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Sex, income and level of education associated with physical activity level among workers

ABSTRACT

OBJECTIVE: To analyze socioeconomic and demographic factors associated with physical activity level among workers.

METHODS: Cross-sectional study conducted in Brazil's Federal District, from 2000 to 2001, with a representative sample of 1,044 workers from both sexes, who are covered by the Programa de Alimentação do Trabalhador (Workers' Food Program). Binary logistic regression was used to determine possible risk factors associated with physical activity level and selected by the backward elimination process. Interactive effects of the variables were verified in the final model by means of the odds ratio for physical activity level ≥ 1.4 .

RESULTS: The final model included sex, income and level of education. Male individuals who only finished elementary school and earned less than four Brazilian minimum wages per month were the most likely to show physical activity level ≥ 1.4 . The odds ratio estimate indicated that men were five times more likely to show physical activity level ≥ 1.4 than women. Individuals who only finished elementary school and had an income equal to or below four minimum wages were two times more likely to show physical activity level ≥ 1.4 than individuals who earned more than four minimum wages and had a university degree or higher.

CONCLUSIONS: Results indicate that the factors associated with physical activity level among workers are the following: male, elementary school level, and income below four Brazilian minimum wages per month.

DESCRIPTORS: Collective Feeding. Motor Activity. Socioeconomic Factors. Nutrition Programmes and Policies. Cross-Sectional Studies.

INTRODUCTION

Non-communicable diseases and conditions result from a group of risk factors, and are thus characterized as multi-causal. According to the World Health Organization (WHO), some of these factors are related to diet and physical activity, consequently having an impact on people's quality of life.¹⁴

Innumerable associations between physical activity and non-communicable diseases and conditions have been found.^{9,12,14,16,19} As regular physical activity can prevent gain of weight, in addition to improving physical performance, mortality and morbidity can thus be reduced. However, as a result of changes in life and working conditions, the number of people who practice regular physical activity is small. Moreover, most occupations require low energy

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expenditure. In Brazil, around 13% of adult individuals practice leisure physical activity with some regularity, of which male practice surpassed female practice in terms of length of time and frequency.^{6,12,16}

According to the proposal from the WHO's "Global Strategy on Diet, Physical Activity and Health",¹⁴ efficient, solid strategies are necessary to cause changes in the population's diet and physical activity patterns. In addition, they have to be promoted with permanent monitoring and impact assessment of the actions planned.

Following this line of reasoning, The Brazilian Ministry of Health released the "*Guia Alimentar para a população brasileira: promovendo a alimentação saudável*" ("Food Guide for the Brazilian population: promoting a healthy diet"), within the context of the *Política Nacional de Alimentação e Nutrição* (National Policy on Food and Nutrition) and in accordance with the Global Strategy purposes. This Guide recommends, in its first special directive, an increase in regular physical activity, emphasizing that a healthy diet and physical activity are fundamental to support the maintenance of a healthy weight, reduce the risk of diseases, and improve quality of life.^a

According to what has been previously described and given the scarcity of scientific studies on this theme in Brazil, the importance and need to investigate the population's physical activity pattern can be observed. Thus, the present study aimed to analyze risk factors associated with physical activity level among workers.

METHODS

This was a cross-sectional study with a representative sample of workers from both sexes, all covered by the *Programa de Alimentação do Trabalhador* (PAT –Workers' Food Program) in Brazil's Federal District. Data were gathered between October of 2000 and September of 2001. The sample was calculated according to the official list of restaurants that are in partnership with the PAT in the Federal District, provided by the *Ministério do Trabalho e do Emprego* (MTE – Ministry of Labor and Employment) and combined with the list of restaurants registered in the *Conselho Regional de Nutrição - 1ª região* – CRN-1 (Regional Council of Nutrition – 1st region).

A total of 73 *Unidades de Produção de Refeições* (UPR – Meal Production Units) were identified and classified, according to the size of the meals served. Thus, the parameter used to calculate the sample size was the classification in terms of the UPR size, defined by the

number of meals served. This classification follows the internal PAT norms. After statistical calculation of a simple random sample, when an absolute margin of error of 5% in the estimate of proportions was considered, a sample of 1,044 workers was obtained. This sample is representative of the individuals who eat at the restaurants that are in partnership with the PAT in the Federal District. Data collection in the UPRs was completed when the number of interviews per unit was reached. Individuals who did not complete the questionnaire were excluded. The methodology and instruments used had been pre-tested in a pilot study performed in two of the units. Sampling details are described by Savio et al.¹⁸

Regarding physical activity data, participants were questioned about practice and type of activity, when this was performed for at least ten minutes, in the week preceding the interview. The reported values of minutes of participation in each activity were multiplied by the number of days when the activity was performed, and subsequently divided by seven. The results were thus given in minutes per day (day base). The duration of activities involved, for example, hours of sleep; work, leisure and locomotion activities; and hours watching television or video. The level of partial activity was calculated by multiplying the basal metabolic rate (BMR) by the duration of activity and by the respective activity factor. The BMR was estimated by means of equations, and the factors for each activity were obtained from tables provided by the Food and Agriculture Organization/ World Health Organization/ United Nations Organization (FAO/WHO/UNO).⁹ Routine activities that were not questioned or registered because they lasted less than ten minutes were named complementary, and the 1.4 factor was used as the BMR multiplier. Thus, the daily 24-hour period was completed (1,440 minutes). The sum of partial and complementary activity levels was divided by 24 hours to obtain the physical activity level (PAL) per day. The estimated PAL value for each individual was used in the multiple regression model.⁹

The EpiInfo software was used to create the database and the SAS statistical software was used for data analysis. All data were input to the EpiInfo software, and the 1,044 questionnaires were subsequently reviewed to correct possible data entry errors. Descriptive analyses related to socioeconomic, educational, nutritional status and family history of chronic disease characterization were obtained.

The physical activity level found among individuals in the study was very low, when compared to the levels recommended by the FAO/WHO to maintain an adequate health condition, which is PAL equal to

^a Ministério da Saúde, Secretaria de Atenção à Saúde, Coordenação-Geral da Política de Alimentação e Nutrição. Guia alimentar para a população brasileira: Promovendo a alimentação saudável. Brasília; 2005. (Série A. Normas e Manuais Técnicos).

or above 1.6.⁹ This fact determined the establishment of the PAL cut-off point at 1.4. To determine the possible risk factors associated with physical activity level, binary logistic regression was adjusted. PAL ($\geq 1.4=1$ and $<1.4=0$) was considered as the dependent variable. The independent variables considered were the following: body mass index (BMI), family history of chronic diseases, sex, smoking and drinking, level of education, age and income.

Initially, all the variables were included in the multiple analysis and selected by means of the backward elimination process. For the purpose of variable selection, a 5% significance level was used.

As the last stage, residual analysis was performed. Observations that showed residues that were higher than the value of plus or minus 2 were eliminated, and the final model obtained. According to the Hosmer-Lemeshow test, the model was fitted to the data ($p=0.24$). The odds ratio for PAL higher or equal to 1.4 was subsequently calculated.

The chi-square test was used to assess the association between sex and physical and occupational activities.

The research was approved by the Research Ethics Committee of the Faculdade de Ciências da Saúde/Universidade de Brasília.

RESULTS

On Table 1 the individuals' descriptive data are shown, according to physical activity level and researched variables.

Table 2 shows the final logistic regression model with the variables: sex and income (≤ 4 Brazilian minimum wages per month) with $p<0.01$, level of education 1 (elementary school) with $p<0.01$ and level of education 2 (high-school and university + higher) with $p=0.01$. Male individuals who have elementary school level and earn less than four minimum wages were more likely to show $PAL \geq 1.4$.

The odds ratio estimate (Table 3) indicates that male individuals were five times more likely to show $PAL \geq 1.4$ than female ones. Women were more associated with management services and production processes, whereas men were more associated with commerce and maintenance ($p<0.01$). Regarding the result to assess the relationship between sex and physical activity type, it was observed that women were more associated with moderate sedentary activities, while men were more associated with vigorous activities ($p<0.01$). Individuals who only completed elementary school were two times more likely to show $PAL \geq 1.4$ than those with university level or higher; whereas individuals who completed high-school were 1.61 times more likely to show $PAL \geq 1.4$ than those with university level or

Table 1. Worker's characteristics, according to physical activity level. Federal District, Brazil, 2000-2001.

Variable	Physical activity level		p		
	<1.4		≥ 1.4		
	N	%	N	%	
Sex					<0.01*
Female	326	79	87	21	
Male	260	41	371	59	
Total	586	56	458	44	
Age range					0.02**
< 20	22	51	21	49	
20 35	304	52	278	48	
35 50	208	62	129	38	
≥ 50	52	63	30	37	
Total	586	56	458	44	
Level of education					<0.01**
Elementary school 0 - 4 years	32	52	29	48	
Elementary school 5 - 8 years	95	42	132	58	
High school	257	55	212	45	
University - undergraduate studies	164	72	65	28	
University - postgraduate studies	38	66	20	34	
Total	586	56	458	44	
Income (Brazilian minimum wages per month)					<0.01**
< 2	5	71	2	29	
2 - 4	149	44	190	56	
5 - 6	135	62	83	38	
7 - 8	53	62	33	38	
≥ 8	241	62	146	38	
Total	583	56	454	44	
BMI					0.02*
≤ 24.9	351	59	241	41	
≥ 25.0	235	52	217	48	
Total	586	56	458	44	
Smoking					0.18*
Yes	81	51	77	49	
No	505	57	381	43	
Total	586	56	458	44	
Consumption of alcoholic drinks					0.01*
Yes	161	50	162	50	
No	425	59	296	41	
Total	586	56	458	44	
Family history of diseases					0.29*
Yes	93	60	62	40	
No	493	55	396	45	
Total	586	56	458	44	

* Chi-square test

** Cochran-Armitage test for trend

Table 2. Final model of multiple binary logistic regression for workers' physical activity level ≥ 1.4 . Federal District, Brazil, 2000-2001.

Variable	df*	Estimate	Standard-error	Wald test	p
Intercept	1	-2.26	0.25	80.00	<0.001
Sex*	1	1.69	0.15	125.42	<0.001
Level of education					
Elementary school**	1	0.80	0.23	12.51	0.01
High-school**	1	0.50	0.19	6.96	0.01
Income (minimum wages per month)					
≤ 4 ***	1	0.79	0.19	16.52	<0.01
≥ 7 ***	1	0.43	0.20	4.80	0.03

df: degrees of freedom

* Reference category for comparison: female sex

** Reference category for comparison: university level of education

*** Reference category for comparison: income of 5 to 6 minimum wages per month

Table 3. Odds ratio estimate of workers' physical activity level ≥ 1.4 . Federal District, Brazil, 2000-2001.

Variable	Odds ratio	95% CI
Sex		
Male x female	5.34	3.98;7.17
Level of education		
Elementary school x university	2.16	1.39;3.36
High-school x university	1.61	1.11;2.33
Income (minimum wages)		
≤ 4 versus 5 - 6	2.16	1.48;3.15
≥ 7 versus 5 - 6	1.49	1.01;2.20

higher. Regarding income, individuals who earned less than four minimum wages per month were two times more likely to show $PAL \geq 1.4$ than those who earned between five and six minimum wages; the former were 1.5 times more likely to show $PAL \geq 1.4$ than individuals who earned more than seven minimum wages.

DISCUSSION

The results from the present study among workers covered by the PAT in the Federal District reflect the physical activity level in an economically active population. According to the WHO, a sedentary lifestyle does not represent a personal risk exclusively, but is also economically harmful to society.¹⁴

Comparison by sex indicates that the prevalence of a sedentary lifestyle among women was higher than among men. One possible explanation for this fact, which must be further studied, has to do with women's double work shift, as they accumulate housework and sedentary work activities. However, this study did not aim to determine factors associated with the predominance of a sedentary lifestyle among women.

Some studies^{6,11} reveal that the prevalence of physical inactivity is higher among women, behavior which is observed from adolescence on, as pointed out in the study by Garcia et al.⁴ Workers covered by the PAT in the Federal District showed higher prevalence of a sedentary lifestyle among women. Other studies confirmed these results, such as the Canadian national survey² (59% of inactive women and 52% of inactive men) and Matsudo et al's¹¹ in the city of São Paulo (47.3% of inactive women and 45.6% of inactive men). Satariano et al¹⁷ concluded that, among individuals over 55 years of age, women reported more obstacles to physical activity practice in their free time than men. Similar result was found by Gomes et al,⁵ where occupation and leisure were grouped according to energy expenditure, in a probabilistic sample in the city of Rio de Janeiro; the prevalence of inactive women (77.8%) surpassed that of men (59.8%).

Analysis of studies on factors associated with sedentary lifestyle must include the perspective of the distinct environments or locations where they were performed. Research on leisure physical activities is usually conducted among men and those with higher income and level of education. On the other hand, research on occupational physical activities focuses on men and those with lower income and level of education. Finally, analysis of domestic physical activity usually assesses women and individuals with lower socioeconomic conditions.

The present study did not find age as a factor associated with physical activity level. There have been controversial reports in the literature concerning the effect of age on the population's level of sedentariness. Hallal et al⁶ observed that physical inactivity was positively associated with age. These data are emphasized by the WHO, which reports a decrease in physical activity practice as one gets older.³ On the other hand, data from both the Brazilian Ministry of Health and a study by Matsudo et al¹¹ show that there are no relevant differences in the proportion of insufficiently active individuals in distinct age ranges, in the locations studied, except for the capital cities of Manaus, Fortaleza, Recife and Porto Alegre, where the values increased. The absence of association between age and level of physical activity among workers

could be explained by the researched group's inherent characteristic, that is to say, an age range comprised of economically active individuals exclusively.

It was observed that the higher the income and level of education were, the less frequent the physical activity level was. In a study by Alves,¹ a decrease in physical effort in commerce-related activities is mentioned. A great number of men in the Federal District are connected to commerce and similar sectors, leading to a decrease in their work physical activities. Nonetheless, these can be compensated by leisure physical activities. This hypothesis is corroborated by the Ministry of Health's research, whose results show that the group with lower level of education had a lower percentage of sedentary people, with significant data for the Federal District.² Heavy work is more prevalent among those who are 40 years of age or older, with lower levels of education and family income ($p < 0.01$).^b Even though the present study investigated a specific part of the population, it was observed that the physical activity level showed a dependent effect of progressive reduction as the worker's level of education increased.

The analysis of the current situation shows that work and leisure patterns have changed. In the past, physical labor and energy expenditure were intense when work was farm-related and without technological innovations, and getting around did not depend on automotive vehicles. However, more and more often, people perform occupational activities that demand less physical effort. They also get around by means of transportation that do not require great energy expenditure, and report doing little leisure physical activity. This corroborates the results found in the present study, which state that male gender, elementary school level of education, and income below four minimum wages are associated with physical activity level.

In 2002, the Ministry of Health created the *Agita Brasil* program, following the example of the *Agita São Paulo* program, whose objectives are the population's involvement and knowledge build-up about the benefits of physical activity. The proposal is to increase every person's physical activity level by means of at least 30 minutes of activity, most of the days. The program's strategy covers people's daily routine, including the proposal that involves domestic chores, transportation and leisure. The WHO also seeks to stimulate the

implementation of strategies that create opportunities to promote health, through the "Global Strategy on Diet, Physical Activity and Health".¹⁴

In this context, the consolidation of actions is necessary to promote healthy behavior, with an increase in the practice of physical exercises. Thus, it is important to plan and prepare programs performed by multidisciplinary teams in the work place, following the example of *Agita Brasil*.

Some companies execute life quality programs, which measure the individual's perception of his/her position in life, in the context of the culture and value system he/she lives in, and in relation to his/her objectives, expectations, patterns and concerns. Thus, this definition is subjective and multidimensional.³ There is the component of multiple responsibility in it: the State's responsibility (healthy public policies), the community's (stress on community action), and the individual's (development of special abilities). People must work to transform their behavior, focusing on their lifestyle and leaning towards educational programs, which would be under their partial control.

Quality life programs must aim at health promotion and include a wide range of factors related to quality of life: a proper diet pattern, satisfactory working conditions, educational opportunities throughout life, responsible life style, adequate healthcare, and physical activity practice suitable for health promotion and disease prevention. The theme "work and physical activity" is fundamental to understand modern life as a whole, especially as regards PAT's main purpose. In this context, the results from the present study and other research on this theme could contribute to the search for more adaptable and balanced means to manage the necessary priorities for an individual's health. This, in turn, benefits the individual himself, the organization that hires him, and society as a whole.

Results from the present research show the following factors as associated with physical activity level among workers: sex (male), level of education (elementary school) and income (less than four Brazilian minimum wages per month). These results indicate that a significant number of workers investigated showed physical activity level that puts them at risk of chronic, non-communicable diseases and conditions. This is a relevant fact in the national context of growth of these diseases and in the larger sphere of the worker's health analysis.

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^b Serviço Social da Indústria. Estilo de vida e hábitos de lazer dos trabalhadores da indústria catarinense (1999-2004): relatório geral. Florianópolis; 2004.

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