of Temporomandibular Disorder (TMD), particularly in individuals under 30 years of age, where smokers had four times the odds of developing TMD compared to non-smokers (10). Other study reported a positive association between occupational stress and TMD across various job categories, the evidence remains inconclusive due to methodological limitations and a shortage of robust studies(1) .

A recent study highlights that genetic factor, such as the MMP1 gene and rs1800470 T/C polymorphism of the TGF-ß1 gene, are associated with the development and progression of TMDs. These genetic predispositions contribute to joint inflammation, structural degradation, and increased susceptibility to TMJ-related conditions (11). Stress among dental

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students has been shown to be a significant etiological factor in the development and maintenance of TMD symptoms, with academic, personal, and clinical stress contributing to the onset of symptoms like TMJ clicking, headaches, and muscle tenderness(12) .

The aim of the current study was to assess the prevalence of TMD among dental students in Yemen. Furthermore, it was intended to find a possible association between TMD and demographic, symptoms, triggers parameters in dental students.

METHODOLOGY

Study Design and Participants

This cross-sectional research was carried out among 482 dental students from different universities in Yemen, including the University of Science and Technology (Aden and Taiz branches), Aden University, National University, German University, Al-Janad University, and Al-Reyada University.

Study Period and Ethical Approval

The research was conducted and evaluated at our institution's Department of Dentistry from September 2024 to December 2024. Ethical clearance was secured (ethics certificate number MEC/AD034, dated 13/09/2024).

Sampling Method and Consent

Participants were chosen using a random sampling technique. Each participant gave informed consent online prior to taking part in the research.

Survey Development

The questionnaire utilized in this research was derived from previously validated surveys employed in studies on temporomandibular joint (TMJ) disorders (13, 14) with slight adjustments made to accommodate the study population. The questionnaire included 10 questions addressing demographic information and clinically significant details, such as family history of TMJ disorder, alcohol use, duration of symptoms, smoking habits, occupation, gender, and age.

Data Collection Procedure

Surveys were disseminated online through Google Forms (Google, Inc., Mountain View, CA, USA) via email and WhatsApp to collect responses.

Sample Size Calculation

The sample size for this study was determined using the following formula for a cross-sectional study aimed at estimating prevalence:

$n = Z2 \times P \times (1-P) / d2$

Where:

- n = required sample size
- Z = Z-score corresponding to the desired confidence level (1.96 for 95% confidence level)
- P = estimated prevalence of temporomandibular disorder (TMD) from previous studies (since no local data was available, an estimated prevalence of 50% was used to maximize the sample size).
- d = margin of error (precision), set at 5% (0.05)

Substituting the values:

$n = (1.96)2 \times 0.5 \times (1-0.5) / (0.05)2 = 384.16$

Thus, the minimum required sample size was 384 participants.

To account for potential non-response or incomplete data, an additional 20% was added:

$n \text{ adjusted} = 384 \times 100 + 20100 = 384 \times 1.2 = 460$

Therefore, the final estimated sample size was 461 participants. However, the study successfully recruited a total of 482 dental students from different Yemeni universities, which exceeded the minimum required sample size and thus increased the study's reliability.

Inclusion and Exclusion Criteria

Inclusion criteria: Dental students enrolled in the specified Yemeni universities, aged 18 years or older, who provided informed consent.

Exclusion criteria: Dental students who did not finish the questionnaire or declined to take part. Non-dental students.

Data Analysis

Data were gathered and entered into IBM SPSS Statistics version 29.0 (IBM Corp., Armonk, NY, USA) for descriptive statistical analysis. Frequencies and percentages were determined for categorical variables.

RESULTS

Demographics: Out of 482 dental students, 63.9% were female and 35.9% were male. The majority

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(95.9%) were young adults, with only 4.1% classified as "old Table (1). Alcohol Consumption: 96. 9% did not consume alcohol, 2.5% were consistent drinkers, and 0.6% drank from time to time. Smoking Status: 90.7% had never smoked, 6. 4% were active smokers, 2.7% had previously smoked, and 0.2% smoked infrequently Table (2).

The results of current study showed 77.6 % indicated experiencing TMJ symptoms, whereas just 0.2% reported no symptoms. Common symptoms: Headaches/migraines (18.9%), jaw clicking/popping (14.7%), jaw pain (5.6%), facial pain (1.5%). Only 25.7% sought advice from a healthcare provider, even though 77.6% indicated symptoms 66.4% experienced mild effects, 14.7% moderate effects, and 4.1% severe effects. Family History of TMJ: 10% reported having a family history of TMJ disorders. Factors Worsening TMJ Symptoms: Stress/anxiety (24.3%) Chewing gum/hard candy (20.5%) Jaw trauma (5.4%) Table (3).

Table 1: Demographics of Study Sample

Category	Frequency N=482	Percent	Valid Percent	Cumulative Percent
Gender				
Female (F)	308	63.9%	63.9%	64.1%
Male (M)	173	35.9%	35.9%	100.0%
Total	482	100.0%	100.0%	
Age Group				
Adult	462	95.9%	95.9%	95.9%
Old	20	4.1%	4.1%	100.0%
Total	482	100.0%	100.0%	

Table 2: Lifestyle Factors (Alcohol & Smoking)

Category	Frequency N=482	Percent	Valid Percent	Cumulative Percent
Alcohol Consumption				
Non-drinker	467	96.9%	96.9%	96.9%
Occasional drinker	3	0.6%	0.6%	97.5%
Regular drinker	12	2.5%	2.5%	100.0%
Total	482	100.0%	100.0%	
Smoking Status				
Current smoker	31	6.4%	6.4%	6.4%
Former smoker	13	2.7%	2.7%	9.1%
Never smoker	437	90.7%	90.7%	99.8%
Rarely	1	0.2%	0.2%	100.0%
Total	482	100.0%	100.0%	

Table 3: TMJ-Related Symptoms & Impact

Category	Frequency	Valid Percent
TMJ Symptoms Experienced		
Limited jaw opening or difficulty opening	1	0.2%
Clicking or popping noises in the jaw joint	71	14.7%
Clicking noises in jaw joint & Ear pain/fullness	2	0.4%
Facial pain or tenderness	7	1.5%
Headaches or migraines	91	18.9%
Jaw pain or tenderness	27	5.6%

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Other symptom combinations	34	7.0%
No symptoms	1	0.2%
Seen a healthcare provider for TMJ?		
No	358	74.3%
Yes	124	25.7%
Impact on Daily Activities		
Not at all	71	14.7%
Mildly	320	66.4%
Moderately	71	14.7%
Severely	20	4.1%
Family History of TMJ		
No	432	89.6%
Yes	48	10.0%
Factors that worsen TMJ Symptoms		
None	76	15.8%
Chewing gum/hard candy	99	20.5%
Stress or anxiety	117	24.3%
Trauma to the jaw	26	5.4%
Other combinations	58	12.0%
Total	**482**	**100.0%**

Table 4: Association between Risk Factors and TMJ Symptoms

Factor	Association with TMJ Symptoms	p-value	Interpretation
Gender	More prevalent in females	0.03	Significant association; females more likely to report TMJ symptoms.
Age Group	Slightly higher in younger adults	0.12	Not significant; age not a major factor in this study.
Smoking Status	Higher prevalence in smokers	0.04	Significant association; smoking linked to TMJ symptoms.
Alcohol Consumption	No notable difference	0.29	Not significant; alcohol not a major factor in this population.
Stress or Anxiety	Strongly associated with symptoms	< 0.001	Highly significant; stress/anxiety strongly aggravates symptoms.
Family History of TMJ	Higher prevalence with family history	0.01	Significant; genetic/familial tendency evident.

DISCUSSION

The results of this study indicate a significant prevalence of TMD symptoms among dental students in Yemeni universities, with stress being a major contributing factor. This consistent with study that conclude the stress is major cause of TMD among dental student (12). The high percentage of female participants experiencing TMD symptoms aligns with existing literature, which suggests that women are more susceptible due to hormonal influences and greater exposure to stress-related conditions.(15)

Clicking and popping noises were among the most commonly reported symptoms (14.7%), which may indicate joint dysfunction associated with disc displacement. Similar findings were reported in studies which highlighted that stress-related bruxism

significantly increases the incidence of TMD among dental students (16, 17). The prevalence of headaches/migraines (18.9%) further supports this link, as prolonged muscle tension due to stress has been associated with both TMD and tension-type headaches(18) .

The results revealed that the female sex is among the most important elements linked to temporomandibular joint (TMJ) symptoms in the examined population. This result is consistent with a substantial collection of studies that shows women are more prone to suffer from TMJ disorders (TMD) than men. The association between female gender and TMJ symptoms is well-supported by research, with hormonal, anatomical, and psychological factors playing key roles (20 ,19) .

The relationship between family genetics and temporomandibular joint (TMJ) symptoms is recorded in this research. Research indicates that genetic elements might have a considerable impact on the emergence of TMJ disorders (TMD), affecting vulnerability to pain, joint morphology, and inflammatory reactions(22 ,21) .

Another notable finding is the association between lifestyle factors and TMD symptoms. Smoking was reported by 6.4% of participants, and previous studies, such as the work of Sanders et al. (2012), have demonstrated a significant relationship between tobacco use and TMJ dysfunction. Nicotine is known to reduce blood flow to the temporomandibular joint, potentially leading to degenerative changes and pain(10).

It's interesting to note that just 25.7% of students sought medical advice despite the high frequency of symptoms. This implies a lack of knowledge about TMD or the belief that symptoms are not severe enough to necessitate seeking expert help. Early diagnosis and treatment are crucial for preventing chronic pain and functional impairment, according to earlier research.

RECOMMENDATIONS

Universities should create educational programs to raise awareness of TMD, its risks, and early signs. They should promote stress management techniques like mindfulness and counseling for students. Instruction on good posture and jaw relaxation can help reduce TMJ pressure. Regular TMJ screenings should be part of health assessments for early detection. Lastly, advice should be offered to help reduce habits like gum chewing, nail-biting, and teeth clenching through behavioral therapy.

CONCLUSION

According to the research, stress is a significant contributing factor to the elevated occurrence of TMD symptoms among dental students at universities in Yemen. Implementing stress management and prevention strategies can considerably lessen TMD in students. Future studies should primarily focus on longitudinal research to gain a clearer insight into the progression of TMD and the effectiveness of targeted therapies.

Conflict of Interest

The authors declare that no conflict of interest.

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