Associação entre Prática de Atividade Física, Escolaridade e Perfil Alimentar de Motoristas de Caminhão

Association between Physical Activity, Educational Level and Food Intake Profile among Truck Drivers

Maria Alice Franzini Codarin
Acadêmica de Nutrição da Faculdade de Saúde Pública da USP, Bolsista PiBic/CNPq.
Endereço: Av. Dr. Arnaldo, 715, CEP 01246-904, Cerqueira César, São Paulo, SP, Brasil.
E-mail: licacodarin@usp.br

Eloisa Massaine Moulatlet
Acadêmica de Nutrição Faculdade de Saúde Pública da USP, Bolsista Apoio Técnico/CNPq.
Endereço: Av. Dr. Arnaldo, 715, CEP 01246-904, Cerqueira César, São Paulo, SP, Brasil.
E-mail: elozinha@usp.br

Patrícia Nehme
Mestranda da Àrea de Concentração Saúde Ambiental do Programa de Pós-Graduação em Saúde Pública—da Faculdade de Saúde Pública da/USP.
Endereço: Av. Dr. Arnaldo, 715, CEP 01246-904, Cerqueira César, São Paulo, SP, Brasil.
E-mail: patricianehme@usp.br

Melissa Ulhôa
Doutoranda da Área de Concentração Saúde Ambiental do Programa de Pós-Graduação em Saúde Pública—da Faculdade de Saúde Pública USP.
Endereço: Av. Dr. Arnaldo, 715, CEP 01246-904, Cerqueira César, São Paulo, SP, Brasil.
E-mail: meulhoa@usp.br

Claudia Roberta de Castro Moreno
Professora Associada do Departamento de Saúde Ambiental Faculdade de Saúde Pública da USP.
Endereço: Av. Dr. Arnaldo, 715, CEP 01246-904, Cerqueira César, São Paulo, SP, Brasil.
E-mail: crmoreno@usp.br

Resumo

A demanda da sociedade moderna intensificou o trabalho ininterrupto em diversas profissões. Além disso, o modo de organização da sociedade, com atividades predominantemente mecanizadas, tem contribuído para a prevalência de hábitos de vida não saudáveis, como a inatividade física. Este estudo objetiva verificar se fatores ocupacionais, sociodemográficos, antropométricos e alimentares estão associados à prática de atividade física insuficiente e se há diferenças nessa associação entre motoristas de caminhão que trabalham de dia ou à noite. Participaram da pesquisa 470 motoristas de caminhão, que responderam a questionários de dados sociodemográficos, atividade física e frequência alimentar. Foi realizada uma regressão logística univariada para verificar a associação entre atividade física insuficiente e as demais variáveis. Além disso, a regressão logística múltipla foi testada para obter modelos que mostrem a associação de conjuntos de variáveis relacionados à atividade física insuficiente. Os resultados indicaram que a prática de atividade física está associada ao maior nível de escolaridade (OR = 1,84; IC = 1,22-2,76) e menor consumo de bebidas alcoólicas (OR = 1,59; IC = 1,04-2,45). Maior ingestão de cereais integrais (OR = 1,63; IC = 1,08-2,46) foi associada à prática regular de atividade física. Entre os trabalhadores noturnos, foi encontrada associação entre a prática regular de atividade física, maior consumo de cereais integrais (OR = 2,02; IC =1,13-3,60) e menor consumo de carboidratos simples (OR = 1,91; IC = 1,08-3,37).
Palavras-chave: Atividade física; Motoristas; Turnos; Alimentação.

Abstract

The modern society's demand has intensified uninterrupted work among several professional categories. Besides that, the society's organization, with activities that are predominantly mechanized, has contributed to unhealthy life habits, such as lack of physical activity. This study aims to verify the association of occupational, social-demographic, anthropometric and food intake data with insufficient practice of physical activities and if there are any differences in this association between day and night truck drivers. The 470 truck drivers who participated in this study answered social-demographic, physical activity and food frequency questionnaires. Univariate logistic regression analysis was used to verify the association between insufficient physical activity and the other variables. Additionally, multiple logistic regression was tested to obtain models that show the association between sets of variables related to insufficient physical activity. The results indicated that practice of physical activities is associated with high educational level (OR=1.84; CI = 1.22-2.76) and low alcohol consumption (OR = 1.59; CI = 1.04-2.45). High intake of whole grains (OR = 1.63; CI = 1.08-2.46) was associated with regular practice of physical activity. Among the night workers, we found association between regular practice of physical activity, high consumption of whole grains (OR = 2.02; CI = 1.13-3.60) and low consumption of simple carbohydrates (OR = 1.91; CI = 1.08-3.37).

Keywords: Physical Activity; Drivers; Shifts; Food Intake.

Introduction

Professional drivers, such as truck drivers, perform their work subject to climatic conditions and environmental hazards such as poor road conditions, heavy traffic, bad weather, excessive noise, heat exposure inside the vehicle, and uncomfortable, not ergonomically designed seats. Moreover, their work involves long hours in a static position, which can lead to irritability, insomnia, decreased reflexes and attention disorders (Battiston et al., 2006, Lopes et al., 2007).

Shift work, a routine practice for many truck drivers, seems a natural solution to make use of the 24 hours of the clock, seven days a week (Krieger, 1987). However, this work arrangement that aims at maximizing profit and meeting local needs of all customers (Fischer and Lieber, 2003) may cause an impact on physical, mental and social well-being of workers, and place them at high risks of occupational injuries (Moreno et al., 2003).

Irregular working hours of truck drivers make most of them develop habits that significantly contribute to changes in their eating behavior such as nibbling food, especially foods rich in fat, and increased consumption of caffeinated beverages and alcohol, especially during night shifts (Gordon et al. 1986; Knutsson, 2003). These workers usually have high-calorie, low nutritional meals in roadside restaurants where most drivers eat every day (Cavagioni, 2006).

Several studies have found a high prevalence of inadequate physical activity among truck drivers reporting rates up to 90% (Masson and Miller, 2005; Andrusaitis et al., 2006, Jacobson et al., 2007), which can be a result of their long working hours that favor a sedentary lifestyle. In addition, truck driving involves low energy expenditure with metabolic equivalent of task (METs)[1] ranging from one to three, which is a low level of intensity (Weller and Corey, 1998). Inadequate physical activity can increase the risk of developing health conditions such as diabetes, hypertension, hypercholesterolemia, obesity, several types of cancer, osteoporosis, kidney and gallbladder stones, and erectile dysfunction as well as mental health conditions such as low self-esteem and body

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1 MET is the unit for basal consumption of oxygen (1 MET = 3,5 ml/Kg/min) and refer to the basal energetic cost.

image, reduced well-being, low sociability, increased anxiety and stress, depression, Alzheimer's and Parkinson's disease, and impaired cognition (Keihan and Matsudo, 2005).

It is estimated that 58% of freight transport in Brazil is by road (Lopes et al., 2007) and truck drivers have a central role in this industry. Thus, the present study aims to assess the association between demographic, anthropometric, occupational and eating factors and physical inactivity among truck drivers and any differences in this association between those working day and night shifts.

Methods

Study design and population

A cross-sectional study was conducted in a sample of truck drivers in 2007. Data was collected through self-administered questionnaires.

The study population consisted of truck drivers from seven different branches of a Brazilian truck transportation company, located in southern and southeastern Brazilian cities, who volunteered to participate in this study: Campinas (n = 130), Rio de Janeiro (n = 103), São Paulo (n = 92), Belo Horizonte (n = 89), Vitória (n = 24), Americana (n = 24), and Curitiba (n = 8). All 470 truck drivers of all branches were invited to participate and more than 95% of them were male. There were no exclusion criteria. Losses were due to inadequate completion of questionnaires. Therefore, the study results varied due to different sample sizes. The study was approved by the Research Ethics Committee of Universidade de São Paulo School of Public Health and all respondents signed a consent form.

Data collection

The data for this study were obtained from a large study on health and work conditions of truck drivers. Only data on obstructive sleep apnea have been previously published (Lemos et al., 2009). Three questionnaires were used in the study: sociodemographic characteristics, physical activity (International Physical Activity Questionnaire, IPAQ) and food frequency questionnaires (FFQ).

The International Physical Activity Questionnaire (IPAQ) is an international instrument that measures physical activity, developed in 1998 by the World Health Organization (WHO), the Karolinska Institute in Sweden, and the Centers for Disease Control and Prevention in the U.S. (Barros and Nahas, 2003). In Brazil, the IPAQ was tested by São Caetano do Sul Physical Fitness Laboratory Study Center (CELAFISCS) showing good accuracy and stability (Pardini et al., 2001; Matsudo et al., 2001). It was used the IPAQ – short form that comprises eight open questions, with no breakdown by type of activity. The IPAQ categorizes individuals regarding their level of activity as follows:

· Very active: vigorous physical activity $\geq$ 5 days a week, $\geq$ 30 minutes per session or vigorous physical activity $\geq$ 3 days a week, $\geq$ 20 minutes per session plus moderate activity and/or walking $\geq$ 5 days a week, $\geq$ 30 minutes per session.

· Active: vigorous physical activity $\geq$ 3 days a week, $\geq$ 20 minutes per session; moderate activity or walking $\geq$ 5 days a week, $\geq$ 30 minutes per session or any combined activity $\geq$ 5 days a week, $\geq$ 150 minutes per week (walking + moderate activity + vigorous activity).

· Inadequately active: does not meet any of the criteria described above.

Sedentary or individuals who do not practice any physical activity are also categorized as "inadequately active".

The FFQ is a method that assesses frequency of food consumption in time units for identifying usual food consumption in a population group (Slater et al., 2003). It is a low-cost, easily administered instrument that can be used in population-based studies. There were included in the FFQ foods commonly consumed by the general population.

Data analysis

In this study, the 29 food choices in the FFQ were divided into 10 food groups: "meat"; "fatty meat and sausages"; "milk and dairy products"; "oils and fats"; "bread, rice, pasta and baked potato"; "fast food"; "sugar, sweets and candies"; "soft drinks and processed fruit juices"; "fruits, green vegetables and legumes" and "whole grains". The frequency of food consumption was measured in a standard unit (times a week) to allow comparisons and median was set as a cutoff in the sample studied.

Demographic variables including age and work duration were categorized using the median as cutoff. We opted for the use of this measure of central tendency (median) rather than mean to prevent the effect of outliers (New et al., 1985, Reis et al., 2005). Educational level followed a dichotomous categorization: elementary education and high school/college education.

Occupational variables also followed a dichotomous categorization: working hours (day shift – working only during the day; and night shift – working during the night but not exclusively); employment status (contracted; outsourced); type of work (short trips – trips within the urban area and working hours shorter than a day; long trips – intercity trips and working hours longer than one day).

Alcohol intake was categorized as "yes" or "no/stopped drinking." Body mass index (BMI) was calculated based on self-reported weight and height. Descriptive analyses were based on the World Health Organization BMI classification (WHO, 2000): <18.5 (underweight); 18.5-24.99 (normal range); 25-30 (pre-obese) and >30 (obese). For statistical analyses a BMI cutoff of 24.99 kg/m² was set, which is the limit between normal weight and overweight.

Descriptive analyses included estimation of absolute and relative frequencies of each variable and calculation of the median used as a cutoff.

The variable inadequate physical activity including "inadequately active" and sedentary individuals was the dependent variable in the statistical analyses. Univariate logistic regression analysis was performed to assess the association between inadequate physical activity and other variables and odds ratios (OR) and their related 95% confidence intervals (95% CI) were estimated. Multiple logistic regression models were then constructed to show the association of a set of variables and inadequate physical activity. All analyses were performed using Stata 9.0.

Results

Median age in the sample studied was 39 years old, and 51.8% worked as truck drivers for up to nine years. A small proportion of the respondents (3.9%) had incomplete college education while nearly half of the sample (49.1%) had either incomplete or complete elementary education.

The analysis of occupational variables showed that 60.5% of the respondents worked night shifts; 37% were contracted and 63% outsourced workers. Long trips were reported by 45.2% of the sample, of which 60.7% worked night shifts.

The proportion of overweight respondents was 62.4%, of which 28.4% were obese. Only one respondent was underweight and one had a BMI higher than 60. With respect to physical activity, more than half of the respondents (53.1%) were classified as "inadequately active", of which 54.2% were sedentary.

Alcohol intake was seen in 67.1% and most (65.6%) reported a frequency of consumption of no more than twice a week. The median frequency of consumption of certain food groups was higher among night than day shift workers, especially "meat", "fruits, green vegetables and legumes" and "oils and fats" as shown in Table 1.

Table 2 presents the univariate logistic regression of the association between inadequate physical activity and selected variables with p<0.20 included in this analysis.

We decided to keep two final multiple logistic models because the combination of the variables alcohol intake and consumption of whole grains in the same model was found to weaken it. These models are showed in Tables 3 and 4.

The descriptive analysis was performed separately on day shift truck drivers and night shift truck drivers. The median age was 40.5 and 38 years old among day shift drivers and night shift drivers, respectively. Regarding education, drivers who worked night shifts were more educated than those who worked day shift, 56.9% and 37% had incomplete or complete high school or college education, respectively.

The analysis of occupational variables showed that 76% of day shift workers compared to 53.9% of those working night shifts were outsourced workers and 22.2% and 60.7 % reported long trips, respectively.

Most respondents with BMI above the normal weight range (61.3%) worked night shifts while 38.7%

Table 1 - Median frequency of consumption of food groups (times a week) among truck drivers by work shift. Brazil, 2009

Food groups	Entire sample	Day shift	Night shift
Meat	6.5	6.5	7.0
Fatty meat and sausages	2.5	2.5	2.5
Milk and dairy products	3.0	3.0	3.0
Bread, rice, pasta and baked potato	23.5	23.5	23.5
Whole grains*	-	-	-
Fruits, green vegetables and legumes	14.0	11.5	15.0
Oils and fats	7.0	6.8	7.5
Sugar, sweets and candies	7.0	7.0	7.0
Fast food	2.0	2.0	2.0
Soft drinks and processed fruit juices	3.0	3.0	3

*57.4% of the sample reported a consumption of whole grains lower than once a month.

Table 2 - Association between inadequate physical activity and educational level, alcohol intake, work shift, type of work, work duration, consumption of whole grains and soft drinks and processed fruit juices among truck drivers. Brazil, 2009

Variable	Category	OR	95% CI	p-value[1]
Sociodemographic variables				
Educational level (n = 399)	High school education or incomplete/complete college education	1.81	1.21–2.70	0.003
	Incomplete/complete elementary education			
Occupational variables				
Work shift (n = 389)	No night shift	1.38	0.91–2.08	0.123
	Night shift			
Type of work (n = 401)	Short trips	1.31	0.88–1.94	0.181
	Long trips			
Work duration (n = 388)	≤ 9 years[2]	0.77	0.52–1.15	0.200
	> 9 years[2]			
Food intake profile				
Alcohol intak (n = 394)	No	1.59	1.05–2.42	0.029
	Yes			
Consumption of whole grains (n = 387)	> 0 times a week[2]	1.64	1.09–2.46	0.016
	≤ 0 times a week[2]			
Consumption of soft drinks and processed fruit juices (n = 387)	≤ 3 times a week[2]	1.32	0.88–1.97	0.175
	> 3 times a week[2]			

1 Selected variables with p <0.20 obtained from the chi-square test.
2 The cutoff values were obtained by calculating the median.

worked day shifts. As for physical activity, 48% of daytime and 56% nighttime workers were classified as "inadequately active."

The same statistical analyses carried out in the entire sample were also performed by work shift. For daytime workers, no association was found with p <0.20 between inadequate physical activity and other variables. However, associations were seen for nighttime workers as shown in Table 5. Table 6 presents the final model.

Table 3 – Final model of factors associated with inadequate physical activity among truck drivers. Brazil, 2009

Variable	Category	OR	95% CI	p-value[1]
Educational level	High school education or incomplete/complete college education			
	Incomplete/complete elementary education	1.80	1.22–2.76	0.003*
Consumption of whole grains	> 0 times a week[1]			
	≤ 0 times a week[1]	1.63	1.08–2.46	0.020*

1 The cutoff values were obtained by calculating the median.
* p"0.05.

Table 4 – Final model of factors associated with inadequate physical activity among truck drivers. Brazil, 2009

Variable	Category	OR	95% CI	p-value[1]
Educational level	High school education or incomplete/complete college education			
	Incomplete/complete elementary education	1.84	1.22–2.76	0.003*
Alcohol intak	No			
	Yes	1.59	1.04–2.45	0.033*

* p < 0.05.

Table 5 – Association between inadequate physical activity of truck drivers working night shifts and educational level, work duration, alcohol intake, type of work, employment status, consumption of whole grains and bread, rice, pasta and baked potato. Brazil, 2009

Variable	Category	OR	95% CI	p-value[1]
Sociodemographic variables				
Educational level (n = 240)	High school education or incomplete/complete college education			
	Incomplete/complete elementary education	1.97	1.18–3.31	0.010
Occupational variables				
Work duration (n = 231)	≤ 9 years[2]			
	> 9 years[2]	1.74	1.03–2.95	0.037
Type of work (n = 241)	Short trips			
	Long trips	1.44	0.85–2.42	0.170
Employment status (n = 236)	Contracted			
	Outsourced	0.7	0.41–1.17	0.176
Food intake profile				
Alcohol intak (n = 238)	No			
	Yes	1.58	0.92–2.72	0.095
Consumption of whole grains (n = 232)	> 0 times a week[2]			
	≤ 0 times a week[2]	1.73	1.02–2.92	0.040
Bread, rice, pasta and baked potato (n = 239)	≤ 23.5 times a week[2]			
	> 23.5 times a week[2]	1.61	0.96–2.69	0.069

1 Selected variables with p < 0.20 obtained from the chi-square test.
2 The cutoff values were obtained by calculating the median.

Table 6 – Final model of factors associated with inadequate physical activity among truck drivers working night shifts. Brazil, 2009

Variable	Category	OR	95% CI	p-value[1]
Educational level	High school education or incomplete/complete college education			
	Incomplete/complete elementary education	2.10	1.19-3.70	0.011*
Work duration	≤ 9 years[1]			
	> 9 years[1]	2.20	1.24-3.89	0.007*
Consumption of whole grains	> 0 times a week[1]			
	≤ 0 times a week[1]	2.02	1.13-3.60	0.017*
Bread, rice, pasta, baked potato	≤ 23.5 times a week[1]			
	> 23.5 times a week[1]	1.91	1.08-3.37	0.026*

[1] The cutoff values were obtained by calculating the median.

* p < 0.05.

Discussion

Health benefits of physical activity are well documented in the literature; however, modern life is characterized by sedentary behavior. The increased mechanization of work and household tasks over the past 50 years has decreased energy expenditure of human activities, and leisure-time physical activity has gained importance for meeting the need for daily physical activity. The level of physical activity is dependent on individual characteristics such as motivation, motor skills and other behaviors as well as environmental factors such as access to recreation centers, costs, time availability, and social support (Camões and Lopes, 2008).

Environmental factors also include educational level and access to information and knowledge to understand the importance of physical activity and other health promotion activities such as nutrition education, smoking cessation and weight reduction (Neri et al., 2005). The association between educational level and physical activity has been described in several studies with different populations.

A study of Portuguese population found that men with 12 or more years of education were 2.08 times more likely to engage in high-intensity leisure-time activities and 7.61 times more likely to engage in physical exercise (Camões and Lopes, 2008) compared with those with four years or less of education. Another study in the European Union showed that men with elementary education were 1.5 times more likely to have a sedentary lifestyle than those with higher education (Varo et al., 2003). A study in Brazilian adults demonstrated that leisure-time physical activity increased with education level (Malta et al., 2009). The present study also found an association between education level and physical activity among truck drivers: those with incomplete or complete elementary education were 80% more likely to be "inadequately active" or sedentary than those with incomplete or complete high school or college education. Among night shift drivers, those with lower education were about twice as likely to be less active.

Access to information can promote physical activity but also individuals who regularly engage in physical activities are more exposed to health-related information that can motivate them to make healthier choices regarding dietary (Werblow et al., 1978, Blakely et al., 2004) and alcohol consumption habits (Camões and Lopes, 2008). The present study found that "inadequately active" or sedentary individuals were 1.59 times more likely to consume alcohol than active or very active ones. In the sample studied, 65.9% of respondents reported alcohol intake but it was not investigated whether this consumption was during working hours or not. Yet it should be noted that although alcohol consumption is a major cause of road accidents and fatalities and that its sale at gas stations is prohibited by law, it is known that many truck drivers, pressured by short delivery times and personal factors, eventually

resort to alcohol drinking to relieve anxiety (Nascimento et al., 2007).

The so-called Western diet includes few raw foods like fruits and green vegetables and is rich in salt, fats, animal proteins and simple carbohydrates. According to a study conducted by the Brazilian Institute of Geography and Statistics (IBGE) and the Brazilian Ministry of Health, this diet has been prevalent in Brazil as it was found an increased availability of energy from fats and simple carbohydrates to the detriment of complex ones (Tan et al., 2006). Diets rich in energy from simple carbohydrates have been associated with increased prevalence of cardiovascular disease, diabetes type II and obesity (Morris and Zemel, 1999). On the other hand, complex carbohydrates like whole grains have a substantial amount of dietary fiber with functional properties that have been showed to prevent and treat diseases and regulate bowel function (Mattos and Martins, 2000). Corroborating the finding that individuals engaging in regular physical activity tend to make healthier food choices, the present study found higher consumption of whole grains among active respondents when compared with "inadequately active" or sedentary ones. The same was seen among active nighttime workers who also had lower intake of simple carbohydrates ("bread, rice, pasta and baked potato").

Night shift workers have problems associated with physiological adaptation and social interaction because a good number of activities usually take place during the day when they are sleeping or feeling too tired to get involved. In a study comparing aspects of quality of life of rotating shift workers, night shift workers reported having fewer opportunities for exercise training, leisure time and personal growth compared to daytime and non-rotating shift workers (Kaliterna et al., 2004). This can explain the fact that an association between work duration and physical activity was only found among nighttime workers, and the longer they worked as truck drivers, the greater the odds of being "inadequately active" or sedentary.

In conclusion, the present study corroborates the findings of other studies on truck drivers reporting a high prevalence of inadequate physical activity and sedentary lifestyle. Educational level seems to be a major factor associated with physical activity, and it can be thus assumed that healthy behaviors including adequate diet and low alcohol intake may also be associated with educational level. The time of exposure to night work seem to further reduce physical activity, probably due to limited time availability.

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