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Job strain and hypertension in women: *Estudo Pró-Saúde* (Pro-Health Study)

ABSTRACT

This study aimed to analyze the association between job strain and hypertension in the female population. A cross-sectional study was performed with 1,819 women who participated in the *Estudo Pró-Saúde* (Pro-Health Study), in the city of Rio de Janeiro, Southeastern Brazil, between 1999 and 2001. The Brazilian version of the short version of the Job Stress Scale (demand-control model) was used. Overall prevalence of measured hypertension ($\geq 140/90$ mmHg and/or antihypertensive drug use) was 24%. Compared to participants with jobs classified as low strain, adjusted prevalence ratios for hypertension in women who performed passive and active high-strain jobs were, respectively, 0.93 (95% CI: 0.72;1.20), 1.06 (95% CI: 0.86;1.32) and 1.14 (95% CI: 0.88;1.47). Longitudinal analyses should be performed to clarify the role of these work environment psychosocial characteristics as a determinant of hypertension.

DESCRIPTORS: Women. Hypertension. Professional Burnout. Working Women. Occupational Health.

INTRODUCTION

Job strain resulting from the relations between psychological demand and control, associated with the work process, as proposed by Karasek,⁵ has been investigated in relation to health outcomes since the beginning of the 1980s. According to this theoretical model, work activities can be classified into four categories (or quadrants), based on the combination between the levels of psychological demand and work process control: low strain (less demand and more control); active (more demand and more control); passive (less demand and less control); and high strain (more demand and less control). It is suggested that high-strain work processes are associated with negative repercussions for health.⁵

Arterial hypertension has been one of the outcomes studied and it shows controversial results. The majority of studies concluded that there is a direct association between job strain and levels of systolic and/or diastolic blood pressure in men, but not in women. Studies on female populations have been less frequent and a growing number of investigations usually suggest lack of association.^{2,3,8,9,a}

The present study aimed to analyze the association between job strain and arterial hypertension in women.

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^a Alves MGM. Pressão no trabalho: estresse no trabalho e hipertensão arterial [doctorate thesis]. Rio de Janeiro: Escola Nacional de Saúde Pública da Fiocruz; 2004.

METHODS

Data from a more extensive study entitled “*Estudo Pró-Saúde*” (Pro-Health Study)⁴ were used. This ongoing study consists in investigating the role of markers of social status and other social life dimensions in several domains of quality of life, morbidity and behavior associated with health, using a cohort of technical-managerial employees from a university in the state of Rio de Janeiro. A total of two baseline data collections were conducted (1999 and 2001), where 3,253 (78%) of all the 4,177 eligible employees participated, excluding only those who were retired or temporarily assigned to other institutions.

A cross-sectional study was performed, whose sample was comprised of 1,819 women who participated in stages 1 and 2 (56% of the total number of employees). A total of 66 women were excluded from the analysis as they did not answer certain questions about the job stress scale, in addition to 27 pregnant women and ten other participants who did not have their arterial pressure measured. Thus, the population studied included 1,716 women.

Job strain was assessed using Theorell’s adapted version of the psychological and control demand scale, comprised of 11 questions, which was translated and adapted to Portuguese, as part of the *Estudo Pró-Saúde*.¹ This scale was included into a multidimensional questionnaire, entirely completed by participants themselves. The “psychological demand” dimension is formed by four questions that assess time and speed to perform tasks, and one question that assesses conflict between different demands. The “control” dimension is formed by four questions about the use and development of abilities and two about the authority to make decisions while at work. For both dimensions, response options are shown on a Likert scale (1-4), ranging from “frequently” to “never/rarely”. A value between 1 (least frequent) and 4 (most frequent) was attributed to each response given by participants. Each of the dimensions has a question with a reverse meaning.¹

According to the results from the study on test-retest reliability with 94 employees, the scale’s stability (above 0.81) and internal consistency (above 0.70) were considered adequate, based on Landis & Koch’s classification, cited by Alves.^b Intraclass correlation coefficient for the “demand” dimension was 0.85 (95% CI: 0.75;0.91); and for the “control” dimension, 0.82 (95% CI: 0.71;0.90). Cronbach Alpha coefficients were 0.73 and 0.63, respectively.¹

Arterial pressure measurements were obtained by trained and qualified professionals. A total of two measurements were taken with participants sitting, with an interval of one minute, using a mercury column sphygmomanometer. Participants with a mean of two systolic blood pressure measurements ≥ 140 mm Hg

and/or a mean of diastolic blood pressure ≥ 90 mm Hg and/or reported antihypertensive drug use were considered hypertensive. Drugs reported to have been used in the two previous weeks were classified as antihypertensive by two independent reviewers.

The following covariables were analyzed: ethnic group (self-reported as white, mixed, black, indigenous and Asian), according to the *Instituto Brasileiro de Geografia e Estatística* (IBGE – Brazilian Institute of Geography and Statistics) categories; age (younger than 35 years, 35-44 years, 45 years and older); level of education (up to complete primary education, secondary education, \geq higher education); monthly per capita household income in minimum wages (< 2.5 , 2.5-6, > 6 MW); marital status (single; married, widowed; separated or divorced); number of children (none, one, two or more); number of hours worked per week (up to 40, 41-59, 60 or more); occupational status (manual workers, routine non-manual workers and professionals); and length of time in job (up to five years, 6-11, 12 or more).

In the statistical analysis, the scores of the “psychological” and “control” dimensions were divided into two categories defined by their median. In the case of demand, the cut-off point was 14. “Less demand” was defined as scores from 5 to 14 inclusive; and as “more demand”, the scores above this value. In the case of control, the cut-off point was 17, with the adoption of a criterion similar to the one defined for demand. Based on the combination between less/more demand and less/more control, participants were placed into the four quadrants of work environment classification. Participants with activities classified as low-strain (less exposure) were compared to those placed in each of the other work categories (active, passive and high-strain). The outcome variable, arterial hypertension, was categorized as absent or present.

Associations between variables were expressed as crude and adjusted prevalence ratios and their respective 95% confidence intervals, using Poisson regression models with robust variance. For the multiple logistic regression analysis, covariables associated with the outcome and exposure were selected, with a statistical significance level $p \leq 0.10$. Some variables, despite their not meeting this criterion (such as ethnic group and mean length of time in job), were included into the model due to their relevance. The variables that showed statistically significant association with arterial hypertension ($p \leq 0.05$) and/or were relevant for exposure and/or the outcome, according to the literature, remained in the model.

This study was approved by the Research Ethics Committee of *Instituto de Medicina Social da UERJ* (Rio de Janeiro State University Institute of Social Medicine).

RESULTS

Overall prevalence of hypertension in women was 24%. Considering the categories proposed by the demand-control model, the highest prevalence of hypertension was found in the group of passive jobs (28.3%), followed by high-strain jobs (24.8%). The group that showed the lowest prevalence was that of jobs classified as low-strain (20.9%) (Table).

The risk of developing arterial hypertension was 35% higher in women in passive jobs, when compared to women in low-strain jobs. However, this effect disappeared after adjusting the model according to the selected covariables (Table).

DISCUSSION

In the population studied, among female civil servants who participated in the *Estudo Pró-Saúde*, there was no statistically significant association between different job strain categories – high-strain, passive and active – and arterial hypertension in any of the multivariate models, adjusted for age, ethnic group, level of education, income, occupation and length of time in job.

Results from this study are in agreement with other studies, even though differences in the literature in terms of the way exposure (e.g. quadrants, terciles or ratio of demand and control scores) and outcome (arterial pressure measured continually or casually, systolic and diastolic pressure treated as continuous variables)^{3,4} were assessed. One possible explanation for the lack of association in the majority of studies could be the tendency hypertensive people have to seek more “peaceful” activities,^{3,4} i.e. these workers would request a transfer from high-strain jobs to low-strain jobs or those classified as passive. This change of workplace could cause the magnitude of effect to be underestimated, due to an exposure classification error. The longitudinal design of the *Estudo Pró-Saúde* will enable this possibility to be explored in future analyses, considering the incidence of arterial hypertension, in addition to its prevalence.

Although measurement of the outcome of interest involved training, supervision and strict quality control, casual blood pressure measurement may limit the analyses of this study. In general, studies that continually monitored blood pressure found positive results more frequently than those that obtained a casual measurement.^{3,4}

In the population studied, characteristics of stability of the employment relationship, in an external context of worsening work relations in Brazil, may have contributed to a lower perception of high strain at work. Despite confirmation, this hypothesis does not cause the use of the demand-control model in job strain assessment to be unviable, once it has been used in other cohorts of civil servants in England, Japan and Finland.⁶ Cohort stability, on the other hand, benefits longitudinal studies in terms of their losses. In the *Estudo Pró-Saúde*, even though results did not point to an association with arterial hypertension in women, high-strain jobs increased the occurrence of interruption of routine activities due to health,⁷ occupational accidents^a and minor psychological disorders, both in men and women (data not published).

Finally, the theoretical model adopted may not consider all psychosocial stress sources inherent in the work environment. Another model, proposed by Siegrist in 1982 and cited by Alves,^b associates work production efforts and rewards resulting from work: the unbalance between these two dimensions would create stressful situations that could be related to cardiovascular diseases, among other health problems.

Studies on the characteristics of work processes that influence workers' life and health are necessary. Health promotion strategies in the work environment must consider, in addition to recommending healthy individual behavior, work characteristics while workers are ill, once many of these characteristics may be changed.

Table. Association between job strain and arterial hypertension in women. Municipality of Rio de Janeiro. Southeastern Brazil. 1999-2001.

Job strain categories	n	%	Arterial hypertension	
			Gross PR (95% CI)	Adjusted PR ^a (95% CI)
Low strain	92	20.9	1.00	1.00
High strain	90	24.8	1.19 (0.92;1.53)	0.93 (0.72;1.20)
Passive	161	28.3	1.35 (1.08;1.69)	1.06 (0.86;1.32)
Active	74	21.5	1.03 (0.78;1.35)	1.14 (0.88;1.47)

^a Adjusted for age, ethnic group, level of education, income, occupation and length of time in job.

^a Brito AS. Estresse e acidentes no trabalho: Estudo Pró-Saúde [doctorate thesis]. Rio de Janeiro: Instituto de Medicina Social da UERJ; 2007.

^b Alves MGM. Pressão no trabalho: estresse no trabalho e hipertensão arterial [doctorate thesis]. Rio de Janeiro: Escola Nacional de Saúde Pública da Fiocruz; 2004.

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