ORIGINAL ARTICLE

SLEEP PROFILE, CLINICAL VARIABLES, AND WORKING HOURS IN ELDERLY AND MIDDLE-AGED LONG-HAUL TRUCK DRIVERS

Perfil de sono, variáveis clínicas e jornada de trabalho de caminhoneiros idosos e de meia-idade em rodovias

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ABSTRACT

This cross-sectional study aimed to investigate the association of variables representative of the sociodemographic profile, working hours, and general health status of long-haul truck drivers with their reported sleep regimen. Questionnaires provided by the Transportation Social Service and the National Transportation Learning Service, in which data were collected from professional truckers aged ≥ 45 years, were analyzed. The results found allow us to infer that the sleep profile of these ground freight transportation workers seems to correlate negatively with general health (prevalence of arterial hypertension and drug use) and the number of working hours per day.

KEYWORDS: occupational health; sleep wake disorders; psychomotor performance; traffic accident.

RESUMO

Este trabalho objetivou investigar a associação de variáveis representativas do perfil sociodemográfico, da jornada de trabalho e das condições gerais de saúde de profissionais do transporte de cargas em rodovias com o regime de sono relatado. Tratou-se de um estudo transversal com análise de questionários cedidos pelo Serviço Social do Transporte e pelo Serviço Nacional de Aprendizagem do Transporte, em que foram averiguados dados relativos aos profissionais com idade ≥ 45 anos. Os resultados encontrados permitem inferir que o perfil de sono exibido pelos profissionais de transporte de cargas parece correlacionar-se negativamente com a condição geral de saúde (ocorrência de hipertensão arterial sistêmica e consumo de medicamentos) e a extensão da jornada de trabalho.

PALAVRAS-CHAVE: saúde do trabalhador; distúrbios do sono; desempenho psicomotor; acidente de trânsito.

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INTRODUCTION

In Brazil, according to the National Land Transportation Agency (ANTT), the national land transportation fleet consists of 2,226,109 vehicles, of which 1,004,502 are independent owner-operators, 1,203,633 are company drivers, and 17,974 are cooperative drivers.[1] Thus, the country has a large contingent of workers engaged in the transportation of goods and cargo by road.

Truck driving is still an under-recognized occupation. Although these professionals spend hours ferrying food, apparel, fuel, chemicals, supplies, and other materials — accounting for about 60% of all cargo handled in Brazil[2] and 6% of the gross domestic product (GDP) — the impacts of this heavy workload on health often go unobserved. These workers are susceptible to health problems that can be triggered by various adverse circumstances outside their control. At first, occupational disorders that interfere with psychophysiological function, manifesting as irritability, insomnia, attention disorders, and musculoskeletal symptoms, predominate.[3] Risk factors related to eating habits must also be considered, as these workers tend to consume energy-rich diets with little nutritional value, often including alcoholic beverages.[4] The most significant conditions associated with this type of lifestyle are chronic noncommunicable diseases (NCDs), such as high blood pressure and diabetes, which may result from a routine that involves a high level of demand, leaving little time for physical activities; precarious eating habits; and alcohol and tobacco use.[5]

Within this context, the present study aimed to investigate the association of variables representative of sociodemographic profile, working hours, and clinical parameters with representative aspects of sleep habits in a sample of long-haul truck drivers in the Center-West Region of Brazil.

METHODS

This cross-sectional analysis used data collected and filed by the national Transportation Social Service (SEST) and the National Transportation Learning Service (SENAT). Data were collected through questionnaire-based interviews and personal evaluations administered to truck drivers, seeking to evaluate the general health conditions of male workers in this field.

Data collection took place on highways leading to the federal capital (BR-40, BR-50, BR-60, and BR-70). It was coordinated by SEST and SENAT and operationalized by Federal Highway Police (PRF) officers, physicians from the Referral Center for Occupational Health of the Federal District Health Department (CEREST/SES-DF) and students of undergraduate health degree programs (mainly nursing) at various institutions of higher education in the Federal District. These field activities focused on approaching and interviewing the drivers. Each activity was preceded by a preparatory meeting meant to train the undergraduate students about the methods and procedures adopted. However, only data collected between the years 2010 and 2013 from male truck drivers aged 45 years or older (middle-aged and elderly) were used for the analyses contained in this report. During each activity, all drivers with a category C, D, or E license who were stopped by PRF officers from 8 a.m. to 11 a.m. on the days of operation were referred to interview and evaluation stations.

Completion of the evaluation form for each subject was divided into "stations", as described below. At the first station, the driver's personal information was recorded, including sex, marital status, educational attainment, daily driving hours, usual nighttime hours, history of involvement in road traffic accidents, and transportation of dangerous goods. Furthermore, the presence of NCDs (self-reported) was evaluated, and drivers were asked whether they used any drugs on an ongoing basis. Cigarette smoking and its frequency, as well as self-reported intake of alcoholic beverages, were also recorded.

At the second and third stations, anthropometric and clinical parameters were measured, including weight and height for calculation of body mass index (BMI in kg/m^2), waist circumference (cm), systolic and diastolic blood pressure (mmHg), and heart rate (bpm). Weight was measured on a digital scale (Filizola, São Paulo, São Paulo, Brazil; resolution 0.1 kg, capacity 150 kg). Height was measured with a Seca stadiometer (Cotia, São Paulo, Brazil; resolution 0.1 cm), with subjects standing erect and barefoot. Waist circumference was measured with a self-retracting inelastic fiberglass tape measure (Cardiomed, Curitiba, Paraná, Brazil; resolution 0.1 cm). Blood pressure and heart rate were measured by traditional auscultatory methods, using a manual aneroid sphygmomanometer (Premium model ESFH20GR, Duque de Caxias, RJ, Brazil; accuracy ± 3 mmHg).

At the fourth station, strength measurements were performed using a handgrip dynamometer to assess grip strength (in kgf). Results were shown in 10-kgf increments, over a measuring range of 0–40 kgf. These measurements were obtained on both sides of the body (right and left limbs).

At the fifth and last station, a specialist in occupational medicine supervised the collection of clinical, anthropometric,

and physical performance data in order to ensure completeness of information, confirm any self-reported comorbidities—such as hypertension (HTN) and diabetes mellitus—and refer the drivers for specialized care as needed. These activities were approved by the institutional Research Ethics Committee (opinion no. 087/2010). Participation in the study was voluntary, and informed consent was obtained from each subject.

Key clinical parameters were described as mean ± standard deviation, relative frequency in the sample, or as modal values (for interval data). Given the purpose of the study and the categorical nature of most of the data, inferential statistical procedures began with an exploratory Spearman correlation analysis between the assessed indicator of physical performance (palmar grip strength) and the subjects' physical and occupational health parameters. As necessary, the variables were dichotomized according to their presence (1) or absence (0) in the sample, and partial correlations were used to control for confounders. Then, Student's *t*-test for independent samples and the χ^2 test were used to compare clinical variables with normal distribution and categorical variables among grouped subjects, respectively. Data were tabulated in Microsoft Excel 2010 for Windows (Microsoft Inc., Redmond, WA, USA) and analyzed in SPSS Statistics for Windows, Version 17.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

Data from 367 truck drivers were analyzed. The mean age of the interviewed subjects was 53 years. Most (53.7%; n = 197) were 55 to 59 years old. Regarding marital status, 70% of participants were married or cohabitating. Just over half (56.8%) had had 4 to 8 years of formal education. The vast majority (85.8%) lived in the Center-West region; 55.6% in the Federal District, 29.7% in the state of Goiás, 0.5% in Mato Grosso do Sul, and none in Mato Grosso. Analysis of working hours revealed that most subjects (69.2%, n = 254) drove up to 8 hours a day, whereas the remaining 30.8% of subjects reported working longer than 8 hours a day, with an overall average daily time at the wheel of 7.7 ± 3.4 hours. When asked about prior history of road traffic accidents, more than 81% denied any such involvement.

The clinical characteristics of the sample are listed in Table 1. There was a remarkable predominance of overweight among the subjects, as demonstrated by the average values for BMI (28.1 kg/m²) and waist circumference (96.8 cm). HTN and diabetes mellitus were reported by 26.4 and 9.0% of participants, respectively. Overall, 32.8% of subjects reported chronic use of medications, mainly antihypertensive and oral antidiabetic agents. Regarding lifestyle habits, 18.9% reported regular cigarette smoking, and 39.2% reported regular alcohol intake. Concerning the physical performance of the sample, as measured by handgrip strength, no significant difference in performance was found between the right and left sides ($p > 0.05$). The scores obtained for both sides are consistent with reasonable physical fitness, as more than 55% of subjects exhibited a handgrip strength of 30 kgf or greater.

Table 2 lists the results of inferential analyses, with data expressed as Spearman correlation coefficients. We then sought to evaluate the correlation between representative variables of sleep profile (time and quality) with sociodemographic data and occupational and physical health findings. Total working hours were negatively associated both with total sleep time ($r = -0.15$, $p = 0.005$) and with sleep quality ($r = -0.11$, $p = 0.047$) reported by the subjects. In other words, the longer the time spent driving, the lower the quality scores and total duration of nighttime rest reported by the subjects. Our results also revealed negative associations

Table 1 Clinical characteristics of the sample.

Parameters	Subjects (n = 367)
Age (years)	53.0 ± 6.7
BMI (kg/m²)	28.1 ± 4.4
WC (cm)	96.8 ± 12.5
HR (bpm)	79.7 ± 15.0
Systolic blood pressure (mmHg)	134.8 ± 19.5
Diastolic blood pressure (mmHg)	87.5 ± 14.0
Nocturnal total sleep time (hours)	7.2 ± 1.4
Hypertension (%)	26.4
Diabetes (%)	9.0
Medication use (%)	32.8
Smoking (%)	18.9
Alcohol intake (%)	39.2
Right HGS[a] (kgf)	≤ 20 (42.0%)
Left HGS[a] (kgf)	≤ 20 (43.1%)

[a]Data expressed as mean ± standard deviation, frequency, or mode (and proportion within set); BMI: body mass index; WC: abdominal circumference; HR: heart rate; BP: blood pressure; HTN: hypertension; HGS: handgrip strength.

of presence of hypertension and chronic use of medications with sleep quality scores. Only 53.2% of hypertensive patients reported good or excellent sleep quality, versus 67.9% of normotensive patients (χ^2 = 6.57; p = 0.037). An even greater discrepancy was observed in subjects who were on medication for chronic diseases: 53.0% reported good or excellent sleep, versus 69.9% of those not on drugs for chronic conditions (χ^2 = 10.10; p = 0.006).

DISCUSSION

The study population consisted mainly of elderly and middle-aged subjects with little formal education.[5,6] Their average daily workload was approximately 8 hours; this is much less than in previous studies, in which an average workload of 15 to 16 hours was reported.[5,6] One justification for this apparent discrepancy may be the implementation in Brazil of Law no. 12,619 of April 30, 2012, which regulates the occupation of truck driver and mandates a working day of no more than 8 hours at the wheel and no more than 2 hours of overtime.[7]

Table 2 Exploratory analysis of correlation between sleep profile and indicators of physical health and workload among long-haul truck drivers.

Variable	Sleep profile	
	Duration (hours)	Quality (score)
Age (years)	-0.07 [0.172]	-0.07 [0.180]
BMI (kg/m^2)	-0.05 [0.341]	-0.03 [0.595]
Educational attainment (years)	-0.07 [0.206]	-0.05 [0.343]
Daily time at the wheel (hours)	-0.15 [0.005]	-0.11 [0.047]
History of road traffic accident[a]	-0.08 [0.116]	-0.08 [0.146]
Systolic blood pressure (mmHg)	0.05 [0.330]	0.06 [0.285]
Diastolic blood pressure (mmHg)	0.07 [0.205]	-0.04 [0.400]
HTN[a]	-0.07 [0.183]	-0.13 [0.011]
Diabetes[a]	0.06 [0.242]	0.01 [0.826]
Medication use[a]	-0.06 [0.228]	-0.17 [0.001]
Smoking[a]	-0.05 [0.310]	0.07 [0.158]
Alcohol intake[a]	-0.06 [0.230]	-0.09 [0.077]
Right HGS (kgf)	-0.06 [0.258]	-0.02 [0.763]
Left HGS (kgf)	-0.04 [0.395]	-0.08 [0.115]

Data expressed as Spearman's rho index of correlation [p-value]; [a]dichotomized by absence (0) or presence (1) of the variable when needed; BMI: body mass index; BP: blood pressure; HTN: hypertension; HGS: handgrip strength.

The characteristic lifestyle of truck drivers is probably implicated in many of the defining vulnerabilities of this class of workers, especially their high prevalence of overweight and sedentary behavior.[8-14] This prevalence overweight among truck drivers likely reflects a lifestyle based on high-calorie, high-fat, high-carbohydrate and nutrient-poor diets, coupled with alcohol intake and sedentariness.[4,15]

These unhealthy habits may explain, at least in part, the waist circumference measures observed. In this study, high mean waist circumference values (> 90 cm) were observed, consistent with those observed in previous studies with other samples of drivers.[8,14-16] Large mean waist circumference values in the context of occupational risk factors probably have an additive effect as possible adverse determinants of health, as they are predictive of the presence of chronic non-communicable diseases (NCDs) such as insulin resistance, type 2 diabetes, cardiovascular risk, hypertension, dyslipidemias, and reduction of the high density lipoprotein (HDL) cholesterol fraction.[17,18] These abnormalities may be associated with hemostatic balance and increased atherothrombotic risk.[19,20] This would be in line with previous research carried out in this population, which has shown that truck drivers have a high prevalence and incidence of cardiovascular disease.[15,21,22]

Smoking is among the several factors that predispose to chronic NCDs, and studies of professional drivers have found that these workers make up a substantial portion of the tobacco-smoking population.[5,23,24] Studies conducted in 2010 indicated that 38% of truck drivers were smokers; a 2012 survey reported an average of 19.8%, while a 2013 survey reported 15.0%.[5,25,26] These data are consistent with the findings of this study, and demonstrate a reduction in the prevalence of smoking population among Brazilian long-haul truck drivers. The VIGITEL (Vigilância de Fatores de Risco e Proteção para Doenças Crônicas por Inquérito Telefônico) telephone survey of NCD risk factors reported a 30.7% decrease in the number of Brazilian smokers between the years 2006 and 2014.[27] This relative reduction may be related to changes in habits as a result of awareness campaigns about the harmful effects of smoking.

The rate of alcoholism among road drivers is remarkably high, and can be perceived as a public health problem. A study carried out in 2007 reported that 91% of truck drivers consumed alcoholic beverages.[28] In 2010, other surveys

confirmed that 62–73% of all truck drivers were alcoholics.[5,28] Comparison with the findings of the present study (39.2% prevalence of alcohol use) reveals a reduced frequency of consumption in this population group. Nevertheless, the frequency remains high, and is likely to be associated with road traffic accidents and even road deaths.[28,29]

In addition to these frequency statistics regarding important driving-related issues, we found some inferential associations that might influence the daily activities of these truck drivers. The literature endorses sleep profile as a relevant variable representative of the general physical health status of an individual. In this study, the reduction in sleep quality and quantity reported as time at the wheel increased may be explained by the development of severe physical exhaustion secondary to the drivers' daily workload. However, it bears stressing that such physical exhaustion may not be directly related to bodily fatigue, but rather to psychological wear and tear due to the intensity of freight haulage work. Studies have shown that 16% of sensory losses are associated with occupational causes. We thus presume that an adverse correlation exists between sleep duration/quality and working hours in elderly and middle-aged truck drivers, which would be plausible from the point of view of occupational risk exposures.

The negative correlations of HTN and of medication use with sleep quality reported by the subjects are a common finding in the literature. It is largely attributable to use of diuretic-containing antihypertensive agents, which can cause fragmented sleep secondary to nocturia.[30] Thus, any investigation into sleep profile and associated complaints in middle-aged and elderly truck drivers should take into account medications used for the treatment of incidental chronic disorders, as the optimization of therapy tends to facilitate optimization of the sleep-wake cycle.

Despite its careful methodological design, this study does contain bias. The results found may be representative only of truck drivers, and would thus not be applicable to drivers of passenger vehicles. Another limitation is the absence of female drivers in the sample, which means that results may be gender-specific.

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