

3 ORIGINAL ARTICLE

4 The awareness and knowledge of students 5 and dental practitioners and postgraduate at 6 Qassim University about TMD examination 7 and treatment and diagnosis: a cross- 8 sectional study

9 Mohammed Fakhry Almutairy¹, Sulaiman Ahmad Alhomaïd^{2*}

10 ABSTRACT

11 **Background:** Temporomandibular disorder (TMD) is considered one of the most common musculoskeletal conditions
12 that affect the masticatory system. The consequences of TMD include pain and functional limitations. Early diagnosis
13 and proper management are important for avoiding chronic pain and permanent tissue damage. Our cross-sectional
14 study aimed to evaluate the level of knowledge in terms of TMD examination and diagnosis, as well as treatment,
15 among dental students, postgraduate students, and dental practitioners at Qassim University, Saudi Arabia.

16 **Methods:** A cross-sectional study using a structured, validated online questionnaire was distributed to 98
17 participants. The eligible participants included fourth-year students (27.6%), postgraduate students (9.2%),
18 fifth-year students (12.2%), interns (15.3%), and dental practitioners (35.7%). The survey investigated the
19 general demographics and the 25 items classifying knowledge of TMD etiology, diagnosis, treatment, and
20 prognosis. For comparing scores with respect to gender and academic/professional status, non-parametric
21 tests (Mann-Whitney U and Kruskal-Wallis tests) were used at a less than 0.05 level of significance.

22 **Results:** The overall mean knowledge score of participants was 17.48 ± 2.76 , with a maximum score of 25. Most
23 participants showed a high level ($n = 22$, 22.4%) or moderate level ($n = 59$, 60.2%) of knowledge. In contrast, only 17
24 participants (17.3%) showed a low level of knowledge. There were significant differences in knowledge scores across
25 academic and professional status ($p = 0.033$). Postgraduate students (18.89 ± 1.17) and interns (18.13 ± 1.68) had
26 the highest scores, and fifth-year students (15.42 ± 3.85) and fourth-year students (16.74 ± 2.86) had the lowest scores. Many
27 people had false beliefs about treatment protocols. For example, 60.2% incorrectly agreed that occlusal grinding is
28 an effective early treatment. The knowledge scores of males and females did not differ significantly ($p > 0.05$).

29 **Conclusion:** Within a small included sample, there was a satisfactory basic knowledge of TMD etiology and clinical
30 signs among students, postgraduates, and dental practitioners. However, there is an alarming ignorance and wide-
31 spread unawareness of evidence-based management and treatment of TMD. Educational and specialized clinical
32 training programs should focus on addressing this gap in practical management guidelines. Given the small percentage
33 of participants, our data are limited. Future multicenter cross-sectional studies are needed to confirm these findings.

34 **Keywords:** Temporomandibular disorders (TMDs), knowledge, Dental practitioners, Postgraduate students,
35 Dental students.

36 Introduction

37 The temporomandibular joint (TMJ) complex consists of
38 a synovial joint found between different parts, including
39 the mandibular condyle, glenoid fossa, and temporal
40 bone joint eminence. It consists of bone, cartilage,
41 masticatory muscles, ligaments, and other structures

Correspondence to: Sulaiman Ahmad Alhomaïd

*College of Dentistry, Qassim University, Buraydah,
Saudi Arabia.

Email: dr.sulaimanahmad2@gmail.com

*Full list of author information is available at the end of
the article.*

Received: 23 August 2026 | **Revised (1):** 08 September 2026

| Accepted: 02 September 2026



This is an open access article distributed in accordance with the Creative Commons Attribution (CC BY 4.0) license: <https://creativecommons.org/licenses/by/4.0/> which permits any use, Share — copy and redistribute the material in any medium or format, Adapt — remix, transform, and build upon the material for any purpose, as long as the authors and the original source are properly cited. © The Author(s) 2026.



that support the high biomechanical load of mastication [1]. Temporomandibular disorders (TMDs) are a group of diseases accompanied by pain in the TMJ or its surrounding tissue, sounds (clicking and crepitation) during movement, and limited mandibular function [2]. Several studies have shown that TMD-related pain, sound, and functional limitations may aggravate physical and psychological damage and seriously reduce the quality of life [3,4]. According to the World Health Organization, TMDs are the third most common disease reported in dental clinics. The prevalence of TMDs in society varies between 50 and 80% [5]. TMDs are prevalent in adults with a prevalence rate of about 31% [6] and are most common between the ages of 15 and 30 years [7,8].

College students are considered a high-risk group for exposure to stress due to their heavy workload, high expectations for academic performance, and limited leisure time and sleep time. The psychological stress level and the prevalence of TMDs are significantly associated with the anxiety/depression level of university students [5,9–13]. Psychosocial stress stimulates the hypothalamic-pituitary-adrenal axis and affects the secretion of stress hormones, including cortisol, which exacerbates pain and dysfunction related to TMD [14]. Moreover, studies have shown that psychosocial stress is able to affect brain areas (e.g., hippocampus) through immune mechanisms (e.g., microglial activation), leading to mood disorders and increased pain perception, which contribute to the pathogenesis of TMD [15]. Medical students, like other college students under pressure, also have a high incidence of TMDs. The TMD prevalence rate is 27.4% in Saudi Arabia, 26.5% in Poland, 33.2% in Brazil, 46.1% in Mexico, and 19.7% in Lebanon, while in Sweden the prevalence is 4.2% and 7% in Norway [6–13]. Currently, there are few available studies evaluating knowledge about TMD examination, diagnosis, and treatment among dental healthcare workers in Saudi Arabia. This study aimed to assess the level of knowledge of TMD examination, diagnosis, and treatment among dental students, postgraduate students, and dental practitioners. Additionally, we assessed the relationship between knowledge and different demographic features such as gender and academic status.

Methods

Study design and inclusion criteria

A cross-sectional study using an online survey was performed to assess the knowledge of students, dental practitioners, and postgraduate students at Qassim University about TMD examination, treatment, and diagnosis in Saudi Arabia. The eligible participants included fourth-year students, fifth-year students, interns, postgraduate students, and dental practitioners (general dentists or specialists) in Saudi Arabia aged 18 years or older. Individuals with other jobs or not residing in the target region or unwilling to provide informed consent were excluded.

Data collection

A previous structured questionnaire was used. General information was collected in the first section of the survey, including the age and gender of participants, the practicing specialty of the respondents, and whether they have taken any courses on TMD or occlusion. The questionnaire consists of 25 items related to attitudes toward four domains: etiology, diagnosis, treatment, and prognosis of TMD and chronic pain. Items were rated on a 6-point scale from 1=“strongly agree” to 2=“agree,” 3=“neutral,” 4=“disagree,” 5=“strongly disagree,” and 6=“I don’t know”. Dentists were also asked about level of practice. Subsequently, the English version of the questionnaire underwent a forward-backward translation process into Arabic to guarantee linguistic accuracy and cultural relevance for the targeted population [16].

Sample size and sampling technique

Convenience sampling was used via online platforms, as it offers practical efficiency for a cross-sectional study. To ensure the study is adequately powered, the minimum necessary sample size was determined to be 384 participants, calculated using a 95% confidence level and a 5.9% margin of error. To account for anticipated non-response and incomplete online submissions, we established an adjusted target sample size of 430 participants. Due to recruitment constraints during the study period, a final sample of 98 participants was included in the analysis. Consequently, the study was underpowered, and the findings should be interpreted as exploratory.

Ethical approval

Ethical approval was granted by the Qassim University Institutional Review Board (Approval No. 24-07-10) Dated: 3-10-2024. Informed consent was obtained from all included participants. No rewards were given to any participant. Participation was voluntary, and confidentiality was maintained throughout the study.

Statistical analysis

Descriptive statistics

Descriptive statistics were performed to analyze the data. Categorical data, including gender, academic or professional status, and response, were expressed as frequencies (N) and percentages. Continuous data of knowledge scores were expressed as mean $\pm$ standard deviation (SD) and median with interquartile range (IQR) for normally and non-normally distributed data, respectively.

Scoring and category classification

A scoring system was developed to assess the knowledge of the participants regarding TMD. Each question was scored based on the correct answer. The participants’ knowledge regarding TMD was scored as follows:

A structured scoring system was applied to assess participants’ knowledge regarding TMD. Each

questionnaire item was evaluated based on predefined correct responses. For all knowledge items, responses of “Agree” and “Strongly Agree” were considered correct for positively phrased statements, while “Disagree” and “Strongly Disagree” were considered correct for negatively phrased statements, reflecting an appropriate understanding of TMD management principles (Supplementary Table S1). Each correct answer was given 1 point, and each incorrect answer, neutral, and “I don’t know” was given 0 points. The total knowledge score was 0-25. For further analysis, levels have been created for the scores. Knowledge score levels have been classified according to Bloom’s cutoff categorization as high level 20-25 (80%-100%), moderate level 15-19 (60%-79%), and low level <15 (<60%) [17].

Inferential statistics

To check whether the data are normally distributed or not, the Shapiro-Wilk test was used. The Shapiro-Wilk test showed that the data are not normally distributed. Therefore, non-parametric tests were applied. The Mann-Whitney U test was used for comparing two different groups, for example, gender. The Kruskal-Wallis test was used for comparing more than two different groups, for example, academic or professional status. For categorical data, associations were evaluated using Fisher’s exact test and the Fisher-Freeman-Halton exact test, as appropriate. The internal consistency of the questionnaire was evaluated using Cronbach’s alpha. In this study, the questionnaire demonstrated acceptable reliability with a Cronbach’s alpha of 0.576, indicating moderate internal consistency. These values suggest that the items in each section were reasonably consistent in measuring the underlying constructs of TMD knowledge.

Significance level

A *p*-value of less than 0.05 was considered statistically significant.

Software

All statistical analyses were performed using IBM SPSS Statistics version 27.0.1.

Results

Distribution of study participants according to gender and Academic/Professional Status

A total of 98 participants were included in the analysis. Of these, 61 (62.2%) were male, and 37 (37.8%) were female. Regarding academic or professional status, 35 (35.7%) were dental practitioners, 27 (27.6%) were fourth-year students, 15 (15.3%) were interns, 12 (12.2%) were fifth-year students, and 9 (9.2%) were postgraduate students Table 1.

Distribution of responses to knowledge items regarding temporomandibular disorders

Overall, participants demonstrated a relatively favorable understanding of TMD-related knowledge. Most participants agreed or strongly agreed that sleep disturbances are common in individuals with chronic orofacial pain (88.8%), depression may play a significant role in chronic orofacial pain (82.7%), stress is a major contributing factor to chronic TMD (88.7%), and oral parafunctional habits are frequently associated with chronic TMD (85.7%). Furthermore, 91.8% agreed or strongly agreed that examining the neck muscles and TMJ is important for patients with chronic orofacial pain. However, uncertainty was observed for some items, particularly TMD prevalence among children with mixed dentition, for which 21.4% selected “I don’t know.” Overall, 60.2% of participants agreed or strongly agreed that occlusal grinding may be an effective early treatment for TMD. Similarly, 57.1% agreed or strongly agreed that orthodontic treatment may prevent TMD, 52.1% believed that orthodontic treatment could be used to address TMD symptoms, and 71.4% agreed or strongly agreed that orthodontic therapy may be beneficial in resolving TMD in patients with skeletal malocclusions. Despite having a high level of knowledge, there was a high number of misconceptions about TMD management, which needs to be addressed (Table 2).

Uncertain responses

The analysis of the responses to the questionnaire has investigated the uncertainty in the form of “I don’t know” responses. Most items showed low uncertainty levels, with “I don’t know” responses ranging from 0% to 2% for statements about basic pain triggers, the role of stress, and behavioral counseling. However, significant

Table 1. Distribution of study participants according to gender and Academic/Professional Status.

		N	%
Gender	Female	37	37.8%
	Male	61	62.2%
Academic or Professional Status	Dental Practitioner (General Dentist or Specialist)	35	35.7%
	Fifth-Year Student	12	12.2%
	Fourth-Year Student	27	27.6%
	Intern	15	15.3%
	Postgraduate student	9	9.2%

Table 2. Distribution of responses to knowledge items regarding temporomandibular disorders (TMD).

	Strongly disagree		Disagree		I don't know		Neutral		Agree		Strongly agree	
	N	%	N	%	N	%	N	%	N	%	N	%
1. Sleep disturbances are common in individuals with chronic orofacial pain.	0	0.0%	0	0.0%	4	4.1%	7	7.1%	40	40.8%	47	48.0%
2. Depression may play a significant role in chronic orofacial pain.	2	2.0%	2	2.0%	2	2.0%	11	11.2%	37	37.8%	44	44.9%
3. Pain is often the primary reason for seeking treatment for TMD.	1	1.0%	2	2.0%	0	0.0%	6	6.1%	35	35.7%	54	55.1%
4. TMD pain may worsen or improve with jaw movement.	0	0.0%	0	0.0%	0	0.0%	8	8.2%	51	52.0%	39	39.8%
5. TMJ clicking can indicate a serious condition that may lead to pain.	3	3.1%	13	13.3%	2	2.0%	19	19.4%	42	42.9%	19	19.4%
6. Oral parafunctional habits are frequently associated with chronic TMD.	0	0.0%	3	3.1%	1	1.0%	10	10.2%	59	60.2%	25	25.5%
7. Stress is a major contributing factor to the development of chronic TMD.	0	0.0%	4	4.1%	0	0.0%	7	7.1%	41	41.8%	46	46.9%
8. Patients with TMD who clench or grind their teeth may do so during the day, at night, or both.	0	0.0%	4	4.1%	0	0.0%	16	16.3%	45	45.9%	33	33.7%
9. Bruxism during sleep may be triggered by occlusal interferences.	0	0.0%	9	9.2%	1	1.0%	7	7.1%	38	38.8%	43	43.9%
10. Migraine headaches may cause or be associated with facial or jaw pain.	1	1.0%	1	1.0%	2	2.0%	6	6.1%	41	41.8%	47	48.0%
11. The position of the condyle in the jaw joint, as seen on imaging, can provide valuable information about internal joint issues.	0	0.0%	3	3.1%	4	4.1%	9	9.2%	50	51.0%	32	32.7%
12. Examining the neck muscles and TMJ is important in patients with chronic orofacial pain.	0	0.0%	1	1.0%	2	2.0%	5	5.1%	30	30.6%	60	61.2%
13. Reduced mouth opening capacity is rarely caused by TMJ arthritis.	24	24.5%	30	30.6%	7	7.1%	9	9.2%	14	14.3%	14	14.3%
14. Palpable tenderness in the jaw joint or surrounding muscles is a key clinical sign of TMD.	1	1.0%	2	2.0%	4	4.1%	9	9.2%	41	41.8%	41	41.8%
15. TMD is more prevalent among children with mixed dentition than among adults with permanent teeth.	18	18.4%	29	29.6%	21	21.4%	13	13.3%	14	14.3%	3	3.1%
16. Measuring mouth opening capacity is a reliable diagnostic method for TMD.	2	2.0%	11	11.2%	6	6.1%	16	16.3%	36	36.7%	27	27.6%
17. Anti-inflammatory medications are often effective in managing acute arthralgia associated with TMD.	0	0.0%	2	2.0%	11	11.2%	7	7.1%	43	43.9%	35	35.7%
18. Occlusal splints are a commonly used therapy for TMD.	1	1.0%	3	3.1%	10	10.2%	10	10.2%	40	40.8%	34	34.7%
19. Occlusal splints may help alleviate bruxism in some individuals.	0	0.0%	2	2.0%	6	6.1%	3	3.1%	47	48.0%	40	40.8%
20. Not all individuals with TMJ clicking require treatment.	0	0.0%	1	1.0%	1	1.0%	8	8.2%	53	54.1%	35	35.7%
21. Counseling and behavioral therapy are often recommended as the initial treatment approach for individuals with chronic TMD.	0	0.0%	2	2.0%	0	0.0%	4	4.1%	37	37.8%	55	56.1%
22. Occlusal grinding may be an effective early treatment for TMD.	8	8.2%	6	6.1%	6	6.1%	19	19.4%	47	48.0%	12	12.2%
23. Orthodontic treatment may help prevent the development of TMD.	6	6.1%	6	6.1%	15	15.3%	15	15.3%	44	44.9%	12	12.2%
24. Orthodontic treatment can be used to address TMD symptoms.	5	5.1%	7	7.1%	13	13.3%	22	22.4%	43	43.9%	8	8.2%
25. Orthodontic therapy may be beneficial in resolving TMD in patients with skeletal malocclusions.	4	4.1%	8	8.2%	3	3.1%	13	13.3%	53	54.1%	17	17.3%

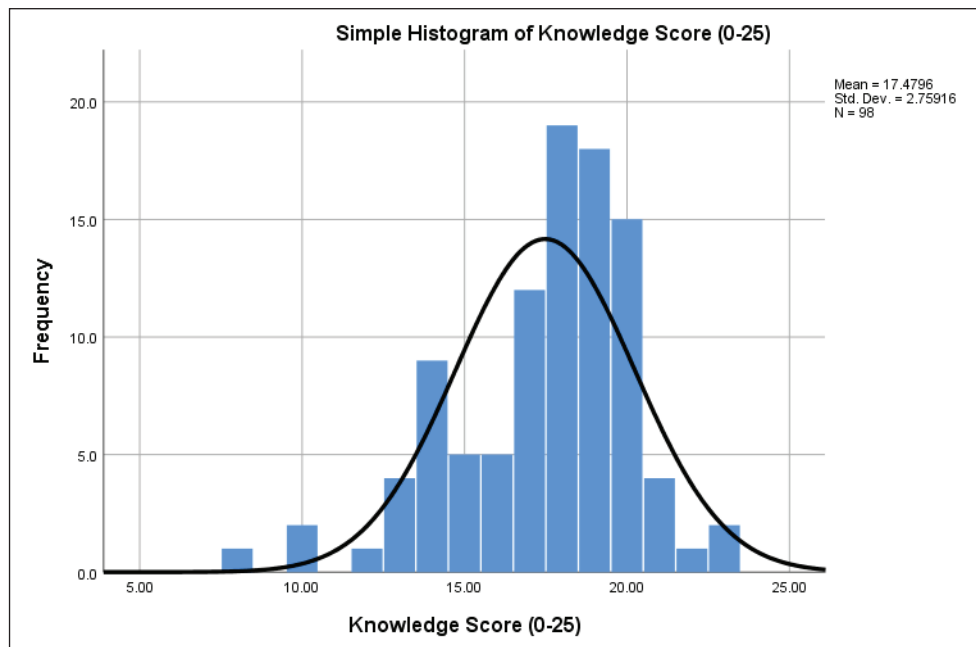


Figure 1. Histogram showing the distribution of knowledge scores.

Table 3. Descriptive statistics and reliability of knowledge regarding temporomandibular disorders.

	Mean $\pm$ SD	Median (IQR)	Minimum	Maximum	Total Items	Cronbach's Alpha
Knowledge Score (0-25)	17.48 $\pm$ 2.76	18.00 (16.00-19.00)	8.00	23.00	25	0.576

Table 4. Categorization of knowledge scores regarding temporomandibular disorders.

		N	%
Knowledge categories	High level	22	22.4%
	Moderate level	59	60.2%
	Low level	17	17.3%

knowledge gaps were observed regarding specialized clinical concepts. The most frequent uncertainty was observed for Item 15 on TMD prevalence in children with mixed dentition, with 21.4% ($N = 21$) of the participants answering, "I don't know." Likewise, items related to orthodontic interventions also showed increased indecision, with 15.3% ($N = 15$) undecided about orthodontic prevention (Item 23) and 13.3% ($N = 13$) undecided about orthodontic management of symptoms (Item 24). Other areas of hesitation were the use of anti-inflammatory drugs for acute arthralgia (Item 17, 11.2%) and the role of occlusal splints (Item 18, 10.2%) (Table 2).

Descriptive statistics, reliability, and categorization of knowledge scores regarding temporomandibular disorders

The mean knowledge score was 17.48 ± 2.76 out of 25, with a median of 18 (IQR: 16-19) and a range of 8-23. Overall, 22 participants (22.4%) and 59 participants (60.2%) were classified as having high and moderate levels of knowledge, respectively, whereas 17 (17.3%)

had low levels of knowledge. The knowledge scale demonstrated a Cronbach's alpha of 0.576 (Figure 1 and Tables 3-4).

Comparison of knowledge scores and categories according to gender and Academic/Professional Status

Knowledge scores did not differ significantly according to gender. Females had a mean knowledge score of 17.89 ± 2.41 compared with 17.23 ± 2.94 among males ($p = 0.541$). Similarly, a high level of knowledge was observed in 24.3% of females and 21.3% of males ($p = 0.451$). On the other hand, knowledge scores differed significantly across academic and professional groups ($p = 0.033$). Postgraduate students had the highest mean knowledge score (18.89 ± 1.17), followed by interns (18.13 ± 1.68) and dental practitioners (18.11 ± 2.47), whereas fifth-year students had the lowest score (15.42 ± 3.85). The categorical analysis similarly demonstrated a non-significant association between academic/professional status and knowledge category ($p = 0.107$), with a high level of knowledge observed in 22.2% of postgraduate students, 20.0% of interns, and 34.3% of dental practitioners, compared with 18.5% of fourth-year and 0.0% of fifth-year students (Table 5).

Discussion

Our findings are broadly consistent with other studies showing that TMD-related understanding among dental learners and practitioners is often uneven, with better

Table 5. Comparison of knowledge scores according to gender and Academic/Professional Status.

		Knowledge Score (0-25)		
		Mean $\pm$ SD	Median (IQR)	p value ^{U/K}
Gender	Female	17.89 $\pm$ 2.41	18.00 (16.50-19.50)	0.541
	Male	17.23 $\pm$ 2.94	18.00 (16.00-19.00)	
Academic or Professional Status	Dental Practitioner (General Dentist or Specialist)	18.11 $\pm$ 2.47	18.00 (17.00-20.00)	0.033
	Fifth-Year Student	15.42 $\pm$ 3.85	16.50 (13.00-19.00)	
	Fourth-Year Student	16.74 $\pm$ 2.86	17.00 (15.00-19.00)	
	Intern	18.13 $\pm$ 1.68	18.00 (18.00-19.00)	
	Postgraduate student	18.89 $\pm$ 1.17	19.00 (18.00-19.50)	

^UIndependent Sample Mann-Whitney test.

^KIndependent Sample Kruskal-Wallis test.

p < 0.05, Significant.

performance in general concepts than in applied diagnosis and management. In our sample, most participants showed a high level ($n = 22$, 22.4%) or moderate level ($n = 59$, 60.2%) of knowledge. In contrast, only 17 participants (17.3%) showed a low level of knowledge, indicating a marked gap between recognizing TMD concepts and selecting evidence-aligned treatment approaches. Knowledge has also improved significantly across training levels.

The analysis of the “I don’t know” responses demonstrated low uncertainty levels, with “I don’t know” responses ranging from 0% to 2% for statements about basic pain triggers, the role of stress, and behavioral counseling. Nevertheless, significant knowledge gaps were seen regarding specialized, important clinical concepts. These results suggest that specific epidemiological details and specialized interdisciplinary treatment are important areas of uncertainty that should receive targeted educational reinforcement, although the general associations between chronic orofacial pain, stress, and behavioral health are widely acknowledged.

The study by Xiong et al. [18], which evaluated postgraduate dental students and practicing dentists in Western China, reported that most respondents had not received systematic TMD training and that both groups showed limited knowledge, although practicing dentists tended to perform better on several items than postgraduate students. This study demonstrated that a total of 15 statements had statistically significant differences in responses between the postgraduate student and dentist groups ($p < 0.05$), and 9 of these statements had a different consensus. For example, practicing dentists generally agreed that “TMJ clicking is a serious symptom which often creates a painful condition,” “nocturnal bruxism is caused by occlusal interferences,” and “reduced mouth opening capacity is almost never caused by TMJ arthritis.” In contrast, postgraduate students disagreed with “all individuals with TMJ clicking need treatment” and “TMD is more common among children with mixed dentition than among adults with permanent dentition,” and these two statements showed no consensus among practicing dentists [16]. This aligns with our finding that greater clinical seniority was associated with higher knowledge scores, but it also supports the broader interpretation that progression in training alone does

not fully correct gaps in TMD understanding, especially when structured education is lacking.

This interpretation is also supported by other cross-sectional studies. Aboubakr and Elkwatehy [18], in a survey of 512 dental students and interns in Saudi Arabia, likewise found insufficient TMD knowledge, no significant association with gender, and only a rough upward trend with advancing academic year [18]. Similarly, Choudhary et al. [19] reported a gradual increase in knowledge and self-awareness from first-year students to postgraduate trainees [20]. In contrast, our results suggest that although overall knowledge increased significantly with training level, the knowledge of appropriate management remained low across nearly all groups, especially with respect to misconceptions surrounding occlusal grinding and orthodontic treatment as routine TMD therapies. This difference may indicate that contemporary learners are increasingly exposed to TMD symptoms, risk factors, and associated conditions, yet still receive insufficient instruction on conservative first-line management and on the limited role of irreversible occlusal or orthodontic approaches.

A similar pattern was reported in Saudi Arabia by Al-Huraishi et al. [21], who examined newly graduated dentists against orofacial pain specialists and framed the problem around frequent confusion between temporomandibular pain conditions and dentoalveolar disorders, a confusion that may lead to mismanagement. Their findings support our concern that the main educational deficit may not be simple factual recall but the ability to translate knowledge into correct clinical reasoning and treatment decisions. That interpretation fits our data closely, because participants in our study performed relatively well on symptom associations and contributing factors, yet continued to endorse inappropriate early management strategies such as occlusal grinding and orthodontic treatment for TMD.

Predoctoral data from Brazil further reinforce this distinction. De Medeiros Tormes et al. [22] specifically evaluated knowledge, competency, and attitudes among predoctoral dental students, showing that TMD education cannot be judged by knowledge alone because competence and attitudes may lag behind factual understanding. This is very similar to the discrepancy observed in our cohort,

377	where acceptable overall knowledge scores coexisted	436
378	with very poor knowledge of appropriate management.	437
379	In Italy, Mozhdeh et al. [23] found only moderate	438
380	knowledge overall, with a mean diagnosis and treatment	439
381	score of 23.8 ± 7.3 out of 40 and significant variation	440
382	according to sex, age, and years of experience [20].	441
383	In India, Prabhakar et al. [20] likewise identified gaps	442
384	in dentists' knowledge and awareness regarding TMD	443
385	[24]. These studies suggest that the central problem	444
386	is international rather than local: dental trainees and	445
387	practitioners may recognize TMD as a clinical entity, but	446
388	many still lack confidence or accuracy in management	447
389	principles, particularly when older occlusion-centered	448
390	beliefs compete with contemporary conservative and	449
391	biopsychosocial models of care.	450
392	The mechanistic explanation for this pattern likely lies	451
393	in the current biopsychosocial understanding of TMD.	452
394	Recent reviews describe TMD as a heterogeneous pain	453
395	condition shaped by peripheral joint or muscle input,	454
396	altered pain modulation, psychological distress, somatic	
397	awareness, oral behaviors, and sleep-related vulnerability	
398	[24–26]. This persistent knowledge-awareness gap	
399	highlights how outdated educational frameworks -	
400	which historically overemphasized dental occlusion	
401	and mechanical interventions - continue to conflict with	
402	the modern biopsychosocial paradigm. Because many	
403	academic and clinical environments still rely heavily	
404	on legacy occlusion-centered teaching, trainees may	
405	struggle to integrate multidisciplinary pain mechanisms	
406	into everyday clinical decision-making.	
407	Limitations	
408	This study has several limitations that should be	
409	considered when interpreting the findings, which are	
410	exploratory in nature given the small sample size. First,	
411	its cross-sectional design prevents any causal inference	
412	regarding the effect of training level on knowledge.	
413	Second, the sample size was small, and the subgroup sizes	
414	were uneven, especially for postgraduate participants,	
415	which may have affected the precision of between-	
416	group comparisons. Third, the measurement approach	
417	introduces notable constraints, including the limitations	
418	of the 6-point Likert scale (such as the absence of a neutral	
419	midpoint) and potential vulnerabilities to selection bias,	
420	response bias, and social desirability bias, which may	
421	have led participants to overestimate their competence.	
422	Fourth, the questionnaire measured stated beliefs rather	
423	than observed clinical decisions, and recent educational	
424	literature suggests that confidence, knowledge, and	
425	actual performance do not always fully align. Finally,	
426	the single-center design limits generalizability; because	
427	temporomandibular disorder curricula vary substantially	
428	across institutions and countries, these findings may	
429	not reflect the knowledge and awareness of dental	
430	professionals at other institutions.	
431	Future directions and implications	
432	Our findings support a more structured and clinically	
433	grounded approach to TMD education. Future studies	
434	should use multicenter designs, larger samples, and	
435	case-based assessments that test diagnosis, treatment	
	sequencing, and referral choices rather than factual	436
	recall alone. Curricula should also align more directly	437
	with current evidence by teaching TMD within a	438
	biopsychosocial framework and by clarifying that stress,	439
	sleep, psychological distress, headache, and cervical	440
	dysfunction are not peripheral details but integral parts of	441
	assessment and management. In parallel, teaching should	442
	more directly challenge myths regarding orthodontics,	443
	occlusal grinding, and irreversible treatment models.	444
	Interdisciplinary exposure is also needed, as recent studies	445
	show incomplete awareness among dentists regarding the	446
	role of physical therapy and other collaborative strategies	447
	in TMD care. Virtual patient modules and other applied	448
	educational tools may be especially useful because they	449
	help bridge the gap between theory and real clinical	450
	choices. If these curricular changes are adopted, we may	451
	move from simple symptom recognition toward more	452
	accurate, conservative, and patient-centered management	453
	of TMD.	454
	Conclusion	455
	In conclusion, our study shows that participants possessed	456
	reasonably good general knowledge of TMD but had	457
	poor knowledge of evidence-aligned management within	458
	the small included cohort. This discrepancy is clinically	459
	meaningful because it suggests that learners may	460
	recognize the disorder while still relying on outdated	461
	therapeutic assumptions. We therefore need TMD	462
	teaching that moves beyond factual recognition toward	463
	applied clinical reasoning, conservative multimodal care,	464
	and interdisciplinary referral when appropriate.	465
	List of Abbreviations	466
	DC/TMD Diagnostic Criteria for Temporomandibular	467
	DisordersIBM	468
	SPSS International Business Machines Statistical	469
	Package for the Social Sciences	470
	IQR Interquartile Range	471
	N Number (Frequency)	472
	SD Standard Deviation	473
	TMD / TMDs Temporomandibular Disorder(s)	474
	TMJ Temporomandibular Joint	475
	Conflict of interest	476
	The authors declare that they have no conflict of interest	477
	regarding the publication of this article.	478
	Funding	479
	None.	480
	Data availability	481
	The data are available upon request from the corresponding	482
	author.	483
	Author details	484
	Mohammed Fakhry Almutairy ¹ , Sulaiman Ahmad Alhomaidd ²	485
	1. Department of Oral and Maxillofacial Diagnostic Sciences,	486
	College of Dentistry, Qassim University, Buraydah, Saudi	487
	Arabia	488
	2. College of Dentistry, Qassim University, Buraydah, Saudi	489
	Arabia	490
	<i>Supplementary content (If any) is available online.</i>	491

References

1. Whyte A, Boeddinghaus R, Bartley A, Vijayaendra R. Imaging of the temporomandibular joint. *Clin Radiol*. 2021;76(1):76.e21–35. <https://doi.org/10.1016/j.crad.2020.06.020>
2. Buescher JJ. Temporomandibular joint disorders. *Am Fam Physician*. 2007;76(10):1477–82.
3. Bal B, Sarak G, Oral K. Oral health-related quality of life and psychological states of dental students with temporomandibular disorders. *J Dent Educ*. 2022;86(11):1459–67. <https://doi.org/10.1002/jdd.12951>
4. Yang W, Xiong X, Wu Y, Zhu Y, Liu J, Ye C, et al. College Students with Oral Habits Exhibit Worse Psychological Status and Temporomandibular-Related Quality of Life: a Correlational Study. *Pain Res Manage*. 2022;2022:6079241. <https://doi.org/10.1155/2022/6079241>
5. Owczarek JE, Lion KM, Radwan-Oczko M. The impact of stress, anxiety and depression on stomatognathic system of physiotherapy and dentistry first-year students. *Brain Behav*. 2020;10(10):1797. <https://doi.org/10.1002/brb3.1797>
6. Valesan LF, Da-Cas CD, Réus JC, Denardin ACS, Garanhan RR, Bonotto D, et al. Prevalence of temporomandibular joint disorders: a systematic review and meta-analysis. *Clin Oral Investig*. 2021;25(2):441–53. <https://doi.org/10.1007/s00784-020-03710-w>
7. Ushakar V, Paul J, D'Lima JP, Parackal ST, Thomas D, Roy JS. Determination of prevalence of Temporomandibular disorders among dental students in Ernakulum district - A cross sectional study. *IP Int J Periodontol Implantol*. 2023;5(4):154–8. <https://doi.org/10.18231/j.ijpi.2020.035>
8. Calixtre LB, Gruninger BLDS, Chaves TC, Oliveira ABD. Is there an association between anxiety/depression and temporomandibular disorders in college students?. *J Appl Oral Sci*. 2014;22(1):15–21. <https://doi.org/10.1590/1678-775720130054>
9. Srivastava KC, Shrivastava D, Khan ZA, Nagarajappa AK, Mousa MA, Hamza MO, 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. <https://doi.org/10.1186/s12903-021-01578-0>
10. Namvar MA, Afkari BF, Moslemkhani C, Mansoori K, Dadashi M. The Relationship between Depression and Anxiety with Temporomandibular Disorder Symptoms in Dental Students. *Maedica (Bucur)*. 2021;16(4):590–4. <https://doi.org/10.26574/maedica.2021.16.4.590>
11. Wallan Alahmary A. Association of Temporomandibular Disorder Symptoms with Anxiety and Depression in Saudi Dental Students. *Open Access Maced J Med Sci*. 2019;7(23):4116.
12. Habib SR, Al Rifaiy MQ, Awan KH, Alsaif A, Alshalan A, Altokais Y. Prevalence and severity of temporomandibular disorders among university students in Riyadh. *Saudi Dent J*. 2015;27(3):125–30. <https://doi.org/10.1016/j.sdentj.2014.11.009>
13. Martínez L, Mendivelso C, Bustamante P, Sánchez C, Sarrazola A. Prevalence of temporomandibular dysfunction and pain syndrome and associated factors in dental students. *Rev Estomatol*. 2015;23(1):21–5. <https://doi.org/10.25100/rev.v23i1.2966>
14. Xiao F, Hu A, Meng B, Zhang Y, Han W, Su J. PVH-Peri5 Pathway for Stress-Coping Oromotor and Anxious Behaviors in Mice. *J Dent Res*. 2023;102(2):227–37. <https://doi.org/10.1177/00220345221130305>
15. Bugaighis I, Elgehani R, Orafi M, Elatrash A. The prevalence of temporomandibular disorders among a group of Libyan dental students. *Libyan Int Med Univ J*. 2017;02(1):64–73. <https://doi.org/10.21502/limuj.009.02.2017>
16. Xiong X, Xiao C, Zhou X, Li X, Wang J, Yi Y. Knowledge and Attitudes regarding Temporomandibular Disorders among Postgraduate Dental Students and Practicing Dentists in Western China: a Questionnaire-Based Observational Investigation. *Pain Res & Manage*. 2023;2023:7886248. <https://doi.org/10.1155/2023/7886248>
17. Bloom BS. Learning for mastery. *Instruct Curriculum Regional Educ Lab For Carolinas Virginia Topical Papers Reprints*. 1968;1(2):12.
18. Aboubakr R, Elkwatehy W. Knowledge about temporomandibular joint disorders among dental students in Saudi Arabia. *Egypt Dent J*. 2021;67(4):2885–92. <https://doi.org/10.21608/edj.2021.82405.1688>
19. Choudhary SH, Kale LM, Mishra SS, Sodhi S, Muley PB, Pandey ND. An institutional survey for knowledge-based and self-awareness assessment in temporomandibular joint disorders among dental students. *Indian J Dent Res*. 2016;27(3):262–7.
20. Bhagat BR, Khairnar MR, Maity S, Sachdev MM, Shah S, Dharamsi R. Jaws of knowledge: an analysis of temporomandibular joint insights in dental training-a quasi-experiment study. *J Korean Assoc Oral Maxillofac Surg*. 2024;50(2):80–5. <https://doi.org/10.5125/jkaoms.2024.50.2.80>
21. Al-Huraishi HA, Meisha DE, Algheriri WA, Alasmari WF, Alsuhaim AS, Al-Khotani AA. Newly graduated dentists' knowledge of temporomandibular disorders compared to specialists in Saudi Arabia. *BMC Oral Health*. 2020;20(1):272. <https://doi.org/10.1186/s12903-020-01259-4>
22. De Medeiros Tormes AK, Lemos GA, Da Silva PL, Forte FD, De Sousa FB, Araujo DN, et al. Temporomandibular disorders: knowledge, competency, and attitudes of predoctoral dental students. *Cranio*. 2023;41(1):32–40. <https://doi.org/10.1080/08869634.2020.1812816>
23. Mozhddeh M, Caroccia F, Moscagiuri F, Festa F, D'Attilio M. Evaluation of knowledge among dentists on symptoms and treatments of temporomandibular disorders in Italy. *Int J Environ Res Public Health*. 2020;17(23):8760.
24. Prabhakar V, Rajvikram N, Ramachandran U, Saravanan R, Ponsekar AA, Thomas DC. Knowledge and awareness about temporomandibular disorder among dentists in India: questionnaire study and review. *J Indian Prosthodont Soc*. 2024;24(3):284–91. https://doi.org/10.4103/jips.jips_573_23
25. Zhang Y, Ozathaley A, Wang X, Wu Y, Zhang K, Li Y, et al. Causal effects of sleep behaviors on temporomandibular disorders and pain: a bidirectional mendelian randomization study. *J Oral Facial Pain Headache*. 2025;39(2):101–11.
26. Chaudhry BA, Robinson CL, Caronna E, Dodd-Glover F, Virk AS, Prieto Peres MF, et al. Central and Peripheral Sensitization in Temporomandibular Disorders: proposed Mechanisms of Botulinum Toxin Therapy. *Toxins (Basel)*. 2026;18(1):28. <https://doi.org/10.3390/toxins18010028>