

Pain in the Shoulders, Neck, and Back is a Regular Occurrence among Dental Workers in Abha, KSA

Yahya Alogaibi*, Munirah Abdallah Alhawaish, Keareyah Amin Banjar, Amal Husin Alamri, Noura Omar Bahamdan, Reham Mutlaq Alotaibi, Saad Masoud Alhumaidi, Rana Hassan Abduljabbar, Nahed Hosam Rozi, Noha Saleh Hawari, Rouwaida Taha Halawani and Nawal Naif Alotaibi

Department of Orthodontics, MOH, KSA

*Corresponding Author: Yahya Alogaibi, Department of Orthodontics, MOH, KSA.

Received: December 01, 2023; Published: December 08, 2023

Abstract

Background: Pain from musculoskeletal disorders (MSDs) is a significant health issue for dental professionals, negatively impacting both their quality of life and performance at work.

Purpose of the Study: The purpose of this study was to ascertain the prevalence of shoulder, neck, and lower back pain as well as the risk factors linked to it in Abha, KSA.

Methods: Three primary sections of a questionnaire-questions about working conditions, job organization, and demographics-were electronically completed by 105 dental staff members who participated in a cross-sectional study.

Findings: Of the participants, 53% were dentists, and 82% were women. In the preceding year, the neck (73.3%, n = 77), lower back (72.4%, n = 76), and shoulders (70.5%, n = 74) were the most common MSDs reported. Sixty-eight percent of dental staff members work while seated. Just 12% of people exercise everyday, while 53% exercise occasionally. In the 12 months prior, 25.7% of the staff had sought medication for MSD discomfort.

Conclusion: Among dental professionals in Abha, Saudi Arabia, there was a significant prevalence of MSDs as well as shoulder, lower back, and neck pain.

Keywords: Musculoskeletal Disorders (MSDs); Shoulder, Neck, and Lower Back Pain; Dentistry; Dental Professionals

Introduction

The field of dentistry requires a high level of focus and accuracy. While the duties of the various dental team members-dentists, dental hygienists, and dental assistants-vary, they are all subject to the same extended, repetitive standing or sitting positions that cause neck, shoulder, and back pain.

The term “musculoskeletal diseases” (MSDs) refers to a group of microtraumas that build up in the body and have the potential to become more significant injuries to the bones, joints, ligaments, muscles, tendons, and nerves.

Their intensity can range from moderate, sporadic painful bouts to severe, chronic debilitating illnesses, making them one of the most often reported work-related ailments.

Because of ergonomic and physiological considerations, musculoskeletal discomfort is a serious occupational health risk for all dental personnel. Biomechanical, ergonomic, and occupational factors have been identified as potential risk factors for MSD (psychosocial risk factors due to job stress).

A clinician is typically made aware of the need for changes by having them “self-recognize” the problem. In order to enhance their working environment, dental staff members have also been recommended to seek and obtain instruction regarding musculoskeletal health, injury prevention, and ergonomics.

According to recent studies, by their third year of dentistry school, 70% of dentists report having back pain.

The majority of respondents were female (79.1%) and the prevalence of back pain was 44.9%, with dental technicians having the highest prevalence, according to the findings of a study done in a state in northeastern Malaysia to examine the prevalence and related factors of back pain among dental personnel (52.4%). Bad posture and being a dental assistant were the two main risk factors for back discomfort.

Dental staff members’ quality of life is negatively impacted by musculoskeletal pain. While some may successfully seek treatment, others may choose to change careers, quit, or look into early retirement plans out of concern for their health.

On the other hand, information about musculoskeletal pain among dental staff in Abha is scarce. Therefore, it was thought that a study to determine the prevalence and risk factors of MSD among them was necessary.

Method

The electronic self-administered questionnaire used in this observational cross-sectional study was given to dentists. One hundred or more dentists made up the representative sample that was chosen at random.

All eligible participants who consented to take part were asked to immediately complete the questionnaire. Filling out a questionnaire takes about five minutes on average.

There were eighteen questions in the questionnaire. 1. What kind of organization do you work for? 2. Area of expertise: 3. Gender: 4. Age: 5. Status of marriage: 6. Body Mass Index (BMI): 7. Dental profession experience: 8. How many patients a day do you see? 9. How many hours a day do you work? 10. How many days a week do you work? 11. Did you experience any MSD pain prior to entering the dental field? 12. During the past 12 months, did you experience any lower back pain? 13. During the past 12 months, did you experience any neck pain? 14. During the past 12 months, have you experienced any shoulder pain? 15. Did a decrease in activity stem from MSD pain? 16. Do you use medicine for this discomfort? 17. When giving dental care, are you accustomed to working while standing or sitting? 18. Do you work out every day?

Population and sample of the study

All dental staff members are included in the study population, and a random sample size of 105 was chosen; their data-driven features are displayed in the following table 1.

The preceding table indicates that about 82% of the participants were female and 18% were male. Based on age, 70.5 percent of the participants were in the 24 - 34 age range, approximately 25 percent were in the 35 - 44 age range, and approximately 5 percent were over the 45-year age range.

Personal Data		N.	%	P-value
Gender	Male	19	18.1	0.000**
	Female	86	81.9	
Age	24 - 34Y	74	70.5	0.000**
	35 - 44Y	26	24.8	
	+45Y	5	4.8	
Marital status	Single	52	49.5	0.922
	Married	53	50.5	
BMI (Body Mass INDEX)	20 - 25	57	54.3	0.380
	More than 25	48	45.7	
Type of institution you are working at	Governmental	77	73.3	0.000**
	Private	4	3.8	
	Student	24	22.9	
Specialty	Dentist	53	50.5	0.992
	Others	52	49.5	
Experience in the dental profession	1 - 4Y	36	34.3	0.918
	5 - 9Y	36	34.3	
	+10Y	33	31.4	

Table 1: The participant's data (n = 105).

Chi-squared test: **Significant at 0.01.

Approximately 50% of the participants were single, and approximately 50% of them were married, based on their marital status.

Furthermore, based on the body mass index, their distribution is roughly 54% of their body mass in the (20 - 25) range, and 46% of their body mass in the (> 25) range (25).

Their breakdown by kind of institution of employment was as follows: roughly 73 percent worked for the government, roughly 4 percent for private institutions, and roughly 23 percent were students.

In conclusion, the participants were distributed based on their experience in the dentistry profession. Approximately 34% of them had between four and five years' experience, 34% had between five and nine years' experience, and 31% had more than ten years' experience.

The above results are summarized in figure 1.

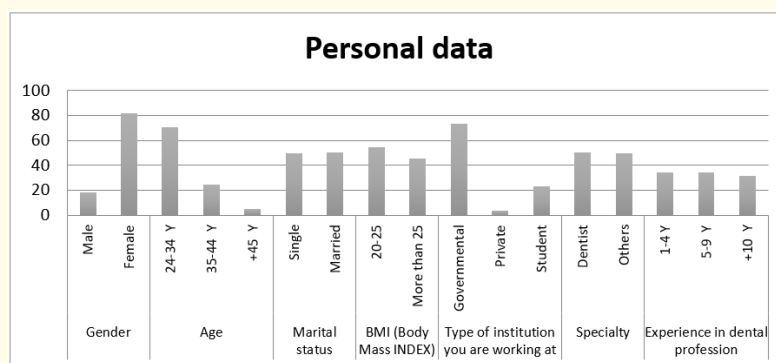


Figure 1: The participant's data.

Findings

The participants’ distribution is displayed in the following table based on the number of patients treated each day, the number of working hours per day, the number of working days per week, the treatment environment, and the amount of daily activity.

Regarding the number of patients treated on a daily basis, around 44% of dentists treat 5 - 9 patients, approximately 24% treat 1 - 4 patients, and approximately 32% treat patients everyday.

About 70% of dentists work more than six hours a day, roughly 26% work four to six hours a day, and roughly 5% work one to three hours a day.

Regarding the number of days that dentists work a week, we see that the great majority of them work (4-6) days. It is noteworthy that around 63% of dentists who participate in the study treat patients while seated, and 53% of them occasionally engage in physical activity.

		N.	%	P-value
How many patients you have seen per day?	1 - 4	25	23.8	0.042*
	5 - 9	46	43.8	
	+10	34	32.4	
How many hours do you work per day?	1 - 3H	5	4.8	0.000**
	4 - 6H	27	25.7	
	+6H	73	69.5	
How many days do you work per week?	1 - 3	3	2.9	0.000**
	4 - 6	94	89.5	
	+6	8	7.6	
Are you used to working standing or sitting while providing dental treatment?	Standing	33	31.4	0.000**
	Sitting	72	68.6	
Are you doing daily exercises?	Always	13	12.4	0.000**
	Sometimes	56	53.3	
	Rare	36	34.3	

Table 2: Displays the distribution of participants by the number of patients treated daily, the number of working hours worked, the number of working days in a week, the treatment environment, and the amount of exercise each day.

Chi-squared test: **Significant at 0.01.

The distribution of participants is displayed in the following table based on a number of factors, including the presence of MSD pain prior to entering the dental field, lower back, neck, and shoulder pain during the past year, whether or not these pains have caused a decrease in activity, and whether or not they are currently taking medication for these pains. The majority of participants reported no MSD discomfort, while 72% reported low back pain, 73% reported neck pain, and 71% reported other types of pain in the previous 12 months. In the past year, 74% of people with shoulder discomfort do not take medicine for back pain, and 57% of people think that back pain limits activity.

	Yes		No		P-value
	N.	%	N.	%	
Did you have any MSD Pain before joining the dental profession?	19	18.1	86	81.9	0.000**
Did you feel any lower back pain in the last 12 months?	76	72.4	29	27.6	0.000**
Did you feel any neck pain in the last 12 months?	77	73.3	28	26.7	0.000**
Did you feel any shoulder pain in the last 12 months?	74	70.5	31	29.5	0.000**
Did MSD pain Cause a reduction in activity?	60	57.1	45	42.9	0.143
Are you on medication for this pain?	27	25.7	78	74.3	0.000**

Table 3: Demonstrates the distribution of participants based on the following factors: whether or not they experienced MSD pain prior to entering the dental field; whether or not they experienced lower back pain, neck pain, shoulder pain, or both in the past year; whether or not MSD pain led to a decrease in activity; and whether or not they were taking medication for this pain.

Chi-squared test: **Significant at 0.01.

Variable Yes		Did you feel any lower back pain in the last 12 months?		P-value
		No		
Gender	Male	13	6	.670
	Female	63	23	
Age	24 - 34Y	54	20	.818
	35 - 44Y	19	7	
	+45Y	3	2	
BMI	20 - 25	39	18	.323
	More than 25	37	11	
Experience in the dental profession	1 - 4Y	26	10	.842
	5 - 9Y	25	11	
	+10Y	25	8	
How many hours do you work per day	1 - 3H	4	1	.206
	4 - 6H	16	11	
	+6H	56	17	
How many patients you have seen per day?	1 - 4	19	6	.832
	5 - 9	32	14	
	+10	25	9	
Are you used to working standing or sitting while providing dental treatment	Standing	26	7	.320
	Sitting	50	22	

Table 4: The connection between lower back discomfort and (Gender, age, BMI, experience, working hours, number of patients, and method of treatment).

Relationships test

The above table leads us to the conclusion that there is no correlation between lower back discomfort and any of the following factors: gender, age, BMI, years of dental experience, working hours, daily patient volume, and treatment modality.

Variable Yes		Did you feel any neck pain in the last 12 months?		P-value
		No		
Gender	Male	12	7	.268
	Female	65	21	
Age	24 - 34Y	55	19	.218
	35 - 44Y	20	6	
	+45Y	2	3	
BMI	20 - 25	43	14	.595
	More than 25	34	14	

Experience in the dental profession	1 - 4Y	26	10	.961
	5 - 9Y	27	9	
	+10Y	24	9	
How many hours do you work per day	1 - 3H	5	0	.178
	4 - 6H	17	10	
	+6H	55	18	
How many patients you have seen per day?	1 - 4	19	6	.927
	5 - 9	33	13	
	+10	25	9	
Are you used to working standing or sitting while providing dental treatment	Standing	25	8	.704
	Sitting	52	20	

Table 5: The connection between headaches and (gender, age, BMI, experience, working hours, number of patients, and method of treatment).

Based on the previous table, we can conclude that there is no correlation between neck discomfort and age, gender, BMI, years of dental experience, number of patients treated daily, working hours, or treatment type.

Variable	Yes	Did you feel any shoulder pain in the last 12 months?		P-value
		No		
Gender	Male	10	9	.060
	Female	64	22	
Age	24 - 34Y	52	22	.252
	35 - 44Y	20	6	
	+45Y	2	3	
BMI	20 - 25	43	14	.224
	More than 25	31	17	
Experience in the dental profession	1 - 4Y	22	14	.314
	5 - 9Y	27	9	
	+10Y	25	8	
How many hours do you work per day	1 - 3H	4	1	.140
	4 - 6H	15	12	
	+6H	55	18	
How many patients you have seen per day?	1 - 4	15	10	.421
	5 - 9	34	12	
	+10	25	9	
Are you used to working standing or sitting while providing dental treatment	Standing	25	8	.422
	Sitting	49	23	

Table 6: The connection between shoulder discomfort and (gender, age, BMI, experience, working hours, number of patients, and method of treatment).

The preceding table leads us to the conclusion that shoulder pain is unrelated to gender, age, BMI, years of dental experience, working hours, the number of patients treated each day, or the type of treatment used.

Discussion

Employees in the dentistry field frequently have MSD pain, which is made more likely by a number of causes. Compared to other professions, dental professionals have a higher risk of developing motor skill disorders (MSDs) because of their continuous use of static postures and accurate hand and wrist movements [7,8]. According to B. and K. Valachi [6], almost 80% of dentists in America reported having neck, shoulder, and lower back pain. The current study, which concentrated on dental staff members engaged in dental work, demonstrates the high frequency of musculoskeletal complaints among them during the course of the preceding year in Abha, Saudi Arabia. The age group of 24 to 34 years old made up the highest proportion of the study's respondents, who were primarily female. The neck (73.3 percent, n = 77), lower back (72.4 percent, n = 76), and shoulders (70.5 percent, n = 74) were the most often affected body areas in the current study. The prevalence statistics from this study were similar to those from a study on MSD among dentists in the Ha'il Region, with lower back rates (73.5%) being higher than those for the neck (66%) and shoulders (43.3%) [19]. The current study's lower back pain prevalence (72%) was lower than what Saudi Arabian dentists had reported (79.1 percent) [15] but more than a Taiwanese survey (66 percent). Nine (59%) Danish, ten (58.4%) Brazilian, eleven (Eleven), and eighteen (53.7%) Australian dentists in Denmark (65%) and Saudi Arabia (63.7%) reported lower 12-month prevalence rates of neck-related discomfort than dental staff in Abha (73%), although Taiwanese dentists' reports were comparable (72 percent) [10]. After data from the current study's prevalence of shoulder pain (70.5 percent) were analyzed, it was discovered that Taiwanese (75 percent) In Brazil, reports of nine or more (40 percent) [11] research has indicated that the symptoms of multiple sclerosis (MSD) worsen with age as senior dentists see more patients and finally develop complex pain [17]. Furthermore, younger dentists are mostly practicing general dentistry or doing postgraduate study, which puts them under more strain, whereas senior dentists are more specialized and see fewer patients. Previous research has shown that dentists with less training and experience were more likely to report shoulder, back, and neck MSDs. According to a study conducted on Thai dentists, those with less experience had a higher likelihood of experiencing musculoskeletal pain compared to those with more experience [14]. Furthermore, a study conducted in 2007 by Leggat., *et al.* reported that age was a major predictor of back pain. They observed that among dentists who were younger [30], back pain was more common. This may be related to the younger dentists' lack of work experience and insufficient understanding of dental treatments. This was not noted in the Saudi Arabian dental staff research conducted in Abha. Nevertheless, the frequency of symptoms and age did not correlate in the Leggat., *et al.* (2007) investigation. This aligns with the Alberta study that found no correlation between age [29] and back discomfort. It might be fair to presume in this instance that the dental staff members, both younger and older, suffer from the same kinds of postural issues. The current study's findings regarding the lack of a correlation between gender and MSD pain were consistent with those of Al Wazzan., *et al.* (2001) [15] and Shrestha., *et al.* (2008) [20]. In contrast, a study by Abduljabbar, T. A. (2008) found that, compared to their male colleagues, female dentists experienced pain, headaches, and weakness far more frequently. Males often have a higher threshold of tolerance than females, which could help to explain this [33]. Although over half of the participants in this study were overweight or obese, BMI was not found to be a major risk factor (45.7 percent). Samat., *et al.*'s study included [24] similar findings showed that, despite the lack of a substantial correlation between pain and BMI, maintaining a healthy weight is essential for dental staff members' general health because carrying more weight puts more strain on their back muscles and may be the root of any ensuing pain. BMI should not be disregarded as a risk factor for MSD, even though there was no link found in this study between BMI and MSD. On the other hand, a study conducted on dental students in Norway by Heuch., *et al.* (2010) found a strong correlation between a high BMI and a higher prevalence of low back pain. Being overweight puts a lot of strain on the muscles, which accelerates the onset of working fatigue [32]. Exercises from physiotherapy and medical care are crucial in the management of such MSD discomfort. The percentage of staff members who sought medication for pain related to multiple sclerosis (25.7%) was lower than what was found in research conducted on dental staff members in Saudi Arabia (37 percent) [15] and 37.5% in a different study conducted in Queensland, Australia [16]. This shows that dental staff members' MSD discomfort is not very bad.

Seventy-four percent of the 105 study participants had never sought medical attention for pain connected to their jobs, indicating a lack of knowledge on their part. Early pain ignorance, along with ongoing exposure to aggravating stimuli, is what turns mild to moderate pain into severe, incapacitating pain. Frequent exercise has been shown to be beneficial in both avoiding and treating discomfort from dental procedures [20]. According to this study, most dental staff members did not engage in particular exercises designed to prevent or reduce shoulder, neck, and back pain. According to Harutunian., *et al.* aerobic exercise helps with weight loss, strengthens the torso, and lessens the perception of discomfort [21]. Muscle stretches can also help with back pain relief. Exercises that relax muscles and rest were found to be effective in relieving pain; on the other hand, inactivity was discovered to be closely linked to back pain. However, Szymanska's study could not discover any conclusive link between discomfort and physical exercise [23]. The high frequency of shoulder, back, and neck pain seen in this study and different working postures are unrelated. Thirty-one percent of these workers worked while standing, compared to Szymanska's finding of 27.6 percent and Marklin and Cherney's equivalent result of 78 percent of workers working when seated. The preferred practicing position for the dentists in the Polat., *et al.* study was standing (only 11.7 percent used the sitting position while working) [27]. It is advised that dental staff members take on a variety of roles while working. They ought to switch off between sitting and standing. By doing this, one allows one set of muscles to alternate and relax the other set of muscles. Furthermore, Moradia and Patel observed that prolonged sitting or standing was the element that exacerbated the pain the most [28] health promotion initiatives should also be implemented among dental professionals and postgraduate students in order to reduce MSD pain issues. Daily exercise, regular breaks, switching between sitting and standing, and frequent muscle stretching should also be incorporated into the work plan. These techniques should be known by professors and staff and set as a policy to lessen the ongoing problems and encourage healthy behaviors throughout the school. It helps prevent repetitive injuries by increasing the activity of the problematic muscles.

Conclusion

According to this study, MSDs are regarded as a serious occupational health issue for dental staff members in Abha City. The most prevalent complaint is neck pain, which is followed in frequency by back and shoulder pain. All of these complaints are typically minor, and very few people have sought medical assistance for them. Regarding musculoskeletal problems, there was no discernible difference between male and female employees, nor was there a relationship with experience, exercise, or BMI. More studies are now needed to clarify the effects of MSD on dental staff members in greater detail, particularly with regard to the suspension or limitation of clinical practice. They also need to uncover specific risk factors and practical ways to lower MSD among dental staff members.

Recommendation

More research is required in Saudi Arabia to determine the prevalence of MSD on a national scale, to include all dental professionals in the survey, to pinpoint specific risk factors, and to determine practical ways to lower MSD in them. In order to avoid MSD, research on clinical training at Saudi Arabian dentistry institutions should be carried out to enhance instruction and clinical supervision.

Supplements

Dentistry's questionnaire of musculoskeletal disorders

Dental professionals are particularly vulnerable to musculoskeletal disorders (MSDs), which are defined as discomfort or injuries affecting any part of the human musculoskeletal system, including the joints, ligaments, muscles, tendons, nerves, and supporting structures of the neck, back, and limbs. Please respond to the following inquiries in relation to this:

1. Type of institution you are working at:		
Governmental	Private	Student
2. Specialty:		
Dentist	Specialty:	
Others	Specialty:	
3. Gender:		
Male	Female	
4. Age:		
24 - 34Y	35 - 44Y	+45Y
5. Marital status:		
Single	Married	
6. BMI (Body Mass Index):		
20 - 25	More than 25	
7. Experience in dental profession:		
1 - 4Y	5 - 9Y	+10Y
8. How many patients you have seen per day?		
1 - 4	5 - 9	+10
9. How many hours you work per day?		
1 - 3H	4 - 6H	+6H
10. How many days you work per week?		
1 - 3	4 - 6	+6
11. Did you have any MSD Pain before joining dental profession?		
Yes	No	
12. Did you feel any lower back pain in last 12 months?		
Yes	No	
13. Did you feel any neck pain in last 12 months?		
Yes	No	
14. Did you feel any shoulder pain in last 12 months?		
Yes	No	
15. Did MSD pain Cause a reduction in activity?		
Yes	No	
16. Are you on medication for this pain?		
Yes	No	
17. Are you used to work standing or sitting during providing dental treatment?		
Standing	Sitting	
18. Are you doing daily exercises?		
Always	Sometimes	Rare

Table

Bibliography

1. Szeluga R. "A survey of work-related musculoskeletal complaints among dental hygienists in Kentucky (unpublished manuscript)". Lexington, KY (2002): 1-7.
2. Diaz-Cabellero A., et al. "Ergonomic factors that cause the presence of pain muscle in students of dentistry". *Medicina Oral, Patologia Oral, Cirugia Bucal* 15.6 (2010): e906-e911.
3. Valachi B and Valachi K. "Mechanism leading to musculoskeletal disorder in clinical dentistry. Strategies to address the mechanisms leading to musculoskeletal disorders". *Journal of the American Dental Association* 134.10 (2003): 1604-1612.
4. Samat RA., et al. "Prevalence and associated factors of back pain among dental personnel in North-Eastern State of Malaysia". *International Journal of Collaborative Research on Internal Medicine and Public Health* 3.7 (2011)]
5. L Finsen., et al. "Musculoskeletal disorders among dentists and variation in dental work". *Applied Ergonomics* 29.2 (1998): 119-125.
6. B Valachi and K Valachi. "Mechanisms leading to musculoskeletal disorders in dentistry". *Journal of the American Dental Association* 134.10 (2003): 1344-1350.
7. Alexandre PC., et al. "Musculoskeletal disorders among Brazilian dentists". *Archives of Environmental and Occupational Health* 66.4 (2011): 231-235.
8. Rambabu T and Suneetha K. "Prevalence of work related musculoskeletal disorders among physicians, surgeons and dentists: a comparative study". *Annals of Medical and Health Science Research* 4.4 (2014): 578-582.
9. Lin TH., et al. "Prevalence of and risk factors for musculoskeletal complaints among Taiwanese dentists". *Journal of Dental Sciences* 7.1 (2012): 65-71.
10. Finsen L., et al. "Musculoskeletal disorders among dentists and variation in dental work". *Applied Ergonomics* 29 (1998): 119-125.
11. Oliveira Dantas FF and de Lima KC. "The relationship between physical load and musculoskeletal complaints among Brazilian dentists". *Applied Ergonomics* 47 (2015): 93-98.
12. Aljanakh M., et al. "Prevalence of musculoskeletal disorders among dentists in the Haâ [euro](TM) il Region of Saudi Arabia". *Annals of Saudi Medicine* 35.6 (2015): 456-461.
13. Jacobsen N., et al. "Occupational health complaints and adverse patient reactions as perceived by personnel in public dentistry". *Community Dentistry and Oral Epidemiology* 19.3 (1991): 155-159.
14. Chowanadisai S., et al. "Occupational health problems of dentists in southern Thailand". *International Dental Journal* 50.1 (2000): 36-40.
15. Al Wazzan KA., et al. "Back and neck problems among dentists and dental auxiliaries". *Journal of Contemporary Dental Practice* 2.3 (2001): 17-30.
16. Leggat PA and Smith DR. "Musculoskeletal disorders self-reported by dentists in Queensland, Australia". *Australian Dental Journal* 51.4 (2006): 324-327.
17. Soares JFF., et al. "Age and musculoskeletal pain". *International Journal of Behavioral Medicine* 10.2 (2003): 181-190.
18. Leggat PA and Smith DR. "Musculoskeletal disorders self-reported by dentists in Queensland, Australia". *Australian Dental Journal* 51.4 (2006): 324-327.

19. Aljanakh M., *et al.* "Prevalence of musculoskeletal disorders among dentists in the Haâ [euro](TM) il Region of Saudi Arabia". *Annals of Saudi Medicine* 35.6 (2015): 456-461.
20. Shrestha BP, *et al.* "Work related complaints among dentists". *Journal of Nepal Medical Association* 47.170 (2008): 77-81.
21. Harutunian K., *et al.* "Ergonomics or musculoskeletal pain among postgraduate students and faculty members of the School of Dentistry of the University of Barcelona (Spain). A cross sectional study". *Medicina Oral, Patologia Oral, Cirugia Bucal* 16.3 (2011): e425-e429.
22. Hayes MD, *et al.* "A systematic review of musculoskeletal disorders among dental professionals". *International Journal of Dental Hygiene* 7.3 (2009): 159-165.
23. Szymanska S. "Disorders of the musculoskeletal system among dentists from the aspect of ergonomics and prophylaxis". *Annals of Agricultural and Environmental Medicine* 9.2 (2002): 169-173.
24. Samat AR, *et al.* "Prevalence and associated factors of back pain among dental personnel in the north eastern state of Malaysia". *International Journal of Collaborative Research on Internal Medicine and Public Health* 3.7 (2011): 576-586.
25. Szymanska S. "Disorders of the musculoskeletal system among dentists from the aspect of ergonomics and prophylaxis". *Annals of Agricultural and Environmental Medicine* 9.2 (2002): 169-173.
26. Marklin RW and Cherney K. "Working postures of dentists and dental hygienists". *California Dental Association Journal* 33.2 (2005): 133-136.
27. Polat Z., *et al.* "Musculoskeletal symptoms of dentists from South - East Turkey". *Biotechnology and Biotechnological Equipment* 21.1 (2007): 86-90.
28. Moradia S and Patel P. "A study on occupational pain among dentists of Surat City". *National Journal of Community Medicine* 2.1 (2011): 116-118.
29. Newell TM and Kumar S. "Prevalence of musculoskeletal disorders among orthodontists in Alberta". *International Journal of Industrial Ergonomics* 33.2 (2004): 99-107.
30. Leggat PA., *et al.* "Occupational health problems in modern dentistry". *Industrial Health* 45.5 (2007): 611-621.
31. Heuch I, *et al.* "The impact of body mass index on the prevalence of low back pain". *Spine* 35.7 (2010): 764-768.
32. Polat Z., *et al.* "Musculoskeletal Symptoms of Dentists From South East Turkey". *Biotechnology and Biotechnological Equipment* 21.70 (2007): 86-90.
33. Abduljabbar TA. "Musculoskeletal disorders among dentists in Saudi Arabia". *Pakistan Oral and Dental Journal* 28.1 (2008): 135-144.]

Volume 23 Issue 1 January 2024

©All rights reserved by Yahya Alogaibi., et al.