Overweight and factors associated in civil servants from Southern Brazil

Excesso de peso e fatores associados em servidores do Sul do Brasil

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Abstract – This study aimed to estimate the prevalence of overweight and investigate its association with sociodemographic factors, physical activity level, hypercholesterolemia, and diabetes in civil servants of a university in the state of Paraná, Brazil. The research was conducted with 339 civil servants aged above 18 years. Overweight was analyzed by self-reported body mass index. Physical activity level was evaluated using a questionnaire. Sociodemographic data (sex, age, economic status, educational level, marital status, and working hours) and information on the chronic diseases of interest (hypercholesterolemia and diabetes) were obtained from self-report. The association between overweight and the other variables was investigated using binary logistic regression. The prevalence of overweight was 50.6%. The groups most susceptible to overweight were: male civil servants (OR: 2.04; CI: 1.30-3.22), those less than 12 years of education (OR: 2.46; IC: 1.43-4.23), who were insufficiently active (OR: 1.64; CI: 1.03-2.60), and those with hypercholesterolemia (OR: 2.28; CI: 1.32-3.96). This study concluded that more than a half of the sample was overweight and that this condition was associated with male sex, educational level below 12 years, insufficient physical activity, and hypercholesterolemia.

Key words: Chronic disease; Exercise; Occupational health; Overweight; Workers.

Resumo – *O objetivo deste estudo foi estimar a prevalência de excesso de peso e verificar a associação com fatores sociodemográficos, nível de atividade física, hipercolesterolemia e diabetes em servidores universitários do Paraná, Brasil. A pesquisa foi realizada com 339 servidores públicos com idade acima de 18 anos. O excesso de peso foi avaliado por meio do Índice de Massa Corporal, autorelatado. O nível de atividade física foi avaliado por meio de questionário. Os dados sociodemográficos (sexo, idade, nível econômico, escolaridade, situação conjugal e jornada de trabalho) e as doenças crônicas (hipercolesterolemia e diabetes) foram avaliados por autorrelato. Para a associação entre o excesso de peso e as demais variáveis foi utilizada a regressão logística binária. A prevalência de excesso de peso foi de 50,6%. Os grupos mais suscetíveis ao excesso de peso foram: sexo masculino (OR: 2,04; IC: 1,30–3,22), escolaridade menor que 12 anos (OR: 2,46; IC: 1,43–4,23), insuficientemente ativos (OR: 1,64; IC: 1,03–2,60) e os que tinham hipercolesterolemia (OR: 2,28; IC: 1,32–3,96). Conclui-se que mais da metade da amostra estava com excesso de peso. Os fatores associados ao excesso de peso foram o sexo masculino, escolaridade menor que 12 anos, prática insuficiente de atividade física e hipercolesterolemia.*

Palavras-chave: *Doença crônica; Exercício; Saúde do trabalhador; Sobrepeso; Trabalhadores.*

INTRODUCTION

Data from the World Health Organization[1] in 2010 reveal that overweight is the most common health risk factor in middle-income countries. In Brazil, overweight in adults increased by 1.3% each year from 2006 to 2012[2]. The adverse effects of this health condition are related to structural anatomical abnormalities (postural deviations), increased cardiac workload (hypertrophy and cardiac arrhythmia), and changes in lung function (airway obstruction and apnea), endocrine function (insulin resistance, increased cortisol levels, and reduced growth hormone levels), and immune function (increased cytokine production)[3]. In the work environment, overweight decreases productivity and increases absenteeism and occupational injuries[4]. These aspects have a negative impact on the Brazilian health system and generate costs for the treatment of overweight (above 33 million Brazilian reais in 2011)[5].

The workplace represents a favorable environment to investigate health aspects in adults due to the possibility of reaching a high number of individuals. Specifically, civil servants have been widely studied, given their socioeconomic heterogeneity, job stability, high rate of participation, easy access, and feasibility of interventions[6]. Therefore, investigations conducted with Brazilian civil servants found prevalences of overweight of 49.4% in Minas Gerais[7], 63.5% in Rio de Janeiro[8], and 56.0% in Santa Catarina[9]. The divergence in overweight prevalence rates shows that a closer look at the topic is required.

Interventions should give priority to populations most vulnerable to health risks, based on the analysis of possible factors associated with overweight[2]. Studies that analyzed these factors observed that male older adults who are highly educated, belong to a high economic status and have a partner are more likely to develop overweight[2,10]. These studies have not found an association between the amount of working hours and overweight; however, the exhaustion caused by the hours spent at work may influence willingness to perform physical activity and consequently energy balance[11].

Other factors that has been associated with overweight among workers include low physical activity levels and presence of chronic diseases[1]. Low physical activity levels and the presence of diabetes or hypercholesterolemia alone tend to reduce individuals' life expectancy and quality of life, and the possible association of these factors with overweight may potentiate adverse health effects[1]. The present study aimed to fill the existing gap in the literature about the presence of chronic diseases associated with overweight in workers. Estimating the possible relationship between these variables, regardless of sociodemographic factors and physical activity level, makes it possible to infer the risks of the combination of these diseases and their consequences in the work environment[8].

The analysis of prevalence of overweight and associated factors (sociodemographic factors, physical activity level, and presence of diseases) is relevant because: (a) overweight workers experience a 4.2% loss in productivity annually[4]; (b) the costs resulting from overweight in workers

may reach 73 billion dollars per year[12,] and absenteeism may result in expenses of 4.3 billion dollars[13]; (c) the identification of the groups most susceptible to overweight makes it possible to promote interventions within the work environment that have an impact outside this environment[4.] Therefore, the aim of this study was to estimate the prevalence of overweight and investigate its association with sociodemographic factors, physical activity level, hypercholesterolemia, and diabetes in civil servants of a public university in the state of Paraná, southern Brazil.

METHODOLOGICAL PROCEDURES

This cross-sectional analytic study was conducted in Maringá, state of Paraná, Brazil, which is considered the third largest city in the state and the seventh most populated in southern Brazil, with a Municipal Human Development Index of 0.808[14]. The percentage of the population considered economically active increased from 70.91% in 2000 to 72.46% in 2010[14].

This study was approved by the university's Research Ethics Committee (report no. 517/2009), and all participants signed an informed consent form. The study population consisted of state civil servants of a public university in Maringá. The number of administrative civil servants and professors working at the institution was obtained from the university's personnel board, which provided a list with complete data about university staff. According to these data, the institution has 2,658 administrative civil servants and 1,490 professors.

Sample size calculation considered a prevalence of outcome of 43%[15], tolerable error of five percentage points, and a confidence level of 95%. Assuming a population of 4,148 employees, the required sample size for a simple random sampling design was 345 employees. The participants were selected by simple random sampling, and six refusals were reported.

Since data were used to perform association analyses, statistical power was calculated to evaluate the association between overweight and all the independent variables. For the purposes of this study, the associations between overweight and the variables gender (power of 2%), physical activity levels (10%), and economic status (18%) were those that had the lowest statistical power for association tests[16].

The dependent variable was overweight, classified according to the body mass index (BMI), calculated by dividing body mass (kg) by the square height (m). Based on BMI cutoffs established by the World Health Organization[1] (underweight <18.50 kg/m2; normal weight 18.50≥BMI≤24.99 kg/m2; overweight 25.00≥BMI≤29.99 kg/m2; obesity BMI≥30,00 kg/m2), the participants were categorized as: normal weight (underweight and normal weight) and overweight (overweight and obesity). Height and body mass were self-reported, a method that has already been validated in adults, showing good agreement between measured and reported BMI[17].

Sociodemographic information (gender, age, marital status, educational level, working hours, and economic status) and presence of diseases

(hypercholesterolemia and type 2 diabetes) were collected from a self-administered questionnaire. The variable age was expressed in years and categorized into "18-39 years" and "≥40 years", in order to obtain homogeneity of age in each category, due to the low frequency of individuals in each year of age. Economic status was identified by administering a questionnaire developed by the Brazilian Association of Market Research Companies (Associação Brasileira de Empresas de Pesquisa)[18] and categorized into "High" ("A1", "A2" "B1" and "B2") and "Low" ("C1", "C2" "D" e "E"). We decided to follow this categorization approach due to the homogeneity in data distribution in the two categories.

Marital status was categorized as "without partner" (single, separated, widow/widower) and "with partner" (married). Educational level was dichotomized into "≥ 12 years of study" and "< 12 years of the study". Working hours were categorized into "≤ 8 hours/day" (civil servants who worked one or two shifts a day) and "> 8 hours/day" (those who worked more than two shifts a day).

Physical activity level was analyzed using the International Physical Activity Questionnaire (IPAQ) version 8 – short form[19], which classifies practice of physical activity in the past week into five categories: "Very active"; "Active"; "Irregularly active A"; "Irregularly active B"; "Sedentary". Cutoff for sufficient weekly physical activity was a minimum duration of 150 minutes per week[20]. Therefore, the categories were: "insufficiently active" ("irregularly active A and B", and "sedentary") and "active" "very active" and "active").

The presence or absence of the diseases of interest was examined by an item on the questionnaire that asked: "Do you have or did you have hypercholesterolemia?" "Do you have or did you have type 2 diabetes?" Possible answers were "Yes" or "No". These questions were similar to those used in other studies[20,21].

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS®) software, version 22.0, Descriptive and inferential statistics were employed, the first to determine absolute and relative frequencies and the latter to perform the chi-square test for heterogeneity. Bivariate and multivariate analyses were performed using the Wald test and binary logistic regression to estimate odds ratio (OR) and 95% confidence intervals (95%CI). Two adjusted regression models were developed. The first was used to investigate whether sociodemographic factors and physical activity level were associated with overweight, and the latter to investigate whether diseases of interest (hypercholesterolemia and diabetes) were associated with overweight. All variables were included in the adjusted regression model, regardless of their p-value in the crude analysis.

Regression analysis was adjusted for all sociodemographic variables and for physical activity level. In the final analysis, only factors with p-values below 0.05 were considered significantly associated with the study outcome. Analyses were not stratified by sex because there was no interaction between sex, outcome, and the other variables.

RESULTS

A total of 339 civil servants participated in the research. The majority of the sample was female (57.2%), was 40 years of age or older (65.5%), had a partner (64.3%), had more than 12 years of education (75.7%), worked less than eight hours daily (71.2%), belonged to the upper class (53.6%), and was physically active (58.6%). Half of the civil servants (50.6%) were overweight. With regard to diseases, 25.7% of the sample reported to have or have had hypercholesterolemia, and 4.5% reported to have type 2 diabetes (Table 1).

Table 1. Distribution of sociodemographic characteristics, physical activity level, and self-reported diseases in a sample of civil servants of a public university. Maringá, state of Paraná, Brazil.

Variable	n	%
Sex (n=339)		
Female	194	57.2
Male	145	42.8
Age (n=339)		
18-39 years	117	34.5
≥40	222	65.5
Educational level (n=338)		
>12 years of education	256	75.7
≤12 years of education	82	24.3
Marital status (n=333)		
Without a partner	119	35.7
With a partner	214	64.3
Working hours (n=313)		
≤ 8 hours/day	223	71.2
> 8 hours/day	90	28.8
Socioeconomic status (n=338)		
High	181	53.6
Low	157	46.4
Physical activity level (n=338)		
Active	198	58.6
Insufficiently active	140	41.4
Hypercholesterolemia (n=334)		
No	248	74.3
Yes	86	25.7
Self-reported diabetes (n=333)		
No	318	95.5
Yes	15	4.5
Nutritional status (n=336)		
Normal weight	166	49.4
Overweight	170	50.6

Crude and adjusted analyses (Table 2) showed that overweight was associated with sex, educational level, and physical activity level. Thus, male civil servants (adjusted OR: 2.04; 95%CI: 1.30-3.22), those with less than 12 years of education (adjusted OR: 2.46; 95%CI: 1.43-4.23),

and who were insufficiently active (adjusted OR: 1.64; 95%CI: 1.03-2.60) were more likely to be overweight.

Table 2. Crude and adjusted logistic regression analysis of the association between overweight and sociodemographic characteristics and physical activity level in civil servants. Maringá, state of Paraná, Brazil.

	Overweight n (%)	Unadjusted OR (95%CI)	p	Adjusted OR (95%CI)[†]	p
Age					
18-39 years	51 (44.0)	1.00	0.05	1.00	0.11
≥40 years	119 (54.1)	1.54 (0.98-2.42)		1.45 (0.91-2.32)	
Sex					
Female	84 (44.0)	1.00	<0.01*	1.00	<0.01*
Male	86 (59.3)	1.54 (0.98-2.42)		2.04 (1.30-3.22)	
Marital status					
Without a partner	59 (50.0)	1.00	0.84	1.00	0.91
With a partner	107 (50.5)	1.04 (0.66-1.63)		0.97 (0.58-1.62)	
Educational level					
> 12 years of education	116 (45.3)	1.00	<0.01*	1.00	<0.01*
≤ 12 years of education	53 (67.1)	2.32 (1.38-3.90)		2.46 (1.43-4.23)	
Working hours					
≤ 8 hours/day	115 (51.8)	1.00	0.23	1.00	0.24
> 8 hours/day	38 (43.2)	0.73 (0.45-1.21)		0.73 (0.43-1.23)	
Economic status					
High	93 (52.0)	1.00	0.59	1.00	0.41
Low	77 (49.4)	0.89 (0.58-1.36)		0.81 (0.50-1.32)	
Physical activity					
Active	91 (46.0)	1.00	0.04*	1.00	0.03*
Insufficiently active	78 (56.9)	1.55 (1.00-2.40)		1.64 (1.03-2.60)	

OR: odds ratio; CI: confidence interval; *p<0.05; † - Analysis adjusted for all variables, regardless of their p-value in the crude analysis.

Table 3 shows that the prevalence of overweight in individuals with hypercholesterolemia and diabetes was 65.1% and 73.1%, respectively. Crude and adjusted logistic regression analyses found an association between overweight and hypercholesterolemia, revealing that, after adjustment, civil servants with hypercholesterolemia were 2.28 times more likely to be overweight compared with those who had never had increased cholesterol levels. In the crude analysis, civil servants with diabetes were 2.89 times more likely to be overweight compared with those who had never developed the disease. However, no significant association was observed between overweight and diabetes in the adjusted analysis.

DISCUSSION

The main findings of this study were: 1) half of the sample (50.6%) was overweight; 2) male civil servants, those with less than 12 years of education, who were insufficiently active, and who had or had previously had hypercholesterolemia were more likely to be overweight.

Table 3. Crude and adjusted logistic regression analysis of the association between overweight and the isolated presence of hypercholesterolemia and type 2 diabetes in civil servants. Maringá, state of Paraná, Brazil

	Overweight n (%)	Unadjusted OR (95%CI)	p	Adjusted OR† (95%CI)	p
Hypercholesterolemia			<0.01*		<0.01*
No	109 (44.5)	1.00		1.00	
Yes	56 (65.1)	2.38 (1.43-3.96)		2.28 (1.32-3.96)	
Diabetes			0.02*		0.06
No	150 (48.5)	1.00		1.00	
Yes	19 (73.1)	2.89 (1.18-7.07)		2.48 (0.94-6.52)	

OR: odds ratio; CI: confidence interval; *p<0.05; † - Analysis adjusted for the variables age, sex, marital status, educational level, working hours, economic status, and physical activity level, regardless of their p-value in the crude analysis.

The high prevalence of overweight found in this study is similar to that observed in civil servants of universities located in other states, such as Santa Catarina (63.6%)[9] and Rio de Janeiro (63.5%)[8], and in employees of Universidade Federal de Pernambuco (60%)[22]. The similarity in the prevalence of overweight among different working populations reflects the high prevalence of this condition in the Brazilian population, which reaches 56.3% in some state capitals[2]. An American study with 412 workers aged 19-63 found that the prevalence of overweight was 31% in this population[23]. Lower prevalences of overweight workers may be found in studies that emphasize interventions focused on motivating workers to perform physical activity outside the workplace[24].

Men were more likely to develop overweight. According to 2013 data from the Telephone-Based Surveillance of Risk and Protective Factors for Chronic Diseases (Sistema de Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico, VIGITEL), the prevalence of overweight in men (54.7%) was higher that found in women (47.4%)[2]. The lower prevalence of overweight in women may be explained by the sociocultural model of beauty that overvalues thinness and thus increases concerns with body weight control and the desire to lose weight[25]. Additionally, men tend to take less care with their health in terms of life habits and the development of diseases[25].

Educational attainment seems to interfere with individuals' health status, thus being analyzed in a national survey on chronic diseases conducted by the Brazilian Ministry of Health[2]. The result of this survey showed that less educated adults (≤ 8 years of education)[2] had the highest prevalence of overweight, corroborating the findings of the present study. Low educational level may limit knowledge on healthy foods and on the relevance of physical activity for health promotion[10]. Both behaviors (inadequate diet and physical inactivity) have an influence on energy balance, causing weight gain in the population[26].

Insufficiently active servants were more likely to be overweight than active counterparts. Other study conducted with workers found that insufficient physical activity was associated with a 40% increased risk for

obesity[27]. Weight gain due to positive energy balance results in increased insulin production arising from the inefficient use of glucose as an energy source[28]. The result of this process is insulin resistance and increased fat deposits, which will contribute even more to the onset of overweight if there is no increase in physical activity level[28].

The civil servants who reported to have or have had hypercholesterolemia were more likely to be overweight. This may be explained by the metabolic complications resulting from the latter health problem, such as reduced HDL cholesterol levels and increased LDL cholesterol levels[29]. These complications lead to the deregulation of the lipolysis process and to increased release of fatty acids and glycerol, therefore contributing to overweight[29].

It is important to emphasize that no hierarchical statistical analysis was performed in this study, since overweight is mutually influenced by biological, social and behavioral factors, which makes it difficult to identify whether the outcome (overweight) causes the exposure (diabetes and hypercholesterolemia) or vice versa[30].

The cross-sectional design of the study and the fact that it was conducted with a specific population of civil servants limit the extrapolation of study results to the general working population. Additionally, relying on self-reported BMI may have influenced study results, because civil servants may have underestimated or overestimated body mass and height. Furthermore, sample size was not enough to draw conclusions on the association between overweight and the variables sex, economic status, and physical activity level.

This research contributed to the existing literature by providing data related to overweight in civil servants of a university in the state of Paraná that can be used as a parameter for comparison in future investigations conducted with the same working population. Findings on the association between overweight and male sex, low educational level, insufficient physical activity, and the presence of hypercholesterolemia intensify the need to plan programs to promote a healthier lifestyle targeting these subgroups, in order to reduce health risks arising from weight gain.

In conclusion, the prevalence of overweight found in this study may be considered high when compared with that of population studies conducted with adults. Moreover, the subgroups of civil servants of a public university more likely to develop overweight were men, those who had less than 12 years of education, who were insufficiently active, and who had or had previously had hypercholesterolemia.

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286