

Risk Factors of Musculoskeletal Pain in Brazilian Dental Students

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ABSTRACT

Musculoskeletal pain is commonly reported in dentists and can start from their training period and continue throughout their practice if preventive or corrective measures are not implemented. To evaluate the perception of dental students in relation to the risk factors that may contribute to the musculoskeletal pain, and verify how the existence of painful symptoms influences the perception of risk factors. This cross-sectional study was conducted among 241 dental students at public university of São Paulo, Brazil in 2016. The data were collected through interviews, using the Standardized Nordic Questionnaire for Musculoskeletal Symptom and the Work-Related Activities that May Contribute to Job-Related Pain Questionnaire. Statistical analyses were performed using SPSS 21.0. Painful symptoms were observed in 199 participants (83.0%). Most students had their perception classified as minimal to moderate (86.3%). A statistically significant association ($P=0.005$) was found when the test of association between the perception of risk factors and the presence of painful symptoms was performed. The highest averages were found in the issues related to repetition of movement, followed by work-related factors and finally the risks to external factors. There are statistically significant differences in the average perception when comparing the group with and without pain for each question of the instrument when comparing the body areas. Undergraduate students are aware of the factors that contribute to health issues and development of musculoskeletal pain, and in particular, there is a greater perception among those who may have had any symptoms.

KEYWORDS: *Musculoskeletal pain; Dental students; Perceptions*

INTRODUCTION

Painful symptoms in the musculoskeletal system are a major concern among dentists [1-3]. The dental professionals are at risk for the development of work-related musculoskeletal disorders [MSDs], due to the high prevalence of pain found between them [4-5]. This prevalence may vary between 64% and 93% [5].

According to WHO and the National Institute for Occupational Safety and Health (NIOSH), the causes of MSDs are multifactorial, including not only the conditions and exposures in the workplace but also the organizational, psychosocial and socio-cultural relations, among others [6-7].

In dentistry, inadequate postures and rotations can lead to back pain.

Repetitive movements and excessive time in the same posture result pain in the neck and shoulders, in addition to psychosocial stressors that cause tension throughout the body. Hands neuropathies are also exposed by high-frequency vibrations tools. In most cases, the dental surgeon is susceptible to major problems in the musculoskeletal system and general health [4, 6-9].

Risk factors for the development of work-related musculoskeletal pain in dentists are multifactorial, including: static or inadequate postures (particularly related to the neck and shoulders), repetitive movements and the use of force (most commonly related to the hand), lack of proper lighting (both in intensity and location), inadequate positioning of a patient, individual characteristics (physical conditioning, height, weight, general health status, gender, age) and psychosocial aspects [10].

Dental students perform the same clinical tasks as dental surgeons already working in the

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clinic, but only recently has there been scientific evidence to suggest a relationship between the tasks and musculoskeletal pain [1]. Thus the undergraduate curriculum in dentistry concentrates on the factors of the work environment that can compromise the dental surgeon, minimizing future problems [11]. In addition, students of dentistry obtain the perception of risk factors [11-12].

Thus, this study aimed to evaluate the perception of dental students in relation to the risk factors that may contribute to the musculoskeletal pain, and verify how the existence of painful symptoms influences the perception of factors.

MATERIALS AND METHODS

This exploratory transversal study, performed in course of dentistry enrolled at the Araçatuba School of Dentistry - UNESP, attended at least one course that contemplated clinical activities in its teaching plan. During the collection period, Sep to Nov 2016, there were 303 students enrolled who met this criterion.

The sample was composed of 241 dental students. Students with physical disabilities, either congenital or acquired, that included upper and lower limbs, articulate or spinal, and those who were pregnant or lactating were excluded from the study sample. In the questionnaire was attached the informed consent for participation in the study any questions in need of clarification regarding the voluntary participation in the research. This study was approved by the Research Ethics Committee of Araçatuba Dental School - UNESP, following all national and international standards.

Data collection was carried out during 4 months in 2016, after completion of a pilot study with 20 professionals, conducted to test the viability of the data collection tools. The data relating to socio-demographic variables, work, and health of students were obtained through a structured questionnaire, that contains only closed-ended questions designed specifically for this study. Socio-demographic variables include age, gender, and marital status. In relation to health, there was the body mass index (BMI), physical activity, consumption of cigarettes and alcohol, diagnosis of any disease in the last 12 months and use of pain medication.

To evaluate the work-related musculoskeletal disorders, the Standardized Nordic Questionnaire for Musculoskeletal Symptom [13] was used, with the goal of standardizing measuring of the musculoskeletal symptoms. The Brazilian version of the Nordic questionnaire was validated and adapted [14]. This tool consists of a posterior view of a human figure, subdivided into 9 anatomical regions: neck, shoulders, upper and lower back, elbows, wrists/hands, hips/thighs, knees and ankles/feet, and questions about the presence of musculoskeletal pain in any of the 9

anatomical areas, inability to perform normal activities and necessity to consult a health professional. The respondent has to signal with an X an affirmative or negative response (yes or no). A 12-month period prior to the time of the study was considered for the occurrence of musculoskeletal symptoms.

The questionnaire on risk factors at work that can contribute to musculoskeletal disorders (work-related) was also applied to identify how much work activities contribute to the development of musculoskeletal symptoms. This tool was originally developed in the United States [12].

In 2009, it was adapted and validated for Brazilian culture [15]. This instrument comprises 15 items that evaluate individuals' awareness of job environment factors and their potential contribution to musculoskeletal disorders. The individuals were asked to indicate on a scale from 0 to 10 (with 0= nothing and 10= a lot) how much each variable contributed to the development of pain and lesions related to their current work tasks. Responses were classified on a scale of three categories, which indicate severity of symptoms in crescent order: the first, from 0-1, indicates absence of symptoms; the second, from 2-7, indicates minimal to moderate symptoms; and the last, from 8-10, indicates severe symptoms. Each participant answered two validated and self-administered questionnaires, delivered at the end of the lectures in order not to disrupt the teaching activities. The questionnaires were distributed to the participants by graduate students, previously trained, who explained and clarified any doubts, avoiding errors in the filling and comprehension. The analysis was performed with the SPSS ver. 21.0 (Chicago, IL, USA). Descriptive statistics were used, and the data distribution was verified through the Kolmogorov - Smirnov test, which pointed out that the principles of normality are not followed. The association test for groups; the categories of the WRAPI and the comparison of the means were performed (Mann-Whitney and t-test) between groups with and without the presence of pain to determine whether there were differences in the perception of risk factors between the groups. The association test (likelihood ratio) between the groups with and without pain and the categories of the instrument regarding work factors that can contribute to musculoskeletal symptoms were performed. The average comparisons between groups were performed as follows: for each question, the instrument regarding work factors that can contribute to musculoskeletal symptoms and for each area of the body, according to the segments evaluated in the Nordic Questionnaire.

RESULTS

Among the students surveyed, with the average age of 22 (SD \pm 1.97) yr, 62.7% were

female, 97.9% single, and most practiced some physical activity (60.32%). Lots of the students (68.62%) had no harmful habits and practiced physical activities (60.57%). The presence of pain in the last 12 months was observed in 199 participants (83.0%). More than half of the respondents indicated the presence of neck pain (51.5%) in the last 12 months, 49.8% in the lower back, 49.4% reported pain in the upper back, 38.4% in the wrist/hand and. Musculoskeletal pain in the lower extremities (hips/thighs, knees, calf/leg, ankles/feet), were reported by less than 30% of the respondents. Most students had their perception classified as minimal to moderate (86.3%), with 6.2% high perception and 7.5% low perception. When the test of association between the perception of risk factors and pain symptoms was

performed ($P= 0.005$)(Table 1).

The instrument regarding work factors that can contribute to musculoskeletal symptoms, and the average of the group with pain being higher than the group without pain presented statistically significant differences for questions 1, 5, 6, 7, 9, 11, 13. The highest averages were found in the issues related to the repetition of movement (issues 5-9), followed by work-related factors (questions 9-15) and finally the risks to external factors (questions 1-4) (Table 2).

When comparing the groups with and without pain in the body areas, the average scores are also higher in the group without pain. All areas of the body showed statistically significant differences between the groups with and without pain, except for the elbows and knees (Table 3).

Table 1. Association between pain symptoms and the perception of risk factors that may contribute to the musculoskeletal symptoms in dental school students, Brazil, 2016

WRAPI	Painful symptoms				P
	Yes		No		
	n	%	n	%	
Absence	11	5.5	7	16.7	0.005*
Minimal to moderate	173	86.9	35	83.3	
High	15	7.5	0	0.0	
Total	199	100.0	42	100.0	-

*Likelihood ratio

Significance $\alpha = 0.05$

Table 2. Comparison of the mean scores on the instrument work factors that can contribute to musculoskeletal symptoms among dental students, Brazil, 2016

Instrument work factors	Painful symptoms				P
	Yes	sd(\pm)	No	sd(\pm)	
1. Perform the same task repeatedly	3.80	2.65	2.76	2.68	0.044
2. Work quickly for short periods (get up, hold, pull, etc.)	3.24	2.58	2.71	2.74	0.260
3. Have to handle or hold small objects	2.37	2.78	2.19	2.69	0.779
4. Insufficient intervals or pauses during the work day	3.88	2.96	3.12	2.90	0.153
5. Work in uncomfortable/inadequate positions or in a very tight-fitting space	6.70	2.60	5.74	2.73	0.035
6. Work in the same position for long periods (standing, inclined, seated, kneeling, etc.)	6.53	2.47	5.05	3.00	0.003
7. Bend or twist my back in an uncomfortable manner	6.43	2.64	5.17	3.07	0.019
8. Work close to or at my physical limit	5.81	3.11	4.90	3.45	0.123
9. Reach for or work at a level above my head or away from my body	5.41	2.97	4.33	3.09	0.039
10. Work in a hot, cold, humid, or damp environment	4.80	3.34	4.40	3.19	0.472
11. Continue working when I have some pain or some lesion	6.79	2.88	5.31	3.13	0.003
12. Carry, lift, or move heavy materials or items of equipment	5.17	3.15	4.24	3.46	0.111
13. Work day (duration of work, overtime)	4.28	2.91	3.00	2.95	0.012
14. Use tools (shape, weight, vibration, etc.)	3.64	2.94	2.90	2.90	0.147
15. Work without receiving training	5.25	3.40	4.52	3.68	0.247

Mann-Whitney Test

Significance $\alpha = 0.05$

Table 3. Comparison of the mean scores on the instrument work factors that can contribute to musculoskeletal symptoms, by area of the body, among dental students, Brazil, 2016

	Painful symptoms				
	Yes	sd(\pm)	No	sd(\pm)	P
Neck	5.35	1.76	4.18	2.11	0.000*
Shoulders	5.47	1.80	4.28	2.03	0.000*
Upper Back	5.16	2.00	4.43	1.98	0.005*
Elbow	5.24	1.88	4.74	2.03	0.428*
Hands/Wrist	5.43	1.74	4.37	2.07	0.000*
Lower Back	5.22	1.96	4.35	1.99	0.001*
Thighs	5.44	1.51	4.65	2.08	0.022*
Knees	4.79	2.13	4.78	1.98	0.965*
Ankle/foot	5.42	1.76	4.59	2.05	0.013*
Average of all areas	4.94	1.95	4.02	2.16	0.007**

*Mann-Whitney Test

**t-test

Significance $\alpha = 0.05$

DISCUSSION

Several studies bring forth evidence of the high prevalence of musculoskeletal disorders in the neck, shoulder and spine areas, as was found in the participants of this research. The most affected area was the neck (57.5%), while the prevalence in the lumbar region was relatively low (21.1%) [16]. Pain in the lumbar region was also the most frequently reported type, being prevalent in 2/3 of the sample [17].

Several risk factors are associated with a dental career. During the job, many wrong postures are performed and repeated several times, including shoulder elevation, spine twist, spin and neck flexion, poor positioning of the hands and wrists, among others. These postures associated with a variety of factors directly related to work (provision of the equipment and equipment in the office and tools) and not ergonomic factors (e.g. working hours, work habits and personal characteristics) can lead to musculoskeletal pain [18].

Thus the education of ergonomics should focus on teaching the identification of these risk factors, which can endanger the health of the students and should be avoided to minimize future problems [19]. Students can understand the risk factors for the development of musculoskeletal problems, highlighting the factors related to repetition of movement. The classification of the perception of the students is very controversial in the literature [20], which only ranked as high perception the mean scores higher than 7. In our study, the average was 5, considered moderate by these authors.

Students who already suffer from muscle pain are more aware of the risks than others without symptoms are, so there needs to be a greater awareness for the students of the causative factors of musculoskeletal pain. In order to stop the increased prevalence of this condition, the preventive measures are taken as soon as possible, preferably in the academic training of the

professional [21].

There are statistically significant differences in the average perception among groups in the comparison of each issue of the instrument when comparing the areas of the body. In another study, this difference was only present between the groups in the area of the neck and ankles/feet, perhaps because the instrument examined was divided into three dimensions and not the total score [21].

A study performed by dental assistants observed similar means to the present study. The factors considered most problematic were working in the same position for long periods, bending or twisting the back and accomplishing the same task several times [22]. The clinical activities performed by dental students are very repetitive and require static postures for long periods, being risk factors for the early onset of musculoskeletal disorders [23].

The instrument used in the present study, despite having already been validated and tested by several authors [12, 15, 24], has been widely used as an evaluation tool in the risk perception of dental professionals. Most studies are related to industrial [12, 15, 25], agriculture [26] and Mason tenders [27], and with nursing professionals [24]. This fact limited the comparison of our findings with the existing literature.

Although there are characteristic limitations of cross-sectional studies, this work shows a new perspective in relation to the planning of prevention actions for the academics. There are few reports in the literature on the perception of risk factors for professionals and dental students. Research is limited to verify the presence or absence of pain symptoms, without worrying about whether the dental surgeon and students realize or know the attitudes that cause musculoskeletal disorders.

CONCLUSION

Undergraduate students are aware of the

risk factors that contribute to the development and aggravation of musculoskeletal disorders, especially those related to repetition of movement. There is a greater perception of those already presented symptoms.

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