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ORIGINAL ARTICLE

Effects of improper postures on the health of dental professionals

Doménica Alexandra Vaca-Velasteguí[1], Erick Israel Lara-Proaño[1], Marco Alexander Llerena-Aldaz[1], Gabriela Liseth Vaca-Altamirano[1]

[1]Universidad Regional Autónoma de los Andes. Ambato, Ecuador.

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ABSTRACT

Introduction: musculoskeletal disorders represent a growing problem in dental practice, where the adoption of inadequate postures during clinical care compromises the health and performance of both students and professionals.
Objective: to determine musculoskeletal symptoms associated with poor ergonomics in dentistry students during clinical practice.
Methods: an observational, descriptive, and cross-sectional study was conducted at the Universidad Regional Autónoma de los Andes in 2024. The population included students from the seventh to tenth semesters of the Dentistry program, with a probabilistic, simple random sample of 186 participants. The Nordic Kuorinka questionnaire, validated for the detection of musculoskeletal discomfort, was applied. Descriptive statistical methods were used to analyze the data obtained, while adhering to bioethical principles.
Results: 80,6 % of students reported neck discomfort, 81,2 % reported pain in the dorsal or lumbar region, and 65,6 % in the shoulders. Additionally, 68,8 % reported pain in the wrists or hands, and 50,5 % in the elbows or forearms. Most pain episodes lasted less than one hour and occurred between 1–7 days in the past six months. Furthermore, 35,5 % identified the rehabilitation course as the main source of academic stress.
Conclusions: the findings reveal a high prevalence of musculoskeletal discomfort linked to incorrect postures in dental clinics. The need to implement ergonomics programs and preventive education is emphasized, in order to promote physical health and long-term professional performance.

Keywords: Musculoskeletal Diseases; Ergonomics; Students, Dental; Occupational Health.

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INTRODUCTION

Dentistry is responsible for the diagnosis, treatment, and prevention of diseases of the stomatognathic system and human dentition. Dentists and dental students have a significant commitment to society in performing complex procedures requiring force application and often adopt incorrect postures and techniques to achieve successful treatment outcomes, which can trigger motor system problems in the professional.[1]

At the Autonomous Regional University of the Andes, dental students treat approximately one patient per hour and at least four patients per day, and their poor posture may affect their short- or long-term health as well as their quality of life.[2] Within dentistry, several factors cause problems for dentists, including physical and mental exhaustion, weakness, musculoskeletal disorders, poor posture, improper instrument handling, among others, as well as an increased incidence of pathologies affecting the neck, shoulders, upper back, lower back, hands, wrists, and vision loss due to insufficient or excessive illumination.[3]

Over the years, it has been demonstrated that inappropriate actions or postures adopted by dental professionals or students in this field lead to musculoskeletal disorders in 30 % of cases, resulting in annual expenditures of approximately USD 215 billion on treatment.[4] The work environment may present various risks stemming from incorrect working postures due to inadequate design of seats and chairs, as well as risks related to worker actions (e.g., fixed working positions, excessive force, improperly executed movements, or when perceptual and attentional capacities are overloaded).[5]

Working while seated enables careful and precise tasks; this position should maintain the natural curvature of the spine and reduce load on the support structures. It is important that the dental chair be designed to relieve pressure on the skin and superficial vascular system. Movements must be rapid and highly precise to prevent individual muscle insertions from remaining in a tense position; fixed working postures should be avoided.[6]

A four-handed work approach is more appropriate due to limited range of motion and the long hours of high-intensity work required. This technique is highly useful in daily practice and study.[7,8] However, these positions must be corrected, as static muscular tension may cause subjects to accumulate muscular toxins in such postures. In these cases, implementing measures aimed at ensuring professionals' quality of life and health is crucial. Physical exercise and general sports activities are recommended, as adopting correct postures alone will be of little benefit without developing habits and proper postural patterns.[9] Prevention is preferable to avoid progression of pain or risks associated with work-related musculoskeletal disorders, placing health above all else.[10]

Thus, correct ergonomic posture is extremely important today, as neglecting it can impair individuals' quality of life and even lead to disability-related issues.[11] The aforementioned considerations led to the present study, which aimed to determine musculoskeletal symptoms associated with poor ergonomics among dental students during clinical practice.

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METHODS

An observational, descriptive, cross-sectional study was carried out at the Autonomous Regional University of the Andes (UNIANDES), Ambato, Ecuador, during 2024. The population consisted of dental students from the seventh to tenth semesters.

Inclusion criteria: Enrolled students in the aforementioned semesters, of either sex, who voluntarily agreed to participate.

Exclusion criteria: Students who did not complete the questionnaire or declined to participate. The sample size was calculated based on a population of 356 students, with a 95 % confidence level and a 5 % margin of error, resulting in 186 participants selected through simple random probabilistic sampling.

Procedures and techniques

Data collection was performed via an electronic survey distributed using Google Forms. The Kuorinka Nordic Questionnaire, validated for detecting musculoskeletal discomfort, was employed. The instrument comprised 29 items grouped into six sections, assessing the presence, duration, and location of symptoms in the neck, shoulders, thoracic or lumbar region, elbows, wrists, and hands.

Statistical analysis

Descriptive statistical methods were applied, including absolute frequencies, percentages, and measures of central tendency. No hypothesis tests were performed, given the exploratory nature of the study. Microsoft Excel software was used. Missing data were handled by excluding incomplete cases, and bias was minimized through random sampling and standardized questionnaire administration.

Ethical considerations

The study received approval from the Institutional Ethics Committee of the Autonomous Regional University of the Andes. All participants provided electronic informed consent prior to completing the survey. The principles of the Declaration of Helsinki and current bioethical standards were respected, ensuring confidentiality and anonymity of the information.

RESULTS

Table 1 shows the distribution of the sample by sex and semester enrolled. The largest proportion of surveyed students belonged to the ninth semester (37,6 %), followed by the seventh (34,9 %). Female participants predominated (55,4 %) over male participants (44,6 %). This finding reflects that the stage with the highest clinical workload coincides with the ninth semester, which may explain the high prevalence of musculoskeletal discomfort in this group.

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Table 1. Distribution by sex and semester.

Semester enrolled	Sex				Total	
	Female		Male			
	No.	%	No.	%	No.	%
Seventh	30	16,13	35	18,82	65	34,95
Eighth	5	2,69	15	8,06	20	10,75
Ninth	47	25,26	23	12,37	70	37,63
Tenth	21	11,30	10	5,37	31	16,67
Total	103	55,38	83	44,62	186	100

The most affected regions were the thoracic/lumbar area (81,2 %) and the neck (80,6 %), followed by shoulders (65,6 %) and wrists/hands (68,8 %). These results demonstrate that prolonged postures and instrument manipulation generate overload in areas critical for dental practice, confirming the direct relationship between poor ergonomics and musculoskeletal symptoms (Table 2).

Table 2. Discomfort in the limbs.

Indicator		No.	%
Have you experienced neck discomfort?	Yes	150	80,6
Have you experienced shoulder discomfort?	Yes (right)	100	53,8
	Yes (left)	22	11,8
Have you experienced thoracic or lumbar discomfort?	Yes	151	81,2
Have you experienced elbow or forearm discomfort?	Yes (right)	51	27,42
	Yes (left)	19	10,22
	Yes (both)	24	12,9
Have you experienced wrist or hand discomfort?	Yes (right)	75	40,3
	Yes (left)	22	11,8
	Yes (both)	31	16,7

In the previous semester, 77,4 % reported cervical pain and 74,2 % lumbar pain, while more than half (62,4 %) experienced wrist/hand discomfort. The persistence of symptoms over an extended period suggests that these problems are not episodic but recurrent and cumulative. Most episodes of neck (62,1 %), shoulder (61,1 %), and wrist (64,9 %) discomfort occurred within 1–7 days. This indicates that discomfort is frequent, albeit short-lived, potentially affecting the continuity of clinical performance. Nearly half of the students reported episodes lasting less than one hour, particularly in the elbow/forearm (50,6 %) and wrist/hand (4,5 %). Although brief, the repetition of these episodes reflects constant overload that may progress to chronic injuries (Table 3).

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Table 3. Sample distribution according to presence and duration of discomfort in the last 6 months

Indicator		No.	%
Have you had neck discomfort in the last 6 months?	Yes	144	77,4
Have you had shoulder discomfort in the last 6 months?	Yes	115	61,8
Have you had thoracic or lumbar discomfort in the last 6 months?	Yes	138	74,2
Have you had elbow or forearm discomfort in the last 6 months?	No	96	51,6
Have you had wrist or hand discomfort in the last 6 months?	Yes	116	62,4
How long have you had neck discomfort in the last 6 months?	1–7 days	110	62,1
How long have you had shoulder discomfort in the last 6 months?	1–7 days	102	61,1
How long have you had thoracic or lumbar discomfort in the last 6 months?	1–7 days	99	55,6
How long have you had elbow or forearm discomfort in the last 6 months?	1–7 days	110	66,3
How long have you had wrist or hand discomfort in the last 6 months?	1–7 days	111	64,9
How long does each episode of neck pain last?	< 1 hour	81	45,5
How long does each episode of shoulder pain last?	< 1 hour	78	46,7
How long does each episode of thoracic or lumbar pain last?	< 1 hour	74	42,3
How long does each episode of elbow or forearm pain last?	< 1 hour	84	50,6
How long does each episode of wrist or hand pain last?	< 1 hour	83	48,5

Lumbar pain was the only symptom that caused significant work limitation, with 41,8 % of students reporting 1–7 days of impairment. In other regions, most students indicated that discomfort did not directly interfere with work, although it did affect their overall well-being (Table 4).

Table 4. Work impairment.

Indicator	Response	No.	%
How many days has neck discomfort prevented you from working in the last 6 months?	0 days	82	45,6
How many days has shoulder discomfort prevented you from working in the last 6 months?	0 days	85	47,8
How many days has thoracic or lumbar discomfort prevented you from working in the last 6 months?	1–7 days	76	41,8
How many days has elbow or forearm discomfort prevented you from working in the last 6 months?	0 days	91	51,1
How many days has wrist or hand discomfort prevented you from working in the last 6 months?	0 days	85	47,2

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31,3 % did not receive treatment for cervical discomfort, and 35,5 % identified the rehabilitation course as the main source of stress. This suggests that, in addition to ergonomics, academic workload contributes to the perception of physical and psychological discomfort (Table 5).

Table 5. Treatment and stress level.

Indicator	Response	No.	%
Have you received treatment for these discomforts in the last 6 months?	Neck (No)	56	31,3
Have you had discomfort in the last 7 days?	Neck (Yes)	52	30,1
Rate your discomfort on a scale from 0 (no discomfort) to 5 (very severe discomfort)	Score 3	50	27
What is your main source of stress?	Rehabilitation	65	35,5

DISCUSSION

Statistically, the values obtained in the survey allow us to observe a correlation between symptoms and poor posture among students attending dental clinics at UNIANDES. Many students have been experiencing this type of symptomatology for more than one month due to inadequate ergonomics during patient care, as noted by Romero et al.,[11] This affects their health, as improper movements can cause conditions such as spinal disorders, including back pain or disc herniation.[6,12]

Musculoskeletal injuries constitute a serious occupational health problem among dental students and professionals due to their magnitude and high prevalence, as they adopt postures that, over time, lead to musculoskeletal complications. Vega,[9] notes that symptoms clearly differ according to the severity of the injury, typically in the lumbar region; this depends on the affected nerve—if the sciatic nerve is involved, pain occurs in the posterior thigh and may even lead to more severe complications such as sensory disturbances or paralysis.

The application of the Kuorinka Nordic Questionnaire—which is used to collect information on discomfort, pain, or symptoms in different body regions—helps identify that students experiencing the greatest problems are those currently enrolled in clinical courses. It is assumed that female students were more represented because they showed greater willingness to complete the questionnaire. As Gaitán González,[13] indicates, the Nordic Questionnaire has already been modified and specifically adapted for assessing musculoskeletal symptoms, making it highly valuable and suitable for frequent use in multicenter studies, which would allow identification of individuals most prone to developing these conditions.

To maintain proper whole-body posture, it is necessary to understand correct postural principles to prevent damage to the limbs—particularly the thoracic and lumbar regions, where 81,2 % of students reported discomfort, followed by the neck (80,6 %), shoulders (65,6 %), and hands, with the lowest percentage (16,7 %) reporting pain in both hands. According to Martínez,[10] the main musculoskeletal disorders associated with dentistry are localized "in the neck (58 %), upper back (51,8 %), shoulders (44,4 %), and lower back (43,2 %)," with fewer alterations affecting the upper limbs (hand, arm, forearm).[14]

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Furthermore, according to the obtained results, it was observed that 12,4 % of students reported a pain score of 0 (no discomfort), 11,9 % reported a score of 1 (minimal discomfort), 20 % reported a score of 2 (moderate discomfort), 27 % reported a score of 3 (discomfort), and 19,5 % reported a score of 5 (very severe discomfort). Due to the various poor postures adopted by students during clinical or pre-professional practice, there is a high risk that may negatively impact their future professional careers; therefore, prompt intervention is essential.[11]

It is necessary that, as future dentists, we prioritize our own well-being and that of our colleagues. Maintaining incorrect postures inevitably leads to physical deterioration; thus, Gaitán González,[13] emphasizes in his article the importance of ongoing training in ergonomic postures. Such training provides adequate knowledge, ensures high-quality procedures in daily clinical practice, and supports the design of future dental offices.

The results of the present study revealed a discrepancy compared to the study by Lyhne CN et al.,[15] who reported that more than 40 % of participants experienced ocular discomfort—an aspect not addressed in our questionnaire. However, both studies agree on the significant increase in discomfort symptoms associated with prolonged sitting. Extended periods in the same position, whether standing or seated, represent a key factor affecting performance during dental operations and procedures.

Mulimani et al.,[16] in their literature review, highlighted the relevance of evaluating physical ergonomic interventions useful for preventing such disorders in clinical settings. However, they observed that these interventions did not demonstrate a clear effect on the prevalence of discomfort in thighs and feet over a six-month period. In contrast, our study found the lowest prevalence in the thoracic/lumbar region, possibly because the upright posture adopted was relatively correct. Nevertheless, cervical pain persisted in both studies.

It is recommended to improve working posture in the short term, as this contributes to reducing discomfort in the most affected areas—neck, shoulders, wrists, among others—during the workday. One alternative is the Gokhale Method, which proposes exercises, postures, and techniques to alleviate pain.[17] Considering the findings of Cisterna,[18] who noted that dental students maintain constant trunk and neck flexion during clinical practice, our study confirmed that 77,4 % of respondents reported having experienced cervical pain, which impairs their ability to adequately perform daily activities.

Finally, Laguerre's,[19] research demonstrated that increased academic and clinical workload is closely associated with a high prevalence of musculoskeletal disorders among dental students. In our study, some students reported no pain in certain joints, which was attributed to their physical constitution. Additionally, it was inferred that mood influences how each student copes with academic and clinical demands.

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CONCLUSION

The main symptoms causing musculoskeletal disorders due to poor posture (ergonomics) were identified among dental students from the seventh to tenth semesters at the Autonomous Regional University of the Andes, Ambato campus. These include discomfort in hands and wrists due to improper instrument handling (68,8 %), increased pathologies in the neck (80,6 %), and problems in the thoracic and lumbar regions (81,2 %), representing the most significant issue. It is affirmed that poor posture in the dental profession is detrimental to the health of the student, the dentist, and even the patient; therefore, early measures must be implemented to prevent future complications.

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