



## BRIEF COMMUNICATION

### Behavior of musculoskeletal disorders in Dentistry students

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#### ABSTRACT

**Introduction:** dentistry students face ergonomic risks derived from prolonged postures and repetitive movements, which favor the onset of musculoskeletal disorders that affect their academic performance and future professional practice.

**Objective:** to identify the prevalence and characteristics of musculoskeletal alterations in dentistry students.

**Methods:** an observational, descriptive, cross-sectional study was conducted at the Universidad Regional Autónoma de los Andes, Ambato campus, between 2023 and 2024. The population included 335 students from the seventh to tenth semesters enrolled in clinical courses, selected through simple random sampling, to whom questionnaires were applied to obtain information.

**Results:** of the participants, 74,6 % were women, and the predominant age range was 22 to 24 years. A total of 70,7 % reported knowledge of ergonomics, although only 49,9 % considered BRIEThaving received adequate training. About 62,1 % reported pain associated with incorrect postures, mainly in the back, neck, and upper limbs. Pain intensity was concentrated at moderate levels (scores 2 and 3 on a scale of 0 to 4). No significant associations were found between gender and back pain. Additionally, 35,8 % presented calluses on their hands attributable to clinical activity.

**Conclusions:** the findings show a high prevalence of musculoskeletal complaints among students, despite basic knowledge of ergonomics. It is necessary to strengthen ergonomic training, implement stretching programs, and promote postural awareness to improve occupational health and prevent future complications in dental practice.

**Keywords:** Musculoskeletal Diseases; Postural Balance; Ergonomics; Students, Dental.

## INTRODUCTION

Ergonomics in dental care seeks to understand the physical and coordinated interactions between practitioners and work instruments and materials. Recently, the prevalence of musculoskeletal disorders (MSDs) has increased due to prolonged dental procedures involving discomfort and physical strain, during which risky spinal postures are frequently adopted. Although dental chairs have evolved with more advanced technology, ergonomic problems persist—often because professionals develop personal working methods and comfort preferences, regardless of handedness<sup>(1)</sup>

During their professional practice, dentists encounter various occupational hazards, including physical, chemical, biological, and ergonomic factors. Among these, ergonomic risks stemming from prolonged forced postures and repetitive movements are particularly relevant, as they can trigger MSDs. Studies suggest that such disorders affect a significant proportion—between 54 % and 93 %—of dental professionals, primarily impacting the spine, shoulders, and hand-wrist regions. A systematic review of international literature has examined both specific ergonomic risk factors and preventive measures aimed at mitigating MSDs in dental practice.<sup>(2)</sup>

The dental work environment—including that of students in training—involves manual instrument handling, exposure to vibrations, chemicals, biological agents, stress, and improper postures. These combined factors can lead to physical and mental fatigue, weakness, MSDs, equipment-handling errors, and disease onset. Currently, techniques have been developed to improve clinical practice and prevent health and postural problems—an issue of growing concern in modern dentistry. These techniques significantly enhance professionals' quality of life by raising awareness of risks associated with non-ergonomic clinical practices and postures. This knowledge is essential to safeguard the health of both dentist and patient, thereby promoting overall well-being.<sup>(3)</sup>

Dentists are prone to chronic neck, upper and lower back, and shoulder pain. A meta-analysis of 30 studies reported MSD and pain prevalence ranging from 11 % to 98 % among dentists, with the neck (58 %), upper back (41 %), and shoulders (43 %) being the most affected regions. Prevalence rates include 57 % in Australia, 56 % in Poland, 52 % in Iran, 51 % in the Netherlands, and 20 % in Saudi Arabia.<sup>(1)</sup>

Common injuries reported among dentists include tendinitis, shoulder pericapsulitis, carpal tunnel syndrome, and tension neck syndrome. Additionally, 60 % of dentists work in chairs and units lacking adequate ergonomic design. Overall, 89 % adopt incorrect postures during professional practice, resulting in moderate low back pain in 69 % of dentists. Age emerges as a significant factor influencing the prevalence of such discomfort.<sup>(4)</sup> Based on this context, the present study aimed to identify the prevalence and characteristics of musculoskeletal alterations among dental students.

## METHODS

An observational, descriptive, cross-sectional, and retrospective study was conducted at the Universidad Regional Autónoma de los Andes (UNIANDES), Ambato campus, specifically at the Dr. Corona Gómez Dental Specialties Clinic, between November 2023 and April 2024.

The reference population consisted of 335 students enrolled in clinical courses from the seventh to tenth semesters. Inclusion criteria were presence during survey administration and voluntary participation. Students from lower semesters, those not enrolled in clinical courses, or those unwilling to participate were excluded. Sample size was calculated with 95 % confidence level and 5 % margin of error, yielding 74 seventh-semester, 66 eighth-semester, 84 ninth-semester, and 69 tenth-semester students. Selection was performed via simple random sampling.

### Procedures and techniques

Data collection occurred between February 14 and 16, 2024, using self-administered surveys. The instrument used was the questionnaire "Knowledge of Ergonomics among students at the Dr. Corona Gómez Dental Specialties Clinic, PhD," previously validated in the academic setting. Primary variables included the presence of musculoskeletal symptoms (pain in back, neck, upper/lower limbs, ocular discomfort, hand calluses) and pain intensity, measured on an ordinal scale from 0 to 4 (0 = no pain, 4 = severe pain). Secondary variables included gender, age, semester, and parallel group, as well as knowledge and perception regarding ergonomics and postural hygiene.

### Statistical analysis

Descriptive statistics were used to calculate absolute and relative frequencies for qualitative variables, and measures of central tendency and dispersion for quantitative variables. Chi-square tests were applied to explore associations between gender, semester, and musculoskeletal alterations, with significance set at  $p < 0.05$ . Analyses were performed using Stata version 13.0. Missing data were handled by case exclusion, as their proportion was minimal and did not compromise validity. Data were recorded in tables and graphs to ensure consistency and quality.

### Ethical considerations

The study followed STROBE guidelines,<sup>(5)</sup> and the principles of the Declaration of Helsinki. All participants provided informed consent prior to survey completion, ensuring voluntariness, anonymity, and confidentiality. The research was reviewed and approved by the academic committee of the Universidad Regional Autónoma de los Andes.

## RESULTS

By sex, 74,6 % of participants were female. Regarding age, most students were between 22 and 24 years old, with a slight decrease in older age groups.

The survey (Table 1) revealed that most students are aware of ergonomics (70,70 %) but less familiar with "BHOP" (43,60 %). Only 49,90 % felt adequately trained in dental ergonomics. Regarding posture, 44,50 % believed they sat correctly in the dental chair, and 63,90 % recognized the long-term consequences of poor posture. Additionally, 62,10 % had experienced pain due to poor posture, and 35,80 % had hand calluses from dental activity. Notably, 45,10 % recalled experiencing back pain before beginning their studies.

**Table 1.** Knowledge of ergonomics.

Question	Yes		No	
	No.	%	No.	%
Do you know what ergonomics and postural hygiene are?	237	70,70	98	29,30
Are you familiar with the "BHOP," "Position 0," or "Beach Position" concept?	146	43,60	189	56,40
Do you believe you have been adequately trained in dental ergonomics?	167	49,90	168	50,10
Do you feel you are sitting correctly in the dental chair?	149	44,50	186	55,50
Are you aware of the long-term consequences of poor work posture?	214	63,90	121	36,10
Do you have calluses on your hands due to dental activity?	120	35,80	215	64,20
Have you suffered pain due to poor work posture?	208	62,10	127	37,90
Before starting your degree, did you recall back pain or discomfort?	151	45,10	184	54,90

Regarding pain intensity across body regions (Table 2), most participants reported moderate pain levels (scores 2–3) in the back, arms, hands, legs, and neck. Ocular discomfort was comparatively lower. These results underscore the high prevalence of physical discomfort, highlighting the need to effectively address bodily well-being in this population.

**Table 2.** Pain intensity and location.

Location	Pain Intensity									
	0		1		2		3		4	
	No.	%	No.	%	No.	%	No.	%	No.	%
Back	31	9,2	63	18,8	140	41,8	77	23	24	7,2
Arms	40	11,9	90	26,9	112	33,4	64	19,1	29	8,7
Hands	50	15,1	82	24,5	104	31	65	19,4	34	10
Legs	48	14,5	77	23	101	30	70	20,9	39	11,6
Ocular discomfort	45	13,4	73	21,9	106	31,6	76	22,7	35	10,4
Neck	30	9	63	18,8	121	36,1	80	23,9	41	12,2
Other site	40	11,9	68	20,3	122	36,4	76	22,7	29	8,7

## DISCUSSION

These findings provide a detailed insight into the physical health and well-being of dental students at UNIANDÉS. The data are particularly relevant given the physical and mental demands of dental practice. Although most students recognize ergonomics and postural hygiene, two out of three experience moderate to severe pain in the back, arms, hands, legs, eyes, and neck.

Gender distribution reveals a marked disparity, with women representing 74,6 % of the sample. This may reflect demographic trends in the discipline or sociocultural factors influencing career choice. It is crucial to consider how such gender imbalances may affect perceptions and approaches to occupational health and ergonomics in dental settings.<sup>(6,7)</sup>

Knowledge of ergonomics and BHOP varied notably: more students reported general ergonomics awareness than familiarity with BHOP. This highlights opportunities to enhance training and awareness of dentistry-specific ergonomic practices, potentially preventing occupational injuries and supporting long-term health.<sup>(8)</sup>

Posture and physical discomfort findings are especially concerning. Despite significant awareness of proper seating and long-term consequences of poor posture, many students still experience pain, back discomfort, hand calluses, and other physical symptoms.<sup>(9)</sup>

The fact that a considerable proportion reported back pain even before starting dental school underscores the importance of addressing occupational health and ergonomics early in training. Preventive measures and educational programs promoting proper ergonomic practices and bodily self-care are essential in dental education.<sup>(10)</sup>

Ergonomics and proper posture are fundamental in dental practice, significantly influencing professionals' health and well-being. Two recent studies offer valuable insights. Meisha et al.<sup>(11)</sup>(2019) found that 84 % of dental professionals had partial or no knowledge of ergonomic guidelines. Despite this limited awareness, no direct link was found between ergonomic knowledge and work-related MSDs (WMSDs). However, approximately 75 % of WMSDs occurred among postgraduate students, highlighting student vulnerability. New technologies and lack of mobility were identified as critical WMSD risk factors in young practitioners.

In contrast, our study found that 70,70 % of respondents were aware of ergonomics, though fewer knew specific concepts like "BHOP" (43,60 %). Only 49,90 % felt adequately trained in dental ergonomics. While 44,50 % believed they sat correctly, 63,90 % recognized the consequences of poor posture. Significantly, 62,10 % had experienced posture-related pain, and 35,80 % had hand calluses from dental work. These results suggest that, despite general ergonomic awareness, a gap remains in the practical application of optimal ergonomic practices.<sup>(12)</sup>

Comparing both studies reveals differences in ergonomic knowledge and application among dental professionals. Juriga S, et al.,<sup>(13)</sup> reported high rates of limited ergonomic knowledge, our study shows greater awareness—but persistent gaps in practice. This discrepancy emphasizes that knowledge alone is insufficient; consistent implementation of ergonomic practices in clinical settings is essential to prevent injury and promote long-term health.

Scientific research has demonstrated the benefits of regular physical activity both for the general population and for dental professionals. These benefits include improvements at the metabolic, musculoskeletal, and psychosocial levels, and are consistent with international physical activity recommendations, which suggest at least 150 minutes of moderate-to-vigorous activity per week or 75 minutes of vigorous activity. These positive effects on workers translate into increased levels of physical activity, improved work capacity, and enhanced physical effort.<sup>(14)</sup>

In addition, physical activity helps reduce musculoskeletal pain, shortens recovery time from musculoskeletal disorders, decreases sick days and the frequency of work absences due to illness, and improves mental health related to stress and interpersonal relationships. Despite these known benefits, the literature has not explored workers' opinions and expectations regarding exercise in the workplace.<sup>(15)</sup>

These results highlight the urgent need for interventions aimed at improving occupational health and physical well-being among dental students. The implementation of preventive measures and effective educational programs will not only benefit students during their training but also promote a healthier and more sustainable professional practice in the long term.

## CONCLUSIONS

All evaluated students reported some knowledge of ergonomics and had experienced discomfort or pain at some point during dental practice at the Universidad Regional Autónoma de los Andes (UNIANDÉS), Ambato. Uncomfortable postures during clinical practice are common, and the lack of stretching exercises is a frequent behavior among the assessed students. Understanding the discomfort experienced by students in the clinic can serve as a valuable basis for developing targeted recommendations, thereby improving the well-being they should experience while fulfilling their professional training in dental practice.

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