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The prevalence of hand pain and its risk factors among dental students in Riyadh, Saudi Arabia

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ABSTRACT

Assessment of the prevalence of hand pain and its most common risk factors in dental students in Riyadh was the study aim. A questionnaire was sent to dental students through their emails. The questionnaire measured the prevalence, comfortability, interference, and frequency of pain in six different areas of their hands. The results indicated that 74.2% of the students had experienced hand pain, which was considered significant. 53.7% of them had pain in the right hand, 8.4% in the left hand, and 12.1% in both hands. In the left hand, the most area experienced pain was area D (28.1%), while in the right hand, it was area E (28.5%). The results also revealed that prevalence of hand pain was higher among female students. It also showed that ergonomics and stress had an impact on hand pain development. In conclusion, further studies are required on the effects of ergonomics and stress on development of pain in the hands and its management.

Keywords: Hand pain, Hand discomfort, Musculoskeletal pain, Dental students, Ergonomics, Musculoskeletal pain

1. INTRODUCTION

The dental profession plays a significant role in improving communities. Being a dental practitioner comes with significant responsibilities. The work conditions in the dental profession may be the reason for many health issues that may ultimately lead dental workers to quit the job.

Musculoskeletal disorders (MSDs) may affect dental practitioners' work by pain or injury in muscles, tendons, and ligaments that support the neck, shoulder, back, and hands.

MSDs are common in Saudi Arabia, especially in the dental practice, leading to being less productive at work or, in severe cases, quitting the job. Symptoms of MSDs, in the beginning, are mild; thus, dental practitioners tend to ignore them. Also, if not treated, it may progress to permanent injury that may affect the productivity of dental practitioners at work. MSDs may be caused by several reasons like static posture for a long time, wrong movements of hands and wrists, using vibrating tools for a long time, and repetitive movements, but the most crucial reason is being poorly educated or

trained for the job. One of the ways to deal with these problems is ergonomics, which is the science that deals with work-related disorders (Aghahi et al., 2018). A recent study in 2017 in Belgrade, Serbia, showed that MSDs are prevalent among dentists reaching 82.6% (Pejčić et al., 2017). Another study in 2016 in Saudi Arabia showed that 90.2% of dentists have MSDs (Al-Mohrej et al., 2016). The most critical risk factors for musculoskeletal pain are aging, being female, chronic disorders, lengthy working hours, and a lot of patients flow (Pejčić et al., 2017). Moreover, past working experience and stress may play a role in musculoskeletal pain (Pejčić et al., 2017). Massage treatments, physical activities, ergonomically designed equipment, correct and dynamic working positions, and an adequate workflow organization were the most effective measures in preventing musculoskeletal pain (Pejčić et al., 2017).

Some studies proved that most dental practitioners with MSDs had symptoms starting from dental school (Morse et al., 2010; Movahhed et al., 2013). Therefore, this present study focused on dental students who began clinical or lab practices. Moreover, in this field, most articles focus on the general problem, which is the MSDs. Although hands are considered essential body parts for dentists, no studies focus on hand pain among dental practitioners. Therefore, this study investigates the prevalence of hand pain and its most critical risk factors in dental students at King Saud bin Abdulaziz University for Health and Sciences, Riyadh, Saudi Arabia.

2. MATERIALS AND METHODS

Dental students were the study population at the college of dentistry, King Saud bin Abdulaziz University for Health Sciences in Riyadh, Saudi Arabia. Although 183 was the sample size, 192 participants were randomly chosen from undergraduate and internship students who started their clinical training or laboratory practices. The questionnaire was electronic-based and distributed among the students through the university's official email. A written, electronic informed consent was obtained from each participant.

The Cornell Hand Discomfort Questionnaire, which consist of 16 questions, was used to collect the data. Furthermore, the questionnaire contained personal questions and medical history questions, including age, gender, academic year, hand dominance, working days, working hours per day, chronic diseases, family history, previous injuries, and physical exercises. The students marked six different locations of pain in each hand. Pain frequency was categorized as never, 1-2 times a week, 3-4 times a week, once a day, and several times a day. The comfortability during pain was categorized as slightly uncomfortable, moderately uncomfortable, and very uncomfortable. The interference of pain with work was categorized as substantially interfered slightly interfered, and not at all.

Data collection started in December 2020 and finished in July 2021. After that, SPSS Software (version 21) was used for analyzing the data. Frequencies and percentages were calculated for the categorical variables. Charts and Tables were used for a better demonstration. Statistical analyses were done using Chi-square test. All the tests were considered significant if the p-value was less than 0.05.

3. RESULTS

Out of 192 subjects, 190 Participants answered the whole questionnaire and agreed to in the study participation. 99% was the response rate. Out of the 190 participants, 53.2% were females, and 46. 8% were males. Of the respondents, 40 participants were from the third year (21.1%), 60 from the fourth year (31.6%), 30 from the fifth year (15.8%), 30 from the sixth year (15.8%), and 30 from the internship year (15.8%). 6.8% of participants worked two days a week, 13.7% worked three days a week, 42. 6% worked four days a week, and 36. 8% worked five days a week. Among participants, 16. 3% work 1-2 hours a day, 68. 4% work 3-5 hours a day, 9. 5% work 6-8 hours a day, and 5. 8% work > 8 hours a day. Most participants were right-handed (94.2%), and the remaining were left-handed. 11.5% of participants reported having previous different accidents or injuries in other body regions, and the remaining participants had not experienced previous injuries. Also, only 2.6% had a family history of MSDs, and 4.7% had different chronic diseases 74.2% reported having statistically significant hand pain ($p = 0.000$). Results revealed that 58.1% of participants work 1-2 hours a day, 77.7% work 3-5 hours a day, 72.2% work 6-8 hours a day, and 81.8% work more than 8 hours a day reported having hand pain. In the relation between working hours and hand pain, no statistically significant difference was found. 53. 7% of participants reported having pain in the right hand, 8.4% in the left hand, 12.1% in both hands, and 25.8% had not experienced any pain or discomfort (Figure 1).

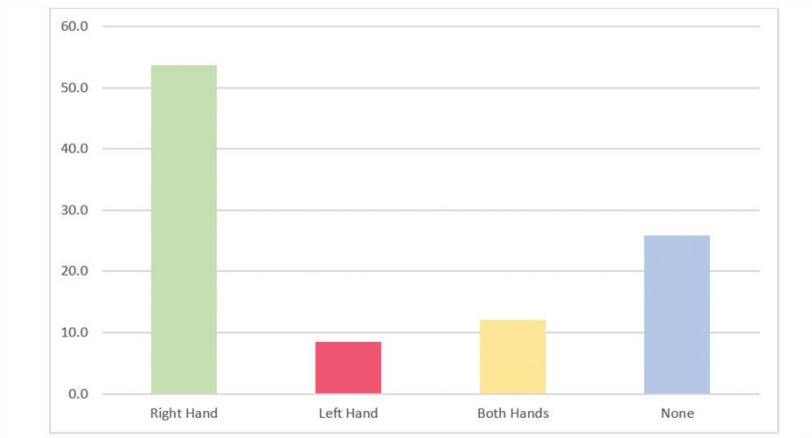

Figure 1: Participants reported pain in each hand.

In the right hand, the most area where participants complained of pain was area E (28. 5%), followed by areas C and F (17.6% each), area D (16.3%), then area A (15.5%), and the least one was area B (4.6%). In the left hand, the most area where participants complained of pain was area D (28.1%), followed by area E (21.9%), area C (18. 8%), area F (14.1%), then area A (10.9%) and the least one was area B (6.3%). (Figures 2, 3) Moreover, out of 190 participants, 58% reported pain in only their dominant hand. There was statistically significant difference between hand dominance and hand pain using chi-square test (p=0. 000).

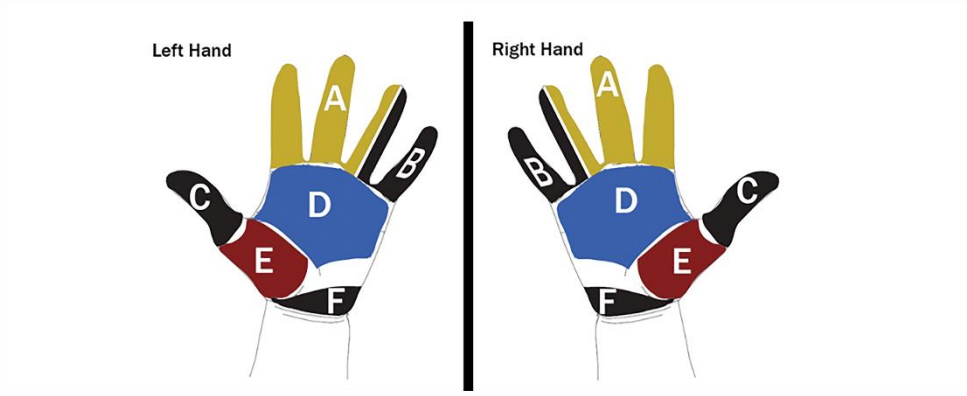

Figure 2: Areas' distribution in each hand.

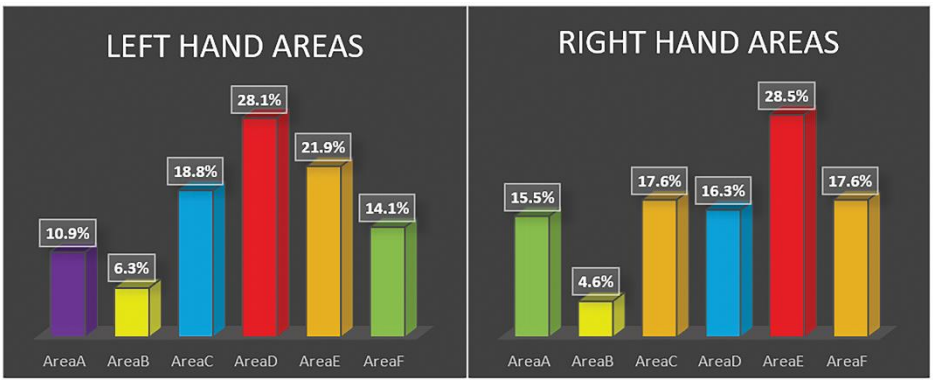

Figure 3: Pain prevalence in each area of each hand.

Difference between females and males having pain was found, where 83% of female participants reported having hand pain, and only 64% of male participants reported hand pain. (Figure 4) Using chi-square test, there was statistically significant difference between hand pain and gender (p=0.003).

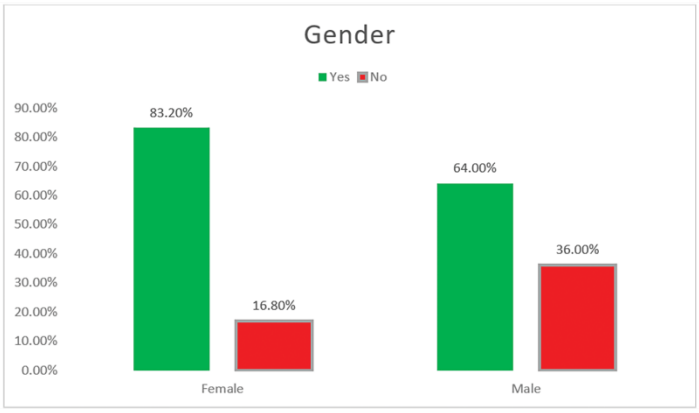

Figure 4: Prevalence of hand pain and gender distribution.

Results revealed that 60% of third-year participants, 83.3% of fourth-year participants, 86.7% of fifth-year participants, 63.3% of sixth-year participants, and 73.3% of internship-year participants had experienced hand pain. In the relation between hand pain prevalence and the academic year, a statistically significant difference was found using chi-square test (p=0.025). Statistical analysis revealed that participants from all different educational years had encountered pain in Area E more than in the other areas, except participants from the fifth-year experienced pain more in Area A. According to the results, 76% of the participants who do not exercise, 80% who irregularly do exercise, 73.3% who do exercise 3 times a week, and 45% who do exercise every day have experienced hand pain. In the relation between hand pain prevalence and doing daily activities, there was statistically significant difference using chi-square test (p=0. 014).

One of the questions asked was how many times the participants experienced pain during their last week of work. 29.8% of them did not experience pain or discomfort, 45.4% have experienced pain or discomfort once or twice, 9.9% have experienced pain or discomfort three times or four times a week, 12.1% have experienced pain or discomfort once a day, and 2.8% have experienced pain or discomfort several times a day.

The participants' answers on their comfortability during hand pain showed that 67.4% chose slightly uncomfortable, 27.7% moderately uncomfortable, and 5% very uncomfortable. Also, they were asked if the pain had interfered with their work or not; 39% of them answered not at all, 48.9% slightly interfered, and 12.1% substantially interfered.

4. DISCUSSION

Most previous studies revealed that MSDs are common among dental practitioners; however, studies about hand pain are limited. There were no studies about hand pain related to dental practitioners in Saudi Arabia. In Taiwan, the prevalence of hand pain among dentists was 41.1% which was consistent with the studies done in Sweden (54%), Poland (44%), Australia (34%), but inconsistent with a study done in Saudi Arabia (19%) (Abduljabbar, 2008; Hayes et al., 2009; Lin et al., 2012). Whereas this present study revealed that 53.7% of participants reported having pain in the right hand and only 8. 4% in the left hand, another study in Iran showed that pain in the right hand was 25.4%, and the left hand was 11.9% (Movahhed et al., 2013). Moreover, in Saudi Arabia, a study about MSDs showed that 22.1% of the participants experienced hand and wrist pain, which is inconsistent with the present study that reported 74.2% of participants experienced hand pain (Al-Mohrej et al., 2016). A study on dental hygiene students has shown that 60% of participants experienced hand and arm pain, which is consistent with the present study (Hayes et al., 2009). The prevalence of hand pain among dental practitioners is widespread worldwide.

Previous studies about MSDs among dentists or dental students showed a correlation between the gender of participants along with pain in their hands, wrists, and fingers (Abduljabbar, 2008; Abi, 2016; Sirajudeen et al., 2018; Tirgar et al., 2015). Likewise, in the relationship between gender and hand pain a statistically significant difference was found in this present study. Of the participants, 83.2% of females and 64% of males reported having hand pain. The present study revealed that males were less susceptible to hand pain than females, which is consistent with Tirgar, Abi-Aad, Sirajudeen, and Abdul-Jabbar's studies (Abduljabbar, 2008; Abi, 2016; Sirajudeen et al., 2018; Tirgar et al., 2015). A study on dental undergraduates, internship students, and postgraduates in Saudi Arabia, showed that 53% of female and 35.9% of male participants complained of hand pain (Alrumi et al., 2020). Another study among Lebanese dentists showed that 21% of female dentists suffered from wrist pain compared to 7% of male dentists, and 17% of females and 13% of males reported finger pain (Abi, 2016). A study at Al Majmaah University, Saudi

Arabia, showed that the reasons behind females having more wrist and hand pain than males were increased biological vulnerability and a lower threshold to reporting symptoms than males (Sirajudeen et al., 2018).

In this present study, 45% of participants, who were doing physical exercises every day, and 76% who did not do any physical exercises, reported having hand pain. Therefore, daily physical exercises showed fewer numbers of hand pain among participants. In Lebanon, among dentists. A study about MSDs showed an inversely proportional relationship between physical activities and hand pain (Abi, 2016). Rafierevealed no statistically significant difference was seen in the relation between exercises and the incidence of pain; however, MSDs were less prevalent in dentists who performed regular exercises, which is consistent with Pour-Abbas et al., Augustson, and Morken (Augustson and Morken, 1996; Pourabbas & Shakouri, 2004; Rafie et al., 2015). Other studies showed an inversely proportional relationship between physical activities and MSDs, including pain in wrists, hands, and fingers (Al-Mohrej et al., 2016; Meisha et al., 2019; Movahhed et al., 2013; Rafie et al., 2015; Tirgar et al., 2015). Some factors can relieve pain, prevent damage, and strengthen the musculoskeletal system, such as regular aerobic activities and stretching exercises (Andrews and Vigoren, 2002; Kumar et al., 2014; Rafie et al., 2015; Valachi and Valachi, 2003).

Many factors affect the prevalence of hand pain, such as work experience, work skills, educational materials, daily schedule, and psychological factors. There is much conflict regarding the effect of experience and skills on the prevalence of hand pain and MSDs. Multiple studies have stated that the prevalence of such disorders is directly proportional to work experience (Abi, 2016; Andrews and Vigoren, 2002; Chowanadisai et al., 2000; Jacobsen and Hensten-Pettersen, 1995; Leggat and Smith, 2006; Ratzon et al., 2000). On the other hand, others have stated more incidence of hand pain in unskilled or less experienced dental personnel (Abi, 2016; Andrews and Vigoren, 2002; Chowanadisai et al., 2000; Jacobsen and Hensten-Pettersen, 1995; Leggat and Smith, 2006; Ratzon et al., 2000). A study in Thailand among dentists revealed that less clinically experienced dentists were more expected to suffer from MSDs, including hand pain, than the more experienced dentists (Chowanadisai et al., 2000). However, hand pain was not significantly associated with work experience in this study. This finding is consistent with the results of studies in NSW and Israel (Marshall et al., 1997; Ratzon et al., 2000). This might be because all participants were young students, or the effect of different learning material taken each year in the college and daily work schedule could play a role. A systematic review in western countries about the prevalence MSDs and its work-related risk factors among dental professionals showed that work schedules have a crucial impact on MSDs, including hand pain (Lietz et al., 2018). Another reason that might affect hand pain prevalence is that experienced dentists are probably better at adjusting their working positions and techniques to avoid musculoskeletal problems than less experienced dentists (Leggat and Smith, 2006). In this study, the prevalence of hand pain in fourth-year participants was 35. 4%, which is higher than in other years. In contrast, a study of musculoskeletal pain and ergonomic factors among dental students at Kerman Medical University, Iran, showed no relation between students' academic year and pain (Aghahi et al., 2018). Moreover, psychological problems are common among dental students because of students' schedules, multiple tasks, exams, requirements, treating patients, time pressure during the day, and other factors. The most prevalent psychological problems among dental students are stress, anxiety, and depression (Moodley et al., 2018). A study among dental students showed that the prevalence of depression was 55. 9%, anxiety was 66. 8%, and stress was 54. 7% of the study sample, which were frightening numbers (Basudan et al., 2017). Another study done in India on physicians, surgeons, and dentists showed a clear relationship between psychological factors and MSDs (Rambabu and Suneetha, 2014).

5. CONCLUSION

In conclusion, one of the most critical MSDs among dental practitioners in Saudi Arabia is hand pain that should be addressed. This study investigates the prevalence of hand pain among dental students that could be a struggle for many students during their dental practice. In addition, in Saudi Arabia, the present study is the only one that discussed the prevalence and risk factors of hand pain and discomfort. The prevalence of hand pain among dental students was high. Moreover, female participants had higher percentages of hand pain than male participants. Work experience, work skills, educational materials, daily schedule, and psychological problems are some factors that can affect the prevalence of hand pain. It is necessary to incorporate ergonomic training courses to help students avoid pain during their clinical and laboratory practices, and to avoid pain in their future life as dentists. Also, dental students should educate themselves to adapt to the pressure and master the correct work positions and techniques. Incorporating frequent work breaks, doing physical exercises, and avoiding stress are recommended to decrease the pain. Finally, more studies with more sample size on hand pain and its risk factors are required.

Recommendations

The research team suggests doing this study in a more extensive range, including more students in different universities and different cities in Saudi Arabia. Also, include more variables such as height, weight, BMI, psychological factors, the intensity of pain, and the specialty that causes hand pain. Furthermore, the study questionnaire should specify the type of physical exercises the participants were doing.

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Author contributions:

All authors have participated in collecting and analyzing the data. Writing the article and revising it critically for publication. All authors have read the final version of the manuscript and approved it for publication.

Ali Asiri, Dana Albassri, Tariq Alswayyed have participated in data collection, data analysis, and writing this manuscript.

Ethical Approval:

Institutional review board (IRB) committee approval was obtained from King Abdullah International Medical Research Center (KAIMRC) IRBC/0075/20.

Conference Presentation:

This research was presented in the DLS5 Bahrain International Dental Conference with IADR Saudi division in 2021 and in the 2nd Dental Student Research Meeting in 2022 in King Saud University.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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