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Original Research Article

Prevalence of work-related lower back pain and psychosocial impacts in dentistry

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ABSTRACT

Background: In dentistry, musculoskeletal (MSK) pain creates a significant occupational health hazard jeopardizing the efficient delivery of care to the patients. There are several factors linked to the job that contribute to the higher incidence of MSK pain among dental practitioners. Uncomfortable postures and movements, frequent and prolonged working hours, the amount of time spent with each patient are some of the work-related factors of work related lower back pain which need to be addressed to prevent the disabling effects in the long run. The study aims to evaluate the prevalence of work related lower back pain and significance of associated risk factors in Saudi Arabia.
Methods: Self-administered questionnaire were distributed to 384 dental practitioners who were working in various clinics in Saudi Arabia. This survey had four sections with questions related to demographic data, clinical practice, ergonomic principles, and psychosocial impacts. Descriptive statistics including chi-square analyses and associated significance were performed.
Results: The relationship between age, years of experience and back pain among dental professionals was found to be significant with back pain lasting between 1 to 7 days in 34.2% among the participants. Older individuals with more experience tend to use back braces, analgesics, and physiotherapy more often. The cumulative prevalence of back pain in the study was 42.2%, with the majority of participants working for 2-8 hours per day. Various types of back strain injuries were observed across age groups and experience levels. Psychosocial impacts like job dissatisfaction and missed workdays were more pronounced in older individuals. The type of dental work and sitting posture also influenced back pain in specific age groups with significant associations observed.
Conclusions: Our study sheds light on the significant issue of MSK pain among dental practitioners in Saudi Arabia, emphasizing its complex nature involving physiological, ergonomic and psychosocial factors. Found high prevalence of MSK pain, especially lower back discomfort, linked to factors like sitting postures and long working hours.

Keywords: MSK pain, Occupational health hazard, Ergonomics, Dental practice

INTRODUCTION

In dentistry, MSK pain poses a significant occupational health hazard.[1] There are several physiological and ergonomic aspects of the job that contribute to the higher incidence of MSK pain among dental practitioners[2]. Uncomfortable postures and movements, frequent and prolonged working hours and the amount of time spent with each patient are among the many risk factors related with the dental work.[3] Other risk factors mentioned in

previous studies included the dentist's body mass index (BMI), the proportion of walk-in clients, and the daily average of planned clients.[4,5] Dentists are more prone to MSK pain due to the high frequency of protracted motions they need to perform for greater visibility such as stooping, slouching, and bending forward and laterally. The back, neck and extremities were mainly affected by such uncomfortable positions.[2,6]

Among the MSK aches for dentists, lower back discomfort is a typical example. According to a study from Surat, India, 37% of the people were affected with factors such as mental health, gender, and activity having strong influences on the development of MSK discomfort.[7] In New Zealand, a study among dentists revealed a 54% prevalence of lower back pain, 57% prevalence of neck pain, and 52% prevalence of shoulder pain.[8] According to a research conducted in Saudi Arabia in 2001, dentists complained about difficulty in getting access to patients' mouths and a lack of workspace.[9] The study also found that 74% of the sample population experienced lower back discomfort that have been alleviated by exercise. 85% of Saudi dentists in research conducted in 2015 reported having MSK pain connected to their jobs.[10] However, the study had some drawbacks. One of them is that the study included 225 members of one dental association, which could be an unrepresentative sample of the entire dental labour force. These members included dental assistants, dental hygienists, and dental technicians. Another disadvantage is the absence of a description of questionnaire validation.

Moreover, in another research conducted in Jeddah in 2019, among the studied population of 234 dentists, 70% of participants had a work-related MSK disorder, and lower back pain was the most common site with a prevalence of 85%.[11] Appropriate operator and chair positions and equipment according to the dominant hand is very important for safe and effective dental practice.[12]

Sitting posture favours less energy expenditure and transmits fewer loads on the lower extremities than standing.[13] Even then, prolonged sitting or unsupported sitting can have harmful effects on the lumbar spine as it creates backward tilt, lower back flattening, and a corresponding forward shift in the center of gravity.[13] The spine ends up hanging on muscles, ligaments, and soft tissues at the back of the spine, causing tension and increased muscular demands in these structures resulting in ischemia and fatigue aggravating lower back discomfort.[14] The need to address this issue is compelling as it is a major factor for psychosocial issues in the dental working population. Occupational health initiatives promoting healthy lifestyles in the academic environment at the dental school influences the future professional life.[15] According to a study, only 17% of working dental professionals exercised during their rest period and only 40% used any kind of assistive devices.[16] Also, clinical procedures favouring the direct view technique compared to the mirror technique had a distinct influence on body tilt, muscle activity, and sitting balance.[17] The common risk factors found in a recent study that contributed to work-related back pain included the years of practice, hours of practice, and the type of practicing professionals affected which were mostly resident doctors.[18]

The study aims to evaluate the cumulative, annual and weekly prevalence of work-related lower back pain among Saudi dentists and clinical dental students and to identify the common risk factors and psychosocial effects in the dental society.

METHODS

A cross-sectional quantitative study was conducted at the college of dentistry, King Saud bin Abdulaziz university for health sciences, Riyadh during a 4 month period starting from September 21,2023 to January 21, 2024. An electronic survey using Google forms was sent to dental practitioners including clinical dental students, residents and dental specialists who are currently practicing in various cities in Saudi Arabia. Online portals like email, WhatsApp, Telegram and Twitter were chosen for wider distribution.

Survey content

The survey was mainly divided into four sections.

The first part of the survey consisted 7 questions including demographic data such as gender, age, clinical student, general practitioner, resident, specialist, retired professional, type of specialty, years of experience, working hours per day, height and weight.

Second section consisted 8 questions which were clinical practice-based related to back pain such as length of practice, procedures causing pain, use of protective equipment like back braces, history of previous back injuries and consecutive use of analgesics for relieving pain.

The third section was composed of 8 ergonomic principle-based questions about performing exercise and stretching after work hours, posture during the procedure, type of dominant hand, adequacy of space in the workplace, instrument convenience and also about knowledge and attendance of related courses about ergonomics.

The fourth section had 5 questions related to psychosocial effects such as missing workdays, job satisfaction, less productivity and income, and whether the normal daily work and leisure activity were affected evaluating each statement using a (yes) or (no).

Survey dissemination

Data were collected among 348 study subjects from different hospitals, clinics, and universities. A self-administered questionnaire was utilised during the data collection period, and dental practitioners were asked to fill out the questionnaire. The exclusion criteria included

dental students in their first three years, dental technicians, dental assistants, as well as individuals with backache due to previous trauma or surgery.

Employing a descriptive, cross-sectional design, the study's sample size was 384 participants. This figure is based on a 5% margin of error, a 95% confidence level, and an estimated population response distribution of 50%, calculated using the Raosoft sample size calculator available at raosoft.com/samplesize.html. A non-probability-based convenience sampling technique was utilized targeting dental practitioners working in clinics across Saudi Arabia.

Positive responses in the clinical and ergonomic sections will be scored as 1 with no points for negative responses. The study measured the cumulative, annual, and weekly prevalence of lower back pain, examining the exposure variables such as dominant hand, working posture and working hours. Outcome variables included lower back pain and any associated chronic pain that leads to psychosocial effects.

Following institutional review board (IRB) approval, the questionnaire's content validity was evaluated using a test-retest method in a pilot study. Approximately 3% of the study population, consisting of fourth-year dental students from the institution were invited to participate, with the questionnaire being repeated after one week. The test-retest reliability was assessed using Cronbach's alpha coefficient on the pilot sample with potential modifications to the questionnaire based on the participant feedback.

For data management and analysis, the statistical package for social sciences (SPSS) version 21 for Windows was employed. Categorical values were presented as numbers and percentages. Chi-square test was used for frequency calculations to evaluate dependent and independent variables with $p<0.05$ deemed statistically significant.

RESULTS

Age and years of experience have a significant relationship with back pain as the majority experienced back pain between 1 to 7 days duration p=0.005. Back braces, analgesics, and physiotherapy were used by 85.7% of participants in the advanced age groups and also those with increased years of experience p=0.005. Cumulative prevalence was found to be 42.2% in the present study and weekly prevalence was 34.3%.

The majority of the participants (70.4%) had 0-5 years of experience followed by 19.3% with 5-15 years of experience. Working hours ranged from 2 to 8 hours for 80% of the participants, 147 of the participants experienced back pain due to dental work and 34.5% were using some form of protective equipment (Table 1).

Simple strains, herniated discs, and tendon injuries were observed in all age groups with increased frequency related to the years of experience whereas numbness, paraesthesia, and strain fractures were observed in younger age groups (Table 3).

Physical exercises and stretching were mostly carried out by the practitioners between 30-50 years of age. Standing, sitting postures, dominant hand and gender did not have any significant relation with age groups and years of experience. The sitting posture and the working hours had a significant relation with the majority working for 2-10 hours in sitting posture p=0.001.

Working space comfort in the modern day clinical set up was experienced by most of the participants. The psychosocial impacts were mostly observed in the advancing age p=0.001 with missing working days, job dissatisfaction, and less income measured as serious outcomes (Table 2).

Job dissatisfaction was reported by 98 of the participants with 81 had undergone physiotherapy for back-related injuries. Endodontic and restorative procedures mostly were linked to back pain in the age group 50-60 years whereas scaling and root planning were tedious for age groups between 40-50 years. No significant relationship was observed between type of practicing speciality and back pain with general dentistry professionals mostly affected.

Type of work related with lower back pain was measured by categorizing the participants into 4 groups, clinical student, resident, dentist, and retired professionals. A statistically significant relationship was observed p=0.001 as most affected during any time for the last 7 days were clinical students and dentists more than resident and retired dentists (Figure 1).

Moreover, for the prevalence of pain at any time in the last 12 months, 174 had pain among the total number of the participants and most of them were male, with an annual prevalence of 50%. Demographic data of the responses is shown in Table 4.

Table 1: Association of working hours per day with different questionnaire.

Variables		Working hours/day								X^2 value	P value
		0-2		2 to 5		6 to 8		8 to 10			
		N	%	N	%	N	%	N	%		
Do you have lower back pain due to dental practice?	No	16	47.10	98	68.50	74	54.40	13	37.10	15.119	0.002
	Yes	18	52.90	45	31.50	62	45.60	22	62.90		

Continued.

Variables		Working hours/day								X^2 value	P value
		0-2		2 to 5		6 to 8		8 to 10			
		N	%	N	%	N	%	N	%		
What is approx length of time that you have had lower back pain in last 12 months?	0 days	22	64.70	82	57.30	60	44.10	9	25.70	24.166	0.019
	1-7 days	10	29.40	42	29.40	44	32.40	15	42.90		
	8-30 days	1	2.90	14	9.80	19	14.00	6	17.10		
	Everyday	0	0.00	3	2.10	6	4.40	1	2.90		
	>30 days	1	2.90	2	1.40	7	5.10	4	11.40		
Are you using any personal protective equipment during your practice? For example, back braces	No	21	61.80	90	62.90	90	66.20	27	77.10	2.753	0.001
	Yes	13	38.20	53	37.10	46	33.80	8	22.90		
Have you had any history of following work-related back injuries?	Strain fractures	3	8.80	1	0.70	1	0.70	0	0.00	66.849	0.001
	Herniated disc	0	0.00	2	1.40	10	7.40	5	14.30		
	None	13	38.20	102	71.30	68	50	16	45.70		
	Numbness or paresthesia	4	11.80	1	0.70	9	6.60	5	14.30		
	Others	0	0.00	1	0.70	0	0.00	0	0.00		
	Sciatica pain	0	0.00	0	0.00	1	0.70	0	0.00		
	Simple strains	10	29.40	33	23.10	42	30.90	5	14.30		
	Tendon injury	4	11.80	3	2.10	5	3.70	4	11.40		
Have you had the lower back pain at any time during last seven days?	No	15	44.10	106	74.10	89	65.40	16	45.70	17.472	0.001
	Yes	19	55.90	37	25.90	47	34.60	19	54.30		
Have you taken any analgesics or muscle relaxant for more than 2 consecutive days due to back pain?	No	19	55.90	125	87.40	96	70.60	24	68.60	20.912	0.001
	Yes	15	44.10	18	12.60	40	29.40	11	31.40		
Your posture while doing majority of clinical procedures?	Sitting	21	61.80	131	91.60	119	87.50	27	77.10	22.329	0.001
	Standing	13	38.20	12	8.40	17	12.50	8	22.90		
Do you have enough space in your workplace?	No	12	35.30	38	26.60	29	21.30	13	37.10	17.805	0.001
	Yes	22	64.70	105	73.40	107	78.70	22	62.90		
Have you attended any courses of ergonomics in dentistry	No	17	50	29	20.30	59	43.40	21	60	30.116	0.001
	Yes	17	50	114	79.70	77	56.60	14	40		

Table 2: Association of working hours/day and significant psychosocial impacts.

Are you experiencing any of the following due to back pain (1-3)?		Working hours per day								X^2 value	P value
		0-2		2 to 5		6 to 8		8 to 10			
		N	%	N	%	N	%	N	%		
1.Job dissatisfaction	No	21	61.80	113	79.00	95	69.90	21	60	8.042	0.045
	Yes	13	38.20	30	21.00	41	30.10	14	40		
2.Less productivity	No	22	64.70	131	91.60	114	83.80	27	77.10	17.166	0.001
	Yes	12	35.30	12	8.40	22	16.20	8	22.90		
3.Less income	No	17	50.00	109	76.20	99	72.80	20	57.10	12.444	0.006
	Yes	17	50.00	34	23.80	37	27.20	15	42.90		

Continued.

Are you experiencing any of the following due to back pain (1-3)?		Working hours per day								X^2 value	P value
		0-2		2 to 5		6 to 8		8 to 10			
		N	%	N	%	N	%	N	%		
What is total length of time that back pain has prevented you from doing normal work during last 12 months?	0 days	23	67.60	113	79.00	88	64.70	16	45.70	23.53	0.005
	1-7 days	7	20.60	26	18.20	39	28.70	13	37.10		
	8-20 days	2	5.90	4	2.80	6	4.40	4	11.40		
	>30 days	2	5.90	0	0.00	3	2.20	2	5.70		
Have you ever undergone physiotherapy or chiropractic because of lower back pain?	No	17	50	126	88.10	102	75	22	62.90	27.977	0.001
	Yes	17	50	17	11.90	34	25	13	37.10		

Table 3: Association of years of experience: with different questionnaire.

Variables		Years of experience								$\chi 2$ value	P value
		+20		0-5		15-20		5-15			
		N	%	N	%	N	%	N	%		
Do you have lower back pain due to dental practice?	No	5	21.70	153	62.40	5	38.50	38	56.70	16.454	0.001
	Yes	18	78.30	92	37.60	8	61.50	29	43.30		
What is approx. length of time that you have had lower back pain in last 12 months?	0 days	6	26.10	129	52.70	3	23.10	35	52.20	28.515	0.005
	1-7 days	5	21.70	78	31.80	6	46.20	22	32.80		
	8-30 days	8	34.80	22	9.00	4	30.80	6	9.00		
	Everyday	2	8.70	6	2.40	0	0.00	2	3.00		
	>30 days	2	8.70	10	4.10	0	0.00	2	3.00		
Are you using any personal protective equipment during practice? For example, back braces	No	8	34.80	174	71.00	5	38.50	41	61.20	17.667	0.001
	Yes	15	65.20	71	29.00	8	61.50	26	38.80		
Have you had any history of following work-related back injuries?	Fractures	0	0.00	5	2.00	0	0.00	0	0.00	74.129	0.001
	Herniated disc	6	26.10	6	2.40	2	15.40	3	4.50		
	None	3	13.00	159	64.90	4	30.80	33	49.30		
	Numbness/ paresthesia	1	4.30	8	3.30	1	7.70	9	13.40		
	Others	0	0.00	1	0.40	0	0.00	0	0.00		
	Sciatica pain	0	0.00	0	0.00	0	0.00	1	1.50		
	Simple strains	9	39.10	61	24.90	5	38.50	15	22.40		
	Tendon injury	4	17.40	5	2.00	1	7.70	6	9.00		
Most difficult procedure causing lower back pain	Crown preparation	12	52.20	114	46.50	7	53.80	27	40.30	37.02	0.05
	Orthodontic treatment	2	8.70	7	2.90	1	7.70	4	6.00		
	Endodontic treatment	13	56.50	115	46.90	3	23.10	34	50.70		
	Restorative procedures	15	65.20	63	25.70	7	53.80	23	34.30		
	Surgical extraction	5	21.70	50	20.40	4	30.80	9	13.40		
	Use of extraction forceps	4	17.40	52	21.20	3	23.10	15	22.40		
	Scaling and root planning	10	43.50	63	25.70	3	23.10	17	25.40		
	Others	0	0.00	13	5.30	0	0.00	3	4.50		

Table 4: Demographic data.

Variables		N	Percentages (%)
Age (in years)	20-30	252	72.4
	30-40	54	15.5
	40-50	24	6.9
	50-60	7	2.0
	60-70	11	3.2
Gender	Female	159	45.7
	Male	189	54.3
Type of work	Clinical student	182	52.3
	Dentist	98	28.2
	Resident	55	15.8
	Retired professions	13	3.7
Type of speciality	Endodontics	29	8.3
	General dentistry	230	66.1
	Operative dentistry	11	3.2
	Oral surgery	16	4.6
	Orthodontics	15	4.3
	Pediatric dentistry	15	4.3
	Periodontics	10	2.9
	Prosthodontics	22	6.3
Years of experience (in years)	+20	23	6.6
	0-5	245	70.4
	15-20	13	3.7
	5-15	67	19.3
Working hours per day:	0-2	34	9.8
	2-5	143	41.1
	6-8	136	39.1
	8-10	35	10.1
Height (cm)	160-170	126	36.2
	170-180	130	37.4
	Less than 160	67	19.3
	More than 180	25	7.2
Weight (kg)	+90	25	7.2
	50-60	82	23.6
	60-70	79	22.7
	70-80	86	24.7
	80-90	28	8.0
	Less than 50	48	13.8

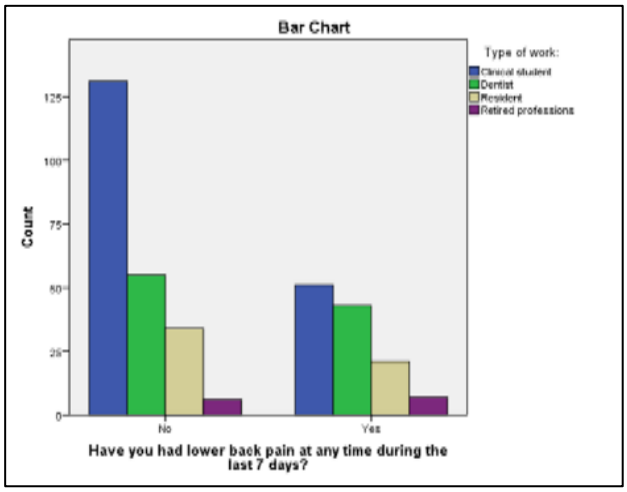

Figure 1: Weekly prevalence of lower back pain.

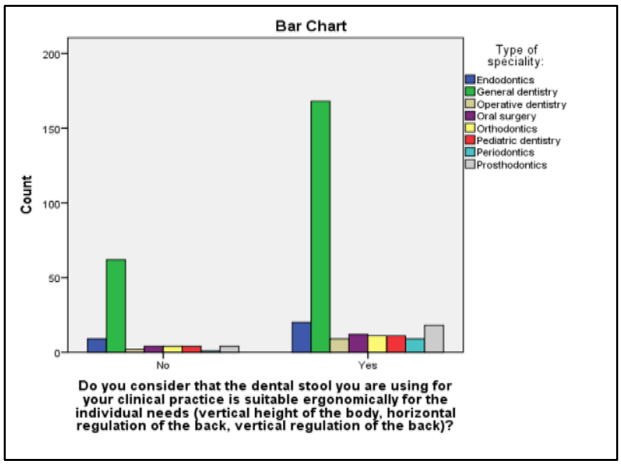

Figure 2: Ergonomical aspects followed in various dental specialities.

DISCUSSION

The prevalence of MSK pain related to the lower back is relatively high among the dental workforce as shown by many previous studies.[18,19] The estimated prevalence of lower back pain in healthcare personnel is very high (54.8%) as reported in a recent systematic review.[20] As the practicing population size increases, this has significant impacts on professional and social life. It is important to ensure harmony between the social and family life with the professional work quality to become successful. So careful evaluation of the causative elements and appropriate institution of remedial measures is becoming again a necessity in the present-day challenges. In this study we investigated the effectiveness of ergonomic tools already been implemented in modern dental practice has helped to reduce the occurrence of back-related problems. The study reveals a high prevalence (42%) of lower back pain and psychosocial impacts with increasing age, years of experience, and working hours. This is assumed to be very high compared with the MSK pain experienced by construction workers in Saudi Arabia (48.5%) published in a recent study.[21] This also gives us an insight into the serious consequences that are experienced by the Saudi dental workforce and their social relations.

The lower back is most commonly affected in work-related injuries as the lumbar spine supports most of our body weight.[20] This can range from simple strains like stiffness, and muscle spasms to severe injuries like herniated discs, and sciatica which is a type of radiating pain. Our study revealed that the majority of the participants accommodated sitting posture and both the working hours and years of experience had a significant relationship with lower back pain as they practiced between 8 to 10 hours (62.9%) p=0.001. Although back pain severity based on the visual analogue scale is not measured, this study takes into consideration the no. of days affected in the past week and one year, and also the use of continuous analgesics, personal protective equipment, and physiotherapy to relieve the pain. This points out both the acute and chronic nature of the problem the dental population is suffering with 76.9% of the retired professional participants using analgesics, protective equipment like back braces and physiotherapy or chiropractic p=0.005. Body position at work, stress, and lack of physical activity have been reported as strong risk factors.[20] Regular aerobic and stretching exercises have been reported as a key factor for preventing damage and strengthening the MSK system in dental workers.[22,23] So responses regarding incorporating exercises and stretches that target muscles in the lower back were taken which can help reduce stiffness and pain, thereby improving flexibility and range of motion. We observed that back pain was most prevalent in the younger age groups while stretching exercises were mostly utilised by the middle age groups. Regardless of the type of practicing specialty, there was no significant relationship observed between the most difficult dental procedures with age and years of experience. Timely management by stressing the incorporation of ergonomic-related courses in the curriculum would become crucial in the standpoint.

Also, we examined the psychosocial impacts experienced by the dental society which is to our knowledge the first of its kind reported in the literature. The psychosocial effects are strong as they account for missed working days and job dissatisfaction among the majority. It has been observed mostly in the advancing age group (p=0.001), which implied a significant association affecting their normal life activities. Gender was not observed as a risk factor as men and women were equally affected in the present study similar to the findings in a systematic review.[20]

Attendance and knowledge of ergonomic training courses covering occupational health, ergonomics, workplace organization, and psychosocial coping skills were taken into consideration for this study and were attended by the participants at different levels of work (p=0.04) (Figure 2). This has shown marked improvement from the experiences reported in past studies in Saudi Arabia and recommends incorporating further at different levels in the universities significantly reducing the occupational burden.

One of the limitations of our study was that we could not include the full sample of the practicing dental population because we used snowball technique in our survey which was distributed on social media. Also, there are disadvantages of social media surveys that has affected the responses such as survey fatigue, difficulty to interpret the sentiments behind the answers and inability to connect with people in remote areas.

CONCLUSION

In conclusion, our study highlights the pressing issue of MSK pain among dental practitioners in Saudi Arabia and underscores the multifactorial nature of this occupational health issue. Through an extensive exploration of physiological, ergonomic, and psychosocial factors, we have elucidated the prevalence, risk factors, and impacts of MSK pain within the dental workforce. Our findings reveal a significant prevalence of MSK pain, particularly lower back discomfort, attributable to various work-related variables such as uncomfortable postures, prolonged working hours, and type of dental work. Furthermore, our study identifies key areas for intervention, including promoting awareness of proper ergonomic practices by optimizing workspace design, and providing access to resources for physical and psychosocial well-being. By addressing these factors, we can enhance the overall quality of life for dental practitioners and improve patient care outcomes. Additionally, our research underscores the importance of incorporating ergonomics and occupational health initiatives into dental education curriculum and practice at various levels. By integrating these principles into the

curriculum and promoting lifelong learning opportunities, we can empower dental professionals to prioritize their health and well-being throughout their career.

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REFERENCES

1. Mohammed ZJ. Musculoskeletal disorders: back and neck problems among a sample of Iraqi dentists in Baghdad city. J Bagh Coll Dentistry. 2011;23(4):90-5.
2. Hayes MJ, Cockrell D, D. Cockrell, Smith DR. A systematic review of musculoskeletal disorders among dental professionals. Int J Dental Hygiene. 2009;7(3):159-65.
3. Szymanska J. Disorders of the musculoskeletal system among dentists from the aspect of ergonomics and prophylaxis. Ann Agri Environ Med. 2002;9(2):169-73.
4. Maguire M, O'Connell T. Ill-health retirement of schoolteachers in the Republic of Ireland. Occup Med (Chic III). 2007;57:191-3.
5. McNee C, Kieser JK, Antoun JS, Bennani H, Gallo LM, Farella M. Neck and shoulder muscle activity of orthodontists in natural environments. J Electromyogr Kinesiol. 2013;(3):600-7.
6. Ayatollahi J, Ayatollahi F, Ardekani AM. Occupational hazards to dental staff. Dent Res J (Isfahan). 2012;9(1):2-7.
7. Shah S, Dave B. Prevalence of low back pain and its associated risk factors among doctors in Surat. Int J Heal Sci Res. 2012;2;91-102.
8. Samotoi A, Mofat SM, Thomson WM. Musculoskeletal symptoms in New Zealand dental therapists: prevalence and associated disability. NZ Dent J. 2008;104:49-53.
9. Al Wazzan KA, Almas K, Al Shethri SE, Al-Qahtani MQ. Back and neck problems among dentists and dental auxiliaries. J Contemp Dent Pract. 2001;2(3):17-30.
10. Alghadir A, Zafar H, Iqbal ZA. Work-related musculoskeletal disorders among dental professionals in Saudi Arabia. J Phys Ther Sci. 2015;27:1107-12.
11. Meisha DE, Alshargawi NS, Samarah AA, Al-Ghamdi MY. Prevalence of work-related musculoskeletal disorders and ergonomic practice among dentists in Jeddah, Saudi Arabia. Clin Cosmet Investig Dent. 2019;11;171-9.
12. Ahmed IM, Ragad AA, Rawan NA, Raghad AB, Saja MK, Shroug K, et al. Clinical Difficulties among Left-Handed Dentists, Dental Students and Interns-A Cross-Sectional Survey in Saudi Arabia. Int J Med Res Health Sci. 2020;9(9):10.
13. Pope-Ford R. A quantitative assessment of low back pain in dentistry. Procedia Manufacturing. 2015;3;4761-8.
14. Valachi B, Valachi K. Mechanisms leading to musculoskeletal disorders in dentistry. J Am Dental Ass. 2003;134;1344-50.
15. Diaz-Caballero AJ, Gómez-Palencia IP, Díaz-Cárdenas S. Ergonomic factors that cause the presence of pain muscle in students of dentistry.Med Oral Patol Oral Cir Bucal. 2010;15(6):906-11.
16. Gaowgzeh RA, Chevidikunnan MF, Al-Saif A, El-Gendy S, Karrouf G, Al Senany S. Prevalence of and risk factors for low back pain among dentists. J Phys Ther Sci. 2015;27(9):2803-6.
17. Katano K, Nakajima K, Saito M, Kawano Y, Takeda T, Fukuda K. Effects of Line of Vision on Posture, Muscle Activity and Sitting Balance During Tooth Preparation. Int Dent. J 2021;71(5):399-406.
18. Alzayani MK, Salama KF, Zafar M. Work-related Musculoskeletal Disorders Among Dental Staff in Armed Force Hospital in Dhahran, Saudi Arabia. Int J Prev Med. 2021;29;112-9.
19. Al-Mohrej OA, AlShaalan NS, Al-Bani WM, Masuadi EM, Almodaimegh HS. Prevalence of musculoskeletal pain of the neck, upper extremities and lower back among dental practitioners working in Riyadh, Saudi Arabia: a cross-sectional study. BMJ Open. 2016;6(6):e011100.
20. Rezaei B, Mousavi E, Heshmati B, Asadi S. Low back pain and its related risk factors in health care providers at hospitals: A systematic review. Ann Med Surg (Lond). 2021;70:102903.
21. Alghadir A, Anwer S. Prevalence of musculoskeletal pain in construction workers in Saudi Arabia. Sci World. J. 2015;2015:1-5.
22. Valachi B, Valachi K. Preventing musculoskeletal disorders in clinical dentistry: strategies to address the mechanisms leading to musculoskeletal disorders. J Am Dent Assoc. 2003;134(12):1604-12.
23. Andrews N, Vigoren G Ergonomics: muscle fatigue, posture, magnification, and illumination. Compend Contin Educ Dent. 2002;23(3):261-6.

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