Musculoskeletal Pain Among Healthcare Workers: An Exploratory Study on Gender Differences

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Background *Musculoskeletal disorder rates among healthcare workers are high compared to other occupational groups. Studies indicate a higher prevalence of musculoskeletal pain in women as compared to men in most productive sectors. The objectives of our study were to assess the prevalence of upper-limb musculoskeletal pain in male and female employees of the Belo Horizonte municipal Health Department, and to identify associated factors, considering individual and occupational characteristics, by gender.*

Methods *This cross-sectional study of a proportional sample of 1,721 subjects from a universe of 13,602 workers in the municipal health system evaluated the prevalence of self-reported upper-limb musculoskeletal pain. The magnitude of the associations was estimated by Poisson regression.*

Results *The prevalence of upper-limb musculoskeletal pain was 24.1% among women and 11.0% among men. Women who had high domestic workloads, and performed tasks under high strain showed high prevalence of musculoskeletal pain. For women and men, a high prevalence of upper-limb pain was reported by those who performed highly physically demanding tasks, and those exposed to poor environmental conditions.*

Conclusions *The findings suggest gender differences in the distribution of upper-limb musculoskeletal pain across occupational groups. It also support initiatives that focus on the need to give visibility to the different effects of working conditions on the health of occupational groups and suggest the importance of developing specific measures to promote women's health. The higher prevalence of pain observed among women with high domestic workloads suggests the importance of these activities when evaluating workload in occupational studies.* Am. J. Ind. Med. © *2013 Wiley Periodicals, Inc.*

KEY WORDS: gender differences; musculoskeletal pain; domestic work; healthcare workers; occupational health

INTRODUCTION

Global initiatives acknowledge the importance of healthcare workers (HCW) to achieve health reforms goals and to improve the quality of care in order to meet Millennium Development Goals [UNDP, 2000; WHO, 2008]. This recognition of the importance of HCW, in turn, has lead to a growing interest in their exposure to adverse working conditions [Smith et al., 2007; Garcia et al., 2010; Assunção et al., 2012; Lahelma et al., 2012].

Musculoskeletal disorders encompass a range of conditions resulting from inflammatory or degenerative processes in tendons, ligaments, muscles, and joints in different regions of the body, especially the upper

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extremities and the cervical and lumbar spine, often accompanied by discomfort or pain [Smith and Leggat, 2003; Chyuan et al., 2004; Punnett and Wegman, 2004]. Several work-related factors constitute risks for developing musculoskeletal pain, including the physical demands of the task, the general conditions of the environment, and psychosocial factors [Leidel et al., 1977; NRC and IM, 2001]. It is known that rates of musculoskeletal disorders among HCW are high when compared to other occupational groups [Ngan et al., 2010].

Studies indicate a higher prevalence of musculoskeletal pain in women as compared to men in most productive sectors [Lundberg, 2002; Strazdins and Bammer, 2004; Smith et al., 2006; Wijnhoven et al., 2006; Cardoso et al., 2009; Fernandes et al., 2011]. Among the explanations, several stand out: (1) biological differences (height, muscle strength, aerobic capacity, hormonal conditions) make women more susceptible to musculoskeletal disorders; (2) women are more likely to report symptoms; (3) outside of work, women are exposed more than men to risk factors for musculoskeletal injuries during household chores and childcare; and (4) the working conditions of men and women are not equivalent, that is, the adverse effects of working life are more pronounced for women because they are more often subjected to precarious employment, are paid lower wages, occupy positions lower in the hierarchy, and are viewed as having less social worth [De Zwart et al., 2001; Wijnhoven et al., 2006].

Findings from several studies of the healthcare sector [Portela et al., 2005; Alamgir et al., 2009; Fonseca and Fernandes, 2010] support the notion that the social roles assigned to men and women establish different ways of organizing life at work and outside of work. For women, these roles may represent an additional burden: housework constitutes another shift. The combined effect of these shifts, besides adding tasks and their burdens, may impact on time available for necessary rest, decreasing the chance of recovery and increasing vulnerability to physical and mental illness [Strazdins and Bammer, 2004; Portela et al., 2005].

Brazil's Public Healthcare System

Since 1988, Brazil has been implementing a universal health system—called the *Sistema Único de Saúde* (SUS) (Unified Health System)—based on the principles that health is a citizen's right and a responsibility of the State. SUS aims to provide universal comprehensive preventive and curative care through the decentralized management and delivery of health services. Administratively SUS has responsibility for developing and implementing health promotion, disease surveillance, vector control, and health education, as well as to ensure continuity of care at the primary, specialist outpatient, and hospital levels [Paim et al., 2011].

Structure of the Belo Horizonte Health Department

The resources of the municipal Health Department of Belo Horizonte, Minas Gerais, are organized geographically into nine regions or health districts. Primary care health centers, urgent care units, secondary specialty outpatient referral centers, mental health and occupational health reference centers, group-living and rehabilitation centers, municipal and contract hospitals are organized as hierarchical networks [PBH, 2010].

This study aimed to: (1) assess the prevalence of upper-limb musculoskeletal pain in male and female employees of the Belo Horizonte municipal Health Department, and (2) identify associated individual and occupational characteristics, by gender.

METHODS

This cross-sectional study of Belo Horizonte Health Department workers was conducted in 2009. All workers of the municipal Health Department regardless of employment status (permanent, temporary, or intern), who were working at the randomly selected facilities were eligible.

Therefore, a survey of working conditions and health of health workers was conducted, evaluating a range of occupational exposures and outcomes. One of the outcomes was musculoskeletal pain. For a specific assessment of upper-limb musculoskeletal pain, the sample size was estimated considering the following parameters: total number of workers in the sector (N = 13,602), a prevalence of upper-limb musculoskeletal pain of 32.8% [Fonseca and Fernandes, 2010], and choosing a confidence interval of 95% and precision of 3%, the calculated sample size was 881 workers ($n = 1.96^2 \times pqN/d^2 \times (N - 1) + 1.96^2 \times pq$).

For the selection of subjects, we conducted a stratified proportional random sampling that considered three stratification criteria: health district, level of complexity of care (primary care centers, specialties, urgent care, district administration) and occupational group.

Access to the list of employees maintained by the Human Resources Department made it possible to identify the distribution of job assignments. After the overall sample size needed was estimated, the composition of the sample was calculated according to percentage share of workers in each health district; in this way the number of subjects to be studied in each district was determined. Then we calculated the number to be studied at each level of complexity of care, according, again, to the percentage of workers in each level. Finally, within each level of complexity, we determined the percentage of workers in each of the ten occupational groups according to the World Health Organization classification[1] [WHO, 2009]. A list of random numbers generated by Epi

Info (Centers for Disease Control and Prevention, Atlanta, USA) was used to select the workers to be studied.

Eight pilot studies were performed at several health facilities to evaluate and adjust the instrument. Each pilot study involved about 20 respondents, who were, therefore excluded from the randomization. Sociodemographic data and information about occupational characteristics were obtained using a self-administered questionnaire, accompanied by a member of a team of nine trained interviewers.

Up to three attempts were made to locate the randomly selected worker. The worker was considered lost to the study if not encountered by the third attempt. Those who were not at work due to vacation, transfer, retirement, or death were replaced by randomly drawing another employee from the same geographic region who had the same occupational function at the same level of complexity of care.

The dependent variable—report of musculoskeletal pain in the upper extremities—was defined as the occurrence of self-reported pain in the arms. The frequency of pain was measured on a Likert scale: 1 = never; 2 = rarely; 3 = infrequently; 4 = often; and 5 = very often. We considered pain in the upper extremities to be present when the employee described the pain as "often" or "very often." "Absence of pain" was assigned when the respondent characterized the pain as 1, 2, or 3 (never, rarely, infrequently).

Recognizing the multifactorial nature of musculoskeletal pain, individual and occupational characteristics were measured. In this way, the explanatory variables considered in the data analysis, according to gender, were: (a) individual characteristics: age, marital status, education level, participation in leisure activities, physical activity, domestic workload, sick leave, absence or extended leave from work due to health problems in the last 12 months, and report compatible with common mental disorder; and (b) occupational characteristics: occupation, length of time in public service and in the facility studied, other jobs, weekly hours worked per week at the facility and total hours worked, workplace conditions, physical demands of the work and psychosocial aspects at work.

Leisure activities were evaluated considering participation in regular leisure activities (cultural activities—movies, theater; physical activities—walking, exercising, sports; and social activities—visits to friends, party), with dichotomous answer option (yes/no).

The housework was evaluated according to the answers (yes or no) about basic household chores (wash, iron, clean, and cook). The "domestic workload" was measured as the sum of these chores, weighted by the number of residents in the household, minus the interviewee (Σ wash + iron + clean + cook) $\times$ (R $-$ 1) [Thierney et al., 1990; Aquino, 1996]. For analysis purposes, the domestic workload score was categorized based on tertiles of the distribution as: low domestic workload (corresponding to values equal to or below the second tertile) and high domestic workload (values above the second tertile).

Common mental disorders (CMD) were evaluated according to the answers to twenty closed questions that make up the Self Reporting Questionnaire (SRQ-20). This instrument seeks to identify in populations suspected cases of CMD characterized by insomnia, fatigue, irritability, forgetfulness, difficulty concentrating, and somatic complaints [WHO, 1994]. For purposes of this analysis, the cutoff point to affirm suspicion of CMD was seven or more positive responses [Mari and Williams, 1986].

The variable "workplace conditions" describes the characteristics of the physical environment, and is determined by aggregating responses to questions about the ventilation, temperature, lighting, technical resources, and equipment used at work, each of which could be judged as poor (1), fair (2), or satisfactory (3). The noise originating at work and outside it, was assessed as negligible (3), fair (2), high and unbearable (1). After adding up the scores, four categories were established for analysis, based on quartiles: poor conditions (first quartile), reasonable conditions (second quartile), satisfactory conditions (third quartile), and good conditions (bottom quartile).

For the variable "physical demands of the work" we summed the scores of responses to questions about postures that caused discomfort or pain; standing or sitting for long periods; walking; lifting, carrying, or pushing excessive weight; moving patients; and whether the individual had breaks during the workday. Each question had four response options (1 = never, 2 = rarely, 3 = sometimes, and 4 = always). A physical demand score was created from the sum of the responses, and subject were assigned to tertiles according to their score. Respondents whose physical demand score was in the first and second tertiles were considered to have low demand and those whose score was in the highest tertile had high demand.

To study psychosocial aspects of work we used the Portuguese version of the Job Content Questionnaire (JCQ) [Araújo and Karasek, 2008], an instrument developed to measure psychosocial aspects at work according to the Demand-Control Model [Karasek and Theörell, 1990]. The model focuses on two dimensions: control over one's work and psychological demands arising from work. From the combination of these dimensions, we distinguished specific work situations that generate different health risks. Based on the combination of levels of demand and control four groups were defined: low strain (combination of low demand and high control), passive work (low demand and low control),

[1] (I) Physicians, (II) nurses and nursing technicians, (III) dentists and dental technicians, (IV) biochemists and laboratory technicians, (V) environment and public health workers, (VI) community health workers, (VII) physical and occupational therapists, (VIII) university level technical professionals, (IX) high school level technical professionals, (X) administrative and clerical personnel.

active work (high demand and high control), and high strain (high demand and low control) [Karasek and Theörell, 1990].

For the variable "social support," we used an indicator calculated as the sum of the values derived from questions in the JCQ instrument related to social support from coworkers and superiors. We adopted a cutoff at the median: values equal to or below the median were categorized as low support, and those above, as high support.

Statistical analyses were conducted using the Stata statistical software package, version 10.0. Computing an odds ratio was judged inappropriate because it overestimates the strength of association when a high prevalence of the event of interest is observed (pain in the upper extremities in this case) [Barros and Hirakata, 2003; Coutinho et al., 2008]. The prevalence ratio was therefore estimated directly by using Poisson regression with robust error variance estimation to verify the existence of crude associations of the prevalence of pain in the upper extremities with each of the categories of the study variables. The magnitude of the associations among variables was estimated by calculating the prevalence ratios and their respective 95% confidence intervals.

From a randomly selected sample of 2,205 workers, 1,808 agreed to participate (response rate = 81.9%), however 87 (4.8%) did not complete the study protocol. Therefore, complete data was obtained for 1,721 participants.

The study was approved by the Ethics Committee of the Federal University of Minas Gerais (opinion No. 542/07) and complied with the ethical principles expressed in the Helsinki Declaration. Informed consent was obtained from all study participants.

RESULTS

Women comprised 71.6% of the sample. The sample included subjects with ages ranging from 16 to 73 years, with a mean age of 40.6 ± 11.1 years. The mean age was higher among women (41.4 ± 10.7 years) than men (38.5 ± 11.8 years).

Life as a couple was the conjugal situation for a majority of women (53.1%) and men (58.2%); 56.7% of women and 47.5% of men had a high school, technical, or university education (Table I). Among women, 50.7% were in public service for less than 10 years, a percentage lower than that observed among men (61.2%) (Table II).

The workweek in the facility was 40–44 hr for 54.2% of women and 51.6% of men; 35.2% of women and 43.2% of men reported having another job. Summing the hours of multiple jobs, 28.5% of women and 38.2% of men reported working more than 44 hr per week (Table II).

Compared to men, women participated less in regular physical activity in the leisure time, reported heavier domestic workloads, missed more work (without mention of cause), took leaves of absence due to health problems more often in the 12 months preceding the survey, and were more likely to have a CMD (Table I). Women also reported poorer workplace conditions with higher physical demand of the work (Table II).

The prevalence of upper-limb musculoskeletal pain was 24.1% among women and 11.0% among men (PR adjusted for age = 2.05; 95% CI: 1.56–2.69). Prevalence of upper-limb musculoskeletal pain was associated with age among women and men, and among those who lived as a couple compared to single among men. Women who reported having a high school, technical, or incomplete university education had a higher prevalence of pain than those with higher education. This pattern contrasted with the lower prevalence observed among men with lower levels of education (Table III).

Women who did not participate in leisure activities and had high domestic workloads, as well as men who did not practice physical activities showed a higher prevalence of upper-limb musculoskeletal pain. The prevalence was higher also among women and men who missed work (without mention of cause), took leaves of absence or were removed from their jobs due to health problems in the 12 months preceding the survey, and for those with a history compatible with a CMD (Table III).

Among women, a higher prevalence of pain was observed among dentists and dental technicians. Among men, the highest prevalence was seen among physical and occupational therapists. For women and men, a higher prevalence of upper-limb pain was reported by those who performed highly physically demanding tasks, and the group exposed to poor environmental conditions when compared to the group that reported good environmental conditions (among women, even those exposed to even adequate environmental conditions still had an elevated prevalence of pain) (Table IV).

Low job control was associated to upper-limb pain among women; while high psychological demand was associated to upper-limb pain only among men. The prevalence of upper-limb pain was higher among those women who performed passive work (low demand, low control), active work (high demand, high control), and tasks under high strain (high demand, low control) (Table IV).

DISCUSSION

Our findings suggest gender differences in the distribution of the prevalence of upper-limb musculoskeletal pain across occupational groups in a population of HCW of the Belo Horizonte Health Department. Some results are noteworthy: occupational factors were associated with musculoskeletal pain in both women and men, with few major differences in the pattern of association according to

TABLE I. Description of the Study Population by Individual Characteristics, Municipal Health Workers in Belo Horizonte, Minas Gerais, Brazil, 2009

	Women (N = 1.281)		Men (N = 507)		
Variables	**n**	**%**	**n**	**%**	***P*-value***
Age (years)					
≤34	353	27.7	212	42.2	<0.001
35–46	462	36,3	142	28.2	
≥47	458	36.0	149	29.6	
Marital status					
Single	599	46.9	212	41.8	0.051
Married or living with a partner	678	53.1	295	58.2	
Educational level					
Higher education or post-graduate	461	36.2	200	39.8	<0.001
High school, technical, or incomplete higher	721	56.7	239	47.5	
Primary education	90	7.1	64	12.7	
Participation in leisure activities					
Yes	893	70.5	421	83.5	<0.001
No	373	29.5	83	16.5	
Physical activity in the leisure time					
Yes, 3 or more times per week	270	24.8	153	33.2	<0.001
Yes, 1 or 2 times per week	386	35.4	212	46.0	
No	433	39.8	96	20.8	
Domestic workload					
Low	638	63.9	327	86.7	<0.001
High	360	36.1	50	13.3	
Sick leave, absence, or leave from work					
No	611	48.4	292	58.5	<0.001
Yes	651	51.6	207	41.5	
Common mental disorders					
Absence	850	72.5	408	84.7	<0.001
Presence	323	27.5	74	15.3	

Note: There were discrepancies in response rates for each variable explaining the internal differences.
*Pearson's χ^2.

gender. The strength of the association between domestic workload and upper-limb pain was similar between women and men (1.77 and 1.68, respectively). However, the association was statistically significant only among women, likely reflecting the larger sample size among women.

The degeneration of musculoskeletal tissues—part of the aging process—is a predisposing factor for many musculoskeletal disorders [Roquelaure et al., 2009; Cardoso et al., 2009] and may account for the association of age with musculoskeletal pain in our findings. However, it is possible that workplace factors, the type of activity, and how work is organized have contributed to these results, because there is evidence of the influence they wield over the degeneration observed with aging [Cardoso et al., 2009].

An association between being married (or living together) and musculoskeletal pain was observed only in the male group (PR = 1.87; 95% CI: 1.00–3.51), a result contrary to that found in a group of Greek dentists [Alexopoulos et al., 2004]. The evaluation of living arrangements that afford companionship is complex, because on the one hand, the bonds confer support. However, on the other hand, demands of the partner, and at times demands imposed by family members may generate stressful responses and increase the chance of anxiety and psychosomatic symptoms that are in turn associated with musculoskeletal pain [Messing and Stellman, 2006].

In Brazil, one's level of education is clearly associated with working conditions and income [Garcia et al., 2010]. Many studies have pointed out a higher prevalence of upper-limb pain among women who reported less education [Fernandes et al., 2011], as found in this study. However, an unexpected finding was a lower frequency of pain in men with high school or technical education or who had started but did not complete university studies as compared to those who completed undergraduate degrees or undertook graduate studies.

TABLE II. Description of the Study Population, by Occupational Characteristics, Municipal Health Workers in Belo Horizonte, Minas Gerais, Brazil, 2009

	Women (N = 1.281)		Men (N = 507)		
Variables	**n**	**%**	**n**	**%**	***P*-value***
Occupation					
Physicians	124	10.5	110	24.0	<0.001
Nurses and nursing technicians	200	17.0	25	5.5	
Dentists and dental technicians	59	5.0	18	3.9	
Biochemists and laboratory technicians	34	2.9	10	2.2	
Environment and public health workers	53	4.5	60	13.1	
Community health workers	201	17.1	22	4.8	
Physical therapists and occupational therapists	18	1.5	5	1.1	
University level technical professionals	48	4.1	9	2.0	
High school level technical professionals	219	18.6	46	10.0	
Administrative and clerical personnel	221	18.8	153	33.4	
Length of public service (years)					
≤10	635	50.7	303	61.2	<0.001
>10	618	49.3	192	38.8	
Length of service at the facility (years)					
≤5	603	48.9	274	55.9	0.009
>5	630	51.1	216	44.1	
Hours worked per week at the facility					
≤36	575	45.8	241	48.4	0.322
40–44	681	54.2	257	51.6	
Another job					
No	712	64.8	265	56.8	0.003
Yes	387	35.2	202	43.2	
Total hours worked per week					
≤36	230	21.5	84	17.9	0.001
37–44	535	50.0	206	43.9	
>44	305	28.5	179	38.2	
Workplace conditions					
Good	163	13.4	98	20.2	<0.001
Satisfactory	386	31.7	164	33.9	
Reasonable	300	24.6	120	24.8	
Poor	369	30.3	102	21.1	
Physical demands of the work					
Low	794	64.1	374	75.9	<0.001
High	445	35.9	119	24.1	
Job demand					
Low	612	50.0	255	51.5	0.569
High	612	50.0	240	48.5	
Job control					
High	509	43.1	232	47.7	0.081
Low	673	56.9	254	52.3	
Demand-Control Model					
Low strain	213	18.6	102	21.3	0.401
Passive work	354	31.0	143	29.9	
Active work	281	24.6	125	26.1	
High strain	295	25.8	109	22.7	

(Continued)

TABLE II. Continued.

Variables	Women (N = 1.281)		Men (N = 507)		*P*-value*
	n	%	n	%	
Social support					
High	528	45.0	237	49.2	0.120
Low	646	55.0	245	50.8	

Note: There were discrepancies in response rates for each variable explaining the internal differences.
*Pearson's χ^2.

It is known that reducing the time for relaxing activities outside of work—and consequently for recovery from the effects provoked by occupational tasks—can be an important contributing factor to keep the tension accumulated during working hours, producing several negative effects on health, including musculoskeletal pain [Lundberg, 2002; Strazdins and Bammer, 2004]. Among women, a higher prevalence of upper-limb pain was observed in the group that reported not

TABLE III. Prevalence of Upper-Limb Musculoskeletal Pain by Individual Characteristics, Municipal Health Workers in Belo Horizonte, Minas Gerais, Brazil, 2009

Variables	Women		Men	
	P (%)	PR (CI)	*P* (%)	PR (CI)
Upper-limb musculoskeletal pain†	24.1	2.05 (1.56–2.69)***	11.0	1.00
Age (years)				
≤34	16.6	1.00	8.1	1.00
35–46	24.0	1.45 (1.08–1.93)*	10.3	1.27 (0.64–2.49)
≥47	30.8	1.86 (1.40–2.44)***	16.3	2.01 (1.11–3.63)*
Marital status†				
Single	23.2	1.00	6.7	1.00
Married or living with a partner	25.0	1.00 (0.81–1.22)	14.1	1.87 (1.00–3.51)*
Educational level†				
Higher education or post-graduate	18.7	1.00	15.5	1.00
High school, technical, or incomplete higher	27.5	1.51 (1.20–1.90)***	7.3	0.52 (0.29–0.93)*
Primary education	25.6	1.20 (0.80–1.82)	11.7	0.73 (0.34–1.59)
Participation in leisure activities†				
Yes	22.1	1.00	9.7	1.00
No	29.4	1.27 (1.04–1.56)*	12.7	1.18 (0.62–2.21)
Physical activity in leisure time†				
Yes, 3 or more times per week	19.7	1.00	8.6	1.00
Yes, 1 or 2 times per week	23.6	1.23 (0.90–1.66)	11.6	1.38 (0.73–2.61)
No	25.0	1.30 (0.97–1.75)	17.2	2.03 (1.03–4.00)*
Domestic workload†				
Low	18.7	1.00	10.9	1.00
High	34.6	1.77 (1.42–2.20)***	18.8	1.68 (0.85–3.28)
Sick leave, absence, or leave from work†				
No	17.4	1.00	7.4	1.00
Yes	30.2	1.71 (1.39–2.12)***	15.9	2.18 (1.30–3.65)**
Common mental disorders†				
Absence	19.4	1.00	8.0	1.00
Presence	34.0	1.88 (1.52–2.31)***	29.2	3.90 (2.40–6.33)***

P, prevalence; PR, prevalence ratio; CI, confidence interval.
†Adjusted for age.
*$P \leq 0.05$.
**$P \leq 0.01$.
***$P \leq 0.001$.

TABLE IV. Prevalence of Upper-Limb Musculoskeletal Pain by Occupational Characteristics, Adjusted for Age, Municipal Health Workers in Belo Horizonte, Minas Gerais, Brazil, 2009

	Women		Men	
Variables	***P*(%)**	**PR (CI)**	***P*(%)**	**PR (CI)**
Occupation				
Physicians	17.1	1.00	13.1	1.00
Nurses and nursing technicians	24.3	1.33 (0.84–2.39)	16.7	1.42 (0.52–3.86)
Dentists and dental technicians	35.1	1.75 (1.04–2.97)*	33.3	2.11 (0.88–5.08)
Biochemists and laboratory technicians	15.6	0.97 (0.40–2.33)	0.0	†
Environment and public health workers	24.0	1.36 (0.72–2.53)	7.0	0.63 (0.21–1.90)
Community health workers	25.8	1.55 (0.98–2.44)	4.8	0.45 (0.06–3.36)
Physical therapists and occupational therapists	0.0	†	50.0	3.02 (1.07–8.53)*
University level technical professionals	14.9	0.83 (0.37–1.83)	22.2	1.53 (0.38–6.12)
High school level technical professionals	27.1	1.45 (0.93–2.28)	15.2	1.30 (0.56–3.02)
Administrative and clerical personnel	25.1	1.49 (0.95–2.35)	6.8	0.53 (0.25–1.15)
Length of public service (years)				
≤10	19.3	1.00	7.7	1.00
>10	29.4	1.26 (0.98–1.61)	16.4	1.76 (0.86–3.60)
Length of service at the facility (years)				
≤5	21.2	1.00	9.6	1.00
>5	26.6	1.06 (0.85–1.32)	13.1	1.09 (0.63–1.90)
Hours worked per week at the facility				
≤36	23.6	1.00	10.8	1.00
40–44	24.0	1.04 (0.85–1.27)	11.6	1.19 (0.72–1.96)
Another job				
No	23.8	1.00	11.0	1.00
Yes	24.1	1.00 (0.80–1.25)	11.2	0.94 (0.54–1.62)
Total hours worked per week				
≤36	23.9	1.00	11.5	1.00
37–44	22.4	0.95 (0.72–1.26)	10.6	1.00 (0.49–2.03)
>44	26.0	1.12 (0.83–1.51)	11.3	0.99 (0.47–2.05)
Workplace conditions				
Good	14.6	1.00	4.1	1.00
Satisfactory	21.1	1.46 (0.95–2.24)	10.1	2.40 (0.82–7.02)
Reasonable	25.8	1.81 (1.19–2.77)**	11.2	2.80 (0.93–8.47)
Poor	28.7	2.00 (1.33–3.02)**	19.4	4.84 (1.68–13.90)**
Physical demands of the work				
Low	19.4	1.00	8.8	1.00
High	32.1	1.63 (1.33–1.99)***	17.4	2.02 (1.20–3.39)*
Job demand				
Low	21.1	1.00	7.5	1.00
High	25.3	1.19 (0.97–1.46)	13.3	1.79 (1.04–3.07)*
Job control				
High	20.6	1.00	11.6	1.00
Low	25.3	1.26 (1.02–1.55)*	10.2	0.91 (0.54–1.51)
Demand-Control Model				
Low strain	17.6	1.00	10.1	1.00
Passive work	25.5	1.49 (1.06–2.11)*	6.4	0.65 (0.27–1.55)
Active work	24.7	1.44 (1.01–2.07)*	12.3	1.21 (0.57–2.58)
High strain	27.6	1.65 (1.17–2.34)**	16.2	1.65 (0.79–3.41)

(Continued)

TABLE IV. Continued.

	Women		Men	
Variables	***P*(%)**	**PR (CI)**	***P*(%)**	**PR (CI)**
Social support				
High	21.2	1.00	9.5	1.00
Low	26.3	1.23 (0.99–1.52)	11.0	1.12 (0.66–1.92)

P, prevalence; PR, prevalence ratio; CI, confidence interval.
†There are no values.
*$P \leq 0.05$.
**$P \leq 0.01$.
***$P \leq 0.001$.

participating in leisure activities. Among men this relationship reflected the degree to which they engaged in physical activities. Those with no or rare physical activity in leisure time had a greater prevalence of pain compared to those whose physical activity was regular or frequent.

These findings are consistent [Tarkowska, 2002; Portela et al., 2005], as it is known that men and women manage their free time differently: women occupy themselves with household chores at the expense of their personal interests, while men develop sports and leisure activities. For men, it is plausible to suppose that the lower prevalence of pain in the group who reported engaging in physical activities suggests a protective effect for a range of morbidities, including those that are musculoskeletal [Fonseca and Fernandes, 2010; Fernandes et al., 2011].

Differences were observed within the group of women; for example, a higher prevalence of pain among those exposed to a high domestic workload (PR 1.77; 95% CI: 1.42–2.20). Evidence indicates that the women, more than the men, devote a significant portion of their time to a "family role" [Lundberg, 2002; Musshauser et al., 2006]. In our study, 36.1% of women reported high domestic workload, compared with only 13.3% of men. Thus, women in the workforce face a greater total workload (job + residence or domicile) concomitant with the difficulties in reconciling family and professional responsibilities [Lundberg, 2002; Portela et al., 2005; Musshauser et al., 2006]. The persistent gender imbalance in domestic work affects the health of women and should be considered in the analysis of the gender differences in musculoskeletal health [Strazdins and Bammer, 2004].

Several studies show that the performance of housework remains primarily a female responsibility, even in developed countries [Lundberg, 2002]. Combined exposure to paid work and domestic work has been associated with negative effects on health [Messing and Stellman, 2006; Cardoso et al., 2009]. A positive association between domestic workload and upper-limb pain has been consistently found among women [Fonseca and Fernandes, 2010; Fernandes et al., 2011].

Regardless of gender, the group of workers who reported missing work (without citing the cause) or sick leave in the 12 months prior to the completing the questionnaire had a higher prevalence of musculoskeletal pain compared to those who denied missing work. Physical and psychosocial factors contribute both to the disease and to their perceptions about their ability to work and to the decision to take a leave of absence [Eriksen et al., 2003]. The content of the tasks, one's position in the hierarchy at work, and the specific needs of the users influence the rate of absenteeism among human service workers [Rugulies et al., 2007].

The prevalence of musculoskeletal pain was higher in the group of women and men whose answers were consistent with CMD compared to the group in which screening was negative for CMD. The multifactorial nature and the role of psychosocial factors—such as dissatisfaction and psychiatric morbidities, stressful working and living conditions—are well established as both triggering and aggravating both chronic musculoskeletal pain and CMD [Menzel, 2007; Costa and Vieira, 2010].

The high prevalence of upper-limb pain was observed in the group of female dentists and dental technicians, and in the group of male physical and occupational therapists. These are occupations known for their risk of musculoskeletal pain [Alexopoulos et al., 2004; Leggat and Smith, 2006; Campo et al., 2008; Passier and McPhail, 2011]. The findings among dentists and dental technicians are consistent with those of samples of Greek dentists [Alexopoulos et al., 2004] and Australian dentists [Leggat and Smith, 2006]. Occupational therapy professionals are exposed to the anxieties and difficulties of patients who are targeted by therapeutic interventions that are under their responsibility, which impact on their physical and mental health [De Marco et al., 2008]. Our findings differ from studies that found higher prevalence of musculoskeletal pain among female physical therapists when compared to their male colleagues [Campo et al., 2008; Passier and McPhail, 2011].

The results presented are consistent with a growing appreciation of the vulnerability of the individuals exposed to physical demands and unfavorable working conditions, regardless of gender. Work that is physically demanding

and poor workplace conditions are associated with a higher prevalence of pain among both women and men.

The physical demands of healthcare work are frequently associated with the development of musculoskeletal problems [Peled, 2005; Alamgir et al., 2007; Ngan et al., 2010; Hansson et al., 2010]. Such problems may result from overexertion during activities: maintaining static postures for extended periods of time, repetitive movements, and mobilization of weight. These physical demands take place in work environments where conditions include extreme temperatures, excessive noise, and uncomfortable furniture [Costa and Vieira, 2010; Magnavita et al., 2011].

Regarding the psychosocial aspects of work, low job control was associated with statistically significant levels of upper-limb pain among women, while high psychological job demand was associated with upper-limb pain among men. Taking "low strain" as the reference group (in the Demand-Control model), an association was observed—only among women—between prevalence of pain and passive work, consistent with the literature [Magnago et al., 2010]. Our results suggest that low job control, situations characterized by repetitive tasks, limited autonomy, and few opportunities for learning, increase the risk of musculoskeletal pain among women [Alamgir et al., 2009; Urbanetto et al., 2011].

The prevalence ratio of upper-limb pain in the group with high job strain was the same for women and men, however the association with upper-limb pain was statistically significant only among women. There was also a higher prevalence of pain among women who performed active work (high demand-high control). These findings are consistent with earlier studies among female HCW [Magnago et al., 2010] and Quebec working population [Leroux et al., 2005].

Different psychosocial components in men and women appear to influence the reporting of musculoskeletal pain. Social and organizational structures that affect health and morbidity may be different for women and men, and different combinations of psychosocial and physical factors could exist in "typical" female and male occupations [Woods, 2005; Alamgir et al., 2009].

Limits and Advantages of the Study

The present study had some limitations that should be considered when interpreting the results. The type of design adopted, cross-sectional, does not permit causal inferences or conclusions about the direction of the associations found. The chronological relationship between risk factors and pain cannot be determined in a cross-sectional study.

The questionnaire did not address the precise location of the pain, the characterization of its intensity, and its duration. However, we observed prevalence of musculoskeletal pain as high as those described in the literature [Alexopoulos et al., 2004; Leroux et al., 2005; Fonseca and Fernandes, 2010; Garcia et al., 2010; Passier and McPhail, 2011], therefore, it is clear that we are dealing with phenomena of high prevalence, which suggests ample opportunities for future investigation.

Despite the limitations cited, the findings raise concern because they are derived from a representative sample of workers that included participants from all occupations, all geographic areas, and levels of complexity of public health services in Belo Horizonte, Brazil. This sampling strategy enabled a broad mapping of health status and work of this population, thus generating useful information for management policy and for the organization of work in the services studied.

CONCLUSIONS

The findings suggest gender differences in the distribution of upper-limb musculoskeletal pain across occupational groups. It also support initiatives that focus on the need to give visibility to the different effects of working conditions on the health of occupational groups and suggest the importance of developing specific measures to promote women's health.

The higher prevalence of pain among women with high domestic workloads suggests the need for the inclusion of such activities when evaluating workload in occupational studies.

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