ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Socio-economic and cultural factors associated with smoking prevalence among workers in the National Health System in Belo Horizonte

Fatores socioeconômicos e culturais associados à prevalência de tabagismo entre trabalhadores do Sistema Único de Saúde em Belo Horizonte

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ABSTRACT: *Objective:* To identify factors related to smoking among health workers of the National Health System in Belo Horizonte, Minas Gerais, Brazil. *Methods:* A cross-sectional study based on a survey conducted between September 2008 and January 2009 with a stratified sample. Data on sociodemographic, health, employment, and work characteristics were analyzed. Poisson regression models with robust variance and estimation of unadjusted and adjusted prevalence ratios were used to establish associations at a 5% significance level for inclusion in the final model. *Results:* In 1,759 questionnaires analyzed, in which the question related to smoking was answered, the overall prevalence of smoking was 15.7%. Reasonable relationship between requirements and available resources remained negatively correlated to smoking in the final model (PR = 0.75; 95%CI 0.58 – 0.96). The variables that remained positively associated with smoking were being male (PR = 1.75; 95%CI 1.36 – 2.25) and the following positions: community health workers (PR = 2.98; 95%CI 1.76 – 5.05), professionals involved in monitoring (PR = 3.86; 95%CI 1.63 – 5.01), administrative and other general services workers (PR = 2.47; 95%CI 1.51 – 4.05); technical mid-level workers (PR = 2.23; 95%CI 1.31 – 3.78), including nurses and practical nurses (PR = 2.07; 95%CI 1.18 – 3.64). *Conclusion:* Specific occupational subgroups were identified and should be prioritized in smoking cessation and prevention programs.

Keywords: Health personnel. Smoking. Prevalence. Public health. Epidemiology. Occupational health.

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RESUMO: *Objetivo*: Analisar os fatores associados ao tabagismo em trabalhadores da saúde vinculados ao Sistema Único de Saúde de Belo Horizonte, Minas Gerais. *Métodos:* Estudo transversal com base em inquérito realizado entre setembro de 2008 e janeiro de 2009 com amostra estratificada. Variáveis sociodemográficas, de condições de saúde, emprego e trabalho foram analisadas. Utilizou-se regressão de Poisson com variância robusta, com estimativa das razões de prevalência bruta e ajustada e o nível de significância para inclusão no modelo final foi 5%. *Resultados:* Em 1.759 questionários analisados e para os quais houve resposta para a questão do tabagismo, a prevalência de tabagismo obtida foi de 15,7%. Na análise de associações permaneceu, no modelo final, negativamente associada ao tabagismo, a relação regular entre exigências e recursos disponíveis (RP = 0,75; IC95% 0,58 – 0,96). Permaneceram positivamente associados ao tabagismo sexo masculino (RP = 1,75; IC95% 1,36 – 2,25) e os seguintes cargos: agentes comunitários de saúde (RP = 2,98; IC95% 1,76 – 5,05); profissionais envolvidos com a vigilância (RP = 3,86; IC95% 1,63 – 5,01); administrativos, de serviços gerais e outros (RP = 2,47; IC95% 1,51 – 4,05); profissionais técnicos de nível médio (RP = 2,23; IC95% 1,31 – 3,78); com inclusão de enfermeiros e técnicos de enfermagem (RP = 2,07; IC95% 1,18 – 3,64). *Conclusão:* Foram identificados subgrupos ocupacionais específicos que devem ser priorizados em programas de prevenção e cessação de fumar.

Palavras-chave: Pessoal de saúde. Hábito de fumar. Prevalência. Saúde pública. Epidemiologia. Saúde do trabalhador.

INTRODUCTION

Smoking is a large-scale public health problem and is considered as the main preventable cause of death in the world by the World Health Organization (WHO)[1]. There is evidence that smoking impacts negatively the health of health workers (HW), as well as their assistance to patients.

The prevalence of smoking among HW, as compared to general population, varies globally. International literature shows a lower prevalence of smoking habit among HW in developed countries in comparison to the general population[2,3]. However, in developing countries this prevalence is similar and sometimes equal to that of the general population[4,5].

Studies conducted in Brazil and other developed or developing countries showed that smoking may impair credibility of the health professionals, once they are expected to set the example of healthy habits to their patients and the community[5-7]. Furthermore, smoking works as a bad predictor for prevention interventions and smoking cessation, once HW tend to approach less frequently subjects related to smoking cessation with patients as compared to HW who are nonsmokers[4,5].

There is no record of studies about smoking conducted in Brazil with this specific population, only research addressing the subject in specific categories, notably physicians[7,8] and nursing professionals[5,9]. However, according to Barros et al.[10] and Dawson et al.[11], particularities of working conditions in this group are subjected to stresses similar to those frequently related to smoking: frustration, stressful work, impotence, devaluation, lack of recognition, employment instability, high-demand workloads, long hours of work,

and non-daily shifts[10,11]. Thus, characterizing smokers per occupation may contribute to improve control and cessation interventions[10]. Services in the public health system require multiprofessional approach, so many categories interact all the time. Therefore, studies addressing the range of HW may help to improve knowledge about factors associated with smoking habit in these populations and also to support prevention and cessation policies inside and outside of their work environment.

This study aims to fulfill this gap in literature by analyzing a sample representing the HW populations to show the prevalence of smoking among HW and factors related to their health and work conditions at the National Public Health System (SUS) associated with this habit.

METHODOLOGY

The epidemiological questionnaire was developed and applied by Núcleo Saúde e Trabalho, a research group linked to the Medical School of Universidade Federal de Minas Gerais (UFMG) from September 2008 to January 2009. Questions focused on health and work conditions. All professionals from the city public health service were eligible for the study, regardless of their employment relationship (permanent, temporary, trainee program), once they were in effective acting in the unit chosen.

Questionnaires did not allow identification of respondents. The study was approved by the Ethics Committee of Universidade Federal de Minas Gerais (protocol 542/07) and the Ethics Committee of the Municipal Secretariat of Belo Horizonte (protocol 054/06). All participants read and signed the informed consent form.

The sample was stratified by health district, complexity level of assistance (health centers, specialty, urgency, and district managements), and occupation. In each stratum, individuals were randomly selected. Those who were not present at work because of vacation, transference retirement, or death were replaced, being respected function, level of assistance, and geographical area.

Sample calculation was made considering all 13,602 HW on data collection, prevalence of smokers in general population of 17.2%[12], 95% confidence level, and 3% accuracy. Among 2,205 HW chosen, 1,808 answered the questionnaire. Of these, 1,759 informed their situations as to smoking, so the response rate was 79.8% [(1.759/2.205)*100]. It is important to note that 1,759 individuals correspond to a sample quite larger than necessary, based on standards defined for sample sizing.

The questionnaire was fulfilled by an experienced interviewer who contacted the unit where participants worked after confirming their presence. Up to three attempts of localization of the chosen workers were made. When participants were not found on the third attempt, they were considered sample loss; data were organized using the SPSS software, version 15.

The variable "outcome" was defined based on answers to the question "considering as smoker people who smoked at least 100 cigarettes or 5 packs in life, do you classify yourself as a non-smoker, former smoker or current smoker?". This variable was dichotomized, being

defined as smokers people who referred to themselves as current smokers and nonsmokers those who reported being former nonsmokers.

Explicative variables were organized into three groups:

1. individual characteristics: sociodemographic and health condition information (sex, age, schooling, and absence to work due to health problems in the last 12 months);
2. work description: function, type of current employment relationship, and monthly gross income in units; and
3. work conditions: relation between tasks demanded and resources available, physical demand at work, and emotional demand at work.

The variable relation between tasks demanded and resources available had its origin in the question with four options of answer: good, regular, bad, or very bad (the latter two alternatives being grouped in the sole category bad/very bad).

The variable physical demand at work was created from the questions about bodily postures compatible with pain or discomfort, standing up or being seated for too long, walking, need for standing up for a while, carrying or pushing excessive weight, helping to move patients, and taking breaks during work. Each question had four options (1 = never; 2 = rarely; 3 = sometimes; and 4 = always). A score for physical demand was created from the sum of features mentioned, which were categorized per tertiles in low demand (values equal to or lower than the second tertile) and high demand (values higher than the second tertile).

The variable emotional demand at work originated in the question "My job demands too much of me emotionally", with the following options of answers: strongly disagree and disagree (grouped as low demand), and agree and strongly agree (grouped as high demand).

First, we performed a descriptive analysis of data (proportions and percentages of subjects, distributed in categories of each variable studied). Afterwards, HW were distributed in the sample for each level of explicative variable, stratified by absence of smoking habit. The univariate analysis was performed by Poisson regression, with simple robust variance, and estimative of gross prevalence ratios (PRs) and respective confidence intervals (95%CI) to assess the extent of association between variables. Variables that showed to be significant at 20% in univariate analysis were grouped in a multivariate model and assessed by sequential deletion, with significance level set at 5% and 95%CI. Nonsignificant variables at multivariate model were removed from sequential deletion analysis, generating a new explicative model. This model is tested once again, with the same significance level. The process is repeated until a final model is obtained, with all variables "resisting" repeatedly to the analysis at 5% significance level. Statistical analysis was performed using STATA 12.0 software.

RESULTS

The proportion of smokers was 276 individuals (15.7%). Females corresponded to 71.6% of the sample; of them, 54.2% reported schooling until high school, technical school, or incomplete higher education; and 51.3% denied absence, license, or work leave in the last

12 months (Table 1). Mean age was 40.8 years (± 11.1), ranging from 16 to 73 years old. As to their jobs, 23% held managing, general services, and other positions, and 69.7% had been approved in tendering. Mean income was R$ 1,932.12 and median was R$ 1,000.00. Regarding work conditions, 50.5% reported the relation between demand and resources as regular, 67.4% considered physical demand at work as low, and 74.7% considered emotional demand at work as high.

The main results of univariate analysis were the following: prevalence of smoking among males was 70% higher than that among females, with PR of 1.70 (Table 2). Regarding educational level, the prevalence of smoking among participants that had gone to high school, technical courses, or incomplete higher education was 50% higher than that of participants with complete higher education or postgraduation (PR = 1.50). Among people who had attended elementary school only, the prevalence of smoking was 93% higher than among those who had been to colleges or completed postgraduation courses (PR = 1.93). Among participants who reported absence in the 12 months before the study, the prevalence of smoking was 22% lower than that among those who denied

Table 1. Sample description. Municipal health workers of Belo Horizonte, MG, 2009.

Individual characteristics	n	%
Sociodemographic and health conditions		
Sex	1788	
Female	1281	71.6
Male	507	28.4
Age (years)	1783	
Up to 34	567	31.8
35 – 46	608	34.1
47 or more	608	34.1
Schooling	1785	
Complete higher education or postgraduation	662	37.1
Complete high school or technical studies	968	54.2
Elementary	155	8.7
Absence (12 months previous to study)	1770	
No	908	51.3
Yes	862	48.7
Smoking	1759	
Nonsmoker	1483	84.3
Current smoker	276	15.7

Table 1. Continuation.

Individual characteristics	n	%
Work conditions		
Position	1643	
Physicians	234	14.2
Nurses and nursing technicians	228	13.9
Technicians with higher education	201	12.2
Professionals of surveillance	106	6.5
Health community agents	223	13.6
Technicians with complete high school	273	16.6
Management, general services, and others	378	23.0
Current work bond	1758	
Tendering	1225	69.7
Hired/trainee program	533	30.3
Gross income per month (R$)	1654	
Up to 600	473	28.6
601 – 1,200	516	31.2
More than 1.201	665	40.2
Work conditions		
Relation demand and resources available	1782	
Good	617	34.6
Regular	900	50.5
Bad/very bad	265	14.9
Physical demand	1740	
Low	1172	67.4
High	568	32.6
Emotional demand	1781	
Low	451	25.3
High	1330	74.7

Note: there was a discrepancy in response rate for each variable, which explains internal differences.

absence at work (PR = 0.78). Regarding work conditions compared to physicians, the prevalence was 2.1 times higher among surveillance professionals (PR = 3.1); 1.37 times higher among health community agents (PR = 2.37); and 1.55 times higher among managers, general service staff, and other professionals (PR = 2.55). The prevalence of smoking among medium-level technicians was 89% higher than that among physicians (PR = 1.98). The prevalence of smoking among hired/trainee HW was 50% higher than that among tendering professionals (PR = 1.50). The prevalence of smoking was 29% lower among participants whose income was greater than R$ 1,201.00 than among those whose income was lower than or equal to R$ 600.00 (PR = 0.71). Regarding work conditions, the prevalence of smoking was 26% lower among people reporting relation between demands and resources available as regular than among those reporting such relation as good (PR = 0.74). The prevalence of smoking among participants who stated low physical and emotional demand at work was 29 and 27% lower than that among participants reporting high demands (PR = 0.71 and 0.73, respectively) (Table 2).

Variables sex, educational level, absence at work, function, type of employment, income, ratio of demand and resources, and physical and emotional demand at work were included in the multivariate model; adjusted PRs were obtained. Results showed an adjusted smoking prevalence of 75% among males, which is higher compared to that among females (PR = 1.75; 95%CI 1.36 – 2.25) (Table 3). Regarding the variable work position, adjusted smoking prevalence, compared to physicians, was 1.07 times higher among nurses and nursing technicians (PR = 2.07; 95%CI 1.18 – 3.64); 1.86 times higher among surveillance professionals (PR = 2.86; 95%CI 1.63 – 5.01); 1.98 times higher among community health agents (PR = 2.98; 95%CI 1.76 – 5.05); 1.23 times higher among medium-level technicians (PR = 2.23; 95%CI 1.31 – 3.78); and 1.47 times higher among management professionals, general service staff, and others (PR = 2.47; 95%CI 1.51 – 4.05). Adjusted smoking prevalence among those who reported the ratio of demand and resources as regular was 25% lower than that among those who reported this ratio as good (PR = 0.75; 95%CI 0.58 – 0.96).

DISCUSSION

The prevalence of smoking, in 2009, found in the sample of HW from the public health system of Belo Horizonte (MG) was slightly superior to that estimated for the general population living in the same municipality (15.7 and 15.2%, respectively). The higher prevalence among HW compared to general population was unexpected at first, given the specificity of the sample composed of health professionals, who were supposed to be more aware of the harmful effects of smoking. In the case of HW holding management and general service positions, although they do not necessarily have higher education degrees in the Health Field, they were constantly in contact with professionals and were aware of the effects of smoking.

Table 2. Smoking prevalence and result of the univariate analysis. Municipal health workers of Belo Horizonte, MG, 2009.

Individuals characteristics	n	%	PR (95%CI)	p-value
Sociodemographic and health conditions				
Sex	1788			
Female	1281	13.1	1.00	
Male	507	22.2	1.70 (1.37 – 2.12)	< 0.001***
Age (years)	1783			
Up to 34	567	17.2	1.00	
35 – 46	608	14.0	0.82 (0.62 – 1.07)	0.144
47 or more	608	16.3	0.95 (0.73 – 1.23)	0.701
Schooling	1785			
Complete higher education or postgraduation	662	11.7	1.00	
Complete high school or technical studies	968	17.4	1.50 (1.16 – 1.92)	0.002**
Elementary	155	22.5	1.93 (1.34 – 2.77)	< 0.001***
Absence (12 months previous to study)	1770			
No	908	17.5	1.00	
Yes	862	13.7	0.78 (0.63 – 0.98)	0.030*
Work conditions				
Position	1643			
Physicians	234	7.9	1.00	
Nurses and nursing technicians	228	12.8	1.63 (0.93 – 2.85)	0.090
Technicians with higher education	201	8.8	1.28 (0.70 – 2.34)	0.428
Professionals of surveillance	106	24.3	3.06 (1.75 – 5.35)	< 0.001***
Health community agents	223	18.6	2.37 (1.41 – 4.00)	0.001**
Technicians with complete high school	273	14.5	1.89 (1.12 – 3.21)	0.018*
Management, general services, and others	378	20.1	2.55 (1.57 – 4.16)	< 0.001***
Current work bond	1758			
Tendering	1225	12.7	1.00	
Hired/trainee program	533	18.4	1.50 (1.20 – 1.87)	< 0.001***
Gross income per month (R$)	1654			
Up to 600	473	17.7	1.00	
601 – 1,200	516	18.5	1.05 (0.80 – 1.37)	0.738
More than 1.201	665	12.6	0.71 (0.53 – 0.94)	0.017*

Table 2. Continuation.

Individuals characteristics	n	%	PR (95%CI)	p-value
Work conditions				
Relation demand and resources available	1782			
Good	617	18.4	1.00	
Regular	900	13.7	0.74 (0.59 – 0.94)	0.013*
Bad/very bad	265	16.4	0.90 (0.64 – 1.23)	0.479
Physical demand	1740			
Low	1172	17.3	1.00	
High	568	12.4	0.71 (0.55 – 0.92)	0.010*
Emotional demand	1781			
Low	451	19.4	1.00	
High	1330	14.2	0.73 (0.58 – 0.92)	0.008*

PR: prevalence ratio; 95%CI: 95% confidence interval; *p < 0.05; **p < 0.01; ***p < 0.001.

Table 3. Prevalence of smoking and results of the multivariate analysis. Municipal health workers of Belo Horizonte, MG, 2009.

Variables	PR (95%CI)	p-value
Sex		
Female	1.00	
Male	1.75 (1.36 – 2.25)	< 0.001***
Position		
Physicians	1.00	
Nurses and nursing technicians	2.07 (1.18 – 3.64)	0.011*
Technicians with higher education	1.41 (0.76 – 2.62)	0.279
Professionals of surveillance	2.86 (1.63 – 5.01)	< 0.001***
Health community agents	2.98 (1.76 – 5.05)	< 0.001***
Technicians with complete high school	2.23 (1.31 – 3.78)	0.003**
Management, general services, and others	2.47 (1.51 – 4.05)	< 0.001**
Relation demand and resources available		
Good	1.00	
Regular	0.75 (0.58 – 0.96)	0.023*
Bad/very bad	0.89 (0.63 – 1.28)	0.542

PR: prevalence ratio; 95%CI: 95% confidence interval; *p < 0.05; **p < 0.01; ***p < 0.001.

This is concerning, once Machado and Assunção[13] reported more interest and implication of HW in stimulating patients to adopt personal practices whose benefits they themselves know. The authors stated that HW draw knowledge for themselves when applying health intervention protocols to their patients. However, smoking prevalence among HW may also indicate absence or failure to apply smoking prevention and cessation protocols in health services[13].

In agreement with the literature, smoking prevalence was higher among males, as seen in developing countries[13,14]. This statistically significant result was maintained in the final model.

When it comes to schooling, a level of exposure was identified in the univariate analysis, characterized by an inverse, gradual, and significant relation between low schooling and higher prevalence of smoking. These findings are similar to those from the literature addressing HW in developing countries and the Brazilian general population[7,12,15]. Low schooling may be considered as a marker for poor access to knowledge and poor understanding of the harmful effects of tobacco consumption on health[16]. However, this result was not maintained in the multivariate analysis.

Regarding occupation, our findings agree with those of the study by Barros et al.[10], which established an association between smoking and working positions that demand lower schooling levels and more physical efforts. They also agree with those of the studies showing a relation to smoking in HW dedicated to management, general services, and other activities[4,6,10]. It is worth mentioning, in comparison to physicians, the high prevalence of tobacco use among health community agents, nurses, and nursing technicians found in the final model, once these are workers who directly deal with the patients.

When it comes to type of employment, findings were also compatible with those of the study by Giatti and Barreto[17]. The fragility of the employment bond was positively associated with smoking in the univariate analysis. But these results were not maintained in the final model.

Regarding health conditions, a negative association was observed between smoking and absence episodes in the 12 months before the study in the univariate model. Although studies by Torres Lana et al.[18] and Gorman et al.[19] reported positive relation between absence to work and harmful behavior, this may be explained by a possible confusion effect resulting from the variable "type of employment," as shown by previous researches[20,21]. Considering that a positive association exits between fragile employment bond and smoking habit, the high proportion of smokers in the group of hired people could explain the low rate of absence. The situation seen in study is compatible with presence at work related to threat of job loss, that is, insecurity may lead to less absence to work among hired people[22].

Also a negative association was observed between smoking and income in the univariate analysis, which also agrees with the literature[10,12,23].

Regarding work conditions, results of the univariate analysis showed a negative association between poor work conditions and smoking. Smoking rate was lower among participants who reported the ratio of demand and resources as regular, and physical and emotional demands at work as high. In fact, studies by Heikkila et al.[24] and Peretti-Watel et al.[25] reported a positive relation of smoking with stressful work conditions, and Sapp et al.[26] mentioned a mitigating effect of social support in the relation smoking and work demand. Radi et al.[27] showed an association of stressful factors at work with smoking habit among the Australian population, with different standards according to sex. These authors reported negative association between active or highly demanding work and smoking among females only. This same study, however, showed a positive relation between smoking and high demands at work among males only, and between smoking, physical demand, and psychological demand among females only. The study by Andersen et al.[28] did not report association between work conditions and smoking prevalence among hired workers in the Danish and Swedish populations.

In this study, the regular relation between demand and resources available, as compared to good relation, was shown to be a protective factor of smoking in univariate and multivariate analyses, and the magnitude of this effect was similar and statistically significant in both models. This result is not intuitive. The literature lacks studies on the relation between smoking and work conditions, specifically among HW, but according to Boeuf-Cazou et al.[29], people subjected to work responsibilities and pressure related to time are more vulnerable to smoking. Nevertheless, our results indicate that control by variables of work categories, which could be a proxy to the time pressure, did not change the effect.

This study has limitations. The sectional design limits the possibilities of establishing a direct cause relation, although associations found were consistent with literature. Information from questionnaire answers may not be applicable to the real smoking rate in the population. It is worth emphasizing that among smokers, the absence of data related to the frequency of tobacco use, age of smoking initiations, and type and quantity of cigarettes smoked per day prevents the ranking of the exposure gradient. This is also true among former smokers, for there is no information about the time passed since they stopped smoking and the study. Results may have also been influenced by the healthy worker effect, a phenomenon often identified in occupational health research.

CONCLUSION

Despite limitations, this is a pioneer study in Brazil that showed features associated with smoking habit among HW and identified target groups considered as priority for smoking prevention and cessation actions. Health policies already laid down or about to be implemented must, therefore, consider the aspects shown in this paper to grant efficacy of interventions by HW from SUS, considering specific occupational groups.

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