

Saudi Dental Graduates Educational Experiences and Awareness about Work-Related Musculoskeletal Disorders Prevention

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ABSTRACT

Introduction: The prevalence of work-related musculoskeletal disorders (MSDs) is high among dental professionals. Early training on MSDs prevention during undergraduate studies could mitigate the incidence of work-related MSDs among dental practitioners.

Aim: This study aimed to shed light on the awareness of Saudi dental graduates regarding work-related MSDs and their prevention as well as the education received regarding this topic during undergraduate dental training. **Methods:** A cross-sectional online survey was carried out among all dental interns who graduated from dental schools in Saudi Arabia in 2019. Through the survey, data about participants' demographics, previous education on work-related MSDs prevention, and awareness levels on work-related MSDs and their prevention were obtained.

Results: 889 dental interns were enrolled in this study. Only 343 (40%) reported having received training on work-related MSDs prevention during undergraduate studies. Most participants were aware that work-related musculoskeletal disorders might affect dental professionals 629 (73%). However, almost half of them (45.3%) reported a lack of awareness of the possible work-related MSDs preventive techniques, and 64% reported a lack of awareness of the available treatments for work-related MSDs. Three in every four respondents (73.4%) recognized that undergraduate education should dedicate more time to educating dental students about work-related MSDs prevention.

Conclusion: Our study showed that education about work-related MSDs prevention provided for dental students in Saudi Arabia is still suboptimal. MSDs prevention-focused curricular changes are necessary to enable future dental professionals to prevent and manage work-related MSDs more effectively.

Key words: Dental students, Dentists, Occupational health, Ergonomics, Dental education

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INTRODUCTION

Dental professionals are especially vulnerable to work-related musculoskeletal disorders (MSDs). According to previous studies, musculoskeletal disorders can affect up to 9 in every 10 dental professionals at some point in their careers [1].

There is compelling evidence demonstrating that MSDs can promote the restriction of movements, cause disability, reduce work performance, and contribute to the early retirement of dental specialists [2]. Although recent clinical trials have investigated interventions to reduce MSDs among oral health professionals [3], contemporary epidemiological studies conducted in China [4], Europe [5], the US [6], and Saudi Arabia [7,8] have not shown evidence of any trend towards a decrease in the

prevalence of musculoskeletal disorders among dental practitioners.

While MSDs are multifactorial, workload and poor ergonomics have been considered the leading factors for MSDs among dentists. For example, Zarra and Lambrianidis reported a dose-response effect among Greek endodontists, with professionals who treated 6-8 patients per day having a chance of MSDs approximately 4 times higher than those seeing fewer than 6 patients per day [5]. In addition, Sio et al. performed an umbrella review and demonstrated that adopting awkward body postures and deviations from a balanced position while providing dental care could promote strain and sprain injuries that significantly increase the risk of MSDs [9].

Thus, it has been widely described that implementing ergonomic strategies and using ergonomic supports at the workplace can help dental professionals to achieve ergonomically optimal working conditions [10]. Still, previous and recent studies have repeatably shown relatively low awareness levels among dental

professionals regarding the presence of risk factors for MSDs in the workplace. In Pakistan, Saleem et al. found that one in every three dental professionals were not thoroughly aware of the risk of musculoskeletal disorders [11]. In Brazil, Ísper Garbin et al. recently demonstrated that individuals' awareness of job environment factors and their potential contribution to musculoskeletal disorders is typically higher among dental professionals with already established MSDs symptoms [12]. Altogether, these results indicate that ergonomics awareness might be more notable among dental professionals with established MSDs when the disorder is already at a more advanced stage.

Importantly, symptoms of MSDs are reported to appear very early in dental careers, as high prevalence of MSDs have also been identified among dental students [13-15]. As a result, it has been suggested that appropriate training during undergraduate dental studies and promotion of ergonomic equipment might favour a "safety culture" among future dental professionals. However, didactic training on work posture biomechanics and occupational hazards are not always successfully incorporated as part of the curriculum of dental schools in many countries [16]. For instance, a previous study indicated that undergraduate students from Riyadh, Saudi Arabia, demonstrated lower awareness of ergonomics when compared to more specialized professional dentists [17], which may suggest a lack of appropriate training on occupational health during dental school. However, evidence is still sparse for the Saudi context, as no study has been conducted to examine the extent of occupational health education related to MSDs prevention provided in the Saudi undergraduate dental curriculum.

Therefore, this study aimed to assess the current level of awareness of dental interns who graduated from all public and private schools in Saudi Arabia in 2019 regarding work-related MSDs and their prevention as well as the education received regarding this topic during undergraduate dental training.

MATERIAL AND METHOD

Design and setting

This online, cross-sectional survey targeted dental interns who graduated from all public and private dental schools in Saudi Arabia in 2019. The investigation was reviewed and approved by Institutional Review Board at King Saud University, Saudi Arabia, and electronic informed consent was obtained from all the participants.

Participants

Dental interns enrolled in any dental school in Saudi Arabia were eligible. Briefly, we included dental interns of both sexes who had have received at least one semester of dental training in the previous year. We excluded interns who received their undergraduate education from dental school outside Saudi Arabia.

Participant recruitment

We used a two-step process to approach dental interns. In the first step, we listed all dental schools in Saudi Arabia and contacted interns coordinators, explaining the purpose of the research. In the second step, after accepting the participation of their dental interns in the research, intern's coordinators emailed the link to the survey to all eligible dental interns. The survey was preceded by a summary of the investigation, the research questions, and the confidentiality of all data collected. Reminders were sent bi-weekly by intern's coordinators to enhance participation rates, culminating in a total of three messages (week 2, 4, and 6 after the first contact).

Survey

We developed items on the survey based on previous publications [18]. Besides, the survey content was refined through feedback from experts in occupational medicine, statistics, epidemiology, and dental public health. We pilot tested and adapted the final version of the survey based on the evaluations from ten dental interns who were excluded from the final analysis.

We divided the survey into three separate parts: (a) Sociodemographic, (b) Previous education on work-related MSDs prevention, (c) Awareness levels on work-related MSDs and their prevention.

In part (a), we collected sociodemographic characteristics of the participants, such as age, sex, and type of dental school (private vs. public). In part (b), we gathered information related to participants' educational experiences regarding "work-related MSDs prevention". Specifically, participants were asked if they had received training regarding work-related MSDs during their undergraduate dental training. Those who responded "yes" were instructed to answer two additional questions:

- What form of training did you receive in your dental school regarding this topic?
- Please specify during which year did you receive education regarding the topic?

All survey respondents were then instructed to respond to the following question: Do you think that the undergraduate curriculum should dedicate more time to educating students about "work-related MSDs prevention"?

In part (c), we examined the awareness levels of participants regarding the term "dental ergonomics". Additionally, this section measured participant's awareness about MSDs that frequently affect dental professionals, preventive measures of work-related MSDs, and currently available therapeutic approaches for work-related MSDs.

Statistical analysis

Continuous variables were presented as means (standard deviation [SD]), and categorical data were summarized as numbers (percentages). We examined associations

between categorical variables with chi-squared tests. We considered statistically significant two-tailed P-values < 0.05. All data analyses were conducted with SAS (version 9.4, SAS Institute Inc., Cary, NC, USA).

RESULTS

From a total of 1552 eligible participants, we analyzed

data from 889 (57.3%) dental interns who completed the survey and met all eligibility criteria. Table 1 shows the demographic characteristics of the study population. The mean age of the study participants was 25 years. Most dental interns were women (55%), and approximately 2 in 3 participants were enrolled in public dental schools (64%).

Table 1: Sociodemographic characteristics of the study participants (n=861).

Variable	Mean (SD) or No. (%)
Age (years), mean (SD)	25.0 ± 2.9
Gender	
Male	388 (45.1)
Female	473 (54.9)
Type of Dental School	
Public	555 (64.5)
Private	306 (35.5)

Participants educational experience on work-related MSDs prevention

Our data revealed that only 343 (40%) of the participants reported had received training on work-related MSDs prevention during undergraduate studies. Participants who attended public dental schools were significantly more likely to report have received education on work-related prevention than those who attended private dental schools (44% vs. 33%, respectively, P = 0.002) (Figure 1A). According to our data, approximately three in every four respondents (n=621, 73.4%) recognized that undergraduate education should dedicate more time to educating dental students about work-related MSDs prevention.

Characteristics of the educational experience on work-related MSDs prevention

When considering specifically the subgroup of participants who received education on work-related MSDs during undergraduate studies, most reported having received training between the third and fourth academic year (277 of 343 [81%]) (Figure 1B). Regarding the training approach used in dental schools to address work-related MSDs, lectures were the most commonly reported form of education (75%), followed by clinical training (32.1%), practical workshop (18.4%), and other forms of training (2.3%), which included posters, clinical tips, and monitoring and observation by the clinical supervisor.

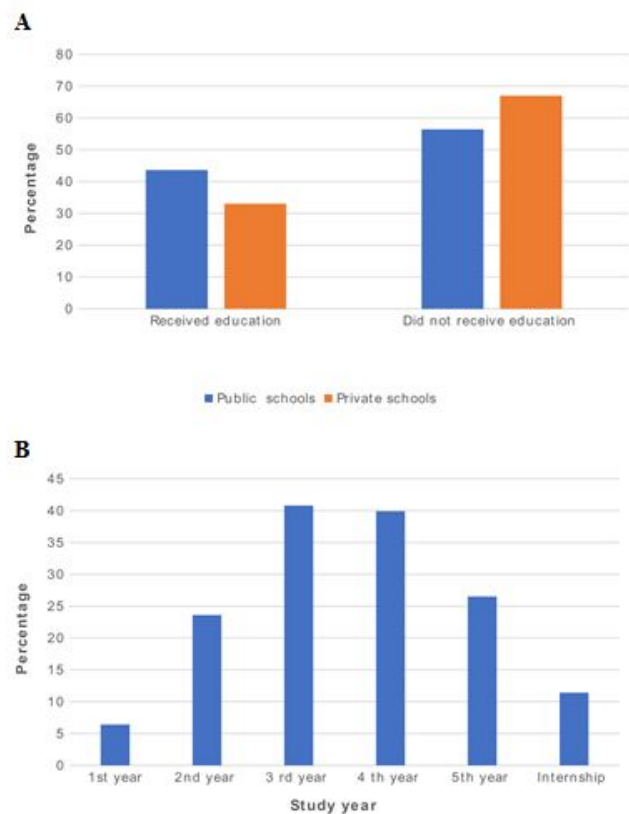


Figure 1. Education in work-related MSDs prevention among dental interns. (A) Percentage of dental graduates who received education about MSDs prevention stratified by the type of dental school (n=861). (B) The academic year in which dental interns received education about WRMSDs prevention (n=343).

Participants' awareness of work-related MSDs and their prevention

Most participants were aware that work-related musculoskeletal disorders might affect dental professionals 629 (73%), but only 303 (35%) were aware of the term "dental ergonomics".

About half of participants (45.3%) reported a lack of awareness of the work-related MSDs preventive

techniques, and 64% reported a lack of awareness of the available therapeutic options for work-related MSDs. Our data indicated that dental interns who had been educated about work-related MSDs during dental school were significantly more likely to know the term "dental ergonomics" and be aware that work-related MSDs can affect dental professionals. These individuals were also more likely to know preventive techniques and be aware of therapeutic options for work-related MSDs (Table 2).

Table 2: Participants' awareness of work-related MSDs and their prevention (n=861).

Variables	Total (N= 861)	Dental school training emphasized work-related MSDs prevention (N=343)	Dental school training did not emphasize work-related MSDs prevention (N=518)	P value
Awareness of the term "Dental Ergonomics"				
Yes, No. (%)	303(35.2)	185 (61.1)	118 (38.9)	<0.0001
No, No. (%)	558(64.8)	158 (28.3)	400 (71.7)	
Awareness of work-related MSDs that might affect dental professionals				
Yes, No. (%)	629(73)	291(46.3)	338(53.7)	<0.0001
No, No. (%)	232(27)	52(22.4)	180(77.6)	
Awareness of work-related MSDs preventive techniques				
Yes, No. (%)	471(54.7)	258(54.8)	213(45.2)	<0.0001
No, No. (%)	390(45.3)	85(21.8)	305(78.2)	
Awareness of treatment options for work-related MSDs				
Yes, No. (%)	310(36)	174(56.1)	136(43.9)	<0.0001
No, No. (%)	551(64)	169(30.7)	382(69.3)	

DISCUSSION

Our data revealed that awareness of work-related MSDs prevention is low in a large sample of dental interns from Saudi Arabia. Overall, we provide evidence that education in work-related MSDs prevention provided for dental students in Saudi Arabia is still suboptimal. Altogether, our findings create opportunities for dental schools to embark on a curricular redesign to ensure that dental professionals are adequately trained on preventing work-related MSDs.

Work-related MSDs are recognized as a significant disease burden in the careers of dental professionals, and a high prevalence has been reported in Saudi Arabia [7-8]. Nonetheless, previous studies on awareness of work-related MSDs prevention have focused mainly on dental professionals. For example, the investigations conducted by Gopinadh et al. (2013) in India [19], Rafeemanesh et al (2013) in Iran [20], and Saleem et al. (2015) in Pakistan [11], have highlighted that between 59 to 67% of experienced dental practitioners were familiar with the concepts and preventive measures regarding work-related MSDs. Our results show a much less cheering scenario among dental interns from Saudi Arabia, where less than half of the studied participants had prior knowledge or training on work-related MSDs prevention. Differences between previous studies and ours might be attributed to a myriad of factors, such as sociodemographic characteristics, outcome definition

and sampling strategies. However, as indicated recently by Ísper Garbin et al., ergonomics awareness might be more pronounced among dental practitioners with established work-related MSDs, explaining, at least partially, the less optimistic scenario detected in our study [12].

According to Gupta et al., education on work-related MSDs prevention and implementing a "safety culture" at the workplace can result in more efficient and productive dental care and more extended and healthier dental careers [21]. Our findings indicate that the education on work-related MSDs prevention seems slightly better among public dental schools. Nevertheless, the overall proportion of students having previous training on MSDs prevention is relatively low in both private and public universities, indicating that curricular changes are needed in dentistry education provided in Saudi Arabia regardless of the type of institution.

Although our results can have limited generalizability to other countries and settings, our study broadly indicates that the curriculum of dental schools might be rethought, and it is imperative to plan and implement critical curricular changes in dental schools in Saudi Arabia and internationally.

Our study shows that dental interns who received education or training in work-related MSDs prevention described being taught mainly in the third and fourth

academic years. Several lines of evidence demonstrate a high prevalence of MSDs in dental students, with comparative and longitudinal studies indicating a greater occurrence of MSDs in later years of dental studies than in the earlier phases of dental training [22-23]. As a result, it has been proposed that education about work-related MSDs prevention should be provided early in the dental course before poor postural habits are acquired, favoring healthy behaviors throughout the clinical training and future practice. Altogether, these observations indicate that training on work-related MSDs might be targeted at first and second-year dental students as well.

Study limitations

Our study has several limitations that should be acknowledged. First, by its retrospective temporality, our investigation cannot completely rule out recall (memory) biases. Second, although we approached all dental schools in Saudi Arabia and obtained data from 57.3% of the contacted dental interns, our sample is not probabilistic. However, we believe that our large sample size allows high internal validity of our findings in the Saudi setting. Finally, our survey approach targeted awareness of work-related MSDs as a categorical variable, reducing statistical power in association analyses. Future investigations could employ continuous measurement approaches (e.g., numeric rating scales or Likert-like instruments), which typically increase power compared to binary variables [24].

Perspective for future research and actions

MSDs prevention-focused curricular changes may be favorably accepted by dental students as our findings have shown that ~73% of dental interns who were surveyed indicated that undergraduate education should dedicate more time to train dental students about work-related MSDs prevention. Remarkably, previous studies have demonstrated that dental students present difficulties applying this knowledge after receiving proper training, particularly on adopting correctly ergonomic postures [25-26]. As a result, Garcia et al. recommended that the educational system provide theoretical ergonomics knowledge, promote practical follow-ups, and motivate or reward the students for increasing the application of ergonomic principles during their training and future clinical practice [25]. Thus, it is vital to ensure that curricular changes in dental schools in Saudi Arabia are supported by teaching strategies that enable a dynamic acquisition and assimilation of the knowledge on dental ergonomics. We anticipate that the implementation and monitoring of the "safety culture" regarding MSDs could be the next practical challenge for dental educators [16].

In summary, despite several lines of evidence concur that work-related MSDs prevention should begin during dental school, preventing the development of work-related MSDs among dental professionals, our investigation indicates that dental schools' curriculum in Saudi Arabia might be suboptimal in providing that

knowledge. Thus, there is a need to stimulate discussion on planning and implementing curricular changes to ensure that Saudi dental professionals receive an improved education, enabling them to manage and prevent work-related MSDs more effectively.

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