OPEN ACCESS

Saudi Journal of Oral and Dental Research

Abbreviated Key Title: Saudi J Oral Dent Res
ISSN 2518-1300 (Print) | ISSN 2518-1297 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article | **Pediatric & Preventive Dentistry**

Knowledge, Attitude, and Practice Regarding Occupational Hazards in Dentistry among Undergraduate Dental Students: A Cross-Sectional Study

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DOI: https://doi.org/10.36348/sjodr.2026.v11i02.006 | **Received:** 26.12.2025 | **Accepted:** 21.02.2026 | **Published:** 24.02.2026

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Abstract

Background: Occupational hazards in dentistry biological, chemical, physical, ergonomic and psychosocial pose significant risks during undergraduate training. We assessed knowledge, attitudes and practices (KAP) regarding occupational hazards among undergraduate dental students to identify gaps that can be addressed through education and policy. ***Methods:*** A cross-sectional survey was carried out at the Institute of Dental Studies and Technologies between 15 December 2025 and 30 January 2026. A structured, self-administered questionnaire (six sections: demographics; knowledge; attitude; practice; domain-specific awareness; training/need assessment) was completed by 453 students. Descriptive statistics (frequencies, percentages) summarized KAP; only fully completed questionnaires were included. ***Results:*** Of 453 respondents, 311 (68.6%) were female; 150 (33.1%) reported prior formal training on occupational hazards. Knowledge was moderate: most students recognised that dentistry involves biological/chemical/physical hazards (78.4%) and the cumulative risks of X-rays (84.5%); however, awareness was lower for chemical hazards (formaldehyde 59.0%; mercury 65.8%), with notable "don't know" responses. Attitudes were strongly positive 87.9% agreed occupational hazards are a serious concern and 85.7% endorsed PPE use yet 81.9% considered undergraduate training insufficient. Self-reported safety practices were generally high for infection control (87.0% "always/often") and biomedical-waste disposal (89.2%), but only 53% always used protective eyewear during curing. High prevalences of work-related ill-health were reported: musculoskeletal disorders 52.1% (shoulder pain most common), psychological stress/burnout 70.2%, and glove-related irritation/latex allergy 64.7%. Importantly, 88.5% expressed willingness to attend structured occupational-safety workshops. ***Conclusion:*** Undergraduate dental students showed positive attitudes and generally good safety practices, but notable gaps in formal training and knowledge especially regarding chemical hazards and ergonomics remain. High levels of musculoskeletal problems and stress highlight the need to integrate structured occupational-safety education, practical training, and wellness support into the curriculum.

Keywords: Knowledge, Attitudes, Biological Hazards, Musculoskeletal Disorders (MSDs), Curriculum Integration.

INTRODUCTION

Knowledge, attitude, and practice (KAP) toward workplace hazards are critical determinants of occupational safety in health professions. The World Health Organization defines a *hazard* as "an inherent property of an agent or situation having the potential to cause adverse effects when an organism, system, or population is exposed to that agent," and occupational illness as a condition resulting from workplace exposure to physical, chemical, or biological agents that impairs normal physiology [1,2].

Dentistry exposes students and practitioners to a broad spectrum of occupational hazards biological (blood-borne and aerosolized pathogens), physical (ionizing/non-ionizing radiation, noise), chemical (resins, solvents, mercury), ergonomic (prolonged awkward posture causing musculoskeletal disorders) and psychosocial (stress, burnout).[3,4] Contemporary reviews highlight that percutaneous exposure incidents, dermatitis, MSDs and inhalational/chemical risks remain important problems despite available protective measures.[5]

Undergraduate dental students are particularly vulnerable: systematic reviews report high pooled prevalences of needlestick/sharps injuries (44%) and substantial rates of work-related musculoskeletal symptoms (neck, shoulder, low back commonly affected) already during training years; moreover, under-reporting and gaps in post-exposure knowledge are common.[6,7] These findings suggest that inadequate awareness and unsafe practices during clinical training increase short- and long-term occupational risk.

Inadequate safety protocols and suboptimal clinic design significantly contribute to occupational injuries in dental settings. Evidence from multiple regions indicates that dental personnel experience a wide range of work-related health problems. Studies from India report a high burden of occupational hazards, with nearly half of dentists sustaining sharps injuries within a six-month period and musculoskeletal complaints particularly back pain affecting over two-thirds of practitioners. Additional Indian surveys have documented high prevalence of sharps injuries (approximately 76–77%), workplace stress (42–43%), musculoskeletal disorders (around 40%), and allergic reactions (24%). [8,9]

Reports from Australia highlight frequent occupational injuries among dental teams, including burns in dental assistants and percutaneous exposure incidents among students, along with notable rates of glove-related dermatitis and latex hypersensitivity. [10,11] Audiological problems have also been reported, with studies from Saudi Arabia identifying tinnitus and impaired speech discrimination in nearly one-third of dentists and auxiliaries. [12] European data further demonstrate the persistence of occupational health issues; for example, public-sector dentists have reported substantial rates of dermatoses and other systemic complaints, alongside musculoskeletal problems. [13,14] Overall, these findings indicate that occupational hazards continue to be a major issue in dentistry worldwide. Although technology and safety standards have improved since Bernadino Ramazzini's early observations in the 18th century, dental professionals still face considerable risks, underscoring the need for improved ergonomics, training, and preventive measures.[15]

In India and comparable settings, questionnaire surveys consistently show high frequencies of sharps injuries, stress, MSD and inconsistent adherence to preventive measures, underlining the need for targeted educational and institutional interventions. Together, these observations justify a KAP assessment among undergraduate dental students to identify knowledge gaps, attitudes that hinder safe practice, and modifiable behaviours that can be improved through curriculum and clinic-level policies. The present cross-sectional study therefore aims to evaluate the knowledge, attitude, and practice regarding occupational hazards among undergraduate dental students and to identify predictors of safe workplace behaviour.

MATERIALS AND METHODS

Study Design and Setting

A cross-sectional study was conducted among undergraduate dental students at the Institute of Dental Studies and Technologies from 15 December 2025 to 30 January 2026. The study assessed knowledge, attitudes, and practices (KAP) regarding occupational hazards in dentistry using a structured, self-administered questionnaire.

Inclusion and Exclusion Criteria

All undergraduate dental students enrolled during the study period were eligible. Inclusion criteria were: (1) currently enrolled in the Bachelor of Dental Surgery (BDS) programme (any year including internship), (2) able to provide informed consent, and (3) willing to complete the entire questionnaire. Students who were absent during the data-collection period or who returned questionnaires with >20% missing items were excluded from analysis.

Sample Size Estimation

The sample size was calculated to estimate a single proportion with 95% confidence and a desired precision of ±5%. Using a conservative expected prevalence $p = 0.50$ (which maximises sample size when the true prevalence is unknown), the required sample size was calculated as:

$$n_0 = \frac{Z^2 \times p(1-p)}{e^2}$$

To allow for non-response and incomplete questionnaires, we increased the sample by 15%:

$$n_{\text{adj}} = \frac{n_0}{1-0.15} = \frac{384.16}{0.85} = 452.54 \approx 453.$$

Therefore, the target sample (and the number of completed questionnaires included in the analysis) was 453.

Design and Structure of the Study Questionnaire

Data were collected using a structured, self-administered questionnaire administered either in paper form during class sessions or electronically via Google Forms, depending on feasibility. The questionnaire,

developed from published literature and occupational safety guidelines, comprised six sections: demographic information; knowledge (True/False/Don't know); attitude (5-point Likert scale); practice (5-point frequency scale); domain-specific preventive awareness (Yes/No); and training and need assessment (Yes/No). It assessed key occupational hazards in dentistry, including biological, chemical, physical, ergonomic, and psychosocial risks. Only fully completed questionnaires were included in the final analysis (n = 453).

Statistical analysis

Data were exported to Microsoft Excel (Office 2016). Descriptive statistics were used to calculate frequencies and percentages of responses; Google Forms summaries were cross-checked against the Excel sheet prior to analysis.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committees. Informed consent was obtained from all participants, and confidentiality was strictly maintained.

RESULT

Table 1: Demographic Characteristics of Participants (n = 453)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	142	31.4
	Female	311	68.6
Year of Study	First year	96	21.2
	Second year	85	18.8
	Third year	92	20.3
	Final year	88	19.4
	Internship	92	20.3
Formal training on occupational hazards	Yes	150	33.1
	No	303	66.9

A total of 453 undergraduate dental students participated in the study. The sample was predominantly female (n = 311, 68.6%) compared with male students (n = 142, 31.4%). Participants were distributed across years of study as follows: first year (n = 96, 21.2%), second year (n = 85, 18.8%), third year (n = 92, 20.3%), final year (n = 88, 19.4%) and internship (n = 92, 20.3%). One third of students reported having received formal training on occupational hazards (n = 150, 33.1%), while two-thirds had not (n = 303, 66.9%), as shown in Table 1.

Table 2: Knowledge Regarding Occupational Hazards in Dentistry

Statement	True n (%)	False n (%)	Don't Know n (%)
Dentistry involves physical, chemical & biological hazards.	355 (78.4)	44 (9.7)	54 (11.9)
Prolonged exposure to curing lights causes ocular damage.	344 (75.9)	34 (7.5)	75 (16.6)
Dental aerosols transmit infectious diseases.	300 (66.2)	57 (12.6)	96 (21.2)
Repeated dental X-ray exposure causes cumulative effects.	383 (84.5)	21 (4.6)	49 (10.8)
Mercury from dental amalgam affects nervous system.	298 (65.8)	34 (7.5)	121 (26.7)
Chronic nitrous oxide exposure causes systemic effects.	342 (75.5)	16 (3.5)	95 (21.0)
Needle-stick injuries are common in dental practice.	355 (78.4)	52 (11.5)	46 (10.1)
Formaldehyde exposure is potentially carcinogenic.	267 (59.0)	52 (11.5)	134 (29.6)

As shown in Table 2, the level of knowledge regarding occupational hazards in dentistry varied across different domains. A large proportion of students were aware that dental practice involves exposure to physical, chemical, and biological hazards, with more than three-quarters responding correctly. Awareness was particularly high for radiation-related risks, as most participants recognised that repeated exposure to dental X-rays can have cumulative effects. Needle-stick injuries were also widely acknowledged as a common occupational risk in dental practice. High proportions also recognised potential ocular damage from prolonged curing-light exposure (344, 75.9%) and systemic effects from chronic nitrous-oxide exposure (342, 75.5%). However, comparatively lower levels of awareness were observed for certain chemical hazards. Fewer students correctly identified formaldehyde as a potentially carcinogenic substance and mercury from dental amalgam as having adverse effects on the nervous system. Notably, uncertainty was most pronounced for these two items, as reflected by the higher proportion of "don't know" responses. This pattern highlights specific gaps in knowledge related to chemical hazards and suggests the need for greater emphasis on these topics within undergraduate dental education

Table 3: Attitudes of Undergraduate Dental Students Toward Occupational Hazards in Dental Practice

Statement	SA n (%)	A n (%)	Neutral n (%)	D n (%)	SD n (%)
Occupational hazards in dentistry are a serious concern for dental students.	176 (38.9)	222 (49.0)	41 (9.1)	10 (2.2)	4 (0.9)
Proper use of personal protective equipment (PPE) can significantly reduce occupational risks.	163 (36.0)	225 (49.7)	49 (10.8)	8 (1.8)	8 (1.7)
Radiation safety protocols are often underestimated in routine dental practice.	116 (25.6)	220 (48.6)	83 (18.3)	18 (4.0)	16 (3.5)
Undergraduate training on occupational hazards is currently insufficient.	104 (23.0)	267 (58.9)	57 (12.6)	18 (4.0)	7 (1.5)
Awareness of occupational hazards is essential for long-term professional health.	220 (48.6)	171 (37.7)	44 (9.7)	8 (1.8)	10 (2.2)

Attitudinal responses demonstrated strong agreement with the importance of occupational-hazard awareness and prevention. When "strongly agree" and "agree" responses were combined, 398 participants (87.9%) considered occupational hazards a serious concern for dental students. Similarly high combined agreement was found for the protective value of PPE (388, 85.7%) and the view that awareness is essential for long-term professional health (391, 86.3%). A substantial majority agreed that undergraduate training on occupational hazards is currently insufficient (371, 81.9%). Notably, 336 participants (74.2%) agreed that radiation-safety protocols are often underestimated in routine practice, as shown in Table 3.

Table 4: Occupational Safety Practices Adopted by Undergraduate Dental Students During Clinical Procedures

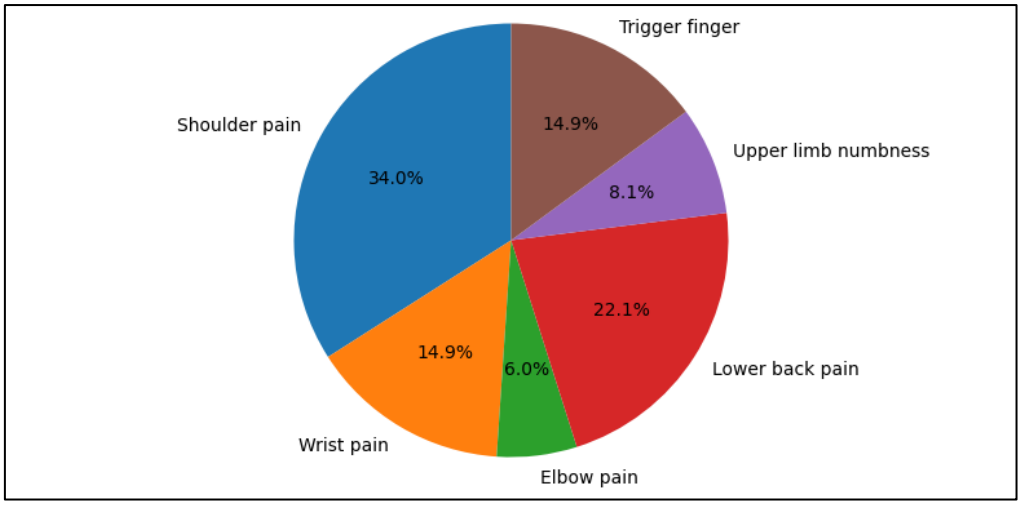
Practice	Always n (%)	Often n (%)	Sometimes n (%)	Rarely n (%)	Never n (%)
Protective eyewear during curing.	241 (53.2)	80 (17.7)	57 (12.6)	31 (6.8)	44 (9.7)
Mask / face shield during aerosol procedures.	287 (63.4)	75 (16.6)	52 (11.5)	13 (2.9)	26 (5.6)
Following infection control protocols.	321 (70.9)	73 (16.1)	39 (8.6)	3 (0.7)	17 (3.7)
Biomedical waste disposal practices.	331 (73.1)	73 (16.1)	23 (5.1)	8 (1.8)	18 (3.9)
Use of lead apron & thyroid collar.	241 (53.2)	86 (19.0)	65 (14.3)	13 (2.9)	48 (10.6)

As shown in Table 4, students reported generally good adherence to key safety practices during clinical sessions. For instance, 321 students (70.9%) said they "always" or "often" wear protective eyewear during curing, 362 (79.9%) use a mask or face shield for aerosol-generating procedures, 394 (87.0%) follow infection-control protocols regularly, and 404 (89.2%) report appropriate biomedical-waste disposal "always" or "often." Use of a lead apron and thyroid collar during radiography was also common (327, 72.2% reporting "always" or "often"). Taken together, these results indicate strong self-reported compliance with several core safety behaviours, although the fact that a minority do not use these measures consistently highlights opportunities for reinforcement through training and supervision.

Table 5: Self-Reported Prevalence of Occupational Hazards in Undergraduate Dental Students

Occupational Hazard	Yes n (%)	No n (%)
Musculoskeletal disorders	236 (52.1)	217 (47.9)
Psychological stress & burnout	318 (70.2)	135 (29.8)
Latex allergy	293 (64.7)	160 (35.3)

As shown in Table 5 and Graph 1, the self-reported prevalence of occupational health problems among undergraduate dental students was considerable. Musculoskeletal disorders were reported by 236 students (52.1%), making them a common physical complaint. Among those affected by musculoskeletal disorders, shoulder pain was the most frequently reported symptom (34.0%), followed by lower back pain (22.1%), wrist pain and trigger finger (each 14.9%), upper limb numbness (8.1%), and elbow pain (6.0%). In addition to musculoskeletal problems, a high proportion of students reported psychological stress or burnout (70.2%) and latex allergy (64.7%). Collectively, these findings highlight a substantial burden of both physical and psychosocial occupational health issues among undergraduate dental trainees, emphasizing the need for preventive strategies and early ergonomic and mental health interventions.



Graph 1: Distribution of musculoskeletal symptoms among undergraduate dental students with musculoskeletal disorders (n = 236)

Table 6: Perception of Undergraduate Training Adequacy and Readiness to Attend Structured Workshops on Occupational Hazards

Question	Yes n (%)	No n (%)
Do you feel undergraduate students receive adequate training on occupational hazards?	225 (49.7)	228 (50.3)
Would you be willing to attend a structured training/workshop on occupational safety?	401 (88.5)	52 (11.5)

As shown in Table 6, students' perceptions regarding the adequacy of undergraduate training on occupational hazards were almost evenly split. Nearly half of the participants (49.7%) felt that the current training was adequate, while a comparable proportion (50.3%) perceived it to be insufficient. In contrast, there was a large majority of students (88.5%) expressed willingness to attend a structured training programme or workshop on occupational safety. This finding reflects a high level of readiness and interest among undergraduate dental students to engage in additional, formal occupational-safety training.

DISCUSSION

In this cross-sectional survey of 453 undergraduate dental students, we found that overall knowledge about common occupational hazards in dentistry was moderate, attitudes were highly positive toward safety, and self-reported safety practices were generally high, but significant gaps remain. The sample was predominantly female (68.6%), reflecting current enrollment trends in many dental schools. Only one-third of students (33.1%) reported any formal training on occupational hazards, and roughly half (50.3%) felt the current curriculum was inadequate. This lack of training is echoed in previous studies, which similarly found that only about one-third of dental students had attended any workshops or courses on safety issues [16]. Crucially, 88.5% of our respondents indicated a strong interest in attending additional safety workshops, underscoring a clear demand for enhanced occupational-safety education. Indeed, experts have recommended "structured educational interventions and continuous professional training" to address such gaps and improve practitioners' safety.[17]

Students showed high awareness of many hazards but notable blind spots in some areas. For example, a large majority correctly knew that dentistry involves exposure to physical, chemical, and biological hazards (78%), and they recognized key risks from X-ray radiation and needle sticks (84.5% and 78.4% correct, respectively). Most students also identified ocular damage from curing lights (75.9% correct) and systemic effects of nitrous oxide (75.5%). These findings align with other surveys showing high awareness of radiation and infection risks among dental students and professionals [18]. In contrast, fewer students correctly identified chemical hazards: only 59.0% knew that formaldehyde is potentially carcinogenic, and 65.8% recognized that mercury in amalgam can affect the nervous system. In these items the "Don't Know" response rate was notably high (29.6% for formaldehyde, 26.7% for mercury), indicating substantial uncertainty. This pattern of stronger knowledge about infection and ergonomic hazards versus weaker knowledge about chemical exposures has also been observed by others. For instance, a recent study found moderately high overall awareness of occupational hazards among dental professionals but identified specific gaps (e.g. only ~15% knew about lead apron use, ~8% about physics rules of radiation). Our results similarly suggest that chemical hazards such as mercury and formaldehyde are under-emphasized in training. Given that formaldehyde and mercury are known risks in dental practice, this

knowledge gaps highlight the need to strengthen curriculum content on chemical safety.[18]

Attitudinally, students were overwhelmingly positive about the importance of hazard prevention. Nearly 88% of respondents agreed that occupational hazards are a serious concern, and a similar proportion agreed that "awareness is essential for long-term professional health" (86.3% combined "strongly agree"/ "agree"). Likewise, 85.7% affirmed that proper use of personal protective equipment (PPE) significantly reduces risk. Most (81.9%) felt that undergraduate training on hazards is currently insufficient, and 74.2% agreed that radiation-safety protocols are often underestimated. These findings indicate that students not only understand the seriousness of hazards but also feel underserved by current education. In general, these positive attitudes are consistent with prior studies: dentistry is widely acknowledged as a highly stressful and hazard-prone profession, and practitioners routinely report that awareness and protective measures are critical. [19,20]

Most students showed good safety behaviour in clinics. Around 80% regularly wore masks or face shields during aerosol procedures, nearly 90% followed proper biomedical-waste disposal, and 87% adhered to infection-control protocols. About 72% also used lead apron and thyroid collar during radiography, which reflects awareness of radiation protection. However, one important gap was seen in protective eyewear use only about half always wore goggles during curing, and a small group never used them. This is concerning because curing-light exposure can damage the eyes.[21] Overall, the findings suggest that basic infection-control habits are well established among students, but protective practices that depend on individual discipline (like eyewear) are still inconsistently followed. Therefore, continuous supervision and repeated reinforcement by faculty are necessary to ensure that all personal protective equipment is used every time, not just most of the time.

In the present study, 52.1% of students reported work-related musculoskeletal disorders (MSDs) during clinical training, with shoulder pain (34.0%) as the most frequent complaint followed by lower-back pain (22.1%), wrist pain/trigger finger (14.9%), upper-limb numbness (8.1%) and elbow pain (6.0%). This pattern closely reflects published evidence indicating that the neck, shoulders and lower back are the most commonly affected regions in dental professionals and students. Systematic reviews report prevalence rates of approximately 51% for neck pain, 45% for shoulder pain and 42% for low-back pain among dental students, [7] while practicing dentists show even higher rates, with up to 81.9% reporting at least one MSD symptom annually.[20] Similar findings have been reported internationally, where 81.9% of dentists experienced MSDs and 91% were exposed to at least one occupational risk, and studies from Nigeria and other regions also identified musculoskeletal problems as the most frequent occupational health issue.[22,23] Additional studies confirm a high prevalence of symptoms affecting the neck, shoulders, hands, wrists and lower back , with females often reporting higher rates of occupational health problems.[24-26] These disorders are largely attributed to static posture, repetitive hand movements and prolonged clinical sessions without breaks. Notably, awareness of ergonomic principles alone does not always prevent symptoms, as many dentists report back and neck pain despite knowing correct posture techniques and prevalence increases with age and clinical experience, especially among prosthodontists.[27,28] Therefore, the substantial MSD burden observed even in students highlights the importance of early ergonomic training, regular posture assessment, scheduled micro-breaks and preventive exercises from the beginning of clinical education.

In addition to physical ailments, psychosocial hazards were also prominent: 70.2% of students reported experiencing significant psychological stress or burnout during training. This is in line with the well-documented mental health strain of dental education and practice.[29] Dentistry is consistently ranked among high-stress professions, and sources of stress (heavy workload, high responsibility, patient anxiety, time pressure) are known contributors to burnout.[30,31] The fact that a large majority of our students have felt burnout highlights the importance of stress management and mental health resources in dental schools.

Finally, 64.7% of students reported having latex allergy symptoms, a surprisingly high rate. Published evidence suggests true latex hypersensitivity among dental workers is around 5–10%, so our result likely reflects reporting any glove-related irritation as "allergy".[32] Nevertheless, it underscores awareness that glove powder and latex can cause dermatitis and hypersensitivity. This finding, together with the fact that nearly 75% of Jazan dental students had received hepatitis B vaccination, indicates that students are at least mindful of common biohazards [16]. Only 59% of students identified formaldehyde and 75.5% recognized nitrous oxide as hazards, showing that their long-term health effects are not well understood and need greater emphasis in training. These results mirror regional data by Benarji *et al.,* (Rajasthan) found 79.45% awareness of HBV infection but only 51.50% vaccination coverage; 20.5% had encountered HBV-infected patients and 59.5% were unaware of post-exposure protocols. In that study, participants most often identified blood (63.9%), sexual contact (21.5%), and oral fluids (42.0%) as transmission routes, and many respondents recommended awareness programs (49.1%) or mandatory hepatitis B vaccination in dental colleges (56.5%).[33]

Our study is limited by self-reported data from a single institution, which may not generalize to all dental schools. The cross-sectional design cannot capture changes over time or causality. Future research could employ objective observational measures of PPE use and ergonomic posture, and could explore interventions: for example, assessing whether an occupational safety course improves knowledge and reduces MSD incidence. Longitudinal studies might also track how attitudes and practices evolve as students advance and eventually enter practice.

CONCLUSION

Undergraduate dental students showed good overall awareness and positive attitudes toward safety but revealed clear gaps in formal training and specific knowledge particularly regarding chemical hazards, ergonomics, and stress management. High self-reported rates of musculoskeletal problems and stress highlight the real, immediate impact of these gaps. We recommend integrating systematic occupational-safety modules and hands-on workshops into the curriculum (covering infection control, chemical safety such as formaldehyde/nitrous oxide/mercury, PPE and waste protocols, and ergonomics), enforcing safety practices in clinical settings, and providing accessible wellness support. Together, these measures will better protect student health and establish safer habits for future clinical practice.

REFERENCES

1. IPCS. IPCS Risk Assessment Terminology. Harmonization Project Document No. 1. Geneva: World Health Organization; 2004. http://www.who.int/ipcs/methods/harmonization/areas/ ipcsterminologyparts1and2.pdf. Accessed August 13, 2018.
2. World Health Organization, Regional Office for the Eastern Mediterranean. Occupational health: a manual for primary health care workers. Cairo, Egypt: World Health Organization; 2002. http://www.who.int/iris/handle/10665/116326. Accessed August 13, 2018.
3. Scully C, Cawson RA, Griffiths M. Chapter 1: Mortality and some aspects of morbidity. In: Occupational Hazards to Dental Staff. London 1990;1-21.
4. Ahmed Massoud Mohamed, Mohamed Fisal Marasstani, Shady Ahmed Moussa. Prevalence of Occupational Hazards among Dentists (Cross-Sectional Study). Sch J Dent Sci, 2024 Nov 11(9): 132-138.
5. Hagberg, M., & Wegman, D. H. (1987). Prevalence rates and odds ratios of shoulder-neck diseases in different occupational groups. Occupational and environmental medicine, 44(9), 602-610.
6. Huang J, Li N, Xu H, Liu Y, An N, Cai Z. Global prevalence, risk factors, and reporting practice of needlestick and sharps injuries among dental students: a systematic review and meta-analysis. J Hosp Infect. 2022 Nov; 129:89-101. doi: 10.1016/j.jhin.2022.06.015.
7. Almeida MB, Póvoa R, Tavares D, Alves PM, Oliveira R. Prevalence of musculoskeletal disorders among dental students: A systematic review and meta-analysis. Heliyon. 2023 Sep 11;9(10):e19956. doi: 10.1016/j.heliyon. 2023.e19956.
8. Reddy, V., Bennadi, D., Satish, G., & Kura, U. (2015). Occupational hazards among dentists: A descriptive study. J Oral Hyg Health, 3(185), 2332-0702.
9. Mehta, A., Gupta, M., & Upadhyaya, N. (2013). Status of occupational hazards and their prevention among dental professionals in Chandigarh, India: A comprehensive questionnaire survey. Dental Research Journal, 10(4), 446.
10. Katelaris, C. H., Widmer, R. P., & Lazarus, R. M. (1996). Prevalence of latex allergy in a dental school. Medical journal of Australia, 164(12), 711-714.
11. McDonald, R. I., Walsh, L. J., & Savage, N. W. (1997). Analysis of workplace injuries in a dental school environment. Australian dental journal, 42(2), 109-113.
12. Al Wazzan, K. A., Al Qahtani, M. Q., Al Shethri, S. E., Al Muhaimeed, H. S., & Khan, N. (2005). Hearing problems among the dental personnel. JPDA, 14(4), 210-214.
13. Jacobsen, N., Aasenden, R., & Hensten-Pettersen, A. (1991). Occupational health complaints and adverse patient reactions as perceived by personnel in public dentistry. Community dentistry and oral epidemiology, 19(3), 155-159.
14. Musculoskeletal Disorders among Dentists in the Private Sector. (2024). *European Journal of Medical and Health Sciences*, *6*(1), 41-44. https://doi.org/10.24018/ejmed.2024.6.1.2041
15. Fasunloro A, Owotade FJ. Occupational hazards among clinical dental staff J Contemp Dent Pract. 2004; 5:134–52
16. Al-Aslami RA, Elshamy FMM, Maamar EM, Shannaq AY, Dallak AE, Alroduni AA. Knowledge and Awareness towards Occupational Hazards and Preventive Measures among Students and Dentists in Jazan Dental College, Saudi Arabia. Open Access Maced J Med Sci. 2018 Sep 23;6(9):1722-1726. doi: 10.3889/oamjms.2018.345.
17. Ramaswami E, Nimma V, Jakhete A, Lingam AS, Contractor I, Kadam S. Assessment of occupational hazards among dentists practicing in Mumbai. J Family Med Prim Care. 2020 Apr 30;9(4):2016-2021. doi: 10.4103/jfmpc.jfmpc_1180_19.
18. Kamal F, Anwari A, Ghazanfari F, Khairzad AA, Sharifi N, Omarzad F. Assessing Knowledge and Awareness of Occupational Hazards and Preventive Measures among Dentists and Final-year Students in Two Dentistry Hospitals, Kabul, Afghanistan. F1000Res. 2025 Sep 9; 14:639. doi: 10.12688/f1000research.166053.3.

19. Ayatollahi J, Ayatollahi F, Ardekani AM, Bahrololoomi R, Ayatollahi J, Ayatollahi A, Owlia MB. Occupational hazards to dental staff. Dent Res J (Isfahan). 2012 Jan;9(1):2-7. doi: 10.4103/1735-3327.92919.
20. Ahmed Massoud Mohamed, Mohamed Fisal Marasstani, Shady Ahmed Moussa. Prevalence of Occupational Hazards among Dentists (Cross-Sectional Study). Sch J Dent Sci, 2024 Nov 11(9): 132-138.
21. Alasiri RA, Algarni HA, Alasiri RA. Ocular hazards of curing light units used in dental practice – A systematic review. *Saudi Dent J.* 2019;31(2):173-180. doi: 10.1016/j.sdentj.2019.02.031.
22. Bârlean, L., Danila, I., SAVEANU, I., & BALCOS, C. (2013). Occupational health problems among dentists in Moldavian Region of Romania. The Medical-Surgical Journal, 117(3), 784-788.
23. Osazuwa-Peters, N., Azodo, C. C., & Obuekwe, O. N. (2012). Occupational health issues of oral health care workers in Edo State, Nigeria. International dental journal, 62(3), 117-121.
24. Biswas, R., Sachdev, V., Jindal, V., & Ralhan, S. (2012). Musculoskeletal disorders and ergonomic risk factors in dental practice. Indian Journal of Dental Sciences, 4(1).
25. Kurşun, Ş., Evirgen, S., Akbulut, N., Oztas, B., & Vaizoglu, S. A. (2014). Work characteristics and musculoskeletal disorders among postgraduate dental students: A pilot study. Journal of Musculoskeletal Pain, 22(1), 62-67.
26. Kierklo, A., Kobus, A., Jaworska, M., & Botuliński, B. (2011). Work-related muculoskeletal disorders among dentists-a questionnaire survey. Annals of Agricultural and Environmental Medicine, 18(1).
27. Rafie, F., Zamani Jam, A., Shahravan, A., Raoof, M., & Eskandarizadeh, A. (2015). Prevalence of upper extremity musculoskeletal disorders in dentists: symptoms and risk factors. Journal of environmental and public health, 2015(1), 517346.
28. Rafeemanesh, E., Jafari, Z., Kashani, F. O., & Rahimpour, F. (2013). A study on job postures and musculoskeletal illnesses in dentists. International journal of occupational medicine and environmental health, 26, 615-620.
29. Srivastava R, Jyoti B, Pradhan D, Kumar M, Priyadarshi P. Evaluating the stress and its association with stressors among the dental undergraduate students of Kanpur city, India: A cross-sectional study. J Educ Health Promot. 2020 Mar 31; 9:56. doi: 10.4103/jehp.jehp_405_19.
30. Chauca-Bajaña L, Ordoñez Balladares A, Carrión Bustamante IA, Sánchez Salcedo AC, Suárez-Palacios J, Villao-León XA, Morán Peña FJ, Egüés Cevallos RC, Tolozano-Benites R, Velásquez Ron B. Burnout Syndrome Among Dental Students in Clinical Training: A Multicenter Cross-Sectional Study in Ecuador. Int J Environ Res Public Health. 2025 Sep 6;22(9):1393. doi: 10.3390/ijerph22091393.
31. Jehan A, Anjum R, Vijay P, Singh P, Khanam W. Burnout in dental students: Navigating stress, exhaustion and academic pressure. J Oral Maxillofac Pathol. 2025 Jan-Mar;29(1):50-53. doi: 10.4103/jomfp.jomfp_359_24.
32. Vaiude AP, Jawdekar A, Mistry LN. Prevalence of latex allergy in dental professionals - A systematic review and meta-analysis. Community Dent Health. 2024 Aug 30;41(3):202-207. doi: 10.1922/CDH_00068Vaiude06.
33. Benarji KA, Anitha A, Suresh B, Aparna V, Praveena A, Penumatsa LA. Knowledge and attitude of dental students toward hepatitis B virus and its vaccination - A cross-sectional study. J Oral Maxillofac Pathol. 2021 Sep-Dec;25(3):553. doi: 10.4103/jomfp.jomfp_387_21.