Musculoskeletal disorders and disability in Brazilian Dentists in São Paulo

Distúrbios musculoesqueléticos e incapacidade em cirurgiões-dentistas de São Paulo

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ABSTRACT

BACKGROUND AND OBJECTIVES: Musculoskeletal disorders represents one of the major public health problems among workers and the general population, and it is multifactorial in origin. It has attracted the attention of researchers concerned with issues relating to health and work, due to cost and its impact on the quality of life. It causes functional impairment, limitations in activities, decreased quality of life, disability, reduced work productivity and direct medical costs. To measure the prevalence of musculoskeletal disorders and the association between the musculoskeletal disorders and pain disability in dentists in São Paulo, Brazil.
METHODS: A cross sectional study was conducted with 91 dentists in the northwest of São Paulo, Brazil. Data were collected through interviews, using the Nordic Questionnaire, The Pain Disability Questionnaire and the Numeric Pain Scale were also administered to workers who reported pain. Statistical analyses were performed using SPSS 21.0.
RESULTS: Most dentists (90.4%) had musculoskeletal disorders, especially in the neck, upper and lower back. The analysis of the intensity of pain and disability with Pain Disability Questionnaire in symptomatic dentists showed an average pain intensity of 1.96, its intensity was classified as moderate. Mean scores of the Pain Disability Questionnaire total (7.91) and its dimensions - functional condition (5.29) and psychosocial condition (2.61) - suggest moderate disability in Brazilian dentists. There was moderate t correlation (r = 0.409) between pain intensity and the total score of disability caused by pain.
CONCLUSION: Pain and work-related musculoskeletal disorders interfere significantly in dentists' lives. There is significant correlation between pain intensity and disability caused by pain in dental surgeons.
Keywords: Cumulative trauma, Disability, Disorders, Occupational health, Risk factors.

RESUMO

JUSTIFICATIVA E OBJETIVOS: Os distúrbios musculoesqueléticos representam um dos principais problemas de saúde pública entre os trabalhadores e a população em geral, e é de origem multifatorial. Esses problemas causam comprometimento funcional, limitações nas atividades, diminuição da qualidade de vida, incapacidade, redução da produtividade do trabalho e custos com cuidados médicos. O objetivo deste estudo foi avaliar a prevalência de distúrbios musculoesqueléticos e a associação com a incapacidade gerada pela dor em dentistas em São Paulo, Brasil.
MÉTODOS: Estudo transversal realizado com 91 dentistas no noroeste de São Paulo, Brasil. Os dados foram coletados por meio de entrevistas, utilizando-se o Questionário Nórdico, o Questionário de Incapacidade gerada pela Dor e a Escala Numérica de Dor também foram aplicados aos trabalhadores que relataram dor. As análises estatísticas foram realizadas utilizando SPSS 21.0.
RESULTADOS: A maioria dos cirurgiões-dentistas (90,4%) apresentou distúrbios musculoesqueléticos, especialmente no pescoço, nas costas, parte superior e inferior. A análise da intensidade da dor e incapacidade com Questionário de Incapacidade gerada pela Dor em dentistas sintomáticos mostrou uma intensidade média de dor de 1,96, sendo sua incapacidade classificada como moderada. As pontuações médias do Questionário de Incapacidade gerada pela Dor total (7,91) e suas dimensões - condição funcional (5,29) e condição psicossocial (2,61) - sugerem incapacidade moderada em dentistas brasileiros. Houve correlação t moderada (r = 0,409) entre a intensidade da dor e a pontuação total de incapacidade causada pela dor.
CONCLUSÃO: A dor e os distúrbios musculoesqueléticos relacionados ao trabalho interferem significativamente na vida dos dentistas. Existe uma correlação significativa entre a intensidade da dor e a incapacidade causada pela dor em cirurgiões-dentistas.
Descritores: Fatores de risco, Incapacidade, Saúde ocupacional, Transtornos traumáticos cumulativos.

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INTRODUCTION

Musculoskeletal disorders represent one of the major public health problems in developed countries[1]. It is common among workers and the general population, and it is multifactorial in origin[2-6]. It has attracted the attention of researchers concerned with issues related with health and work due to its cost and impact on the quality of life. It causes functional impairment, limitations in activities, poor quality of life, disability, reduction in work productivity and direct medical costs[7,8]. Therefore, it causes

problems in the population due to its high prevalence and morbidity and triggers a great potential for disability[2].

Since dentistry is a profession that demands attention and precision in the movements, the dentist is susceptible by the vulnerability and problems of various natures in the occupational framework[9], especially those related to the specific postures during their clinical activity[9-11]. In dental practice, professionals turn sharply flexing or doing rotations in the regions of the neck and spine and shoulder abduction to improve the field of view and achieve easier access to the oral cavity[3,9-14].

The compression of musculoskeletal structures become a risk factor for the development of lesions among these professionals, harming their health and possibly forcing to an early retirement. This occurs when professionals adopt static and sometimes clumsy repetitive movements that combined contribute to the worsening of pain symptoms[8,11,14]. Most of these symptoms can be relieved with proper preventive measures, especially before the settling of chronic damage[3,8,11-14].

Despite the high prevalence of musculoskeletal disorders described, very little is known about these symptoms among dentists and their predisposing factors[15]. The assessment methods to evaluate musculoskeletal disorders have been shown to be constant in order to help define the relationship between symptoms and the type of work and the body region most affected by pain[16]. Organizations and researchers concerned with issues relating to health and work have been studying measures to assess pain and disability in individuals with musculoskeletal disorders, using questionnaires and scales that have been found to be very useful to evaluate the different aspects of these occupational problems[2,16-18].

The tools to assess the functional capacity of the employee are changed due to psychosocial and health problems, and this can cause impacts or limitations on the employment activity[2,16-19]. The objective of this study is to investigate the prevalence of musculoskeletal disorders and the correlation with the disability caused among dental professionals.

METHODS

This is an exploratory transversal study, done in dental clinics that offer dental treatment in the northeastern region of the state of Sao Paulo, Brazil. The study was approved by the Committee on Ethics for Research on Humans of the School of Odontology of Araçatuba of the Paulista State University- under number 373.186, and done with the understanding and written consent of every participant.

The sample consisted of dentists enrolled in various postgraduate specialties (dentistry, endodontics, periodontics, surgery, prosthodontics, implant dentistry, pediatric dentistry, and orthodontics) of a medium-sized municipality in the State of São Paulo, Brazil, during 2016. The board recommends that each dental class specialization is comprised of 12 students (N = 96). Patients with physical limitations and pregnant women were excluded from the study.

Data collection was done during four months in 2016, after the completion of a pilot study with 20 professionals to test the viability of the data collection tools.

The data variables related to sociodemographic, work and the health of dentists were acquired through a structured questionnaire designed specifically for this study. The sociodemographic variables include age, gender, and marital status. Work-related variables include place of employment, the number of hours worked, breaks between consults, and time since graduation. Health-related variables included Body Mass Index (BMI), the practice of physical exercises, consumption of cigarettes and alcohol, the diagnosis of any disease in the last 12 months, and the use of pain medication.

To evaluate work-related musculoskeletal disorders, the Nordic questionnaire developed by Kuorinka was used, with the goal of standardizing the measuring of musculoskeletal symptoms. The Brazilian version of the Nordic questionnaire was validated and adapted by Barros and Alexandre[13]. This tool is composed of a posterior view of a human figure, subdivided into nine anatomical regions: neck, shoulders, upper and lower back, elbows, wrists/hands, hips/thighs, knees, and ankles/feet. It includes questions about the presence of musculoskeletal pain in any of the nine anatomical areas, the inability to perform normal activities and the necessity to consult a health professional, and requires the respondent to mark with an X an affirmative or negative answer (yes or no). A 12-month period prior to the time of the study was considered for the occurrence of musculoskeletal symptoms.

The Pain Disability Questionnaire (PDQ) was used to evaluate pain disabilities in dentists who reported pain in some part of the body in the past 12 months. It was developed in 2003 by Anagnostis, and the Brazilian version of the tool was validated by Giordano et al.[2]. The tool is composed of a total of fifteen items that evaluate the effect of pain on work, personal care, mobility, ability to stay sitting or still, lifting objects, walking or running, self-medication, medical consultations, social life, leisure, help to perform tasks, and emotional state. These questions were divided into two categories: one category measures the Functional Condition, and is composed of nine items (1,2,3,4,5,6,7,12,13), and the other measures the Psychosocial Component, and is composed of six items (8,9,10,11,14,15). The category corresponding to the Functional Condition can vary from 0 to 90, and the Psychosocial Component category can vary from 0 to 60 points. For the total PDQ analysis, the scoring of the tool can vary from 0 to 150 and uses the following classification: zero means no disability, scores from 1-70 indicate a moderate disability, scores from 71-100 demonstrate severe disability and scores from 101-150 indicate extreme disability.

Finally, the numerical pain scale of 0 to 10 was used to evaluate the intensity of the pain. Zero meaning the absence of pain, and ten is the worst pain imaginable[17].

Statistical analyses

Data were entered the database and analyzes were performed using the SPSS version 21.0 program. The descriptive analysis using measures of central tendencies (simple frequencies, averages, and medians) and of dispersion (standard deviation) was done for the categorization of sociodemographic, occupational and population health, and musculoskeletal disorders; disability due to pain, and intensity of pain. The multivariate Logistic Re-

gression analysis was used to analyze the relationship between the sociodemographic variables and the musculoskeletal disorders. The correlation between disability and pain intensity among symptomatic subjects was measured by the Spearman correlation coefficient. For group comparisons, the nonparametric Mann-Whitney and Kruskal-Wallis tests were used. The Maximum Likelihood was used, associating the general questions of the "Nordic Musculoskeletal Questionnaire" (NMQ) (Question A: Over the last 12 months, did you have any problems such as pain, tingling or numbness? Question B: In the last 12 months, were you unable to perform normal daily activities? Question C: in the last 12 months, have you consulted a health professional because of this condition? Question D: Did you have a problem over the past seven days?) and sociodemographic and occupational variables. A statistical significance level of 5% was considered for all tests.

RESULTS

Of the total of dentists surveyed 63.8% were female and 36.2% male (and the average age was 30.68 years (SD±6:16 years). Although the sample shows a higher percentage of female in this variable was not a risk factor for the presence of musculoskeletal

disorders. Supplemental Table shows the frequency of all socioeconomic and occupational profile variables used in the study. The experience of musculoskeletal disorders was reported by 90.40% in at least one part of the body in the last 12 months due to the professional activity (Table 1). The most frequently reported sites were the neck (58.5%), lower back (57.4%), upper back (55.3%), shoulders (46.8%), hand/wrist (44.7%) (Table 1).
In evaluating the intensity and disability caused by pain, 69.1% of dentists had a "moderate" disability to work caused by the pain. The average score on a pain scale, which can range from 0-10, was 1.96 (SD ± 0.86).
The correlations of the Numerical Pain Scale with the issues of the PDQ, when significant, proved weak and positive. The intensity of pain was rated as moderate in 2.1% and null in 95.8%. The correlation between the domains of the PDQ (Functional Condition-FC, Psychosocial Component-CP, and PDQ-Total) and the Pain Scale showed moderate, positive and statistically significant differences (p = 0.409 ep≤0,01; p = 0.503 ep≤0 01; p = 0.498 ep≤0.01). Those who had pain symptoms in the last 12 months and used pain medication had a greater chance of failure than those who did not. These same results were found in comparisons of the Psychosocial Component and Functional Condition (Table 2).

Table 1. Dentists distribution regarding prevalence and severity of musculoskeletal disorders. Brazil, 2016

Regions	Complained of pain in the last 12 months		Inability to perform activities		Consulted a health professional in the last 12 months		Presented a problem in the last 7 days	
	No(%)	Yes(%)	No(%)	Yes(%)	No(%)	Yes(%)	No(%)	Yes(%)
Neck	41.5	58.5	93.6	6.4	81.9	18.1	74.5	25.5
Shoulder	53.2	46.8	94.7	5.3	86.2	13.8	85.1	14.9
Upper back	44.7	55.3	95.7	4.3	81.9	18.1	80.9	19.1
Elbows	87.2	12.8	98.9	1,1	96.8	3.2	96.8	3.2
Fists/Hands	55.3	44.7	96.8	3.2	87.2	12.8	85.1	14.9
Lower back	42.6	57.4	89.4	10.6	78.7	21.3	80.9	19.1
Hips / Thighs	87.2	12.8	97.9	2.1	96.8	3.2	94.7	5.3
Knees	71.3	28.7	94.7	5.3	90.4	9.6	87.2	12.8
Ankles / feet	81.9	18.1	93.6	6.4	94.7	5.3	94.7	5.3
Total	9.6	90.4	72.3	27.7	55.3	44.7	47.9	52.1

Table 2. Comparison of means between the components of the "Pain Disability Questionnaire (PDQ)" and the sociodemographic and occupational variables of dentists. Brazil, 2016

Variables	n	Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value
Gender*										
Female	54	4.56	6.66	0.091	2.67	3.44	0.888	7.22	9.62	0.214
Male	31	6.58	6,98		2.52	2.87		9.1	9.37	
Marital status*										
Married	33	7.09	7.22	0.013*	3.3	3.32	0.064	10.39	9.75	0.012*
Single	52	4.15	6.34		2.17	3.12		6.33	9.1	
Working hours/day **										
6 hours	10	1.7	3.16	0.005**	1	1.7	0.016**	2.7	4.83	0.003**
8 hours	26	4.81	7.06		2.31	3.4		7.12	10.06	
More than 8 hours	32	7.69	7.04		3.84	3.51		11.53	9.69	

Table 2. Comparison of means between the components of the "Pain Disability Questionnaire (PDQ)" and the sociodemographic and occupational variables of dentists. Brazil, 2016 – continuation

Variables	n	Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value
Have breaks *										
Yes	47	4.47	5.89	0.235	1.89	2.48	0.040*	6.36	7.77	0.154
No	36	5.97	7.33		3.53	3.86		9.5	10.81	
Presence of pain*										
Yes	23	8.35	7.21	0.005*	4.52	3.15	0.000*	12.87	9.71	0.001*
No	62	4.16	6.34		1.9	2.98		6.06	8.83	
Uses medication*										
Yes	49	7	7.45	0.002*	3.43	3.53	0.003*	10.43	10.38	0.001*
No	35	3.06	5.09		1.43	2.39		4.49	7.06	

* Mann-Whitney Test / **Kruskal-Wallis Test.

In the multivariate model, by Logistic Regression, all variables that were associated at the p <0.100 level were included. In this analysis, variables such as marital status, the presence of pain and age were statistically significant, and married professionals have 25.54 times higher risk of having a moderate disability due to pain (PDQ) than single individuals. A statistically significant difference was found with the PDQ -Total Marital Status, being married with a greater disability caused by pain than those who were reported as being single. The age was shown as a protective factor (Table 3).

37 The daily working hours of most dentists were over 8 hours (36.36%), and having breaks was reported by 55.3% and presented a significant functional disability. Those who work up to 6 hours/day had the lowest score regarding the inability of professionals to extend their workday (Table 4). Those who had pain symptoms in the previous 12 months had 18.38 times increased risk of having a moderate disability due to pain (PDQ) than the asymptomatic in a multivariate analysis (Table 3).

Table 3. Multivariate analysis by logistic regression of factors that may affect the extent of disability caused by pain among dentists. Brazil, 2016

Variables	Multivariate analysis		
	p-value	OR adjusted	CI 95%
Marital status			
Married	0.027	25.548	1.452-449.481
Single		1	-
Workday			
6 hours		1	-
8 hours	0.187	5.636	0.432-73.509
More than 8 hours	0.132	8.13	0.532-124.183
Presence of pain			
Yes	0.04	18.384	1.139-296.739
No		1	-
Use medicines			
Yes	0.07	5.846	0.864-39.563
No		1	-
Age (years)	0.031	0.834	0.707-0.983

DISCUSSION

In this study, the presence of musculoskeletal disorders was observed in 90.4% of the professionals, and this is a very high prevalence when compared to other studies that also showed higher pain rates of [6,20-24]. Pain is the major symptom resulting from musculoskeletal disorders that may generate different degrees of disability, and this is considered one of the most serious problems regarding the health of the worker[2,17].

The most prevalent regions of musculoskeletal disorders found were the neck, upper back, shoulders, wrists/hands and lower back. The pain is manifested in higher and lower degrees according to the daily requirements of static overload that the professional undergoes[6,20]. The most overburdened regions by static muscular effort are the cervical, shoulder and lower back since the dentist performs flexion and abduction of the shoulder to serve as a support base for fine and precise movements performed with the hands[4,21,23-26]. Furthermore, a sitting posture for a long time can decrease muscle flexibility and joint mobility, leading to fatigue of the extensor spinal muscles, and the somatization of these factors compromise the stability and alignment of the spine, particularly overloading the lumbar region[21,24].

Most dentists presented a "moderate" disability to work caused by pain involving both the functional capacity as well as the psychosocial aspects. This result can be explained by the average age of the study population, 30.68 years, and when analyzing the average pain intensity reported by the subjects, it was observed that it was 1.96, which indicates a predominance of mild pain[2,18,27].

A positive and statistically significant correlation was found between most of the questions and the PDQ Pain Scale. The PDQ tool allows a better understanding of the limitation of symptomatic subjects and its relationship to pain intensity[2,27]. When there was a validation of the PDQ for the Brazilian population, a positive and moderate correlation between the values obtained by the two scales was established[2]. The values found by the correlation coefficient between the PDQ scores and the Numerical Pain Scale suggests that there is a relationship between the intensity and the perception of functional disability[2].

The dentists with pain symptoms in the last 12 months and who used pain medication had more chances of failure than those

who did not. Professionals who had pain first used some form of drug therapy for the relief, seeking help from a professional specialist only after persistent symptoms[21,22,28,29].

It is important to highlight that musculoskeletal disorders are multifactorial in origin[3,4,5,6], and some variables should be considered to study the relationship between pain intensity and disability, such as frequency and location of the pain, the presence of depression and the beliefs regarding pain, among others[2]. The disability caused by pain occurs not only by the pain sensation but also involves the interaction between the physical, psychological, social and labor aspects[2,5,23,30,31].

In the multivariate model, all variables were included that had a statistically significant association. When a multivariate analysis was conducted, variables such as marital status, the presence of pain and age were statistically significant, and married professionals have 25.54 times higher risk of having a moderate disability due to pain (PDQ) than single individuals. These results differ from similar studies already performed[15,32]. Little is said in the literature about the fact that marital status has an influence on musculoskeletal disorders, but studies show that there is a greater psychological and social support for those subjects married or in a stable relationship[32]. It should be noted, however, that people who are married or in a stable relationship are willing to form a family, including children, which requires greater financial stability in order to meet the increased spending. In this framework, a prolongation of working hours associated with the fact that the dentist who performs clinical activities in more than one location can complement the household income, hence creating physical and mental fatigue, stress occurs and may contribute to the onset of painful symptoms[23].

The workday was statistically significant, and those who work up to 6 hours/day had the lowest score regarding disability than the professionals who extend their workday. The extension of the workday ends up requiring more maintenance on the static posture of the body, causing muscle fatigue, which leads to the adoption of compensatory postures, leading to the onset of muscle pain and decreased strength of the upper limbs[14,21,23]. This can be explained by muscles overload on the upper part of the body (including shoulder, neck, hands) that the dentists create when performing their work activities, coupled with the stress and excessive workload[4,11,23].

People who had pain symptoms in the last 12 months had 18.38 times increased risk of having a moderate disability due to pain (PDQ) than asymptomatic patients. Symptomatic subjects presented a higher perception to painful sensation perhaps for fear that the musculoskeletal symptoms may prevent the completion of future work activities or even recreation. The search for help of a health professional can be considered as a warning for the installation of functional disability[31].

Musculoskeletal disorders can be prevented by adopting a healthier lifestyle, taking care of nutrition, practicing sports, performing daily stretches and adoption of ergonomic principles that can protect the dentist from these diseases[26]. Physical exercise on a regular basis causes circulatory and metabolic adaptations beneficial to musculoskeletal structures, helping to maintain the static and dynamic posture, thus reducing the risk of mus-culoskeletal injuries[15,21,26]. Interventions in work organization, changes of pace and workday, adjustments of equipment and office furniture taking into account the comfort, efficiency and the wellbeing of the professional can help to improve musculoskeletal injuries[23].

CONCLUSION

It was concluded that there was a high prevalence of musculoskeletal pain among dentists, and the upper and lower back regions were the most affected. The correlation between pain and disability was positive, despite that the intensity of pain has been shown to be minimal, and the disability of these professionals was considered moderate.

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