

Sexual Dimorphism in the Prevalence of Musculoskeletal Disorders among Dental Students [†]

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Abstract: Work-related musculoskeletal disorders (MSDs) are concerning among dental students. The study aims to compare the prevalence of MSDs between male and female dental students. A total of 63 dental students completed the Nordic Musculoskeletal Questionnaire. The results showed that female students had a higher prevalence of symptoms in the neck and lower back compared to those of the male students. In the weekly assessment, male students had a higher occurrence of symptoms in the hands and wrists. These findings emphasize the need to address musculoskeletal issues among dental students, targeting their different etiologies to prevent disabilities and early retirements associated with MSDs.

Keywords: musculoskeletal disorders; dental students; sexual dimorphism; ergonomics

1. Introduction

In recent years, work-related musculoskeletal disorders (MSD) have become one of the most important health issues among health care workers [1]. Up to 95.8% of dentists could develop MSDs in their lifetime and 92% reported musculoskeletal pain in the last year [1–3]. This issue began early in dentist’s careers, with a prevalence among students between 44% and 93% [2,4,5], with an increasing number of preclinical dental students voicing concerns about MSDs [3]. MSDs contribute considerably to sick leave, reduced the students’ productivity and terminating their clinical practice earlier than they desired [1,3].

MSDs are defined by the World Health Organization (WHO) as a disorder of the muscles, ligaments, tendons, joints nerves, and bones not directly resulting from an acute or instantaneous event (e.g., slips or falls). MSDs are work-related when the work environment promotes their development [1]. Dental professionals have higher risk of developing musculoskeletal disorders or symptoms compared to that of the general population [1,2]. Although increasing evidence is suggesting that psychosocial factors may be associated with the prevalence of MSD, the physical burden of clinical work associated with incorrect postures or poor body mechanics have been described as the major factors associated with MSDs referred by dental health workers [1,3,4]. The characteristics of clinical work and prevalence results demonstrate that female students are more susceptible to develop MSDs [6–9].

Therefore, the aim of this study is to compare the prevalence of musculoskeletal disorders between male and female dental students.

2. Materials and Methods

The participants of this study were students from the fourth and fifth years of their integrated master’s degree in dentistry at Egas Moniz School of Health & Science enrolled



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in clinical practice. We provided an intuitive and easy online form of the Nordic Musculoskeletal Questionnaire (NMQ) to collect the data, which has shown good reliability and moderate validity for use in epidemiological studies [10].

3. Results

A total of 117 students were contacted to participate, and 85 answered the questionnaire, achieving a response rate of 72.7%. Ten were excluded due to being older than 30 years, and 12 were excluded for having been diagnosed with ongoing musculoskeletal injuries, leaving a total of 63 participants. The total was composed of 81% women and 19% men with the following characteristics: 22.54 ± 1.51 years, 1.67 ± 0.08 m, and 59.95 ± 11.11 kg. Descriptive statistics by sex are described in Table 1.

Table 1. Sociodemographic data by sex.

	Students	Age (years)	Height (m)	Weight (kg)
	n (%)	Mean \pm SD [range]	Mean \pm SD	Mean \pm SD
Female	51 (81%)	22.57 ± 1.54 [20–28]	1.64 ± 0.06	56.67 ± 8.53
Male	12 (19%)	22.42 ± 1.44 [20–25]	1.78 ± 0.09	73.92 ± 10.12

Abbreviations. SD = Standard deviation; kg = kilogram; m = meter.

The occurrence rate by sex was assessed within the last year and week, and they are represented in Figure 1. In a 12-month span, the most frequently reported symptoms among women were in the neck (68.6%) and lower back (66.7%), while among the men, they were in the lower back (58.3%) and shoulders (41.7%). A total 92.2% of the female students reported symptoms in at least one body region over the past year, while among the men, the total prevalence was 91.6%.

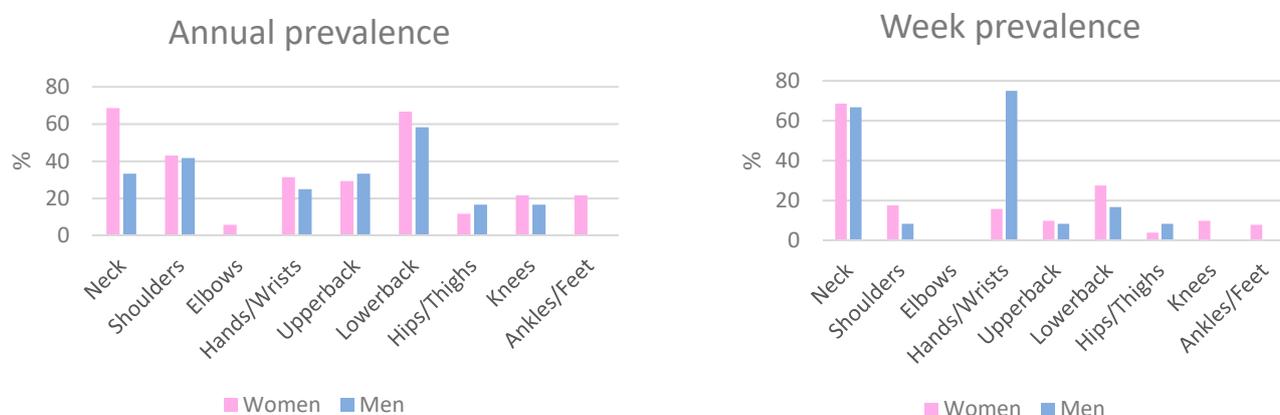


Figure 1. Annual and weekly prevalence of musculoskeletal symptoms among dental students.

The weekly higher occurrence rates were in the neck (68.6%) and lower back (27.5%) among the women and wrists and hands (75%) and neck (66.7%) among the men. For a week-long period, 58.8% of the female students reported symptoms in one or more body regions, while among the men, this rate was 50%.

4. Discussion

The oral cavity represents a very small working area [2]. Dentists’ work position necessitates them leaning their head towards the patients with their arms distant from their body and continuously rotating their trunk, while maintaining high levels of attention and concentration for long periods. The repeated use of these positions results in excessive and continued pressure placed on the musculoskeletal structures in the neck, shoulders, trunk, and waist, exacerbating and highlighting the MSD impact among people in this profession and ultimately leading to a reduced working efficiency and prematurely disabled

dentists [2,4,5,9]. Dental procedures, such as the filling of a cavity or the preparation of a root canal, require static postures [11], which are defined as positions that are maintained for more than four seconds [12]. The kinematic analysis of the work-related musculoskeletal loading of trunks determined that the static positions of a dentist's head and trunk are generally retained for 27.4% and 23.6% of the treatment time, respectively [2].

The present study aimed to monitor and compare the development of musculoskeletal complaints between male and female dental students.

The neck and lower back are the most frequently reported sites of pain, with occurrence rates being generally higher in comparison to those of previous studies [1,6–9]. However, it is important to note that comparisons across studies should be made cautiously, considering factors such as the study design and sample sizes.

Ergonomics and sexual dimorphism could play significant roles in understanding the occurrence and development of musculoskeletal disorders in dentistry students. The occurrence of neck pain is more common higher among women within the general population [13], and this is explained by the existence of different physiological mechanisms for pain perception between sexes. Despite the asymmetry in the male and female participants that could influence the weight of each change between the groups, our results reflect a larger difference between the sexes when comparing to the general population, with women (68.6%) having an annual rate that is twice as large as that of men (33.3%). Since dental work often involves prolonged periods of head tilting, which can lead to the overloading of neck muscles and cervical spine joints, an association between this and the described sexual dimorphism for pain perception could present a possible explanation for this higher incidence. Conversely, symptoms in the lower back are commonly associated with incorrect sitting postures, forward bending, and a lack of hip tilting during work. Although the prevalence of neck and lower back symptoms is high, a disparity between sexes was only observed for the neck, which could suggest that the physical burden associated with clinical practice is potentially greater on the neck than it is on the lower back. The total annual prevalence of MSDs for all body regions was similar between the male (91.6%) and female (92.2%) students and is in line with reported outcomes in previous studies on dental students [2,4,5] and dentists [1–3].

In a weekly report, the symptom rates between men and women were similar, except in the hands and wrists, with men (75%) having a more than five times larger rate than women (15.7%). Improper techniques with the sustained contraction of wrist muscles and inappropriate ergonomic support were previously observed as the causes of these symptoms [14] and could explain these differences. The overall rate of MSDs within a one-week period is slightly higher among the female students (58.8%) compared to that of the male students (50%). However, it is noteworthy that this means that one out of every two students experienced some form of MSD in the previous week. These findings raise concerns regarding the need to urgently develop and implement preventive strategies tailored to the specific needs of each student group, both in the short and long terms. Education on work-related MSDs, preventive exercises, posture correction, and ergonomic aid implementation could be important measures to reduce the differences between the sexes and the global prevalence of MSDs among dental students.

5. Conclusions

Our findings highlight the importance of addressing musculoskeletal issues in dental professionals, even among students, to prevent potential disabilities and early retirement associated with these conditions. Addressing these issues with an intervention targeting their different etiologies and students' sexual differences could promote better outcomes and reduce the general MSD prevalence rates among dental students.

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