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Prevalence of cervical and lumbar pain among dental practitioners in Saudi Arabia: A cross-sectional study

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Abstract:
Musculoskeletal pain can adversely affect the health, productivity and professional performance of dental practitioners. Therefore, it is of interest to assess cervical and lumbar pain and associated risk factors among Saudi dental practitioners. A cross-sectional online survey collected demographic, occupational, ergonomic and musculoskeletal data from 273 participants. Cervical and lumbar pain affected 42.5% and 49.8%; 52.4% used ergonomics, yet 59.7% reported bending or twisting. Thus, data shows a substantial occupational burden and emphasise targeted ergonomic training, posture correction and workplace modifications.

Keywords: Musculoskeletal disorders, lumbar pain, cervical pain, dental practitioners

Background:
Minor injuries to muscles, nerves, joints, and discs are typical causes of MSD, with cervical and lumbar pain being among them **[1, 2]**. Many diverse professions predispose individuals to these kinds of medical conditions **[3, 4]**. However, with greater ergonomic considerations, a lot of cases could be prevented, or minimized **[5, 6]**. Back pain is one of the most common medical problems, with varied causes and diagnostic complications **[7]**. According to the findings from a number of studies, MSD is rather frequent among medical personnel and causes high absenteeism rates **[8]**. A cross-sectional study conducted in Finnish universities indicated that there has been an increase in prevalence of musculoskeletal pain between 2000 and 2012, where cases of lower back pain increased from 10-14%, and cases of neck pain increased from 25-29% **[9]**. It is reported that up to 70% people experience cervical pain at least once during lifetime; furthermore, one-third of young adults suffer from stiffness and discomfort at least once per week **[10]**. Similarly, the lumbar pain is believed to affect between 15-45% of people annually; research reports that younger patients endure painful attacks weekly in 15-30% cases **[11, 12]**. Because of the existence of numerous risk factors, dentists are prone to neck and low back pain. Their inappropriate body posture may be attributed to their suffering **[13]**. Due to limited visibility and workspace related to the oral cavity, dental team is highly susceptible to develop neck and back pains. This is because the dental practitioner often uses uncomfortable body position for better visibility and access. Furthermore, procedures performed are long-lasting and require great deal of concentration **[14]**. Musculoskeletal Disorders (MSD) pose a great problem among dental practitioners. Not only are they debilitating the patients physically but also reduce their professional effectiveness and negatively impact their quality of life. A globally recognized problem, MSD creates serious difficulties for healthcare organizations. Therefore, it is of interest to conduct a comprehensive evaluation of cervical and lumbar pain prevalence among dental practitioners in Saudi Arabia, and to identify sociodemographic, ergonomic, and occupational predictors of these conditions.

Materials and Methods:
Study design
The cross-sectional study aimed to evaluate cervical and lumbar pain prevalence among dental practitioners in Saudi Arabia and analyze the relationship between their occurrence and occupational factors. Thus, the use of the comparative, cross-sectional study design would facilitate obtaining information about dentists' musculoskeletal pain prevalence and occupational characteristics at a single point in time.

Data collection methods:
Given the nature of the study, it was decided to use online survey methodology in order to guarantee participation of more people, while overcoming practical difficulties. Online structured questionnaire was developed with the help of software called Qualtrics. There were four sections of the questionnaire:

[1] Demographic variables (age, gender, years of experience, specialization, working hours);
[2] Prevalence of cervical and lumbar pain: degree of pain expressed by a person on the Likert scale (1-5);
[3] Risk factors include ergonomic practices, use of ergonomic devices, working position, and sitting time;
[4] Pain management: techniques employed for reduction of pain (stretching, physical therapy, medications)

A questionnaire used for data collection in this study was adapted from the study by Alyahya et al. [Awareness of ergonomics & work-related musculoskeletal disorders among dental professionals and students in Riyadh, Saudi Arabia], validated for the assessment of MSD among healthcare professionals. It includes questions measuring the frequency and severity of cervical and lumbar pain.

Sample characteristics:
The study focuses on licensed dental practitioners, including general dentists, dental specialists, and dental interns/dental students.

Inclusion criteria:
The participants should comply with all of the following criteria:

[1] Working currently in Saudi Arabia as a licensed dental professional (dentist, dental hygienist, dental assistant, technician, administrative personnel);
[2] Have at least one year of professional experience to guarantee sufficient exposure to risk factors;
[3] Willingness to provide informed consent and participate voluntarily.

Exclusion Criteria:
Individuals whose participation is prohibited because of the following factors are excluded from this research:

[1] Dental students or dentists not practicing (because of lack of everyday exposure);
[2] Dentists suffering from severe musculoskeletal conditions in the past unconnected with work;
[3] Individuals not completing the questionnaire/ providing unreliable information.

Survey administration:
For recruiting the participants, non-probability convenience sampling technique was used. Professional associations for dental practitioners, social media websites and email invitations were used for recruitment. It facilitated attracting dental practitioners from various regions of Saudi Arabia. While convenient sampling was quick and cost-effective, there was a risk that certain sub-groups may have been underrepresented in the sample. However, effort was made to enhance the representativeness of the sample in terms of demographic and professional characteristics (years of experience, specialization and workplace).

Study preparation:
Study Limitations: Self-reported data may have introduced recall bias. The convenience sampling method may have limited the generalizability of findings to all dental practitioners in Saudi Arabia.

Statistical methods:
Statistical analysis was performed to examine the associations between musculoskeletal pain and occupational as well as demographic characteristics.

Ethical considerations:
The readiness to give informed consent and engage in voluntary participation was required from all participants.

Results:
This study was conducted on dental practitioners in Saudi Arabia to assess their level of awareness regarding the importance of Ergonomics in clinical practice and to determine the frequency of musculoskeletal issues as well as the sociodemographic and occupational factors. Among the study participants, the Majority were male (63.4%), of age group 31–35 years (39.6%), were general practitioners (52.4%), working in the private sector (65.6%), with 11–15 years of experience (39.9%). The majority were right-handed (54.9%), with 30.8% left-handed and 14.3% ambidextrous as shown in (**Table 1).** A considerable proportion of participants demonstrated awareness of ergonomics as shown in (**Table 2)**, with 44.6% agreeing/strongly agreeing that they were familiar with ergonomics, while 37.4% remained neutral. Similarly, 52.4% of the participants reported that they were currently using ergonomic practices, whereas 34.1% were neutral. Most participants acknowledged the importance of ergonomics, with 61.6% agreeing/strongly agreeing that ergonomics is beneficial, and 63.7% believing that not using ergonomics leads to problems. Additionally, 66.9% agreed/strongly agreed that ergonomics improves performance. A high proportion of participants reported physical strain, with 57.8% agreeing/strongly agreeing that clinical work is physically taxing, and 57.8% feeling worn out after work. Musculoskeletal complaints were also common among study participants with majority of the participants experiencing cervical pain (42.5%) or lumbar pain (49.8%) during or after work as shown in (**Table 3)**. More than half of the participants reported positive ergonomic behavior. 56.2% engaged in post-work stretching, 55.1% used magnifying loupes, and 59.0% adjusted their workstation. However, 59.7% reported bending or twisting during work, indicating suboptimal posture practices. Additionally, 56.4% reported using vibrating instruments, which may contribute to physical strain. Most participants preferred a sitting working position (75.8%), and 64.8% reported sometimes working with an assistant. Most worked 5–10 hours per day (76.5%), and 44.0% treated 4–6 patients daily, followed by 34.8% treating 7–9 patients. A majority (69.1%) reported taking work breaks as shown in (**Table 4).** Most participants reported using analgesics (67.4%) and physiotherapy (61.4%) occasionally. Steroid use was less common, with 51.8% reporting occasional use and 37.5% never using steroids. Encouragingly, 62.9% of participants reported engaging in physical activities sometimes, while 19.5% did as regularly as shown in (**Table 5)**. Several sociodemographic variables showed statistically significant associations with Ergonomic awareness and practices as shown in (**Table 6)**. Gender showed a significant association with perceptions of physical workload and work patterns. Male participants more frequently reported that clinical work was physically taxing compared with females ($p = 0.025$). Gender was also significantly associated with preferred working position ($p = 0.001$), working hours ($p = 0.015$), and number of patients treated per day ($p = 0.001$). Age demonstrated significant associations with several ergonomic-related variables. Participants' familiarity with ergonomics ($p = 0.001$), current use of ergonomic practices ($p = 0.001$), and perception that ergonomics is beneficial ($p = 0.002$) varied significantly across age groups. Age was also significantly associated with the perception that not using ergonomics can lead to problems ($p < 0.001$) and that ergonomics improves performance ($p = 0.024$). Clinical profession showed strong associations with ergonomic awareness and practice. Significant relationships were observed between profession and familiarity with ergonomics ($p < 0.001$), current use of ergonomic practices ($p < 0.001$), and the perception that not using ergonomics leads to problems ($p = 0.008$). Profession was also significantly associated with reports of feeling worn out ($p < 0.001$) and perception that clinical work is physically taxing ($p < 0.001$). Working experience was significantly associated with familiarity with ergonomics ($p = 0.002$), current use of ergonomic practices ($p < 0.001$), perception that ergonomics is beneficial ($p = 0.018$), and belief that not using ergonomics leads to problems ($p = 0.010$). Handedness also showed significant associations with ergonomic-related variables including familiarity with ergonomics ($p < 0.001$),

current use of ergonomic practices ($p < 0.001$), and perception that ergonomics is beneficial ($p = 0.001$). Additionally, handedness was associated with clinical work being physically taxing ($p = 0.043$) and engagement in physical activities ($p = 0.001$).

Table 1: Socio-demographic profile of participants (N=273)

Variable	Category	Frequency	Percentage
Gender	Male	173	63.4
	Female	100	36.6
Age	20-25	47	17.2
	26-30	59	21.6
	31-35	108	39.6
	36-40	31	11.4
	Over 40	28	10.3
Clinical Profession	Dental Student	15	5.5
	Dental intern	49	17.9
	General Practitioner	143	52.4
	Specialist	45	16.5
	Professor	21	7.7
Working Institution	Public	93	34.1
	Private	179	65.6
Working Experience	Less than 5 Years	57	20.9
	6-10 Years	44	16.1
	11-15 Yeras	109	39.9
	16-20 Years	42	15.4
	More than 20 years	21	7.7
Handedness	Right-Handed	150	54.9
	Left-Handed	84	30.8
	Both	39	14.3

Table 2: Ergonomics Awareness and Application importance (N=273)

Variable	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Already familiar with ergonomics	20 (7.3%)	29 (10.6%)	102 (37.4%)	67 (24.5%)	55 (20.1%)
Presently use ergonomics	11 (4.0%)	26 (9.5%)	93 (34.1%)	77 (28.2%)	66 (24.2%)
Ergonomics is beneficial	6 (2.2%)	24 (8.8%)	75 (27.5%)	66 (24.2%)	102 (37.4%)
Not using ergonomics leads to problems	4 (1.5%)	22 (8.1%)	73 (26.7%)	64 (23.4%)	110 (40.3%)
Feeling worn out after clinical work	8 (2.9%)	17 (6.2%)	90 (33.0%)	64 (23.4%)	94 (34.4%)
Clinical work is physically taxing	8 (2.9%)	25 (9.2%)	85 (31.1%)	63 (23.1%)	92 (33.7%)
Ergonomics improves performance	7 (2.6%)	11 (4.0%)	72 (26.5%)	76 (27.9%)	106 (39.0%)

Table 3: Cervical and Lumbar Pain & Work Practices (N=273)

Variable	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Cervical pain frequently experienced	14 (5.1%)	28 (10.3%)	115 (42.1%)	73 (26.7%)	43 (15.8%)
Lumbar pain during/after work	9 (3.3%)	26 (9.5%)	102 (37.4%)	68 (24.9%)	68 (24.9%)
Stay active by working	14 (5.1%)	26 (9.6%)	80 (29.4%)	82 (30.1%)	70 (25.7%)
Post-work stretching routine	20 (7.4%)	20 (7.4%)	90 (33.1%)	77 (28.3%)	65 (23.9%)
Use of magnifying loupes	20 (7.4%)	18 (6.6%)	84 (30.9%)	64 (23.5%)	86 (31.6%)
Bend or twist during work	5 (1.8%)	17 (6.2%)	88 (32.2%)	76 (27.8%)	87 (31.9%)
Adjust workstation	7 (2.6%)	20 (7.3%)	85 (31.1%)	66 (24.2%)	95 (34.8%)
Use vibrating instruments	13 (4.8%)	19 (7.0%)	87 (31.9%)	71 (26.0%)	83 (30.4%)

Table 4: Working conditions (N=273)

Variable	Category	Frequency (%)
Preferred working position	Standing	66 (24.2%)
	Sitting	207 (75.8%)
Work with assistant	Always	70 (25.6%)
	Sometimes	177 (64.8%)
	Never	26 (9.5%)
Working hours	<5 hours	31 (11.4%)
	5–10 hours	208 (76.5%)
	>10 hours	33 (12.1%)
Number of patients treated	1–3	24 (8.8%)
	4–6	120 (44.0%)
	7–9	95 (34.8%)
	>9	34 (12.5%)
Take work breaks	Yes	188 (69.1%)
	No	84 (30.9%)

Table 5: Common use of prophylactic remedies (N=273)

Variable	Always	Sometimes	Never
Use of analgesics	39 (14.3%)	184 (67.4%)	50 (18.3%)
Physiotherapy	29 (10.7%)	167 (61.4%)	76 (27.9%)
Steroid use	29 (10.7%)	141 (51.8%)	102 (37.5%)
Physical activities/exercise	53 (19.5%)	171 (62.9%)	48 (17.6%)

Table 6: Statistically significant associations between Ergonomic Awareness & Practices and Sociodemographic factors

Independent Variable	Dependent Variable	p-value	Significance
Gender	Clinical work is physically taxing	0.025	Significant
	Preferred working position	0.001	Significant
	Working hours	0.015	Significant
	Number of treated patients	0.001	Significant
Age	Familiar with ergonomics	0.001	Significant
	Presently use ergonomics	0.001	Significant
	Ergonomics is beneficial	0.002	Significant
	Not using ergonomics leads to problems	<0.001	Significant
	Ergonomics improves performance	0.024	Significant
Clinical profession	Familiar with ergonomics	<0.001	Significant
	Presently use ergonomics	<0.001	Significant
	Not using ergonomics leads to problems	0.008	Significant
	Feeling worn out	<0.001	Significant
	Clinical work physically taxing	<0.001	Significant
	Ergonomics improves performance	<0.001	Significant
Working experience	Familiar with ergonomics	0.002	Significant
	Presently use ergonomics	<0.001	Significant
	Ergonomics is beneficial	0.018	Significant
	Not using ergonomics leads to problems	0.010	Significant
Handedness	Familiar with ergonomics	<0.001	Significant
	Presently use ergonomics	<0.001	Significant
	Ergonomics is beneficial	0.001	Significant
	Not using ergonomics leads to problems	0.023	Significant
	Clinical work physically taxing	0.043	Significant
	Physical activities	0.001	Significant

Discussion:

This research sought to evaluate the extent of awareness of the significance of Ergonomics and to determine the correlation between the level of awareness and musculoskeletal symptoms among the participants. The analysis showed that while the level of knowledge concerning ergonomics was moderate, frequency of musculoskeletal complaints among the respondents was relatively high as seen in several studies. The association between ergonomic and demographic/professional factors was found to be significant. In the current study, even though the majority of the participants recognized the importance of ergonomics, its benefits, and significance, only slightly more than half of them reported using ergonomic practices **[15-18]**. Such observations have also been noted in a systematic review where even though dental practitioners had appropriate ergonomics knowledge, its implementation remained insufficient **[18].** The same review suggested that the increased number of patients seen by a dentist within a given period, lack of training, and poor infrastructure designs hampered ergonomic practices. A recent review showed that although the dentists held positive attitudes towards ergonomics and were ready to implement the practices; their compliance rate was relatively low **[19]**. Therefore, based on the individual situations, background, and objectives, other ergonomic measures should also be considered. Physical strain and musculoskeletal symptoms among the dentists remain a significant issue as evidenced by the findings. The majority of the participants reported that clinical activities are physically strenuous and make them tired. Furthermore, a significant percentage of the participants reported having pain in their cervical and lumbar vertebrae. These results are consistent with global literature showing that dentists are vulnerable to MSDs as well as physical exhaustion **[20, 21]**. According to a systematic review conducted by Lietz *et al.,* the prevalence of MSDs among dentists ranged from 10.8% to 97.9%. It has also been shown to primarily affect the neck, shoulders, and back region of the body **[18].** Another systematic review estimated the prevalence of musculoskeletal symptoms to range from 64% to 93% **[16]**. Similar results were reported in the recent cross-sectional study on MSDs among dental professionals showing high cases of cervical and back pains related to prolonged static postures and repetitions **[21].** In spite of awareness, the current study observed that a relatively high proportion of the participants experienced bending and twisting during their work activities. Exposure to vibrating instruments was also found. Such observations are consistent with literature showing that poor ergonomics practices characterized by awkward postures, repetitive motions, and prolonged static positions have led to a high incidence of MSDs **[22]**. Other studies also emphasized that sustaining inappropriate positions greatly increase the risks of developing chronic musculoskeletal pain **[23].** Even though a workstation adjustment and the use of magnifying loupe were reported, the existence of poor postures suggests inadequate ergonomics practices. Working shifts of more than 5 hours per day as well as the treatment of many patients within a working shift was evident. Higher physical

workloads have been shown to be significantly associated with fatigue and musculoskeletal complaints as evidenced by literature **[24].** In a study conducted in Saudi Arabia among dentists, longer working shifts as well as more influx of patients has been found to increase the chances of developing MSDs. It has also been recommended that the importance of ergonomics as well as adopting proper practices in handling patients for improved work efficiency **[25].** In spite of the fact that almost all participants took breaks during work shifts, short breaks do not show any benefits on the reduction of physical strain **[26].** Use of analgesics and physiotherapy for management of pain among most participants reflects a symptom management approach. Similar observations have been made before in literature. For instance, self-medication and conservative therapy is common among dental practitioners. It is however beneficial that the use of steroid medicines among the respondents in this study was comparatively low **[14]**. The results also show that physical workloads and work pattern varied significantly by gender with males experiencing more physical strains. Literature is quite contradicting in regard to gender and MSDs. Some studies have documented higher MSDs among males while others showed the opposite case with women being more affected due to lower muscle endurance. Therefore, it can be assumed that the current findings are consistent with the latter studies **[27]**. Associations between ergonomic practices/awareness and demographic/professional factors such as age, gender and working experience were found. Experienced clinicians reported higher ergonomic awareness and practices. As has been found previously, clinical experience enhances ergonomic practices **[24].** Professional status was found to correlate significantly with ergonomic awareness and physical strain. This is in accordance with recommendations to include early ergonomic education in dental curriculums **[28].** Handedness was also found to have significant associations with ergonomics and physical strain. One possible reason behind these findings could be constraints in design of the dental operative which suits the right-handed persons and hence exposes left-handed individuals to increased risks.

Conclusion:

Moderate ergonomic awareness did not ensure adequate clinical implementation, resulting in persistent musculoskeletal symptoms among dental practitioners. Long working hours, poor posture, repetitive procedures and inadequate ergonomic practices were the major contributing factors. Curricular training, professional education and ergonomic workplace modifications are essential to improve efficiency and reduce musculoskeletal disorders.

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