

Prevalence of Musculoskeletal Symptoms Among Dental Students in United Arab Emirates

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Research article

Keywords: dental students, musculoskeletal pain, occupational health

Posted Date: July 29th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-42573/v1>

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Version of Record: A version of this preprint was published on January 6th, 2021. See the published version at <https://doi.org/10.1186/s12891-020-03887-x>.

Abstract

Background

The main purpose of this study was to assess the prevalence of neck, shoulder, and low-back pains and to explore factors associated with musculoskeletal pain (MSP) among dental students at Ajman University and Ras Al Khaimah College of Dental Sciences in United Arab Emirates (UAE).

Method

This cross-sectional study was conducted among dental students using an online questionnaire; which was a modified version of the Standardized Nordic questionnaire, focused on neck, shoulder and low-back pain in the past week and the past year.

Results

Two hundred and two students responded to the questionnaire out of 368. The prevalence of MSP in at least one body site in the past week, and in the past year was 48.5% and 68.3% respectively. Factors significantly associated with MSP in at least one body site at any time were having history of trauma ($P=0.009$), exercise ($P=0.001$), being in the clinic for longer time ($P=0.000$), and BMI ($P=0.010$).

Conclusion

MSP among dental students in the UAE is high, particularly among those with history of trauma, not physically active, spending longer hours in the clinic, and those with higher Body Mass Index (BMI). Careful attention is required by the dental colleges to increase students' awareness towards this problem.

Background

The musculoskeletal health of dental professionals has been the subject of numerous studies world-wide, and their focus has been on the pain experienced by the practitioner.¹ A recent review conducted by Moodley and co-workers² demonstrated that most common sites for musculoskeletal pain were the neck, lower-back and shoulders. The prevalence of dentists' discomfort in the neck, shoulder, and lower-back as suggested in many studies conducted around the world ranged from 64 to 93%.³ Thus, work related musculoskeletal disorder (MSD) is common occupational hazard among dentist.

The nature of dental work with repetitive movement, long-term work and awkward static postures, all add up to suffering a musculoskeletal problems among dentists.¹ The costs of these problems are substantial, both in terms of money and in terms of work time lost;⁴ it may result in lower work productivity and adversely effect on the quality of work, efficiency, leading to shorten working lifespan, it

might lead to occupational disability which constitute a major health challenge for individual and healthcare system around the world.^{5,6} A study conducted by Oberg⁷ found that the loss of income for dentistry profession due to musculoskeletal pain to be greater than \$40 million. Long term MSDs could affect quality of life. Therefore, identifying factors associated with musculoskeletal problems in the dental workplace is of high importance.⁸

Various studies have been done to record self-perceived health and health-related behaviors of dental students in other countries,^{9,10} but little is known about the health of dental students in the United Arab Emirates (UAE). Currently only one study investigated the occupational health problems among dentists in the UAE; conducted by Al-Ali and Hashim,¹¹ which demonstrated that musculoskeletal disorders were the most common (68%) occupational health problem.

This study was aimed to determine the prevalence and nature of occupational-related musculoskeletal pain (MSP) and to explore factors associated with MSP among undergraduates dental students in two main dental colleges in the United Arab Emirates.

Methods

This study was conducted among undergraduate dental students in two main dental colleges in the United Arab Emirates namely: Ajman University (AU) and Ras Al- Khaimah College of Dental Sciences (RAKCODS) during the period from October 2019 to February 2020. Only dental students on their clinical stage of practice were invited to participate. The ethics committee of both universities approved the current cross-sectional study. Prior to conducting the study, the students were informed that their participation was voluntary and that refusing to participate would not affect their grades. No identifying information was gathered.

This study used an online self-administrated questionnaire in English language on software from Microsoft Forms. The questionnaire used was a modified version of the standardized Nodic Questionnaire,¹² and was previously validated by other researchers.^{13,14} The questionnaire was composed of four parts; the first part included questions related to socio-demographic data namely, gender. The second part included questions on the risk factors, such as history of physical trauma, family history of musculoskeletal disorders, exercise, caffeine consumption, the period of time spent in the clinic each day and smoking. While the third part included questions related to occurrence of pain in the neck, shoulders, and low-back during the previous seven days and the previous twelve months. Furthermore, the participants were asked questions regarding their height, weight, and number of hours in which students study or use computer, in order to assess their physical activity level.

The questionnaire was pre-tested on 18 students before the commencement of the study to ensure that all of the questions are directly understood by the students. The pre-testing showed a very good understanding to the provided questions. The web link of the questionnaire was distributed to all dental students in their clinical stage of practice through their batch's email addresses with a covering letter to

explain the purpose of the study, and to assure all participants of the anonymity of their responses. The average time to complete the survey was approximately five minutes. All the data entered into the Microsoft Excel, and then transferred into SPSS windows version 22.0 (SPSS Inc., Chicago, IL, USA). Descriptive analysis was conducted to obtain the frequencies, mean, standard deviation and median. The frequency and percentage of the MSP in the past week and in the past year for the neck, shoulder and back was obtained. Chi square test was conducted to obtain the crude odds ratio and 95% confidence interval.

Results

In this cross-sectional study questionnaires were completed by two hundred and two dental students out of 368 from both colleges (AU and RAKCODS), with a total response rate of 55%. Missing data were excluded from the analysis. The majority of the students were females (75.2%). Most of the students (80.2%) had no history of trauma to the neck, shoulders, or lower back. Similarly, more than three-quarter of the participants (84.7%) had no family history of MSD. Around two-third (64.9%) of the students exercise regularly, consumption of coffee was common among more than three-quarter of the participants (76.7%). The majority of the students (73.3%) spent 4 hours per day in the clinics, one-fifth (18.8%) of the participants used tobacco, mean height (\pm SD) and weight (\pm SD) was 165 cm (\pm 8.8), 66.5 kg (\pm 14.4) respectively. Sociodemographic data are shown in Table 1.

The prevalence of MSP -in at least one body site- was (48.5%) in the past week and (68.3%) in the previous year. The prevalence of low-back pain was the highest in the previous week, and in the previous year (38.6%, 61.4% respectively). While the prevalence of neck pain was (28.7%) in the past week, and (52.5%) in the previous year. Shoulder pain was the least experienced in the previous week, and in the previous year (23.3%, 44.1% respectively) as illustrated in Table 2.

The overall prevalence of MSP regardless of the time of occurrence was not significantly associated with gender (OR 1.19, 95% CI 0.62–2.29, $P=0.608$). History of trauma was significantly associated with any MSP at any time. Family history of trauma was not significantly associated with MSP ($P=0.212$). There was a significant association between exercise and the prevalence of MSP ($P=0.001$), those who exercise regularly experienced less MSP. The consumption of caffeine was not significantly associated with MSP ($P=0.932$). While, the duration of time spent in the clinics each day was significant association with MSP ($P=0.000$). Similarly the body mass index (BMI) was significantly associated with MSP ($P=0.010$). There was no significant association between smoking ($P=0.311$) or the duration of study ($P=0.451$) or computer use ($P=0.420$) as illustrated in Table 3.

Discussion

This cross sectional study examined the prevalence of, and some factors associated with MSDs among dental students, by means of an online questionnaire. To our knowledge, this is the first study to report on MSDs among dental students in UAE. The main limitation of this type of research is that participant's

answers may not reflect their actual actions; which may possibly introduce some level of response bias. Nevertheless, this bias was limited as much as possible by utilizing a survey proven to be valid and reliable tool for measuring the prevalence of MSDs.¹⁵ Additionally, only two dental colleges in the UAE out of four were included, this might have an impact on the generalizability of the findings. In this study, the dental students were asked to note the occurrence of musculoskeletal pain over the past 12 months, and the previous 7 days. The pain intensity and frequency were not evaluated in this study.

The results of this study showed that (68.3%) of the students reported symptoms of musculoskeletal disorders on the last year. This percentage is comparatively lower than studies reported by Khan and Chew,⁹ and Rabiei with his team;¹⁶ and higher than other studies reported by Marshall and his team,¹⁷ and Ahmadi Motemayel and her team.¹⁸ While similar percentage was reported by Finsen and co-workers,¹⁹ and Al-Ali and Hashim¹¹ who found that the prevalence of musculoskeletal pain in the past 12 months was (68.9%) and (68.0%) respectively. In the current study, only dental students on their clinical stage of practice were recruited, that might explain the high prevalence of MSP among them due to the work posture of clinical-year's students.

Low-back pain occurrence in the past 12 months was the highest as stated by more than half of the students, whereas the incidence of pain in this region in the past 7 days was reported by more than one third. The high level of back pain might be due to holding a static load for long period of time, which in return might create more strain on dentists' spine while delivering the dental care.² This clearly indicates that there is not adequate support of the lumbar region when students rest on the dental stool and in fact ergonomic principles are underestimated. Therefore, adequate support of the lumbar region is very critical since it helps preserve the lumbar curve. As a result, muscle activity, disc pressure, in addition to the back and leg pain will be decreased.²⁰

The neck pain in the past 12 months with prevalence of (52.5%) was the second most common reported anatomical region. This result supports the findings of similar previous studies in other countries like the findings of Al Wazzan and co-workers,²¹ and Varmazyar and co-workers,²² who suggested that pain were mainly localized in the back and in the neck. The substantial prevalence of pain in the neck in this study could be associated with repetitive work performed with a flexed neck and elevated and abducted arms.²³ Even with their very short clinical experience, the high prevalence among undergraduate students suggests that the progression and deterioration of MSDs starts from the very beginning of the dentists' career life.²⁰ Therefore, practicing dentistry while maintaining a proper working posture cannot be underestimated as it greatly reduces the risk of work-related musculoskeletal disorders.

According to this research, it is crucial to implement ergonomic rules in the clinics in order to adapt the students to the correct working position. Some examples of dental ergonomics are modifying the patient's chair accordingly when working on different quadrants, keeping the instruments and the materials within a short distance for easy access, sitting straight with feet touching the floor, keeping the elbows below the level of the shoulders. These precautions reduce the fatigue and probability of

developing MSDs.⁹ If not taken seriously, students will develop serious symptoms overtime which will interfere with their career negatively.

In this study, there were no statistically significant relation between gender, family history with trauma and MSP, which contradicts the findings of previous study conducted by Waersted and co-workers.²⁴ The significant association between history of trauma and MSP in the current study is understandable. Individuals who experienced a traumatic injury to the neck, shoulder and lower-back were at risk to develop MSP.²⁵ The insignificant association between other variables such as coffee consumption, exposure to smoking, and the use of computer is in agreement with Algarni and co-workers.²⁵

Self-awareness and benefits of regular exercise are the needs of the hour. Around one-fifth of the participants do not exercise at all. This behavior might be a direct cause of MSP being more prevalent among clinical-years' students in this study. This finding was also supported by Hashim and Al-Ali²⁶ who suggested that most of the dentists did not find as much time as they would like for exercise. According to a research done by de Carvalho and co-workers,²⁷ which showed that regular exercise can help prevent work related musculoskeletal disorders and those who participate in any kind of sports activity experience less severe symptoms compared to those who are not physically active. Regular exercise may provide dental students with the required break from their heavy workload, which will recharge and strengthen their bodies. It will also provide mental relaxation from high psychosocial demands of the job.²³ These effects probably interact to contribute to a better health status and in return will decrease the risk of MSP.²⁸

According to this study, the time spent in the clinic significantly related to experiencing musculoskeletal problems, which is in accordance with previous studies conducted among dental professionals.^{3,21,29,30} This might be attributed the fact that dentistry demands high level of precision and it is often preferred with the arms unsupported and the cervical spine rotated and flexed forward.³¹ Additionally, holding static load for long duration may cause symptoms associated with the mask system.³² In a study carried out by Melis and co-workers,³³ data suggest that MSD is prevalent in dental students of Italy as quickly as they start their clinical practice in the clinics. For this reason, it is highly recommended to educate the students about ergonomics throughout their clinical training periods in order to avoid the complications of MSD.³³

The results of this study suggested a significant relationship between BMI and the prevalence of MSP, and this is consistent with the findings of Ahmadi Motemayel and co-workers,¹⁸ and Betterworth and co-workers.³⁴ It's worth noting that work related musculoskeletal disorders not only have negative psychological and social outcomes but also can become very extreme to the point that it is going to have a direct effect on work capacity and might even lead to an early job retirement.²⁷ As a result, the evaluation of dental students' knowledge about work related musculoskeletal disorders is very crucial.

Conclusion

The present study indicates that the prevalence of MSP in the previous year is high among undergraduate dental students, particularly those with history of trauma, less physical activity, long hours of clinical sessions and higher BMI. This problem is of a particular concern; therefore, careful attention is required by dental colleges to increase students' awareness of MSDs; exercise and weight reduction should receive special attention. Further continuing education and investigation of appropriate interventions to reduce this problem is needed.

Abbreviations

AU	Ajman University
BMI	Body Mass Index
MSD	Musculoskeletal Disorder
MSP	Musculoskeletal Pain
<i>P</i>	Probability value
RAKCODS	Ras Al- Khaimah College of Dental Sciences
SD	Standard Deviation
SPSS	Statistical Product and Service Solutions
UAE	United Arab Emirates

Declarations

Ethics approval and consent to participate:

The authors confirm that this research has been conducted in full accordance with the World Medical Association Declaration of Helsinki. The current study was approved by the ethics committee of Ajman University (AU) and Ras Al- Khaimah College of Dental Sciences (RAKCODS). Written informed consent was obtained from all participants included in the study, and the anonymity of the participants was ensured.

Consent for publication: Not applicable.

Availability of data:

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests:

The authors declare that they have no conflict of interest with respect to the submitted work.

Funding: This study was not supported or funded by any research grants.

Authors' contribution:

RH and AS have made substantial contributions to conception and design of the study, analysis and interpretation of data; in addition to revising the manuscript critically. FM and SH have made substantial contributions to the collection of data; and was involved in designing the questionnaire and drafting the final manuscript. All authors has read and approved the manuscript.

Acknowledgements

The authors would like to acknowledge all the undergraduate students participated in this study. This study was not supported or funded by any research grants.

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Tables

Table-1 Demographic characteristics of participants (N = 202).

Variables	N	%
Gender		
Male	50	24.8
Female	152	75.2
History of trauma in the neck, shoulder, lower-back		
Yes	40	19.8
No	162	80.2
Family History of MSD		
Yes	39	19.3
No	163	80.7
Exercise		
Regular	131	64.9
Occasional	34	16.8
Not at all	37	18.3
Coffee Consumption		
< 3 cups / week	65	32.1
> 3 cups / week	90	44.6
Not at all	47	23.3
Duration of clinical session / day		
2 hours	18	8.9
4 hours	148	73.3
8 hours	36	17.8
Smoking		
Yes	38	18.8
No	164	81.2
	Mean (SD)	
Height	165	(8.8)
Weight	66.5	(14.4)

Hours of computer use / day	3.7	(2.1)
Hours of study / day	3.3	(2.0)

Table-2 Prevalence of MSP during the past week and past 12 months (N = 202).

Body site	Prevalence of MSP during the past week		Prevalence of MSP during the past 12 months	
	N	%	N	%
Neck pain				
Yes	58	28.7	106	52.5
No	144	71.3	96	47.5
Shoulder pain				
Yes	47	23.3	89	44.1
No	155	76.7	113	55.9
Low-back pain				
Yes	78	38.6	124	61.4
No	119	58.9	76	37.6
Over all (at least one site)	98	48.5	138	68.3

Table-3 Factors associated with MSP in at least one body site at any time.

Variables	Yes	(%)	No	(%)	OR (95% CI)	P-value
Gender						
Male	31	(62.0)	19	(38.0)		
Female	88	(57.9)	64	(42.1)	1.19 (0.62-2.29)	0.608
History of trauma in the neck, shoulder, lower-back						
Yes	27	(67.5)	13	(32.5)		
No	72	(44.4)	90	(55.6)	2.60 (1.25-5.39)	0.009
Family History of MSD						
Yes	23	(59.0)	16	(41.0)		
No	78	(47.9)	85	(52.1)	1.57 (0.77-3.18)	0.212
Exercise						
Regular	84	(64.1)	47	(35.9)		
Occasional	15	(44.1)	19	(55.9)		
Not at all	12	(32.4)	25	(67.6)		0.001
Coffee Consumption						
< 3 cups / week	34	(52.3)	31	(47.7)		
> 3 cups / week	45	(50.0)	45	(50.0)		
Not at all	23	(48.9)	24	(51.1)		0.932
Duration of clinical session / day						
2 hours	6	(33.3)	12	(66.7)		
4 hours	112	(75.7)	36	(24.3)		
8 hours	32	(88.9)	4	(11.1)		0.000
Smoking						
Yes	22	(57.9)	16	(42.1)		
No	80	(48.8)	84	(51.2)	1.44 (0.71-2.95)	0.311
		Yes (Median, IQR)		No (Median, IQR)		
Body Mass Index	126	(24.3, 4.9)	76	(23.0, 5.5)		0.010
Hours of computer use / day	126	(3.0, 3.0)	76	(4.0, 3.0)		0.420

Hours of study / day	126 (3.0, 3.0)	76 (3.0, 2.0)	0.451

Supplementary Files

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