

# Upper Body Musculoskeletal Symptoms in Sardinian Dental Students

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## A b s t r a c t

**Purpose:** The purpose of this study was to determine how early in a dental career musculoskeletal problems develop, by comparing the prevalence of such symptoms in a dental student population in Sardinia (Italy), a control sample of psychology students from the same university and a sample of dental students in Lebanon.

**Methods:** One hundred and fourteen dental students from the University of Cagliari (Cagliari, Sardinia, Italy) were surveyed by questionnaire about the presence of several upper body symptoms. Their responses were compared with those of 2 different populations: 114 psychology students from the same university, matched for age and sex, and 178 dental students from the University of Saint Joseph (Beirut, Lebanon). The psychology students were chosen for comparison because of the general dissimilarity of their daily activity to that of dentists.

**Results:** The Italian and Lebanese dental students did not differ with regard to presence of symptoms. The Italian dental students differed from the psychology students in just one respect, with the dental students reporting more lower back pain. Headache was the most prevalent symptom in all 3 groups and was more prevalent among women; however, this difference between the sexes did not reach statistical significance for the psychology students.

**Conclusions:** The appearance of musculoskeletal symptoms among dental students, even after a relatively short clinical training period, suggests that ergonomics should be covered in the educational system to reduce risks to dental practitioners.

**MeSH Key Words:** back pain/epidemiology; headache; muscular diseases; occupational diseases/epidemiology

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The working environment has a major role in the development of many musculoskeletal problems, although most of these disorders can be avoided or at least reduced with more attention to ergonomics.<sup>1-6</sup> In particular, dental professionals often assume positions that are uncomfortable and asymmetric, keeping the head forward and rotated to the side with the arms held out from the body. This attitude, if held for prolonged periods each day, tends to overstress muscles and joints, especially those of the neck, back and shoulder, causing symptoms such as headache, neck and shoulder pain, and backache.<sup>1-12</sup>

Seventy-two percent of the dentists examined by Rundcrantz and others<sup>1</sup> reported some pain and discomfort

of the neck, shoulders or head. In support of an occupational cause of the symptoms, pain and discomfort were less in subjects who had adopted ergonomic techniques, such as working in a standing position; altering the working position in relation to the patient, according to the specific area of the mouth to be worked on; using a mirror for a better view of tooth surfaces difficult to access directly; using a wedge cushion to better position the head of the patient; and interrupting work with short pauses.<sup>1,2</sup> Similar results were reported by Kerosuo and others,<sup>12</sup> who discovered that 70% of general dental practitioners and 72% of orthodontists surveyed suffered from musculoskeletal symptoms. The sites most frequently involved were the neck (53% of

**Table 1** Prevalence of symptoms and  $\chi^2$  analysis for comparison of dental students and psychology students

Symptom	No. (and %) of students with symptoms		$\chi^2$	<i>p</i> (df = 1)
	USC ( <i>n</i> = 114)	PSY ( <i>n</i> = 114)		
Headache	58 (50.9)	65 (57.0)	0.86	> 0.05
Neck pain	46 (40.4)	34 (29.8)	2.77	> 0.05
Lower back pain	37 (32.5)	21 (18.4)	5.92	< 0.05
Upper back pain	24 (21.1)	30 (26.3)	0.87	> 0.05
Arm symptoms	22 (19.3)	12 (10.5)	3.46	> 0.05

USC = dental students from University of Cagliari (Cagliari, Italy)

PSY = psychology students from University of Cagliari

df = degrees of freedom

those with pain) and shoulders (56% of those with pain). Chang<sup>5</sup> suggested proper selection of surgical telescopes and use of coaxial illumination headlights to prevent or eliminate chronic neck and back pain. In contrast, Marshall and others<sup>7</sup> questioned whether modifying work position or taking short pauses throughout the day would decrease symptoms.

In comparisons of dentists and subjects working in a different environment, such as farmers and pharmacists, the radiological signs and symptoms of upper body pathologic conditions were more prevalent among dentists.<sup>2,13,14</sup> Compared with office employees, dentists showed more severe symptoms; these differences were especially evident in female subjects.<sup>12</sup>

To determine how early in a dental career these musculoskeletal problems develop, the prevalence of symptoms in a dental student population in Sardinia (Italy), a control sample of psychology students from the same university (matched for age and sex) and a sample of dental students in Lebanon was determined and compared.

## Materials and Methods

Dental students at the University of Cagliari in Cagliari, Sardinia, Italy, psychology students from the same university and dental students at the University of Saint Joseph in Beirut, Lebanon, were asked to respond to a questionnaire (see Appendix I, Student survey on musculoskeletal pain, at <http://www.cda-adc.ca/jcda/vol-70/issue-5/306.html>) about the recent presence of the following body symptoms: headache, neck pain, upper back pain or stiffness, lower back pain or stiffness, and arm symptoms (pain, tingling or numbness). These symptoms were chosen because the neck and back are the body sites reportedly most affected by altered posture during dental work, and problems at those locations may lead to referred symptoms such as headache and arm symptoms.<sup>1-12</sup>

The reported symptoms were compared by means of  $\chi^2$  tests applied to 2 × 2 tables. In the first analysis, the

**Table 2** Prevalence of symptoms and  $\chi^2$  analysis for comparison of Italian and Lebanese dental students

Symptom	No. (and %) of students with symptoms		$\chi^2$	<i>p</i> (df = 1)
	USC ( <i>n</i> = 114)	USJ ( <i>n</i> = 178)		
Headache	58 (50.9)	101 (56.7)	0.92	> 0.05
Neck pain	46 (40.4)	80 (44.9)	1.39	> 0.05
Lower back pain	37 (32.5)	66 (37.1)	1.28	> 0.05
Upper back pain	24 (21.1)	52 (29.2)	2.68	> 0.05
Arm symptoms	22 (19.3)	45 (25.3)	1.32	> 0.05

USC = dental students from University of Cagliari (Cagliari, Italy)

USJ = dental students from University of Saint Joseph (Beirut, Lebanon)

df = degrees of freedom

Italian dental students were compared with the psychology students (matched for age and sex); in the second analysis the Italian dental students were compared with the Lebanese dental students.

## Results

All but one of the Italian dental students returned a completed questionnaire (*n* = 114; 60 men and 54 women). The students ranged in age from 18 to 51 years (mean 22.7 years), but only one student was older than 34. Responses were obtained from 114 psychology students matched for age and sex. All of the Lebanese dental students returned the questionnaire (*n* = 178; 117 men and 61 women, mean age 20.7 years, range 17–27 years).

In the comparison of Italian dental students and psychology students (Table 1), the only difference was more lower back pain among dental students (*p* < 0.05). There were no differences between the 2 groups of dental students (*p* > 0.05; Table 2).

Headache was the most prevalent symptom in all 3 groups (Fig. 1). In a separate analysis, the prevalence of headache was compared between men and women in each student group. In all groups, a greater proportion of women than men reported this symptom (Table 3, Fig. 2), but the difference was significant only for the 2 groups of dental students (University of Cagliari:  $\chi^2$  = 12.77, *p* < 0.01; University of St. Joseph:  $\chi^2$  = 6.47, *p* < 0.05). In addition, the prevalence of lower back pain was higher among female psychology students than among male psychology students (*p* < 0.01; data not shown).

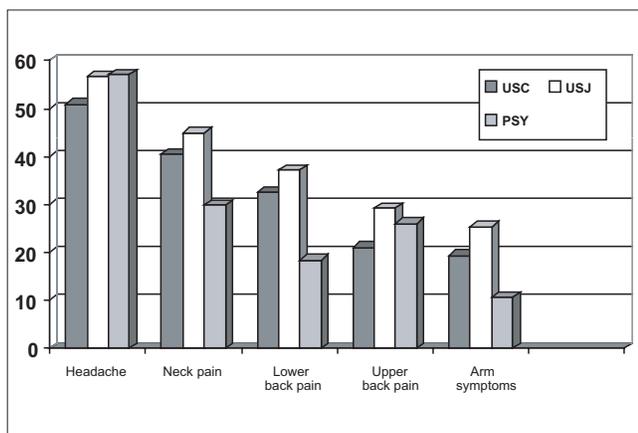
## Discussion

Headache was the most frequent symptom in all 3 populations examined. The percentage of subjects reporting headache (50.9% to 57.0% in the 3 groups) was higher than that reported in most other studies. Rundcrantz and others found that 38% of Swedish dentists in one study<sup>1</sup> and 52 (36.4%) of 143 dentists in another study<sup>2</sup> suffered

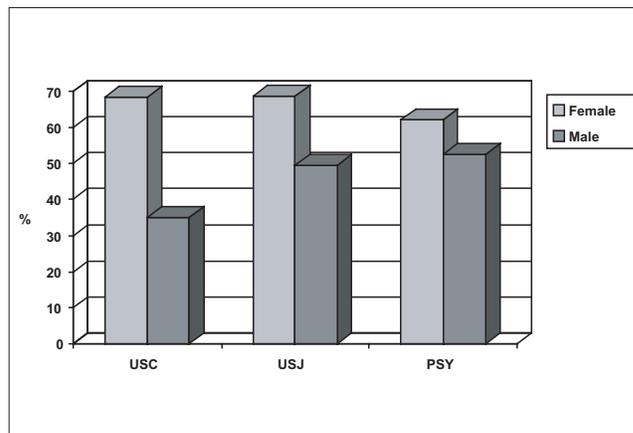
**Table 3** Prevalence of headache in women and men in the 3 student groups

Symptom	USC (n = 114)		PSY (n = 114)		USJ (n = 178)	
	Women	Men	Women	Men	Women	Men
Headache (no. and %)	37 (68.5)	21 (35.0)	34 (63.0)	31 (51.7)	42 (68.9)	58 (49.6)
No headache (no. and %)	17 (31.5)	39 (65.0)	20 (37.0)	29 (48.3)	19 (31.1)	59 (50.4)
Total	54	60	54	60	61	117
$\chi^2$	12.77		1.15		6.47	
P	< 0.01		> 0.05		< 0.05	

USC = dental students from University of Cagliari (Cagliari, Italy), PSY = psychology students from University of Cagliari, USJ = dental students from University of Saint Joseph (Beirut, Lebanon)



**Figure 1:** Prevalence of upper body symptoms. USC = dental students from University of Cagliari (Cagliari, Italy), USJ = dental students from University of Saint Joseph (Beirut, Lebanon), PSY = psychology students from University of Cagliari. Lower back pain was significantly more prevalent within the USC group than within the PSY group ( $p < 0.05$ ).



**Figure 2:** Prevalence of headache. USC = dental students from University of Cagliari (Cagliari, Italy), USJ = dental students from University of Saint Joseph (Beirut, Lebanon), PSY = psychology students from University of Cagliari. For both groups of dental students, the difference between the sexes was statistically significant (for USC,  $\chi^2 = 12.78$ ,  $p < 0.01$ ; for USJ,  $\chi^2 = 6.47$ ,  $p < 0.05$ ).

from headache. Kerosuo and others<sup>12</sup> reported a much lower prevalence of headache (18%) among Finnish dentists and orthodontists. The mean age of subjects examined by Rundcrantz and others<sup>1,2</sup> (in their 40s) was much greater than the mean age of the students in this study (early 20s). However, Rundcrantz and others<sup>1</sup> noted that younger dentists had more headaches than older dentists. The findings of Marshall and others<sup>7</sup> are closer to the results reported here: they found a 58% prevalence of headache among Australian dentists.

Differences between men and women in terms of headache prevalence have been described,<sup>15,16</sup> although there may be variations with different types of headache.<sup>16</sup> In a questionnaire-based study conducted in Hong Kong<sup>15</sup> there was a greater preponderance of all types of headache among female subjects, regardless of age. The same study noted that clerical or service work, housekeeping, and professional or administrative jobs were the most common occupations among respondents with recurrent headaches. Studies on dental students and dental professionals,<sup>1,2,7</sup> including the one reported here, seem to agree that headaches are more common among women. However, this distinction was not evident among psychology students.

Previous studies have suggested a higher prevalence of neck pain among dentists, probably because they assume positions that don't conform to usual body positioning during work,<sup>1,2,12,17</sup> especially when compared with subjects in other occupations, where body positioning is more natural.<sup>18</sup> Although there seems to be a correlation between neck pain and occupational stance in general,<sup>19-21</sup> other studies and the results reported here do not support such a correlation for dental practitioners: the prevalence of neck pain did not differ significantly between the 2 dental student groups or between the dental students and the psychology students at Cagliari University, although there was a trend for more dental students than psychology students to report neck pain.

Rundcrantz and others<sup>17</sup> reported that 44% to 48% of men and 61% to 62% of women experienced neck pain; Niemi and others<sup>18</sup> found that only 10% of young men and 21% of young women had neck pain, but these researchers were examining different populations (dentists were surveyed in the first study, high school students were surveyed in the second study). In another study, the latter authors found that young women suffered more and sought more help with their neck and shoulder pain.<sup>22</sup> In that

study, young women who participated in dynamic sports involving the upper extremities had fewer symptoms than those who participated in more static activities. In the study reported here, there was no difference between men and women in the prevalence of neck pain.

The prevalence of upper back and shoulder pain has varied from 10% to 73% in previous studies.<sup>1,2,10,15</sup> A greater prevalence of back pain among women has been reported by some authors.<sup>12,17</sup> Lower back pain was cited as the most prevalent symptom among Australian dentists (experienced by 64% of those who suffered pain).<sup>7</sup> Given the wide range in previous results, comparison with the current findings is difficult. In a study of Swedish dentists, neither headache nor lower back pain increased over a 3-year period, and general musculoskeletal symptoms were significantly less prevalent among office workers used as controls.<sup>17</sup> The latter results are in accordance with the findings reported here; however, because we did not evaluate the symptoms longitudinally, we are unable to confirm their stability over time.

Feldman and others<sup>23</sup> and Chang<sup>5</sup> suggested that modifying risk factors for lower back pain might prevent the development of lower back pain in the future. Mendez and Gomez-Conesa<sup>24</sup> showed that programs involving practice of manoeuvres and motivating strategies impart health knowledge and habits more efficiently than those restricted to the mere transmission of information. In the authors' opinion, suitable information about appropriate arrangement of equipment and proper working postures, as well as practice in using those postures, would reduce the risk of developing musculoskeletal symptoms.

There were no significant differences in the prevalence of arm symptoms (pain, tingling, numbness) between the 2 dental student groups (19.3% among the Italian students and 25.3% among the Lebanese students) or between the Italian dental students and the psychology students (19.3% and 10.5% respectively). Hand symptoms occurred in a similar proportion of Finnish dentists (17%),<sup>12</sup> but no data were provided to allow comparison of dentists with office employees, except in terms of all locomotor symptoms combined.<sup>12</sup> In another study, elbow symptoms occurred in 13% of subjects and wrist and hand symptoms in 24% of subjects.<sup>1</sup> At 3-year follow-up of the same population,<sup>17</sup> elbow symptoms declined from 11% to 9% among male subjects and rose from 15% to 19% among female subjects; symptoms of the wrist and hand rose from 14% to 19% among male subjects and from 32% to 35% among female subjects. In the latter study<sup>17</sup> the female dentists had significantly greater symptoms than the male dentists. The questionnaire used in the current study asked about arm pain, tingling and numbness without any specific reference to hand or wrist symptoms; therefore, the results cannot be compared.

Marshall and others<sup>7</sup> reported that neurological symptoms were more common in the dominant arm of dentists than the nondominant arm; however, information of this nature was not available for the student groups assessed in this study, because no examination was performed to establish arm dominance of the subjects.

## Conclusions

In the study reported here, low back pain was the only type of upper body pain occurring significantly more frequently among dental students than among a control group of psychology students. Dental studies and dental work often involve time spent in static, uncomfortable positions, which can lead to musculoskeletal symptoms even over the relatively short clinical training period. There is a critical need to address ergonomic issues in the educational system and to change the way dentistry is practised to lower the risks to dental practitioners. ♦



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**Appendix I Student survey of musculoskeletal pain**Age: \_\_\_\_\_ Gender: M  F 

Do you suffer, or have you recently suffered, from one of the following symptoms?

Put an X in the corresponding box.

		No	Mild	Moderate	Severe
Headache	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arm pain/tingling/numbness	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Neck pain/stiffness	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Upper back pain/stiffness	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lower back pain/stiffness	Left	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Be sure you have completed every row. If you do not have the symptom described, put an X in the box corresponding with "No."

*Thank you for your time!*