Original Article

POSTURE, PRACTICE, AND PAIN: A CROSS SECTIONAL STUDY ON MUSCULOSKELETAL DISORDERS AMONG DENTISTS AND DENTAL ASSISTANTS IN ISLAMABAD

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ABSTRACT

Objective: *To estimate MSD prevalence across anatomical regions and identify occupational and demographic predictors.*

Methodology: *A cross-sectional study was conducted among 203 participants (149 dentists, 54 DAs) from dental teaching hospitals. MSDs were assessed using the Modified Nordic Musculoskeletal Questionnaire, and logistic regression identified predictors. Binary logistic regression was employed to assess the association between MSDs in various body parts and different demographic variables at 5% level of significance.*

Results: *Dentists most frequently reported neck (72.5%), shoulder (56.4%), and lower back pain (55.7%), while DAs had more wrist (44.4%) and lower limb complaints. Neck pain was less likely in female dentists (OR = 0.225, p = .027). Shoulder pain was associated with older age (OR = 1.225, p = .013) and right-hand dominance (OR = 48.446, p = .007). Wrist pain was linked to males (female OR = 0.131, p = .002), older age (OR = 1.159, p = .042), hospital practice (OR = 0.020, p = .010), and seated posture (OR = 5.821, p = .005). Lower back pain was predicted by prior injury (OR = 24.026, p = .023), whereas >5 hours non-chairside work was protective (OR = 0.032, p = .012). Longer experience reduced knee (OR = 0.003, p = .019) and ankle pain (OR = 0.001, p = .007), while 4–8 chairside hours increased knee risk (OR = 31.362, p = .002). Among DAs, wrist pain was more likely with prior injury.*

Conclusion: *MSDs are widespread among dental professionals, with distinct patterns between dentists and DAs. Ergonomic interventions, workload management, and preventive strategies are essential to reduce long-term occupational risks.*

Keywords: *Musculoskeletal Diseases, Dentists, Dental assistants, Ergonomics, Occupational Health, Pakistan*

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Received for Publication: Aug 23, 2025
Revised: Oct 01, 2025
Approved: Nov 10, 2025

INTRODUCTION

MSDs are conditions affecting the bones, muscles, tendons, ligaments, joints, nerves, and supporting structures. These disorders often result from repetitive motion, prolonged static posture, forceful exertions, or exposure to vibrations, frequently exacerbated by psychosocial stressors rather than direct trauma. When associated with occupational exposure, they are referred to as work-related MSDs (WRMSDs)[1]. MSDs lead to significant consequences including; reduced work capacity, absenteeism, and potential permanent disability. These conditions also have psychological impacts, such as mood disturbances and a vicious cycle of pain and mental health issues. Additionally, they can result in economic and social dependence, as well as an increased risk of other chronic diseases. Together, these factors contribute to a substantial burden on

individuals and society[2].

Healthcare professionals, particularly dentists, are at elevated risk for MSDs due to sustained strained postures and repetitive precision tasks. A systematic review found prevalence rates among dental professionals, ranging from 10.8% to 97.9%, in the western countries with the neck, lower back, and shoulder being the most affected regions[3]. Dentists report a higher rate of musculoskeletal pain (61%) as compared to surgeons (37%) and physicians (20%) as per stated in an Indian study[4]. Another study conducted in United Arab Emirates found dentists to be at an increased risk as compared to the medical doctors, nurses and technicians[5]. The dentists were reported to have highest prevalence of neck (46%), shoulder (48%) and lower back pain (31%) as compared to the medical doctors & nurses, DAs and technicians[5]. This risk is compounded by the confined workspace, poor lighting, restricted visibility, and the requirement for fine motor control, often necessitating prolonged neck flexion, trunk twisting, and use of vibratory tools[6]. Another systematic review conducted in India in the year 2022 the dentists along with surgeons were found to be more prone to develop MSDs[7].

The DAs, working collaboratively in this same environment, experience similar ergonomic challenges. Studies report WRMSD prevalence is as high as 85.7% among DAs, with some evidence suggesting their risk may surpass that of dentists[8]. The DAs are found to have the highest prevalence of upper back (41%), forearm (50%), wrist (45%), hand (53%) and foot (33%) as compared to the medical doctors & nurses, dentists and technicians[5]. In a 2021 German study too, DAs appear to be more affected than dentists in all the queried regions[9]. A meta-analysis found that female dental healthcare providers have a significantly higher overall prevalence (77.4%, OR= 1.42) of MSDs as compared to males, suggesting the need for gender-sensitive ergonomic interventions[10].

Recent Pakistani studies report a high MSD burden, with prevalence rates of 79% among dentists in Punjab and 91.5% in Islamabad (2023), and 79.3% among dental students in Lahore (2021)[11,12,13]. Similar findings were noted in Peshawar (69%) and Karachi teaching hospitals (75.8%) in 2016[14,15]. However, dental assistants remain underrepresented in Pakistani literature despite facing comparable ergonomic challenges.

Effective prevention strategies emphasize ergonomic awareness, posture correction, the use of magnification tools, and proper operator-patient positioning. Incorporating structured rest breaks, regular physical activity, and early ergonomic education have been shown to reduce the risk. Targeted strengthening and stretching exercises, especially for the neck, shoulders, and back, along with psychological support, are also critical components of a holistic MSD prevention approach[10,16].

MSDs are among the most prevalent occupational health issues in dentistry. While numerous international studies have highlighted the high burden of MSDs among dental professionals, data from Pakistan remain scarce, particularly regarding DAs. In Islamabad, where diverse dental setups and practice patterns exist, understanding the prevalence and predictors of MSDs in both dentists and DAs is essential for developing context-specific ergonomic and preventive strategies. This study aims to determine the prevalence and occupational risk factors of work-related MSDs among dentists and DAs working in dental teaching hospitals in Islamabad. Specifically, it seeks to estimate the prevalence of MSDs across different anatomical regions using a validated questionnaire over a one-year period, and to identify occupational and demographic predictors of these disorders, including prior exposure to ergonomic training.

METHODOLOGY

This cross-sectional study was conducted from June 2024 to June 2025 in tertiary care dental hospitals across Islamabad. As it was a cross sectional study, randomization and blinding were not applicable. The target population included dentists and dental assistants with a minimum of one year of professional experience. Dentists from basic sciences departments engaged in evening clinical practice were also eligible. This criterion automatically excluded professionals with less than one year of experience.

After obtaining the ethical approval from the Institutional Review Board (Ref#IMDC/DS/IRB/270), the questionnaire was distributed electronically via WhatsApp and relevant social media groups. Participation was voluntary, anonymous, and confidential. The online questionnaire included the study title, aim, and a brief description of objectives and participation rights; therefore, submission of the completed form was considered as providing implied informed consent. As all questions were mandatory, incompletely filled questionnaires did not occur and therefore were not part of the exclusion criteria. This study was conducted in accordance with the principles of the Declaration of Helsinki.

A non-probability convenience sampling technique was used due to feasibility and accessibility of participants. While this approach enabled timely recruitment, it may limit generalizability of the findings. The sample size was calculated using the WHO formula at a 95% confidence level and 5% absolute precision. The estimated population comprised 122 DAs and 337 dentists. Using stratified weighting and previously reported MSD prevalence rates (42.6% for DAs and 30.8% for dentists) from a comparative study by Haas Y et al.,

the minimum required sample was determined to be 203 participants—54 DAs and 149 dentists[6,17]. By stratified weighting, we refer to proportionate stratified allocation, i.e., dividing the total sample between dentists and dental assistants in proportion to their representation in the target population.

Data was collected through a structured, validated questionnaire consisting of two sections. The first section gathered demographic and occupational information, including age, gender, height, weight (for BMI calculation), workplace type, years of experience, chairside and non-chairside working hours per day, level of physical activity, and prior ergonomic training. The second section was based on the Modified Nordic Musculoskeletal Questionnaire (NMQ), assessing pain or discomfort over the past 12 months and the past 7 days across nine anatomical regions: neck, shoulders, elbows, wrists/hands, upper back, lower back, hips/thighs, knees, and ankles/feet. Additional questions addressed functional interference, history of prior injury, and medical consultation for MSDs.

A four-member bilingual committee was formed, comprising a community dentistry faculty member, an operative dentistry faculty member, and subject specialists in Urdu and English. Forward translation into Urdu was independently performed by two members, followed by back-translation into English by the other two. The committee reviewed both versions to ensure cultural appropriateness. Cognitive testing was then conducted on five dental assistants, after which minor adjustments were made to finalize the Urdu version of the NMQ. A pilot test involving 10 DAs from six institutions yielded a Cronbach's alpha of 0.844, indicating high internal consistency.

All responses were collected through a mandatory-response Google Form, ensuring that no questionnaire was incomplete or partially filled. Data were reviewed for entry errors and internal inconsistencies, such as implausible demographic values or extreme work hours. No significant outliers were identified that required exclusion. As the survey design did not allow missing entries, there were no missing data to address. The cleaned dataset was then exported to SPSS for analysis.

RESULTS

The demographic distribution is shown in table 1, with 149 dentists and 54 DAs. On average, dentists were older, taller, and heavier compared to DAs, although BMI values were comparable.

Most of the dentists were from Orthodontics (21.5%), Operative Dentistry (20.8%), and OMFS (20.1%). Among DAs, General Dentistry dominated (51.9%), followed by Prosthodontics (35.2%), with fewer dentists and DAs in other specialties.

Dentists and DAs demonstrated distinct work-related patterns as shown in table 2. Right-handedness was dominant but a notable proportion of DAs were left-handed, with limited access to left-handed chairs in both groups. Chairside working hours were more for DAs compared to dentists, while most dentists (80%) worked six days a week, in contrast to DAs who more commonly worked three to four days. DAs most frequently took breaks between patients and were involved in physical activity like gym and walking compared to dentists. Attendance at ergonomics workshops remained low across both groups, especially among dentists (Table2). Among DAs, the most common MSD responsible for them to report to the doctors over the last 12 months was wrist trouble (16.7%). While 15.4% of the dentists reported for lower back trouble severe enough to consult a doctor in the past 12 months.

Musculoskeletal symptoms were more frequently reported by dentists than DAs across most body regions over both 12-month and 7-day periods. Among dentists, the neck, shoulders, and lower back were the most affected areas, with neck pain affecting nearly three-quarters. In DAs, the neck and wrist were the most frequently reported sites, followed by the knees and feet (Figure 1). The 7-day prevalence showed a similar trend, with dentists continuing to report higher symptom frequencies overall, while DAs exhibited notable complaints in the wrist and lower extremities

Multivariate logistic regression identified several significant predictors of musculoskeletal symptoms among dentists and DAs.

Among dentists, for neck pain, female gender (OR = 0.225, p = .027) was associated with lower odds of symptoms which means females are 77.5% less likely to report MSDs than males. Similarly BMI (OR = 0.716, p = .001) was associated with lower odds of symptoms. Participants who occasionally relaxed between patients had significantly lower odds of neck pain (OR = 0.086, p = .002) compared to those who always did.

Shoulder pain was associated with older age (OR = 1.225, p = .013) and right-hand dominance (OR = 48.446, p = .007), while higher BMI (OR = 0.781, p = .003) and occasionally relaxing between patients (OR = 0.093, p = .006) were protective. Additionally, not using left-handed chairs was associated with reduced odds of shoulder pain (OR = 0.156, p = .004), though this may reflect ergonomic or adaptation factors.

For wrist pain, significant predictors included older age (OR = 1.159, p = .042), male gender (female OR = 0.131, p = .002), hospital work setting (private vs hospital OR = 0.020, p = .010), and preference for seated posture (OR = 5.821, p = .005), all of which increased the odds of symptoms.

TABLE 1: DEMOGRAPHIC CHARACTERISTICS OF DENTISTS AND DAS PARTICIPATING IN THE STUDY

Demographic Characteristics	Dentists N=149	DAs N=54
Gender		
Male	64(43.0%)	23(42.6%)
Female	85(57.0%)	31(57.4%)
Age(years)		
$\bar{x}\pm$S.D	31.651±6.03	28.278±5.29
Height(m)		
$\bar{x}\pm$S.D	1.6782±0.90	1.6530±0.21
Weight(kg)		
$\bar{x}\pm$S.D	68.953±13.09	60.685±10.83
BMI (kg/m2)		
$\bar{x}\pm$S.D	24.3930±3.58	24.9374±22.99
Practice type		
Hospital	71(47.6%)	12(22.2%)
Private	4(2.7%)	6(11.1%)
Both	74(49.7%)	36(66.7%)
Sleep per day (hours)		
< 6	55(36.9%)	36(66.7%)
6-9	87(58.4%)	14(25.9%)
> 9	7(4.7%)	4(7.4%)
Work Experience (years)		
< 5	76(51.0%)	20(37.0%)
6-10	51(34.2%)	29(53.7%)
11-15	11(7.4%)	5(9.3%)
> 15	11(7.4%)	0(0.0%)

TABLE 2: WORK-RELATED CHARACTERISTICS OF DENTISTS AND DAS PARTICIPATING IN THE STUDY

Demographic Characteristics	Dentists N=149	DAs N=54
Use of Electronic Devices Per Day (hours)		
2-4	91(61.1%)	50(92.6%)
5-7	49(32.9%)	4(7.4%)
8-10	9(6.0%)	0(0.0%)
Dominant Working Hand		
Right	141(94.6%)	34(63.0%)
Left	8(5.4%)	20(37.0%)
Availability of Left-Handed Chair		
Yes	59(39.9%)	19(35.2%)
No	65(43.9%)	25(46.3%)
sometimes	24(16.2%)	10(18.5%)
Chairside Working Hours per Day		
<4	59(39.6%)	25(46.3%)
4-8	75(50.3%)	4(7.4%)
>8	15(10.1%)	25(46.3%)

|		
Preferred working Position		
Standing	45(30.2%)	2(3.7%)
Sitting	57(38.3%)	1(1.9%)
both	47(31.5%)	51(94.4%)
Number of Working Days Per Week		
3	2(1.3%)	28(51.9%)
4	1(0.7%)	18(33.3%)
5	27(18.1%)	8(14.8%)
6	119(79.9%)	0(0.0%)
Non chairside Working Hours Per Day		
< 3	98(65.8%)	18(33.3%)
3-5	36(24.1%)	31(57.4%)
>5	15(10.1%)	5(9.3%)
Physical Activity		
Nil	78(52.3%)	7(13.0%)
Walk	60(40.3%)	25(46.3%)
gym	11(7.4%)	22(40.7%)
Relax Between Patients		
Yes	21(14.1%)	11(20.4%)
No	63(42.3%)	0(0.0%)
Sometimes	65(43.6%)	43(79.6%)
Attended Ergonomics Workshop		
Yes	43(28.9%)	25(46.3%)
No	106(71.1%)	29(53.7%)
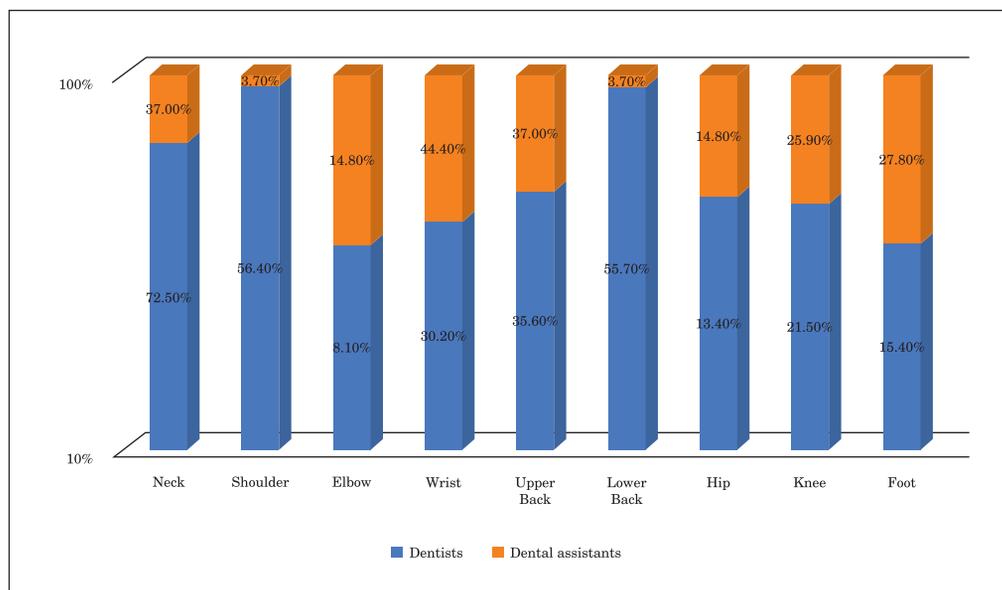
Fig 1: 12-month prevalence of Musculoskeletal Symptoms across nine anatomical regions for Dentists and DAs

TABLE 3: MULTIVARIATE LOGISTIC REGRESSION ANALYSIS SHOWING SIGNIFICANT PREDIC-
TORS OF MUSCULOSKELETAL SYMPTOMS AMONG DENTISTS (N = 149)

Body parts	Predictor variables	B	Sig.	OR	95% C.I. for OR	
					Lower	Upper
Neck	Gender (Male)	-1.494	.027	.225	.060	.847
	BMI	-.334	.001	.716	.590	.869
	Relax Between Patients (Yes)		.008			
	No	-1.091	.147	.336	.077	1.468
	Sometimes	-2.453	.002	.086	.018	.421
	Attend Ergonomics Workshop (No)	.070	.917	1.072	.290	3.962
Shoulders	Gender (Male)	-.030	.962	.971	.287	3.284
	Age	.203	.013	1.225	1.043	1.438
	BMI	-.247	.003	.781	.663	.921
	Dominant Working Hand (Left)	3.880	.007	48.446	2.881	814.715
	Left-Handed Chair (Yes)		.012			
	No	-1.860	.004	.156	.044	.551
	don't know	-.250	.738	.779	.180	3.372
	Relax Between Patients (yes)		.005			
	No	-2.794	.001	.061	.011	.330
	Sometimes	-2.370	.006	.093	.017	.501
Wrist	Age	.148	.042	1.159	1.005	1.337
	Practice Type (Hospital)		.030			
	Private	-3.924	.010	.020	.001	.392
	Both	-.612	.251	.542	.191	1.540
	Preferred Position (Standing)		.020			
	Sitting	1.762	.005	5.821	1.695	19.994
	Both	.816	.182	2.261	.682	7.499
	Gender (Male)	-2.029	.002	.131	.036	.479
Lower back	Non chairside Working Hours Per Day (<3)		.006			
	3-5	.806	.181	2.238	.687	7.295
	>5	-3.433	.012	.032	.002	.471
	History of Lower Back Accident (No)	3.179	.023	24.026	1.553	371.586
Hips	Non chairside Working Hours Per Day (□3)		.049			
	3-5	-2.510	.093	.081	.004	1.521
	> 5 hours	-8.143	.043	.000	.000	.777
Knees	Work Experience (≤5 years)		.049			
	6-10	-2.436	.012	.088	.013	.589
	11-15	-4.140	.044	.016	.000	.887
	> 15 years	-5.747	.019	.003	.000	.387
	Availability of Left-Handed Chair (Yes)		.035			
	No	1.894	.035	6.643	1.144	38.571
	Sometimes	-.591	.566	.554	.074	4.170
	Chairside Working Hours per Day		.007			
	4-8	3.446	.002	31.362	3.642	270.056
	> 8 hours	1.658	.202	5.249	.412	66.868
	Preferred Position (standing)		.016			
	Sitting	1.621	.100	5.059	.734	34.857
	Both	-1.477	.128	.228	.034	1.530

Ankle	**Age**	.272	.031	1.313	1.026	1.681
	Work Experience (≤5 years)		.020			
	6-10	-2.126	.030	.119	.017	.818
	11-15	-4.630	.002	.010	.000	.191
	> 15 years	-7.459	.007	.001	.000	.124
	Left-Handed Chair (Yes)		.041			
	No	.022	.978	1.022	.211	4.942
	Sometimes	-2.435	.022	.088	.011	.700

Displays odds ratios and significance levels for key occupational and demographic variables predicting musculoskeletal symptoms by anatomical region (Only statistically significant predictors (p ≤ .05) are reported in the table. Reference categories are indicated in parentheses)

Having a lower back accident is strongly associated with increased odds of having MSD. In fact, the odds of having MSD are 24 times higher for those who experienced a lower back accident compared to those who didn't (OR = 24.026, p = .023), while spending more than five hours per day on non-chairside work was protective (OR = 0.032, p = .012).

A similar protective effect of extended non-chairside work was seen for hip pain (OR ≈ 0, p = .043).

For knee and ankle symptoms, longer work experience was protective. Participants with more than 15 years of experience had significantly lower odds of knee pain (OR = 0.003, p = .019) and ankle pain (OR = 0.001, p = .007) compared to those with five years or less.

Other significant predictors of knee pain included lack of access to left-handed chairs (OR = 6.643, p = .035) and working 4–8 hours chairside per day (OR = 31.362, p = .002), both of which increased risk.

For DAs, the variables gender and history of wrist accident were the only significant variables. DAs reported with higher percentage of pain in wrists i.e. 44% (Figure 1), those who had a previous history of wrist accident, were more likely to report wrist pain. Females were less likely to report wrist pain as compared to males.

DISCUSSION

This study investigated MSDs among dentists and DAs, revealing a high burden: neck, shoulder, and lower back pain predominated in dentists, while wrists, knees, and feet were most affected in DAs. Predictors identified through multivariate analysis included age, gender, posture, chairside workload, and prior injury. While these findings align with international literature, cross-sectional design limits causal inference, and reverse causation cannot be excluded.

A Turkish study of 116 professionals reported significantly higher neck and shoulder pain among dentists (p<0.05)[18]. A recent Pakistani study also found high MSD prevalence in dentists from teaching hospitals, especially in the neck, shoulders, and lower back, supporting our results[12]. Our study thus reinforces this burden in a South Asian context. Gender effects differed: whereas the Turkish study found none, we observed region specific associations, with males showing higher odds of neck and wrist pain[18].

Most participants' BMI was within the normal range, which may explain the lower odds of MSDs in relation to BMI. The lack of overweight individuals limited demonstration of obesity-related risks. By contrast, obesity has been linked to cervical strain and region-specific disorders like neck pain[19]. Our participants' healthier weight likely explains the difference. It remains possible that MSDs reduce activity, leading to weight loss, while self-reported BMI may have introduced misclassification. Future studies should use objective measures and prospective designs.

Microbreaks between patients were protective against neck and shoulder symptoms, consistent with the Indonesian study by Kholinne et al., which emphasized rest intervals to reduce musculoskeletal load[20]. Such breaks promote postural variation and reduce fatigue. Interestingly, occasional breaks were associated with less neck pain than frequent breaks, possibly reflecting symptom-driven behavior (those already in pain taking more breaks) or indicating that timing and quality of breaks matter more than frequency.

Shoulder pain was more common among older participants and right-hand dominant individuals. Lack of access to left-handed chairs increased knee pain, likely due to ergonomic mismatch forcing compensatory postures. Samuel and Anandan similarly reported that left-handed dentists using right-sided chairs had reduced efficiency and greater MSD risk, recommending ambidextrous chairs[21]. Paradoxically, absence of left-handed chairs was linked to lower odds of shoulder pain, possibly reflecting symptom-driven requests for specialized chairs or long-term adaptation by the small proportion of left-handed dentists.

Wrist pain was particularly common among DAs, with 44% affected. Being female reduced the odds, while prior wrist injury increased risk. These findings align with

Aljanakh, who noted that repetitive static tasks such as instrument handling and suctioning strain the wrists[8]. A few studies distinguish between dentists and DAs in MSD research; by analyzing both groups separately, this study addresses an important gap.

DAs also frequently reported lower limb problems, especially in the knees, ankles, and feet, linked to prolonged sitting or lack of ergonomic support. Similar results were observed in German and Saudi studies, which highlighted static postures in this group[6,8]. In our sample, working 4–8 hours chairside was strongly associated with knee pain, indicating even moderate activity can be impactful. Interestingly, more years of experience appeared protective, likely reflecting adaptive work habits or efficiency gains consistent with the healthy worker effect.

Ergonomic training was lacking in most of the sample. Although attending workshops was not significantly linked to symptom reduction, the low participation highlights a missed preventive opportunity. Pakistani studies have also identified poor ergonomic awareness, particularly in Karachi, where posture was strongly associated with MSDs[15]. This underlines the importance of integrating ergonomics into dental education and continuing professional development.

Among dentists, seated posture was significantly associated with wrist pain, likely due to unsupported forearms and limited arm mobility during procedures. Alghadir et al. similarly found that improper working postures contribute to upper limb disorders among dental professionals[23]. Prior injury was a strong predictor of current lower back symptoms, underscoring the long-lasting impact of musculoskeletal trauma. Comparable findings from the UAE showed that previous trauma affecting the neck, shoulder, or lower back increased pain risk[19]. Consistency across populations highlights injury history as a central occupational health factor.

Spending five or more than five hours on non-chairside duties, involving more varied movements and less static positioning, was associated with fewer lower back and hip complaints. Although direct comparisons of chairside and non-chairside workloads are limited, existing evidence suggests that alternating between sitting and standing can worsen pain, while variation in tasks may be protective[24]. Our findings suggest that balancing chairside with non-chairside duties could help reduce MSD burden.

Taken together, these results emphasize the need for targeted ergonomic strategies and preventive education tailored to the distinct work demands of dentists and DAs. Incorporating ergonomic principles into daily practice, improving access to appropriate equipment, and prioritizing training could substantially reduce the burden of musculoskeletal disorders in dental practice.

LIMITATIONS OF THE STUDY

One of the key strengths of this study is that it included both dentists and DAs, allowing for a more complete understanding of musculoskeletal risks across different roles in dental practice. Using multivariate logistic regression helped us account for potential confounding factors, and the addition of ergonomic variables, such as rest breaks, posture, and handedness, added depth and practical relevance to the findings.

That said, a few limitations should be noted. Since the study was cross-sectional, we can't draw conclusions about cause and effect. The data relied on self-reports, which might be influenced by memory gaps or a desire to give socially acceptable answers. As a non-probability sampling technique was used, the results may not be fully generalizable to the broader population of dental professionals. As all questions in the online survey were mandatory, the possibility of measurement bias cannot be excluded, since some participants may have selected responses to proceed even if the options did not fully reflect their circumstances. Finally, because we reported only statistically significant predictors, we may have missed some subtle but meaningful trends in the data.

RECOMMENDATIONS

Our findings highlight several actionable strategies: promoting routine microbreaks, supporting healthy BMI through wellness initiatives, optimizing operatory ergonomics to accommodate different handedness, and balancing workloads to reduce prolonged static posture during chairside work. Future longitudinal research is needed to assess the long-term impact of ergonomic training, rest break policies, and the use of adjustable equipment in preventing musculoskeletal disorders.

CONCLUSION

MSDs are highly prevalent among dental professionals in Islamabad, with dentists mainly affected in the neck, shoulders, and lower back, and DAs more often reporting wrist and lower limb problems. Although ergonomic training was not a significant predictor, its poor uptake highlights an important gap. These findings underscore the need for targeted ergonomic improvements, workload management, and early preventive strategies to mitigate the long-term occupational health burden in dental practice.

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5. Kiran Saba:	Data collection, reviewing and editing the draft.
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