Original Article

Posture Before Practice: Mapping The Ergonomic Awareness Among Dental Students

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ABSTRACT

Background: Musculoskeletal disorders among dentists often originate during undergraduate training due to poor posture and inadequate ergonomic awareness. Ergonomics aims to optimize work conditions for efficiency, safety, and well-being. Dentistry is physically demanding and involves prolonged static postures and repetitive movements, predisposing practitioners to work-related musculoskeletal disorders and highlighting the importance of early ergonomic education and posture training. The study is conducted to assess ergonomics knowledge, attitude, and posture-related practices among dental students before clinical practice. **Methods:** A descriptive cross-sectional study was conducted among 218 Dental UG and PG students. The study was based on 20 close ended questionnaires. Data was collected using self-administered questions assessing knowledge, attitude and practices related to dental ergonomics. **Results:** Less than half of the participants were familiar with ergonomics (45.4%), and only 37.2% were aware of MSDs related to ergonomics. Although attitudes were positive, with 73.4% supporting ergonomic inclusion in the curriculum, ergonomic practices were inadequate. **Conclusion:** Early ergonomic education is essential to prevent future work-related musculoskeletal disorders.

Key words: Dental ergonomics, Musculoskeletal disorders, Posture

INTRODUCTION

Dentistry is a physically demanding profession that requires precision, concentration, and sustained static postures during clinical procedures. Dental practitioners are frequently exposed to occupational hazards such as repetitive movements, awkward postures, and prolonged working hours, all of which contribute to a high prevalence of work-related musculoskeletal disorders (WMSDs). These disorders commonly affect the neck, back, shoulders, and wrists, leading to pain, reduced productivity, and in severe cases, early retirement from clinical practice.[1,2]

Ergonomics is defined as the science of designing work environments, tasks, and equipment to fit the physical and psychological capabilities of the worker. In dentistry, the application of ergonomic principles aims to optimize posture, enhance efficiency, and minimize physical strain during clinical procedures. Proper ergonomics not only improves the practitioner's comfort and health but also enhances the quality of patient care.[2,3]

Despite the recognized importance of ergonomics in dental practice, several studies have reported inadequate awareness and poor implementation of ergonomic principles among dental professionals.[4] Dental graduates, who are at the beginning of their professional careers, are particularly vulnerable to developing musculoskeletal problems due to insufficient training and early adoption of incorrect working habits. The undergraduate period represents a critical phase for instilling proper ergonomic knowledge and practices that can influence long-term occupational health.[5,6]

Aim

To assess the knowledge, attitude, and practices regarding ergonomics and work-related musculoskeletal disorders (WMSDs) among undergraduate and postgraduate dental students.

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Objectives

- To assess the knowledge of ergonomics and WMSDs.
- To evaluate attitudes toward ergonomic principles.
- To assess ergonomic practices during clinical procedures.
- To identify gaps in ergonomic knowledge and practice.

METHODOLOGY

Study design and setting

A cross-sectional descriptive study was conducted to assess the knowledge regarding ergonomic working positions and musculoskeletal disorders (MSDs) among undergraduate (UG) and postgraduate (PG) dental students. The study was carried out at Department of Public Health Dentistry, Darshan Dental college and Hospital, Udaipur, Rajasthan during the month of January 2026.

Study population

The study population comprised UG and PG dental students enrolled at the institution during the study period.

Inclusion and exclusion criteria

The students and faculty members who were present during the defined study period and who consented to participate by providing complete and valid response to the questionnaire were included in study and those who were not willing to participate or provide complete responses to the questionnaire were excluded from the study.

- UG and PG dental students available to participate in the study.
- Students who responded during the data collection period.

Sample size and sampling technique

The minimum sample size was calculated using the single population proportion formula assuming a prevalence of 50%, a 95% confidence level, and a 5% margin of error. The calculated minimum sample size was 196 participants. After accounting for a 10% non-response rate, the required sample size was 218. Participants were recruited using a non-probability convenience sampling technique. Confidentiality was maintained throughout the study, and no personal identifiers were collected.

Questionnaire

Data were collected using a self-administered, consisting of 20 closed ended questions developed based on a review of relevant literature. The questionnaire is validated and pretested in the Department of Public Health Dentistry. The examiner was trained and calibrated by first testing the questionnaire on 20 subjects then followed by 10 subjects over a gap of 10 days.

The questionnaire consisted of three sections:

- Section I: Demographic details (age, gender, year of study, UG/PG status)
- Section II: Knowledge regarding ergonomic principles and working positions in dentistry.
- Section III: Knowledge and awareness of musculoskeletal disorders associated with dental practice.

Data collection and analysis

Data were collected using a self-administered structured questionnaire created in Google Forms. The questionnaire link was shared with eligible undergraduate and postgraduate dental students through official institutional communication platforms / email / WhatsApp. Prior to accessing the questionnaire, an electronic informed consent was obtained from all participants. Ethical clearance was obtained from Ethical Committee of Darshan Dental College and Hospital.

Participants were instructed to complete the questionnaire only once. Responses were collected anonymously, and all questions were mandatory to prevent missing data. The Google Form was kept active for a period of 1 month after which the responses were downloaded in Microsoft Excel format. The collected data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics version 29.0. Descriptive statistics, including frequencies and percentages, were used to summarize the data.

RESULTS

The study included a total of 218 participants. Table 1 summarizes the participants' sociodemographic characteristics, with the majority being 17–22 years old (69.7%), female (76.6%), and undergraduate students (91.7%). The responses were analysed to assess awareness, attitude, and practices related to ergonomics and musculoskeletal disorders (MSDs). As depicted by the initial findings in Table 2 that awareness of the concept of ergonomics was reported by 99 participants (45.4%), while 119 (54.6%) were not familiar with the concept. Only 81 participants (37.2%) were aware of the association between ergonomics and musculoskeletal disorders (MSDs), whereas 88 (40.4%) lacked awareness and 49 (22.5%) were uncertain about this relationship.

Table 1: Descriptive statistics of the general information gathered from participants.

S no.	Questions	Category	Number(n)	Percentage (%)
1.	Age group(years)	17-22	152	69.7
		23-27	64	29.4
		28-31	0	0
		32-38	2	0.9
2.	Gender	Male	51	23.4
		Female	167	76.6
		Other	0	0
3.	Educational Status	Under graduate	200	91.7
		Post graduate	18	8.3

Figure 1 summarises the key findings of Table 2 that, only 23 participants (10.6%) had attended any course or seminar related to dental ergonomics, while 195 (89.4%) had not. Knowledge regarding principles of dental ergonomics and MSDs was reported by 51 participants (23.4%), whereas 167 (76.6%) lacked such awareness.

Table 2: Data pertaining to Knowledge and Ergonomic practices as reported by the study participants.

S No.	Questions	Yes [n%]	No [n%]	Don't Know [n%]
1.	Are you familiar with the concept of ergonomics?	99(45.4)	119(54.6)	-
2.	Are you aware about MSDs (Musculoskeletal disorders) in relation to ergonomics?	81(37.1)	88(40.4)	49(22.5)
3.	Have you attended any course/ seminar related to dental ergonomics?	23(10.6)	195(89.4)	-
4.	Are you aware about principles of dental ergonomics and MSDs?	51(23.4)	167(76.6)	-
5.	Ergonomic practices and the prevention of musculoskeletal disorders should be emphasized before entering clinical practice.	132(60.6)	86(39.4)	-
6.	Does the condition of your workplace follow the standard of ergonomics?	67(30.7)	41(18.8)	110(50.5)
7.	Do you think ergonomics might improve your daily performance and efficiency in clinic?	115(52.8)	14(6.4)	89(40.8)
8.	Do you consistently perform stretching exercises between patients?	63(28.9	155(71.1)	-
9.	Do you think dental chair and instruments contribute to ergonomics?	107(49.1)	22(10.1)	89(40.8)
10.	Do you think operator chair position and patient chair position has role in development of MSDs?	110(50.5)	18(8.2)	90(41.3)
11.	Do you think ergonomic should be a mandatory part of UG curriculum?	160(73.4)	58(26.6)	
12.	Do you practice standing dentistry (treating patients while standing to alleviate lower back pain caused by prolong sitting)?	96(44)	122(56)	
13.	Do you have idea about workplace simplification rule (applying ergonomic principle to reduce physical fatigue, minimize stress and improve efficiency)?	66(30.3)	152(69.7)	
14.	Do you consciously check your spine alignment during dental procedure?	91(41.7)	127(58.3)	
15.	Do you orient your position in accordance to the quadrant you are working on?	116(53.2)	102(46.8)	

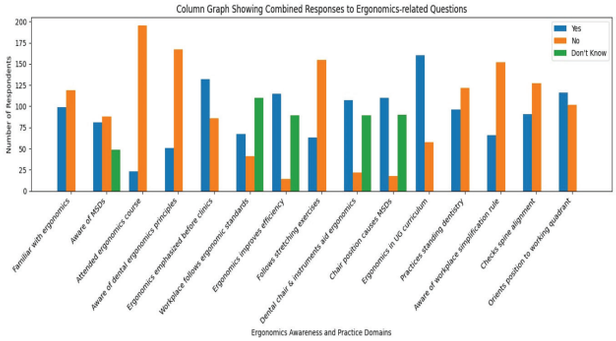

Figure 1: Illustrates the distribution of responses regarding ergonomics awareness, training, and perceived importance among the study participants.

A majority of participants showed a favourable attitude toward ergonomics. 132 participants (60.6%) agreed that ergonomic practices and musculoskeletal problems should be emphasized before entering clinical practice. Ergonomics was perceived to improve daily clinical performance and efficiency by 115 participants (52.8%), while 89 (40.8%) were uncertain.

Regarding the inclusion of ergonomics in the undergraduate curriculum, 160 participants (73.4%) supported making it mandatory. As presented in Table 3 and Figure 2, 52 participants (23.9%) strongly agreed and 66 (30.3%) agreed that adopting ergonomic practices is essential for preventing work-related musculoskeletal disorders (MSDs), while 90 participants (41.3%) expressed a neutral opinion.

Table 3: Perceptions related to ergonomics as reported by the study participants.

S. No.	Questions	Strongly Agree[n%]	Agree [n%]	Disagree [n%]	Neutral [n%]
1.	Do you think adopting ergonomics practices can prevent work related MSDs?	52(23.9)		10(4.6)	90(41.3)
2.	MSDs and poor knowledge about ergonomics are reasons for early retirement among dentists?	54(24.8)		8(3.7)	82(37.6)

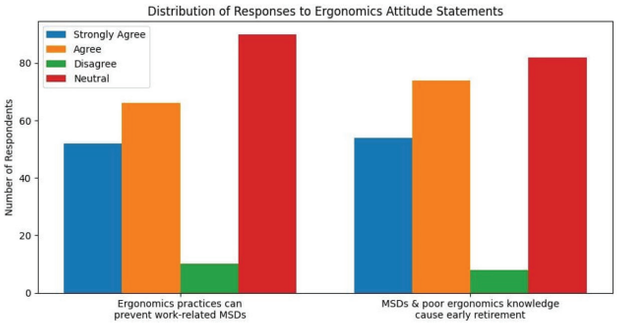

Figure 2: Illustrates participants opinion and attitude and impact of ergonomics knowledge.

Regarding ergonomic practices and workplace conditions, only 63 participants (28.9%) reported regularly performing stretching exercises between patients, while 155 (71.1%) did not. Compliance of the workplace with ergonomic standards was reported by 67 participants (30.7%), while 41 (18.8%) reported non-compliance and 110 (50.5%) were uncertain. Dental chair and instruments were considered contributors to ergonomics by 107 participants (49.1%), whereas 89 (40.8%) were uncertain. Operator and patient chair position were believed to play a role in the development of MSDs by 110 participants (50.5%), while 90 (41.3%) were uncertain. In respect to posture and working practices, conscious monitoring of spinal alignment during dental procedures was reported by 91 participants (41.7%), while 127 (58.3%) did not practice this routinely. Standing dentistry was practiced by 96 participants (44%), whereas 122 (56%) did not adopt this approach. Awareness regarding workplace simplification rules was reported by 66 participants (30.5%), while 152 (69.7%) were unaware. Orientation of operator position according to the working quadrant was practiced by 116 participants (53.2%), whereas 102 (46.8%) did not follow this practice.

As shown in Figure 3, the majority of respondents demonstrated a positive attitude toward ergonomics; however, ergonomic practices were not consistently implemented, reflecting inadequate knowledge and limited exposure to formal ergonomic training.

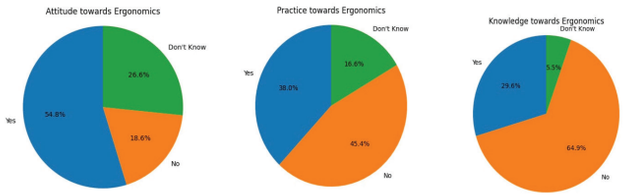

Figure 3 illustrates:

- Attitude: More than half of respondents showed a positive attitude towards ergonomics, suggesting receptiveness to training and curriculum inclusion.
- Practice: Ergonomic practices were inconsistently followed despite awareness.
- Knowledge: Majority responses were negative, indicating poor awareness and training.

DISCUSSION

The present study revealed substantial gaps in ergonomic knowledge and practice among dental students. Only 45.4% of respondents were familiar with ergonomics, despite global reports demonstrating MSD prevalence rates as high as 64–93% among dental professionals6. Likewise, awareness of MSDs in the context of ergonomics was limited to 37.2%, mirroring similar deficits noted by Singh & Jathanna (2023),[15] who emphasized that insufficient ergonomic training contributes significantly to early-onset musculoskeletal symptoms.

A notable 89.4% of participants had never attended ergonomics-related courses, contrasting sharply with the findings of De Sio et al. (2018),[7] who reported that 87.5% of reviewed studies identified static posture as the predominant ergonomic risk factor. This lack of structured training may explain why 71.1% of our respondents did not routinely perform stretching exercises, although stretching was identified as an essential preventive strategy in 75% of reviews included in the PeerJ umbrella review (De Sio et al., 2018).

In terms of ergonomic interventions, 60.6% of participants in our study agreed that ergonomic instruction should be emphasized prior to clinical training. This aligns with Lietz et al. (2020),[10] who found that interventions such as magnification loupes and prismatic spectacles improved posture and reduced MSD symptoms, with loupes showing significant improvements in upper limb discomfort. Similarly, 47.9% of students in our study believed that dental chair design contributes to ergonomics, consistent with the meta-analysis by Gouvea et al. (2018),[8] which demonstrated that saddle seats reduced RULA ergonomic risk scores by 3.16 points (95% CI: −4.02 to −2.30) compared to conventional seats.

Furthermore, 69.7% of participants agreed that ergonomic workplace simplification can reduce physical fatigue and stress, supporting conclusions from comprehensive reviews by Soo et al. (2023)[14] and Kumar & Gupta (2022),[13] who identified physical overload, poor workspace layout, and prolonged static posture as principal MSD determinants.

Overall, the convergence of our findings with global evidence highlights a critical need for early, comprehensive ergonomic training within dental curricula to mitigate long-term MSD risk.

FUTURE RESEARCH

Future research should adopt longitudinal and interventional study designs to evaluate the long-term impact of ergonomic practices on musculoskeletal health. Incorporation of objective ergonomic assessment methods and evaluation of structured ergonomics training programs is recommended. Further studies should also explore curriculum-based ergonomics education, clinic design, and equipment ergonomics across diverse practice settings.

LIMITATIONS

The present study utilized a self-administered questionnaire to assess awareness, attitudes, and practices related to dental ergonomics and musculoskeletal disorders. As the data were self-reported, responses may be influenced by recall bias and social desirability bias. Ergonomic practices, including posture monitoring, stretching exercises, and workplace ergonomics, were assessed based on perception, and no objective ergonomic assessment tools such as RULA or REBA were employed. Additionally, musculoskeletal disorders were evaluated based on awareness and perceived symptoms rather than clinical diagnosis. The cross-sectional design of the study limits the establishment of causal relationships between ergonomic awareness, practices, and musculoskeletal outcomes.

CONCLUSION

The present study demonstrated that while dental professionals and students have a positive attitude and moderate awareness regarding ergonomics, there remains a significant gap in

their knowledge and routine clinical practice. Although most participants recognized the importance of ergonomics in preventing work-related musculoskeletal disorders and supported its inclusion in the undergraduate curriculum, the lack of formal training and inconsistent adoption of ergonomic practices were evident. These findings highlight the need for structured ergonomic education, regular hands-on training, and workplace modifications to encourage proper clinical practices, minimize the risk of musculoskeletal disorders, and enhance the long-term health, efficiency, and productivity of dental professionals.

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REFERENCES

1. Almeida M, et al. Prevalence of musculoskeletal disorders among dental students: A systematic review and meta-analysis. Heliyon. 2023;9(10):e19956.
2. Danylak S, Zafar S. Measuring ergonomic interventions and prevention programs for reducing musculoskeletal injury risk in the dental workforce: A systematic review. J Dent Educ. 2024;88(2):128-141.
3. Garbin AJI, et al. Ergonomic risk and preventive measures of musculoskeletal disorders in the dentistry environment: An umbrella review. PeerJ. 2018;6:e4154.
4. Kumar PM, Sahitya S, Penmetsa GS, et al. Assessment of knowledge, attitude, and practice related to ergonomics among the students of three different dental schools in India. J Educ Health Promot. 2020;9:266.
5. Risinger R, et al. The development of musculoskeletal disorders during undergraduate dentistry studies: A long-term prospective study. Int J Environ Res Public Health. 2021;18(14):7662.
6. Ahmed A, Kumar P, Swapna C, Jaweed S. Applications of ergonomics in dentistry: A review. J Res Adv Dent. 2016;5(3):143–152.
7. De Sio S, Traversini V, Rinaldo F, et al. Ergonomic risk and preventive measures of musculoskeletal disorders in the dentistry environment: An umbrella review. PeerJ. 2018;6:e4154. doi:10.7717/peerj.4154.
8. Gouvea GR, Vieira WA, Paranhos LR, et al. Assessment of the ergonomic risk from saddle and conventional seats in dentistry: A systematic review and meta-analysis. PLoS One. 2018;13(12):e0208900.
9. Gupta A, Sharma N. Ergonomics in dentistry: A comprehensive review. Int J Clin Dent. 2019.
10. Lietz J, Ulusoy N, Nienhaus A. Prevention of musculoskeletal diseases and pain among dental professionals through ergonomic interventions: A systematic literature review. Int J Environ Res Public Health. 2020;17(10):3482.
11. Sharma P, Singh R. Ergonomics in dental practice: Current concepts and future perspectives. J Dent Sci. 2021.
12. Braga da Paz Junior F, Lima RGM. The physical and ergonomic risks of dental practice: A literature review. Res Soc Dev. 2022;11(12).
13. Kumar S, Gupta N. Work-related musculoskeletal disorders among dental professionals: A review. Int Dent J. 2022.
14. Soo SY, Ang WS, Chong CH, Tew IM, Yahya NA. Occupational ergonomics and related musculoskeletal disorders among dentists: A systematic review. Work. 2023;74(2):469–476.
15. Singh A, Jathanna VR. Ergonomics in Dentistry: A Literature Review. J Chem Health Risks. 2023.

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