



Revista Estomatológica Herediana

ISSN: 1019-4355

rev.estomatol.herediana@oficinas-  
upch.pe

Universidad Peruana Cayetano Heredia  
Perú

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Revista Estomatológica Herediana, vol. 27, núm. 4, octubre-diciembre, 2017, pp. 210-218  
Universidad Peruana Cayetano Heredia  
Lima, Perú

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# Musculoskeletal disorders associated to dentists work activities in Brazilian primary health care

Trastornos musculoesqueléticos asociados a actividades de trabajo de dentistas en el cuidado primario de salud brasileño

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## RESUMEN

**Objetivos:** Verificar la prevalencia de los trastornos musculoesqueléticos asociados con el trabajo (TMEAT) de los dentistas de la red de atención primaria de salud en Recife, Brasil. **Material y Métodos:** Se utilizó el Cuestionario nórdico de síntomas musculoesqueléticos con el objetivo de identificar la presencia de dolor, incomodidad o latencia en diferentes áreas del cuerpo. **Resultados:** El 97,3% de los entrevistados mencionaron los síntomas musculoesqueléticos asociados con la práctica de la Odontología. El Cuello (56,75%); el puño / manos / dedos (54,06%); los hombros (51,35%) y la región lumbar (48,65%) fueron los lugares más afectados. Al medir la asociación entre TMEAT y las “5” variables extraprofesionales estudiadas, solo la actividad física se asoció con síntomas en la región de puño / manos / dedos ( $p < 0,05$ ). **Conclusiones:** se observó un alta prevalencia de TMEAT en dentistas de Recife. La práctica de actividad física regular demostró ser un posible factor de protección para las lesiones puño / manos / dedos.

**PALABRAS CLAVE:** Epidemiología, prestación de atención de salud, enfermedades profesionales (DeCS, BIREME).

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## SUMMARY

**Objectives:** It was aimed to verify the prevalence of work-related musculoskeletal disorders (WRMSD) of dentists from the primary health care network in Recife, Brazil. **Material and Methods:** The Nordic Musculoskeletal Symptom Questionnaire was used having as goal to identify the presence of pain, discomfort or dormancy in different body areas. **Results:** The musculoskeletal symptoms associated with the practice of Dentistry were mentioned by 97.3% of the interviewees. Neck (56.75%); fist/hands/fingers (54.06%); shoulders (51.35%) and lumbar region (48.65%) were the most affected locations. When measuring the association between WRMSD and the “5” extra-professional variables studied, only physical activity was associated with symptoms in the fist / hands / fingers area ( $p < 0.05$ ). **Conclusions:** A high prevalence of WRMSD was observed in dentists of Recife. The practice of regular physical activity showed to be a possible protective factor for the fist/hands/fingers lesions.

**KEYWORDS:** Epidemiology, health care, occupational diseases (DeCS, BIREME).

## INTRODUCTION

The word “ergonomics” is derived from the Greek language in which “*ergo*” means “work” and “*no-mos*” means “law”. From this point of view, ergonomics deals with the planning of devices, technical systems and tasks in order to increase staff security, health, comfort and performance. In Dentistry, the application of ergonomic principles shows to be fundamental to the well-being of the working team and has as main goal to obtain resources and systems to decrease physical/cognitive stress and to prevent diseases related to dental practice, seeking a more expressive productivity with better quality and greater comfort for both professional and patient (1).

Dental practice causes dental surgeons to work for long hours seated and to assume at times incorrect postures, thus provoking a mechanic compression on the structures located in the lumbar region and adjacent areas. The use of instruments and apparatus along with task repeatability and excessive applied force in certain procedures, expose these professionals to develop musculoskeletal lesions from occupational order (2). Besides dentist’s posture and movements-related issues, lesions can derive from modern technology insertion such as mechanization and automation of work processes, ignoring the lack of adaptation and training of workers in this new reality. Thus, the tasks are now developed with less effort, while the movements, however, can be repeated and at many times static, always overburdening the same muscular group through the maintenance of a posture that is at times inappropriate and during long periods

on the same day (3).

In Brazil, occupational syndromes have been recognized by the Social Insurance Ministry as Work-Related Musculoskeletal Disturbances (WRMSDs). These syndromes can occurs through the permanence of body segments in determined positions for an extended period of time. The signs and symptoms are muscles, tendons, fascias, nerves, ligaments, vessels and articulations inflammation (4). The most common forms of clinical presentation of these pathologies on dentists are tendinitis, tenosynovitis, carpal tunnel syndrome, myositis and bursitis. “The diagnosis of these conditions should be performed through analysis of: professional life; movements’ frequency; equipments; posture during working hours; environmental conditions; the time in duty; existence of breaks during work and of the interpersonal relationships with co-workers and superiors”(3).

Prevalence studies in scientific literature have demonstrated that the MSDs have presented expressive numbers among dental surgeons from all around the world with incidence percentage ranging from 63% to 95% (5-7) Therefore, with the vertiginous increase of the importance of ergonomics in the current context and the crescent Dentistry professionals’ number involved with musculoskeletal disturbances, a systemic ergonomic approach is necessary to the enhancement of working conditions, optimizing productivity and reducing lesions occurrence (8,9).

In the last decades, health workforce, management, worker healthcare protection and quality of work en-

vironment issues have been in the center of health political discussions in Brazil (10,11). In Primary Health Care (PHC), dentists' determined attributions aim individual and collective integral attention to oral health, with familiar and communitarian approach (12). However, it can be observed that assistance activities concentrate this professional major daily workload.

Additionally, there is a scarcity of studies that aim to clarify the impact of musculoskeletal diseases related to the activities carried out by dentists that work in the PHC (14,15), with the goal of supporting the planning of actions that intent to prevent the development of these disorders, to improve working conditions and increase quality in services rendered. Therefore, the intention of this study was to ascertain the prevalence of musculoskeletal disorders related to the work of dental surgeons that perform in health unities in the PHC network of Recife, Pernambuco, Brazil.

## MATERIALS AND METHODS

### Design and area study

The study is defined as observational of transversal and quantitative character. The study development area corresponded to the eight Health Districts (HD) in the PHC network of Recife's Secretariat of Health, of which Recife is the capital of the state of Pernambuco, located in the northeast region of Brazil.

In the city of Recife, in the Northeast Region of Brazil, the PHC network expanded in 9 times the number of Family Health Teams (FHT) in the last decade, meaning a coverage increase of 54%. Data from 2014, informs the existence of 153 oral health teams (ESB), which corresponds to 32% of assistance coverage in oral health, considered insufficient (Recife, 2014) (16). Eighty-two dentists are distributed as follows: HD1 / 10, HD2 / 28, HD 3 / 6, HD 4 / 24, HD 5 / 20, HD 6 / 14, HD 7 / 34 and HD 8 / 28. The modality of work is 40 hours per week, with 70% reserved for ambulatory care.

### Participants

The study population corresponded to dental surgeons that were performing clinic activities in the BHS and

PHC network of Recife in 2016 (164 professionals). A pilot or convenience sample composed of 50% of the group (82 dentists) was randomly selected from a population composed of 164 dentists from the city of Recife. In each of the eight districts, the selection of the sample was made randomly and corresponded to 50% of the total number of professionals.

### Data collection

Data collection used validated Brazilian version of the self-application form named Nordic Musculoskeletal Questionnaire (17), in which the interviewee would register the presence or absence of pain, discomfort or dormancy in nine body areas: neck/cervical area; shoulders; arms; elbows; forearm; fists/hands/fingers; dorsal area; lumbar region; hips/lower limbs, mentioning the frequency of symptoms presence according to the following categories: no, rarely, often and always. Two researchers were responsible for data collection. The training of the researchers had the objective of standardizing the steps regarding to the data collection with the respondents: appointment with the dentist for the delivery of the form; reading of informed consent for compliance with ethical requirements; receipt of questionnaires after 24 hours. For that reason, a reserved location in the BHS was selected for delivery of the informed consent form and the research form. It was suggested that the interviewee should use this space to respond to the form, during the period of work of the dentist.

All questions were answered by relating the affected body area. Besides that, each research participant would answer if the symptoms presented kept any relationship with the dental work performed. Through this instrument, information regarding the practice of physical activity and extraprofessional activities were also collected as well as sociodemographic data for the characterization of sample profile.

The data collection was only realized after each participant was enlightened about each research step and agreed to participate through the signature of an informed consent form. This research was approved by the Research Ethics Committee of the Centro de Ciências da Saúde of the Universidade Federal de Pernambuco, **CAAE:** 53378216.4.0000.5208. Approval Number: 1.473.034/2016.

## Data analysis

It was structured the distribution of absolute and relative frequencies of the studied sample, according to different variables. Inferential statistical analysis was carried out to verify the association between pain/discomfort and some external variables to the professional practice. For the association tests between these variable, it was used the Fisher's exact test and to measure the association force, the *odds ratio bruta* (OR) was calculated as well as its respective confidence interval at a level of 95% (CI of 95%). The margin of error used in the decisions of statistical tests was of 5%. The statistical program used was EPI info, version 7.

## RESULTS

From the total of 82 selected dentists from the eight sanitary districts that form the health socio-geographic organization of the city of Recife, thirty-seven of them were interviewed for this study, which corresponded to a percentage of 45.12% of the total intended. The high percentage of losses was caused, for the most part, by the professional's refusal to stop his clinical activities to answer the questionnaires. A minority of the losses occurred due to the absence of the professional in the work place at the time of the research due to vacations.

According to obtained data regarding sample characterization, from the 37 professionals interviewed, 29 (78.38%) were of the female sex and 8 (21.62%) of the male sex, with age ranging from 29 to 65 years, presenting a mean of 45.67 years old (standard deviation – SD = 10.89). The majority of the interviewees reported having the right hand as dominant (89.19%). It was verified a mean of clinical activity time of 25.51 years (SD=10.48%).

The greater part of the interviewees (97.3%) affirmed having some type of musculoskeletal disorder related to his/her professional activity, regardless of professional practice time. Only one interviewee with the time of 12 years of work stated that they did not have WRMSD. However, participants in the range of 11 to 15 years of work had the highest percentage of WRMSD (27.3%), followed respectively by the intervals of 31-35 (24.2%) and 21-25 (18.2%). Lower percentages of participants with WRMSD were observed for

the ranges 26-30 (6%), 16-20 (9,1%), 36-40 (9,1%). The range of 6 to 10 years obtained the percentage of 15.2%.

Figure 1 shows the prevalence of musculoskeletal disorders according to the anatomical region and its frequency. Considering the last 12 months, the most affected body areas regarding pain, discomfort or dormancy were neck area (56.75%); fist/hands/fingers (54.06%); shoulders (51.35%) and lumbar region (48.65%), taking into account the total sum of the answers "Often" and "Always". None of these conditions possessed significant statistical association related to the sex of the interviewees.

Regarding working hours, 91.89% of the dentists work in a regimen of 8 or more hours per day. The fact of not practicing physical activity was informed by 54.05% of the interviewees. For this reason, when carrying out the association test between the exposure to physical activities and the presence of pain/discomfort in different body areas, it was observed a significant statistically relationship in wrists/hands/fingers area (OR=0.195/ CI 95%; p=0.038), considering that 85% of dentists which do not physical activity presented problems related to this area.

Among the daily activities external to professional activity, computer use (56.76%) and the execution of household activities were the most related in the research (figure 2).

Concerning the influence of these daily activities on the appearance of pain and/or muscular discomfort, tables 1 and 2 display association measures, regarding neck, fists/hands/fingers, shoulders and lumbar regions, considering that these were the most mentioned areas in the interview, as presented in figure 1. However, none of the tested associations demonstrated to be statistically significant (p>0.05).

**Table 1.** Association between musculoskeletal disorders (pain/discomfort) in neck and fists/hands/ fingers regions and extraprofessional activities in dentists. Recife, 2016.

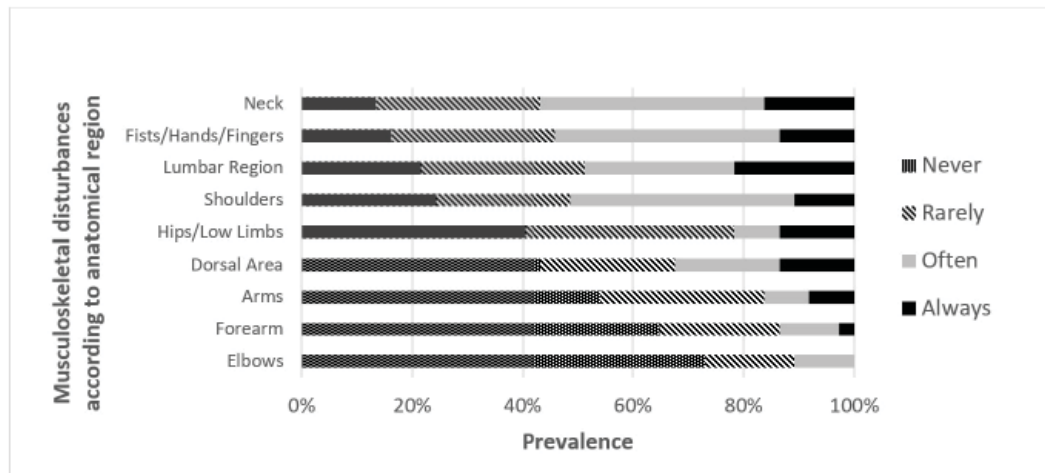
Activity		Neck Presence of pain/Discomfort				Fists / Hands / Fingers Presence of pain/Discomfort			
		n	%	p*	OR (IC=95%)	n	%	p*	OR (IC=95%)
Computer									
Use	Yes	17	80.95	0.317	1.931	16	76.19	0.293	1.92
	No	11	68.75		(0.423- 8,813)	10	62.5		(0.461- 7.989)
Household Activities	Yes	16	84.21	0.195	2.666	14	73,68	0.457	1.4
	No	12	66.67		(0.551- 12.883)	12	66.67		(0.34-5.764)

\* Fisher's Exact Test

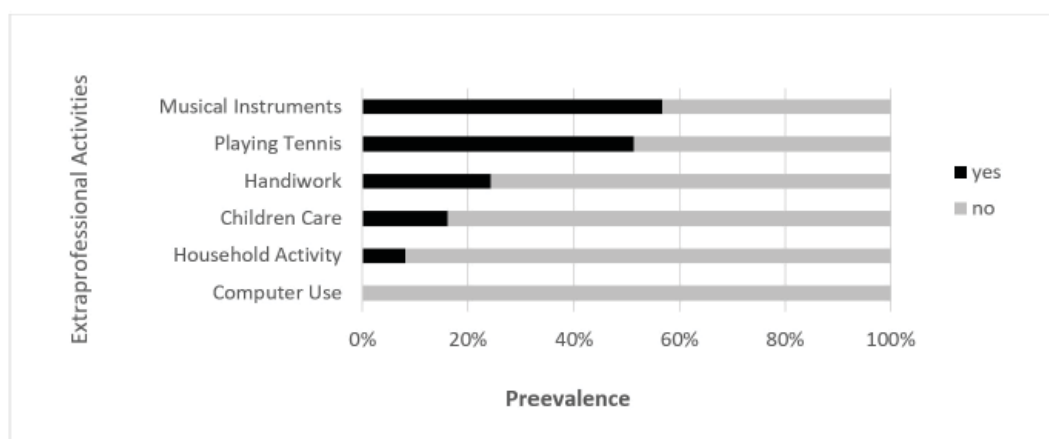
**Table 2.** Association between musculoskeletal disorders (pain/discomfort) in Lumbar and Shoulders Regions and extra-professional activities in dentists. Recife, 2016.

Activity		Lumbar Region Presence of Pain/Discomfort				Shoulders Presence of Pain/Discomfort			
		N	%	p*	OR (IC=95%)	n	%	p*	OR (IC=95%)
Computer Use	Yes	13	61.9	0.348	1.625	12	57.14	0.108	2.933
	No	8	50.0		(0.435- 6.068)	5	31.25		(0.748- 11.491)
Household Activities	Yes	11	57.89	0.574	1.1	10	52.63	0.306	1.746
	No	10	52.38		(0.299 4.042)	– 7	38.89		(0.472- 6.453)

\* Fisher's Exact Test



**Figure 1.** Prevalence and frequency of musculoskeletal disorders' involvement in a sample of dentists from the PHC network of the city of Recife-PE, Brazil, 2016.



**Figure 2.** Prevalence and activities external to the professional practice from a dentist's sample from the PHC network of the city of Recife-PE, Brazil, 2016.



## DISCUSSION

The discoveries of this research settled a diagnosis on the occupational health of dentists belonging to the PHC network of a metropolis from the northeast region of Brazil and are according to countless studies when describing the WRMSD as the main problem related to occupational health in workers involved with oral health (5-7).

It was observed that women are responsible for great part of the dental workforce in city studied. The Pernambuco state has a population formed in its majority by women (18). However, regardless the population matter, women participation as workforce has increased considerably in the different human tasks (19). In the dental area, specifically, this fact has been observed and confirmed by many researches (20-22). The average age found among the interviewees in the city of Recife-PE was 45.67 years old, including both young and older professionals, with 29 years old and 65 years old being minimum and maximum ages, respectively. From this group, the majority (97.3%) related the presence of musculoskeletal symptoms. In a study carried out with dental surgeons from the military police of Pernambuco, also with the application of questionnaires, similar data was found, with an average age of 45.81 years old and 84.1% of the interviewees relating the presence of pain or discomfort.<sup>21</sup> This great prevalence has been observed in other researches: 73% (5); 95% (6); 70% (7); 60% (22); 95.9% (23).

It is important to emphasize that the presence of WRMSD occurred independently of the time of professional practice, which ranged from 6 to 40 years. However, it is not possible to affirm that there is a relationship between professional practice time and presence of WRMSD, since most of the respondents stated that they present symptoms. In addition, the type of study adopted did not allow evidence of such relation, which requires other analytical approaches and longitudinal study design.

On the other hand, the experience of accumulated years can represent a path to be explored. In this case, the average time of practice as a clinic dentist is around 25 years, data which was found in this investigation, and can indicate that the pains, dormancies or discomforts related to the most diverse body areas

can result in accumulation of work that is performed in a non-ergonomic manner and whose consequences reflect in the professionals' health. It was verified in a similar research an average clinical activity of 12.2 years, but still, recorded a WRMSD frequency in approximately 60% of the participants (22).

In addition to professional practice time, working hours can also be an aggravating factor to the occurrence of lesions. In a research realized in the city of Fortaleza, Ceará, Brazil, 55% of the interviewees had a workload of more than 8 daily hours in the private sector, also being possible to observe the detachment of 60% of the professionals due to pain occurrences. In turn, in the city of Recife, 91.89% of the interviewees reported to work 8 or more hours per day (6). This result shows the great workload of the professionals who work in the HPC ambit.

The nature of the dental surgeon activity can expose this professional to many nuisances and harmful factors during his/her working hours (24). The usual posture adopted by the dental surgeon is characterized by maintaining the upper limbs in suspension, torso rotation and head flexion, forcing the cervical, scapular and thoracic-lumbar musculature. This posture, in a repetitive manner, causes discomfort and disorders to the musculoskeletal and the peripheral nervous systems and tends to provoke fatigue in the structures involved in its maintenance, with the possibility of causing acute or chronic lesions (25).

But how to explain the high prevalence of WRMSD in dentists that work with family health strategy, whose professional activities are not exclusively clinical-ambulatory nature? According to the Brazilian policy regarding the HPC, the attributions of a dental surgeon are intended not only to the performance of dental clinical procedures but also the promotion of health collectively, locally and of mapping of the operational area. In spite of that, clinical attendance takes 70% of primary care dentists' working hours, a considerable percentage represented almost always by patient continuous and successive care (12). Considering the great demand of patients directed to public health service, specifically in Recife, the stress and the intense work caused by a great number of clinical attendances, associated to intervals reduction between them, may have contributed to the high number of professionals affected by WRMSD in this



study. Dental practice causes dentists to work seated for long hours, assuming at times incorrect postures which in turn causes a mechanic compression on anatomic structures involved (2). Besides, the use of instruments and devices together with task repeatability and excessive administrated force in certain procedures, expose these professionals to the development of musculoskeletal lesions of occupational order.

In the present research, the most affected body areas regarding pain, discomfort or dormancy were neck, fist/hands/fingers, shoulders and lumbar region. These findings were similar to the ones obtained from other investigations (5,7,22,26,27). These locations represent body areas frequently activated during dental practice. Dentists spend half their work time with their neck flexed at an angle starting in 60 degrees, with their torso assuming angles superior to 30 degrees of inclination, with abductees shoulders (28). Thus, due to mechanic disadvantage imposed to articulations, it is necessary a greater effort to maintain these static postures. Consequently, the overuse of the anatomic structures and the lack of recovery time for this musculature, unleash musculoskeletal disorders, which can be avoided through the adoption of healthier lifestyle, such as: nutritional care, sports practice, daily stretching performance and ergonomic principles application (3).

As a result, it was ascertained that great part (85%) of sedentary dentists presented musculoskeletal symptoms in the fist/hands/fingers area. This result points the need of adopting regular physical activities as protective and strengthening measures of dentists' main work instrument anatomic structures: the hands. Similar data was found in an investigation, that verified the absence of physical activity can have a negative influence upon the professional's health (20). In the present study, extraprofessional activities did not present a relationship with the painful symptoms chart reported by dentists, leading to believe that such relation of symptoms was caused strictly by non-ergonomic maneuvers associated with professional activity, corroborating with other studies (7,22). These maneuvers are realized in ordinary manner when the work environment does not cooperate with the professional's health integrity maintenance, hazarding his/her physical and mental well-being and leading the professional to conserve inappropriate postures and movements to compensate the ergonomic defi-

ciency found in his/her workplace.

For this reason, it can be observed that the occupations can produce specific pathologies related to the type of work performed, which demonstrates the importance of investigating the frequency of dental practice-related musculoskeletal complaints. Prevention still is the best way of fighting the onset of WRMSD; routine habits alterations and work organization are attitudes that need to be encouraged in order to obtain a better life quality (29,30).

Regarding this study limitation, methodological care was taken so that the analyses produced would indeed express the opinion reported by the research's subjects. However, possible information biases must be considered. The high loss percentage interfered in the identification of associations of the considered level. Nevertheless, it was possible to know the prevalence and describe the socioprofessional profile of dental surgeons that work in PHC in Recife. Thus, it is expected that this study findings contribute to expand the discussion about the problematic in question which is related to the improvement of health and work conditions of the worker in the PHC and that consequently impacts the service quality given to the communities, which are targets of Recife's PHC health interventions.

It was observed a high prevalence of WRMSD among dental surgeons of the city of Recife with neck; fist/hands/fingers; shoulders and lumbar being the most affected body areas. There was no association between the disorders and the external activities to dental practice. Additionally, it was verified that the adoption of regular physical activity can be a protection factor against the WRMSD related to the fist/hands/fingers area.

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Recibido: 13-06-2016

Aceptado: 15-10-2017