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Risk Factors of Temporomandibular Disorders Among College Students in Erbil City

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Abstract

Background: Temporomandibular disorders (TMD) are complex conditions impacting the chewing apparatus. University students may be especially susceptible due to factors like academic pressure, specific behavioral patterns, and inadequate sleep. This research sought to determine the prevalence of TMD and identify its associated risk factors within a sample of college students in Erbil City, Iraq. **Methods:** We conducted a cross-sectional study at Jihan University, enrolling 377 students aged 18–23 years (90.2% participation rate). Data collection involved structured questionnaires and clinical evaluations, capturing socio-demographic details, parafunctional habits, anxiety (via the Generalized Anxiety Disorder-7, GAD-7), and sleep quality (using the Pittsburgh Sleep Quality Index, PSQI). TMD status was diagnosed and classified using the Helkimo Clinical Dysfunction Index. **Results:** The mean age of participants was 20.51±1.80 years; 64.5% were female. The TMD prevalence was notably high at 69.5%. This figure included 48.8% with moderate dysfunction, 13.0% with mild dysfunction, and 7.7% with severe dysfunction. Age showed a significant association with TMD prevalence ($p=0.005$), peaking in the 22–23-year-old group. Both anxiety and poor sleep quality were strongly linked to TMD ($p<0.001$ and $p=0.049$, respectively). Conversely, gender, gum chewing, and bruxism did not show significant associations. **Conclusion:** TMD is exceedingly common among Erbil college students. Increased age, anxiety, and subpar sleep quality were confirmed as key risk factors. These findings stress the crucial role of psychological support and sleep management in TMD mitigation, suggesting a clear need for focused health interventions in the university environment.

Keywords: Anxiety, Helkimo Clinical Dysfunction Index, Sleep quality, Temporomandibular disorders.

Introduction

Temporomandibular joint disorder (TMD) represents a collection of orofacial maladies defined by discomfort in the temporomandibular joint (TMJ), adjacent muscles of mastication, or the preauricular region. It also typically involves restrictions or altered patterns in jaw movement, often accompanied by joint sounds during function (1). TMD pathology affects the TMJs, the associated structures, and the chewing muscles. Manifestations range from muscle pain or tenderness to internal joint problems like disc displacement, condylar trauma, or joint dislocation (2,3). TMD signs are observed far more frequently than

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symptoms are reported: while an estimated 70–75% of individuals display at least one sign, only about a quarter report actual symptoms (4). Typical signs encompass TMJ noises, muscle pain, jaw stiffness upon waking, limited mandibular opening, pain during jaw motion, and luxation or locking. Clicking noises often point to disc displacement with reduction but can also stem from hypermobility or joint remodeling; therefore, their absence doesn't guarantee TMJ health (5). TMD involves the articulation between the condyle and glenoid fossa, the occlusion, and the masticatory musculature. Signs usually emerge during adolescence and generally become more common with advancing age (4,6). The cause of TMD was once attributed primarily to dental occlusion. However, it is now accepted as a complex multifactorial disorder with integrated somatic and psychological components (7). Recognized risk factors span mental, medical, and dental domains, including emotional stress, trauma, posture, parafunctional habits, dental restorations, muscle pathophysiology, disc anatomy, orthodontic treatments, and broader psychosocial factors. Age and gender are also recognized influences (2). Further predisposing factors include parafunctional habits like teeth clenching and grinding, sudden changes in occlusion, and trauma to the TMJs (8). Global research investigating mandibular dysfunction has often combined clinical examinations with questionnaires. The findings consistently show that the prevalence of subjective symptoms is lower than that of objective clinical findings, indicating that many individuals are unaware of their dysfunction (2). Although various symptom, etiology, and anatomy-based classification systems exist, a single, universally adopted standard remains elusive (6). While the overall prevalence of TMJ and masticatory muscle disorders typically ranges from 2–5%, rates tend to be higher in younger cohorts. Women are reported to be at least twice as susceptible as men (9). In Erbil City, a previous investigation reported a 57.4% TMD prevalence among medical students (10). This notable rate underscores the importance of examining TMD risk factors among the university student population in this region. Although symptoms may begin in adolescence and persist intermittently, they often resolve over time, justifying a conservative management strategy (11). TMD signs and symptoms can be assessed using several methods, with the choice influenced by practicality, time, and expense (12). Common tools include the Research Diagnostic Criteria for TMD, the Craniomandibular Index, the Fonseca questionnaire, and the Helkimo Clinical Dysfunction Index (4). The Helkimo Index is a seminal tool for grading TMD severity, evaluating five clinical domains: TMJ function, range of mandibular movement, and pain in the TMJ, masticatory muscles, and during movement. Each domain is scored 0, 1, or 5, classifying the severity as mild, moderate, or severe.5 Its efficacy in reliably differentiating between subjects with and without TMD has been recently affirmed (13). This study's objective was to establish the prevalence of TMD among college students and assess related risk factors, specifically gum chewing, bruxism, anxiety, and sleep disturbances.

Materials and Methods

A cross-sectional study was performed at Jihan University in Erbil City, Kurdistan Region, Iraq, to evaluate TMD risk factors in undergraduate students aged 18–23 years. In total, 418 students were initially enrolled following the provision of informed consent. Ethical clearance was secured from the Clinical Research Ethics Committee of the Kurdistan Higher Council of Medical Specialties (Approval No. 2276). The required sample size was calculated using the formula for estimating a single population proportion, based on a reported TMD prevalence of 57.4% in Erbil. (10) Substituting the values Z=1.96 (for a 95% CI), p=0.574, and d=0.05 yielded an initial sample size of n≈376. After incorporating a 10% contingency for non-response,

the adjusted target was n≈418, ensuring sufficient statistical power. A non-probability convenience sampling approach was used. Inclusion was limited to undergraduate students free from severe medical or psychological conditions that could impede questionnaire completion. Students whose orofacial pain was not TMJ or masticatory muscle-related were included.

Exclusion criteria were applied to minimize confounding effects in TMD assessment:

- History of TMJ trauma.
- Current use of fixed orthodontic appliances or active orthodontic treatment.
- Neurological or musculoskeletal disorders.
- Regular use of analgesic or anxiolytic medication.
- Presence of systemic illnesses.

Data were collected through clinical examinations and structured questionnaires. The questionnaires recorded socio-demographics (age, gender) and parafunctional habits (sleep bruxism, gum chewing, awake bruxism). Adapted from Alhussini (11), the questionnaire sections covered:

- Demographics.
- Dental and medical history.
- Parafunctional habits (e.g., teeth grinding, lip biting, tongue thrusting).
- Pain characteristics (e.g., onset, frequency, location, impact on quality of life).

Clinical evaluations comprised:

- Assessment of mandibular movements and TMJ function.
- Palpation of masticatory muscles.
- Occlusal analysis.

A participant was defined as having TMD if they presented with at least two objective or subjective signs/symptoms: jaw deviation, muscle tenderness, pain, clicking, restricted mouth opening, or movement limitation. Two calibrated examiners performed the clinical examinations, demonstrating high inter- and intra-examiner reliability (Kappa coefficients of 0.82 and 0.95, respectively).

Assessment Instruments

- Helkimo Clinical Dysfunction Index (14): This index grades TMD severity based on the total score from five signs: masticatory muscle pain, TMJ pain, pain on mandibular movement, TMJ function, and impaired mandibular movement. Scores of 0, 1, or 5 are assigned for each domain, with the total score categorized as mild (DI), moderate (DII), or severe (DIII) dysfunction.
- Generalized Anxiety Disorder 7-item Scale (GAD-7) (15): Assessed anxiety over the prior two weeks. Scores of 0–3 are given per item, with higher total scores indicating greater anxiety severity. A locally validated version was used.
- Pittsburgh Sleep Quality Index (PSQI) (16): Evaluated sleep quality across seven components (sleep latency, duration, quality, habitual efficiency, disturbances, medication use, daytime dysfunction). Each component is scored 0–3, totaling 0–21. Elevated scores reflect poorer sleep quality. A locally validated version was administered.

Data were processed using the Statistical Package for Social Sciences (SPSS, Version 22). Descriptive statistics summarized categorical data (percentages, frequencies) and continuous data (mean ± SD). The relationship between TMD and potential risk factors (bruxism, gum chewing, sleep quality, and anxiety) was initially assessed via Spearman correlation. Subsequently, logistic regression analysis was conducted to pinpoint risk factors, utilizing a significance threshold of $p \leq 0.05$.

Results

A total of 377 students completed all aspects of the study out of 418 recruited, yielding a 90.2% response rate. The mean age of the cohort was 20.51±1.80 years (range: 18–23 years). The sample composition was 64.5% female (n=243) and 35.5%

male (n=134). Demographic details are presented in Table 1.

Based on the Helkimo Clinical Dysfunction Index, the overall prevalence of temporomandibular disorders (TMD) was 69.5% (n=262). The breakdown by severity was: 48.8% with moderate dysfunction (DII), 13.0% with mild dysfunction (DI), and 7.7% with severe dysfunction (DIII). The remaining 30.5% were categorized as clinically symptom-free (D0). Table 2 shows the distribution of TMD severity.

The average Generalized Anxiety Disorder-7 (GAD-7) score was 5.95, and the average Pittsburgh Sleep Quality Index (PSQI) score was 6.87. Self-reported behavioral habits included regular gum chewing (28.4%), sleep bruxism (5.3%), and awake bruxism (4.2%). Table 3 provides the full distribution of these psychological and behavioral factors.

Chi-square analysis demonstrated a significant relationship between age and TMD prevalence ($p=0.005$). The oldest age group (22–23 years) recorded the highest prevalence (77.1%), while the youngest group (18–19 years) had the lowest (59.6%). Though TMD was slightly more prevalent in females (71.6%) than males (65.7%), this difference was not statistically significant ($p=0.231$), Table 4.

No significant associations were observed between TMD and parafunctional habits: gum chewing ($p=0.558$) or bruxism (sleep: $p=0.440$; awake: $p=0.440$). The prevalence rates for students reporting these behaviors were comparable to those who did not. Students with TMD exhibited significantly greater mean GAD-7 scores (6.61±5.74) compared to their non-TMD counterparts (4.45±4.17; $p<0.001$). Furthermore, TMD sufferers reported inferior sleep quality, indicated by higher mean PSQI scores (7.10±3.72) versus non-TMD students (6.37±3.16; $p=0.049$). These results confirm strong associations between TMD and both anxiety and sleep quality (Table 5).

Table (1): Socio-demographic Characteristics of the Study Population

Characteristic	n	%	Mean ± SD (Range)
Total Sample	377	100.0	20.51±1.80 (18.00–23.00)
Age (Years)			
18–19	136	36.1	
20–21	110	29.2	
22–23	131	34.7	
Gender			
Female	243	64.5	
Male	134	35.5	

Table (2): Prevalence and Severity of Temporomandibular Disorders (TMD) Based on Helkimo Clinical Dysfunction Index

TMD Status / Helkimo Category	n	%
Overall TMD Prevalence	262	69.5
No TMD (D0)	115	30.5
DI (Mild dysfunction)	49	13.0
DII (Moderate dysfunction)	184	48.8
DIII (Severe dysfunction)	29	7.7

Table (3): Distribution of Anxiety, Sleep Quality, and Behavioral Habits

Factor	n	%
GAD-7 Score		
Minimal Anxiety (0–4)	188	49.9
Mild Anxiety (5–9)	104	27.6
Moderate Anxiety (10–14)	43	11.4
Severe Anxiety (15–21)	42	11.1
PSQI Score		
Good Sleep Quality (≤5)	242	64.2
Poor Sleep Quality (>5)	135	35.8
Behavioral Habits		
Gum Chewing (Yes)	107	28.4
Sleep Bruxism (Yes)	20	5.3
Awake Bruxism (Yes)	16	4.2

Table (4): Association Between TMD and Socio-Demographic Factors

Characteristic	TMD Absent n (%)	TMD Present n (%)	p-value
Age Categories			0.005*
18–19	55 (40.4)	81 (59.6)	
20–21	30 (27.3)	80 (72.7)	
22–23	30 (22.9)	101 (77.1)	
Gender			0.231
Female	69 (28.4)	174 (71.6)	
Male	46 (34.3)	88 (65.7)	
*p-values ≤0.05 are considered statistically significant			

Table (5): Association Between TMD and Behavioral & Psychological Factors

Factor	No TMD n (%)	TMD n (%)	p-value
Gum Chewing (Yes)	35 (32.7)	72 (67.3)	0.558
Sleep Bruxism (Yes)	7 (35.0)	13 (65.0)	0.440
Awake Bruxism (Yes)	7 (43.8)	9 (56.3)	0.440
Anxiety (Mean GAD-7)	4.45±4.17	6.61±5.74	<0.001*
Sleep Quality (Mean PSQI)	6.37±3.16	7.10±3.72	0.049*
*p-values ≤0.05 are considered statistically significant			

Discussion

The measured TMD prevalence of 69.5% in our cohort of Erbil college students is remarkably high, exceeding the 57.4% reported in a broader Erbil student population. (10) This suggests that university students represent a particularly susceptible subgroup. While another study suggests up to 75% of individuals have at least one TMD sign (2). Our data show a substantial clinical impact, with almost half of the affected students (48.8%) presenting with moderate dysfunction. Such a high prevalence, especially of moderate severity, indicates that a significant number of students face functional limits or discomfort that could impair their academic performance and general quality of life, even if they don't actively seek treatment. We observed a statistically significant rise in TMD prevalence with increasing age (p=0.005), climbing from 59.6% in 18–19-year-olds to 77.1% in 22–23-year-olds. This finding is consistent with literature suggesting TMD symptomatology may intensify with age, potentially reflecting cumulative risk exposure, increased self-awareness of symptoms, or the escalation of academic and social stress over the course of a college career. Although females demonstrated a higher TMD prevalence (71.6%) than males (65.7%), this difference was not statistically significant (p=0.231). This outcome deviates from typical global patterns, where TMD is generally reported as more common in women (9). The absence of a strong gender effect in this sample might imply that anxiety and sleep quality exert a more powerful influence on TMD in this specific young adult group, or it could be a characteristic unique to this sample and the measurement tool used. The significant associations found between TMD and psychological/behavioral factors provide strong evidence for its multifactorial nature. Students with TMD recorded substantially higher anxiety levels (mean GAD-7 scores: 6.61±5.74) compared to those without (4.45±4.17; p<0.001), supporting previous research linking psychological stress to TMD development (2,7). The pressures of the university environment, including academic demands and uncertainty, likely contribute to the predisposition or exacerbation of TMD. Similarly, the finding that students with TMD reported poorer sleep quality (higher mean PSQI scores: 7.10±3.72 vs 6.37±3.16; p=0.049) reinforces the critical link between sleep health and TMD. A PSQI score over 5 indicates poor sleep, which is known to heighten pain sensitivity and stress. Conversely, TMD pain and associated anxiety can disrupt sleep, creating a bidirectional negative loop. In contrast to Elyasi et al (8), who identify parafunctional habits as significant risk factors, this study found no significant association between TMD and either gum chewing (p=0.558) or bruxism (sleep: p=0.440; awake: p=0.440). This might be due to the relatively low self-reported prevalence of these behaviors in the

cohort, the overriding impact of psychological stress, or potential bias in self-reporting, especially for nocturnal bruxism. The study's strengths include its focus on an under-researched student demographic in Erbil, providing valuable localized data, and the use of validated, internationally recognized instruments (Helkimo Index, GAD-7, PSQI), which enhances the reliability of the findings. The sample size also contributes to the statistical robustness of the results. Limitations are inherent to the cross-sectional design, which prevents drawing causal conclusions. Reliance on self-reported data introduces the potential for recall or social desirability bias, and the single-university setting restricts the generalizability of the findings. These methodological factors or sample characteristics may also explain the non-significant findings for gender and parafunctional habits.

Conclusion

This research confirms a very high TMD prevalence among college students in Erbil. The disorder is significantly associated with increasing age, elevated anxiety, and poor sleep quality. Gender and parafunctional habits were not found to be significant risk factors in this cohort. These results emphasize the complexity of TMD etiology and the profound influence of sleep and psychological well-being on its manifestation in young adults. We stress the urgent need for comprehensive health programs in university settings, encompassing routine TMD screening, stress management, and sleep hygiene education, to effectively mitigate the impact of TMD on students' quality of life and academic success.

Author Contributions:

D.B.Y. was responsible for data collection, analysis, and manuscript drafting. N.H.H. supervised the study, provided critical revisions, and approved the final version. Both authors reviewed and approved the manuscript in its entirety.

Conflicts of interest: None

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