

# Cumulative trauma disorders, overweight and obesity among Brazilian dentists

Evelyne Pessoa Soriano<sup>1</sup>, Marcus Vitor Diniz de Carvalho<sup>1</sup>, Ana Beatriz Vasconcelos Lima Araújo<sup>2</sup>, Humberto Gomes Vidal<sup>3</sup>, Kátia Maria Diniz de Carvalho<sup>3</sup>, Clóvis César de Mendoza<sup>3</sup>

<sup>1</sup>Adjunct Professor, MSc in Forensic Sciences, Faculty of Dentistry, University of Pernambuco, Brazil

<sup>2</sup>MSc student in Public Health, Faculty of Dentistry, University of Pernambuco, Brazil

<sup>3</sup>MSc student in Forensic Sciences, Faculty of Dentistry, University of Pernambuco, Brazil

## Abstract

**Aim:** This study aimed to assess the prevalence of cumulative trauma disorders (CTD), overweight and obesity and the association between them, among public health dentists. **Methods:** The study included 150 dentists working at various public health system units in Recife, PE, Brazil. A Brazilian version of the Nordic Musculoskeletal Symptoms Questionnaire was used. Obesity and overweight were observed across the BMI (body mass index) recommended by the World Health Organization. A descriptive analysis was carried out using SPSS 13.0 software. **Results:** Among respondents, 79.3% were female with a mean age of 44.42 years. The presence of musculoskeletal symptoms was reported by 138 (92%) of participants, 129 of whom linked the symptoms to their work activity. The cervical region was the most involved, accounting for 104 (14.3%) of the total 723 affected areas. Overweight was observed in 32% of the professionals and obesity in 13%. Of the 150 participants, 30 (20%) received a medical diagnosis of CTD and of these, 13 (43.3%) had a high BMI. The 40-49-year-old age group was most affected by CTD and females were more affected than males, accounting for 22.7% of professionals interviewed. There was no significant association between the presence of CTD and overweight/obesity ( $p > 0.05$ ). **Conclusions:** However, given the multifactorial nature of occupational diseases, it is likely that overweight and obesity may act as a predisposing factor in these diseases, interacting and enhancing the effects of other important risk factors for the occurrence of work-related musculoskeletal disorders.

**Keywords:** occupational health, cumulative trauma disorders, overweight, obesity.

## Introduction

Recently there have been reports of an increase in the prevalence of musculoskeletal conditions among dental professionals, with an etiology of repetitive movements, injuries due to cumulative trauma or work-related musculoskeletal disorders<sup>1-2</sup>.

Cumulative trauma disorders (CTD) are a group of diseases that affect muscles, tendons, nerves and vessels of the upper limbs (fingers, hands, wrists, forearms, arms, shoulder, neck and spine) and lower limbs (knee and ankle, especially) that are directly related to the demands of work tasks, physical environments and with the organization of work. They include clinical manifestations characterized by the occurrence of various symptoms, concomitant or not, such as pain, numbness, heaviness and fatigue and are often causes of temporary or permanent employment disability<sup>3-4</sup>.

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### Correspondence to:

Evelyne Pessoa Soriano  
Avenida General Newton Cavalcanti, 1650  
Tabatinga - Camaragibe -PE - CEP: 54753-901  
Phone: (81) 9960 6674  
E-mail: evelynesoriano@yahoo.com.br

There are several risk factors associated with these disorders, which can be divided into individual risk factors and occupational risk factors. The following are considered to be the most likely individual risk factors: age, gender, body mass index, muscular imbalance, muscle strength, socioeconomic conditions and the presence of other pathologies. Overweight and obesity may act as a permissible factor in musculoskeletal disease, interacting and enhancing the effects of other risk factors, as well as the alignment of the skeleton and the condition of muscles<sup>5-6</sup>. In a Swedish study that compared 6,328 obese individuals with 1,135 individuals from the general population of either gender, it was found that neck pain, along with pain in the back, hip, knee and ankle, was more common in obese people than in the general population<sup>7</sup>.

Although they are not recent illnesses, CTD are undoubtedly taking on an epidemic character, and some of their pathologies are chronic and recurring, difficult to treat and are creating disability that is not restricted to the workplace but also found in other normal activities of personal life<sup>8</sup>.

A high prevalence of musculoskeletal complaints was found in 430 Greek dentists participating in a study where a questionnaire was applied. The survey results showed that 62% reported at least one painful complaint<sup>9</sup>. In another study, 98.6% of dentists of Caxias do Sul, RS, Brazil, had some symptoms of musculoskeletal disorder that were associated with certain demographic, clinical and laboratorial characteristics. Pain was the primary symptom of disorder, affecting mainly the regions of the cervical spine, the elbows, lumbar spine and shoulders<sup>10</sup>. In a study carried out with 227 Brazilian dental students in Recife and Camaragibe, PE, Brazil, 176 (76.2%) reported experiencing pain during or after clinical work<sup>11</sup>.

Musculoskeletal disorders have a major impact on quality of life of the population in many countries, not to mention the financial costs. Although not exclusively caused by work, they represent a third of the occupational diseases in countries such as Japan, the United States and the Scandinavian countries<sup>12</sup>. In Brazil, the total of benefits provided by Social Security during the months from January to August 2009 was 1,162,818; of these, 18.97% were related to diseases of the musculoskeletal system and connective tissue<sup>13</sup>.

In order to draw attention to occupational health and to contribute to the quality of the working lives of these professionals, the aim of this study was to assess the prevalence of musculoskeletal symptoms and the association with obesity and overweight among Brazilian public sector dentists.

## Material and methods

This is a cross-sectional study that investigates the factor and effect at the same historical moment. The study was carried out from April to July 2010 and included 150 dentists (drawn from a population of 243) who worked in various units that are part of the public health system in the city of Recife, PE, Brazil, selected by the calculation for finite population, from a list provided by the Municipality of the city of Recife. Of the 283 professionals who originally

appeared in the list, 33 were excluded because they were managers and did not perform clinical activities in health units, two had died and five were removed (two professionals for maternity leave, one for an ongoing long-term out of state, and two due to health problems). Thus, the estimated prevalence was 50%, since no data were available concerning the prevalence for this population, and 5% error and confidence interval of 95%, resulting, then, in 150 subjects.

A modified version of the Nordic Musculoskeletal Symptoms Questionnaire (NMSQ) was used, which was validated in Brazil by Pinheiro<sup>14</sup>. The aim was to investigate the occurrence of musculoskeletal symptoms in the previous 12 months, the anatomical regions most affected, the frequency of symptoms, the participant's demographic profile (gender, age, education and marital status) and the characterization of the work process (activity time and work schedule).

Pain intensity was assessed from the clinical stages of CTD as advocated by Oliveira (1989)<sup>15</sup>, using an increasing scale of symptoms reported by the interviewee. The questionnaire was given to the dentists in their work environment. After filling it out, their anthropometric measurements were taken to assess if they were overweight or obese.

Obesity and overweight were observed across the BMI (body mass index), with the objective of determining if there is an association between this variable and the occurrence of CTD in this sample. To record the BMI, dentists were weighed using a digital scale with a maximum capacity of 150 kg and precision of 0.1 kg. Height was measured in meters, using a flexible measuring tape fixed to the wall. The participants were asked to remove their shoes, their heels and shoulders touching the wall, after which his head was positioned so that the occlusal plane were parallel to the ground. So, with the help of a frame of wood, the individual's height was marked on the tape, making it easier to read.

In population studies, the BMI, defined as the weight in kilograms divided by height in meters squared, is a useful measure to assess excess body fat, and it is generally agreed that, regardless of gender and age, adults with a BMI equal to or greater than 30 kg/m<sup>2</sup> are classified as obese<sup>16</sup>.

Data was analyzed through statistical tests, using the Statistical Package for Social Sciences (SPSS 13.0). Initially, a descriptive analysis was carried out to evaluate the frequency of the distribution of variables and to check if there were errors in data entry, seeking thereby to characterize the sample. The bivariate relationships between the dependent and independent variables were examined using tests of association (chi-square and Fisher's exact test). A statistical significance was considered when  $p < 0.05$  and confidence interval was determined at 95%.

This research was duly approved by the Ethics Committee of the University of Pernambuco, according to the Resolution CNS 196/96, via protocol 212/09.

## Results

Data analysis revealed that 119 (79.3%) of the 150 participants were female and their mean age was 44.42 years.

Among respondents, 77 (51.3%) reported working an average of eight hours per day and 78 (52%) reported performing some physical activity.

The presence of musculoskeletal symptoms was reported by 138 (92%) of participants and 129 (86%) of respondents linked these symptoms to their work activity. The cervical region was identified by respondents as the most affected by painful symptoms, accounting for 104 (14.3%) of the total of 723 affected areas, followed by wrists, hands and fingers (13.4%), lower back (13.4%) and shoulders (13.1%).

Using the BMI calculations, it was found that 48 individuals (32%) were overweight and 20 (13%) were obese. Among the 68 respondents who were overweight, the most affected age group was the 50 to 59 years one and the gender had a significant association with overweight/obesity ( $p < 0.05$ ) using the Pearson chi-square test, in which 26 (83.9%) of the total male respondents were overweight. The number of years doing the same activity was also significantly associated with overweight/obesity, and professionals with 21 or more years of activity as dentists had a greater increase

in BMI. Physical activity was carried out by 35 (51.4%) of the dentists who were overweight or obese (Table 1).

Of the 150 participants, 30 (20%) were diagnosed with CTD in the previous 12 months. Among these, 14 (46.7%) reported that their pain symptoms corresponded to the first stage of clinical CTD, as described by Oliveira (1989)<sup>15</sup>, feeling of heaviness, discomfort or mild and transient localized pain and without irradiation, that worsens with work and improves with rest. The most affected age group by CTD was the 40 to 49 years one and females were more affected than males, accounting for 22.7% of professionals interviewed. Of the 30 professionals diagnosed with CTD, 13 (43.3%) were overweight or obese. There was no significant association ( $p < 0.05$ ) between the presence of CTD and overweight/obesity (Table 2).

## Discussion

One of the main objectives of the results of this study was to describe and analyze how dentists are affected by

**Table 1** - Assessment of overweight/obesity according to age, gender, time since graduation, time in the same occupation, working hours and physical exercise.

Variable	Overweight/Obesity				Group Total		P value	OR (95% IC)
	Yes		No					
	n	%	n	%	n	%		
TOTAL	68	45.3	82	54.7	150	100.0		
<b>Age Group</b>								
Up to 39	22	38.6	35	61.4	57	100.0	$p^{(1)} = 0.182$	1.00
40 to 49	17	39.5	26	60.5	43	100.0		1.04 (0.46 a 2.34)
50 to 59	21	58.3	15	41.7	36	100.0		2.23 (0.95 a 5.21)
60 or over	8	57.1	6	42.9	14	100.0		2.12 (0.65 a 6.94)
<b>Gender</b>								
Female	42	35.3	77	64.7	119	100.0	$p^{(1)} < 0.001^*$	1.00
Male	26	83.9	5	16.1	31	100.0		9.53 (3.41 a 26.66)
<b>Time since graduation</b>								
Up to 10	10	29.4	24	70.6	34	100.0	$p^{(1)} = 0.077$	1.00
11 to 20	17	44.7	21	55.3	38	100.0		1.94 (0.73 a 5.16)
21 or more	41	52.6	37	47.4	78	100.0		2.66 (1.12 a 6.29)
<b>Time in the same profession</b>								
Up to 10	12	27.9	31	72.1	43	100.0	$p^{(1)} = 0.013^*$	1.00
11 to 20	17	44.7	21	55.3	38	100.0		2.09 (0.83 a 5.27)
21 or more	39	56.5	30	43.5	69	100.0		3.36 (1.48 a 7.62)
<b>Work load</b>								
6 hours	12	40.0	18	60.0	30	100.0	$p^{(1)} = 0.260$	1.00
8 hours	32	41.6	45	58.4	77	100.0		1.07 (0.45 a 2.52)
More than 8 hours	24	55.8	19	44.2	43	100.0		1.89 (0.74 a 4.88)
<b>Carry out physical exercise</b>								
Yes	35	44.9	43	55.1	78	100.0	$p^{(1)} = 0.906$	1.00
No	33	45.8	39	54.2	72	100.0		1.04 (0.55 a 1.98)

(\*): Significant difference at a level of 5.0%

(1): Using the Pearson's chi square test

**Table 2** - Evaluation of diagnosed CTD in the past 12 months according to age, gender, time since graduation, time in the same occupation, working hours, physical exercise and overweight/obesity

Variable	CTD				Group total	P value	OR (95% IC)
	Present		Absent				
	n	%	n	%			
TOTAL	30	20.0	120	80.0	150	100.0	
<b>• Age Group</b>							
Up to 39	10	17.5	47	82.5	57	100.0	p <sup>(1)</sup> = 0.724 1.00
40 to 49	11	25.6	32	74.4	43	100.0	1.62 (0.61 a 4.25)
50 to 59	6	16.7	30	83.3	36	100.0	0.94 (0.31 a 2.85)
60 or more	3	21.4	11	78.6	14	100.0	1.28 (0.30 a 5.45)
<b>• Gender</b>							
Female	27	22.7	92	77.3	119	100.0	p <sup>(1)</sup> = 0.107 2.74 (0.77 a 9.71)
Male	3	9.7	28	90.3	31	100.0	
<b>• Time since graduation</b>							
Up to 10	5	14.7	29	85.3	34	100.0	p <sup>(1)</sup> = 0.628 1.00
11 to 20	9	23.7	29	76.3	38	100.0	1.80 (0.54 a 6.03)
21 or more	16	20.5	62	79.5	78	100.0	1.50 (0.50 a 4.48)
<b>• Time in the same profession</b>							
Up to 10	5	11.6	38	88.4	43	100.0	p <sup>(1)</sup> = 0.227 1.00
11 to 20	10	26.3	28	73.7	38	100.0	2.71 (0.83 a 8.83)
21 or more	15	21.7	54	78.3	69	100.0	2.11 (0.71 a 6.30)
<b>• Work load</b>							
6 hours	6	20.0	24	80.0	30	100.0	p <sup>(1)</sup> = 0.270 1.00
8 hours	12	15.6	65	84.4	77	100.0	0.74 (0.25 a 2.19)
More than 8 hours	12	27.9	31	72.1	43	100.0	1.55 (0.51 a 4.72)
<b>• Carry out physical exercise</b>							
Yes	14	17.9	64	82.1	78	100.0	p <sup>(1)</sup> = 0.513 1.00
No	16	22.2	56	77.8	72	100.0	1.31 (0.59 a 2.91)
<b>• Age Group</b>							
Up to 39							
40 to 49	13	19.1	55	80.9	68	100.0	p <sup>(1)</sup> = 0.806 1.00
50 to 59	17	20.7	65	79.3	82	100.0	1.11 (0.49 a 2.48)
60 or older							

(1): Using the Pearson's chi square test.

work-related musculoskeletal symptoms. Despite the occurrence of musculoskeletal disorders found in the study group was considered high, 129 of professionals reported some work-related painful symptoms in the previous 12 months, only 30 were diagnosed with CTD. This suggests that even though the presence of musculoskeletal pain corresponding to the first clinical stage of the CTD condition, dentists trend towards minimization of signs pointing to musculoskeletal changes that somehow relate to their laboring. The symptoms of CTD vary during the working activity and tend to relieve through the rest. Over time, they may become frequent throughout the workday, and also in the performance of other activities. People tend to seek medical help only when the pain becomes unbearable or their movements are restricted<sup>17</sup>. On the other hand, treatment

is often based only on prescription of antiinflammatory drugs and physical therapy sessions, which will only mask the problem without reaching its causes, neglecting the changes in conditions of work<sup>18</sup>.

The study of Santos Filho and Barreto<sup>19</sup>, which assessed all dentists of the Public Health Service in Belo Horizonte/ Brazil (n = 358) also observed a large number of professionals with symptoms (58%). The same situation occurred in the State of Santa Catarina, where Regis Filho et al.<sup>20</sup> reported that among 771 dentists registered at the Regional State Council of Dentistry, 437 (56.68%) had some painful musculoskeletal manifestation that was work-related, which is in line with our study. These data reinforce the observation that the practice of dentistry favors, by its own nature, the occurrence of disorders affecting primarily the musculoskeletal

system of dental surgeons.

In this study, the body region that was most affected by the symptoms was the cervical spine, followed by wrists, hands and fingers, lower back and shoulders. These results are similar to those of a study of 421 dentists who graduated between the years 1986 and 1997 in British Columbia, Canada, which revealed that approximately 18% reported experiencing shoulder pain, 24% had pain in the neck and the lumbar region, with 19% in the upper part of the spine, 30% in the middle and 17% in the lower part<sup>21</sup>. In a survey of 268 Polish dentists<sup>22</sup> symptoms were also mainly related to the thoracolumbar region (60.1%), neck (56.3%), lower limbs (47.8%) and wrist and hand (44.0%). A study that was carried out with all 115 dentists that were members of the Danish Society of Craniomandibular Disorders<sup>23</sup> also found that two thirds of respondents had some type of problem, such as pain or discomfort in the neck and/or shoulder with similar frequency in relation to the problems present in the lumbar region.

With respect to CTD, women were more affected in the present study. This is in accordance with the study by Regis Filho et al.<sup>20</sup> in which the statistical analysis indicated the presence of a significant association between the two genders for the presence of CTD, with women showing more pathologies related to CTD than men. The mean age obtained in this study was 44.42 years, and the most affected age group was the 40 to 49 years one. This is in contrast with the study by Santana et al.<sup>24</sup>, which surveyed 100 dentists in Salvador, BA, Brazil, and the most affected age group was the 27 to 34 years one. However, our study did agree with these authors regarding the higher prevalence of painful symptoms of CTD in females and those professionals who worked 8 hours per day.

In the present study, 30 (20%) participants were diagnosed with CTD in recent months. Of these, 14 (46.7%) reported that they had painful symptoms corresponding to the first clinical stage of the condition as advocated by Oliveira (1989)<sup>15</sup>. These results are similar to those obtained in the study of 227 dental students from Recife and Camaragibe, PE, Brazil, where 42 (18.5%) had a diagnosis of CTD<sup>11</sup>, emphasizing the fact that since their academic training, dentists are already prone to work-related risk factors. This fact is of great importance and should be taken into account on the establishment of preventive practices.

Our study also found a prevalence of overweight in 48 (32%) professionals and obesity in 20 (13%), similar to the study that measured the prevalence of overweight and obesity in 435 employees of the State University of Feira de Santana in the state of Bahia, Brazil<sup>25</sup>. The prevalence of overweight and obesity was 31.95% and 10.34%, respectively<sup>25</sup>.

Among those interviewees who were overweight, the most affected age group was the 50 to 59 years group and 26 (83.9%) of the total of male respondents were overweight. This is in contrast with the study by Abrantes et al. (2003)<sup>26</sup>, in which the prevalence of overweight and obesity was higher among females aged 40 to 79 years. The study that compared estimates of the Household Budget Survey with data from

the National Health and Nutrition Survey, found that the prevalence of overweight and obesity is higher in the male population<sup>27</sup>, as in this study.

As overweight and obesity are consistently identified as risk factors for the development of a number of diseases, evaluation of their prevalence among various population groups is needed, especially when it comes to individuals who develop occupational activities. The illness among workers may lead to dismissal or even partially or totally unable to work, as can occur with people who develop work-related musculoskeletal disorders.

Some authors report that given the multifactorial nature of musculoskeletal disorders, it is likely that overweight and obesity may act as a permissible factor in musculoskeletal disease, interacting and enhancing the effects of other risk factors, as well as the alignment of the skeleton and the muscular condition<sup>6</sup>. One study from Sweden, which compared 6,328 obese individuals with 1,135 individuals from the general population of both genders, found that pain in the neck, lumbar region, hip, knee and ankle was more common in obese people than in the general population (odds ratio - OR ranging from 1.7 to 9.9,  $p < 0.001$ )<sup>7</sup>. In the present study, the statistical analysis showed no significant association between CTD and overweight and obesity. However, although there was no association, one cannot overlook the fact that overweight and obesity are present in these professionals and can cause, in addition to musculoskeletal problems, other health problems, such as hypertension, diabetes and vascular problems, which can interfere with the work quality of these people.

The evaluation of the prevalence of overweight and obesity, which act as risk factors for the onset of work-related diseases, should be continued, since it is known that the population, not only in Brazil but in many countries, has increasingly showing an increase of body mass. Because dentists are part of a category rather prone to developing diseases related to work due to the ergonomic features and overload of dental activity, this study had the scope to contribute to an initial analysis of productive working health professionals to highlight the need for preventive measures that should be implemented since the academic training of dentists. This way, they are less likely to have problems with their working life quality and suffer impediments in exercising their professional activity.

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## References

1. Santos Filho SB, Barreto SM. Occupational activity and prevalence of upper-limb and back pain among dentists in Belo Horizonte, Minas Gerais State, Brazil: a contribution to the debate on work-related musculoskeletal disorders. *Cad Saude Publica*. 2001; 17: 181-93.

2. Brasil. Ministries of Welfare, of Health, of Labour and Employment. National Policy on Occupational Health and Safety. Brasília: Ministries of Welfare, of Health, of Labour and Employment; 2004.
3. Merlo RC, Jacques MGC, Hoefel MGL. Groups activity with Cumulative Trauma Disorders workers: experience report. *Psicol Reflex. Crit.* 2001; 14: 253-8.
4. Chiavegato Filho L, Pereira Jr A. Work-related osteomuscular diseases: multifactorial etiology and explanatory models. *Interface.* 2003; 8: 149-62.
5. Mota R, Dutra DSG, Fabiano S, Barbosa FS. Estudo da prevalência de algias na coluna vertebral em colhedores de café do município de Vieiras - MG. *Rev Ponto Vista.* 2008; 5: 99-110.
6. Wearing SC, Hennig EM, Byrne NM, Steele JR, Hills AP. Musculoskeletal disorders associated with obesity: a biomechanical perspective. *Obesity Reviews.* 2006; 7: 239-50.
7. Peltonen M, Lindroos AK, Torgerson JS. Musculoskeletal pain in the obese: a comparison with a general population and long-term changes after conventional and surgical obesity treatment. *Pain.* 2003; 104: 549-57.
8. Salim CA. Doenças do trabalho exclusão, segregação e relações de gênero. *Sao Paulo Perspectiva.* 2003; 17: 11-24.
9. Alexopoulos EC, Stathi IC, Charizani F. Prevalence of musculoskeletal disorders in dentists. *BMC Musculoskeletal Disorders.* 2004; 5: 16.
10. Gazzola F, Sartor N, Ávila SN. Prevalence of musculoskeletal disorders in Caxias do Sul's dentists. *Rev Cienc Saude.* 2008; 1: 50-6.
11. Carvalho MVD, Soriano EP, Caldas Jr AF, Campello RIC, Miranda HF, Cavalcanti FID. Cumulative Trauma Disorders Among Brazilian Dental Students. *J Dent Educ.* 2009; 73: 624-30.
12. Punnett L, Wegman D. Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. *J Electromyogr Kinesiol.* 2004; 14: 13-23.
13. Araujo ABVL; Soriano EP; Carvalho MVD; Caldas Junior AF; Coelho Junior LGTM; Vidal HG. Prevalência de doenças de caráter ocupacional em Cirurgiões-Dentistas. *Int J Dent.* 2009; 8 Suppl 2: 82.
14. Pinheiro FA. Aspectos psicossociais dos distúrbios osteomusculares relacionados ao trabalho – DORT/LER [thesis]. Brasília: Universidade de Brasília; 2002.
15. Oliveira CR. Terminais e saúde: as explicações devidas. *Proteção.* 1989; 1:30-44.
16. WHO. World Health Organization. Obesity: preventing and managing the global epidemic. Report of a WHO Consultation on Obesity. Geneva: WHO; 1998.
17. Álvares TT, Lima, MEA. Fibromialgia: interfaces com as LER/DORT e considerações sobre sua etiologia ocupacional. *Cienc Saude Coletiva.* 2010; 15: 803-12.
18. Oliveira RMR. A abordagem das lesões por esforços repetitivos/distúrbios osteomusculares relacionados ao trabalho - LER / DORT no Centro de Referência em Saúde do Trabalhador do Espírito Santo - CRST/ES [dissertation]. Rio de Janeiro: Escola Nacional de Saúde Pública, Fundação Oswaldo Cruz; 2001.
19. Santos Filho SB, Barreto SM. Atividade ocupacional e prevalência de dor osteomuscular em cirurgiões-dentistas de Belo Horizonte, Minas Gerais, Brasil: contribuição ao debate sobre os distúrbios osteomusculares relacionados ao trabalho. *Cad Saude Publica.* 2001; 17: 181-93.
20. Regis Filho GIR, Michels G, Sell I. Lesões por esforços repetitivos/distúrbios osteomusculares relacionados ao trabalho em cirurgiões-dentistas. *Rev Bras Epidemiol.* 2006; 9: 346-59.
21. Rucker LM, Sunell S. Ergonomic risk factors associated with clinical dentistry. *J Calif Dent Assoc.* 2002; 30: 139-48.
22. Szymanska J. Disorders of the musculoskeletal system among dentists from the aspect of ergonomics and prophylaxis. *Ann Agric Environ Med.* 2002; 9: 169-73.
23. Finsen L, Christensen H, Bakke M. Musculoskeletal disorders among dentists and variation in dental work. *Appl Ergon.* 1998; 29: 119-25.
24. Santana EJB, Rocha LEFL, Calmon TRV, Alves IL. Estudo epidemiológico de lesões por esforços repetitivos em cirurgiões-dentistas em Salvador-Bahia. *Rev Fac Odontol Univ Fed Bahia.* 1998; 17:67-74.
25. Caires NFR. Sobrepeço e obesidade entre os funcionários da Universidade Estadual de Feira de Santana [dissertation]. Feira de Santana: Universidade Estadual de Feira de Santana; 2004. 200p.
26. Abrantes MM, Lamounier JA, Colosimo EA. Prevalência de sobrepeço e obesidade nas regiões Nordeste e Sudeste do Brasil. *Rev Assoc Med Bras.* 2003; 49: 162-6.
27. Sousa RMRP, Sobral DP, Da Paz SMRS, Martins MCC. Prevalência de sobrepeço e obesidade entre funcionários plantonistas de unidades de saúde de Teresina, Piauí, Brazil. *Rev Nutr.* 2007; 20: 473-82.