

## OBESITY, HYPERTENSION AND DIABETES AMONG TRUCK DRIVERS IN THE MIDDLE-WEST, BRAZIL

### *OBESIDADE, HIPERTENSÃO E DIABETES EM CAMINHONEIROS NO CENTRO-OESTE, BRASIL*

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**ABSTRACT:** A high prevalence of overweight and obesity has been observed among professional drivers. An increased risk of hypertension and obesity may be related to the stress of driving long hours. This work aimed to evaluate the glucose level, blood pressure and body mass index (BMI) in truck drivers. Long distance truck drivers were recruited at a gas station in Goiás State, Brasil, between April 2014 and June 2014. A cross-sectional questionnaire was applied. Random glucose test, blood pressure and body weight were evaluated and body mass index was calculated. Statistic analyses were performed by the software EPI INFO 7.0. The level of significance was set at 5% ( $p \leq 0.05$ ). A total of 155 male long distance truck drivers was included in the study, 78.1% (121/155) said to be sedentary, 30.3% (47/155) were current smokers, 51% (79/155) were using alcoholic beverages with frequency and 58.3% (91/155) did not have a healthy eating. Almost 40% (61/155) were hypertensive ( $>13 \times >8$  MmHg), hyperglycemia ( $>200$  mg/dL) was detected in 11.0% (17/155) and 80% (123/155) were obese (BMI  $> 25$  kg/m<sup>2</sup>). Approximately 90% of hypertensive truck drivers had high BMI ( $p < 0,05$ ) and 81% with high BMI were sedentary ( $p < 0,05$ ). It is concluded that, the majority of truck drivers in this study had sedentary lifestyle associated with high prevalence of overweight and obesity. High BMI was directly associated with hypertension.

**KEYWORDS:** Blood glucose. Blood pressure. Body mass index. Truck driver.

### INTRODUÇION

Brazil has approximately a fleet of 2.5 million trucks according to the statistical bulletin of 2015 of the National Transportation Confederation (BRASIL, 2015). These workers streamline the economy, ensure the agribusiness and social life but they work under poor conditions that favor the development of obesity, diabetes and hypertension. The consumption of high-calorie foods, easily found in restaurants at roadside, a high-salt diet, a sedentary lifestyle and stressful job are factors that contribute to the development of metabolic and cardiovascular diseases, very common among long-distance truck drivers (ISHITANI et al., 2006; APOSTOLOPOULOS et al., 2010).

In the past two decades, the obesity prevalence in the world population has undergone a dramatic increase and has been responsible for 2.8 million deaths per year (ICKS et al., 2009). More than 50% of truck drivers are overweight or obese and it is 15% higher than the general population (WOOD et al., 2007; CABAN et al., 2011).

Diabetes mellitus (DM) and medications side effects can affect driving skills. Diabetic neuropathy and retinopathy are two common complications, which can cause muscle weakness or

even amputation. Moreover, treatment of diabetes can result in hypoglycemia, which in turn may lead to increased reaction time, imbalance and loss of consciousness (BERNE et al., 2015).

Wherefore the state of Goiás, Brazil, a central geographical location of this study makes it an almost mandatory passage hub of industrialized goods/food from the more urbanized southern regions to the less populated and less industrialized northern/northeastern regions, making it possible to evaluate truck drivers from all regions of Brazil. Considering the lifestyles and habits risks associated with the profession of truck driving and the importance of truck drivers to the country's economy, this study aimed to assess the presence of obesity, hypertension and diabetes in long distance truck drivers from the state of Goiás, Middle West, Brazil.

### MATERIAL AND METHODS

#### Study design and population

Truck drivers who drove on the BR153 road through the state of Goiás between April 2014 and June 2014 were invited to participate in the research. The sampling and evaluation of participants was carried out in a gas station in

Aparecida de Goiânia. This gas station is used by long-distance truck drivers to feed, to rest and recreation. Authorization was requested to perform the study in this location. The request specified the need for an appropriate physical space to provide confidentiality and comfort for the participants.

### Clinical evaluation

The subjects were sequentially invited to participate in the research as they arrived at gas station or were resting there. Socio-demographic characteristics, family history of diabetes, hypertension and cardiovascular disease, prior diagnosis of a chronic disease, use of medications, physically active or sedentary lifestyle, consumption of alcohol or other stimulants and smoking habits were evaluated. Height, weight, body mass index (BMI), blood pressure and random capillary glucose were measured.

Truck drivers were asked whether they had previously been diagnosed with any chronic diseases and what medicines they were taking to define a prior diagnosis of a chronic disease. They were considered physically active if they had performed aerobic or anaerobic activities regularly at the past 6 months and they were considered smokers if they used tobacco daily in any quantity at the past 12 months.

### Body mass index, blood pressure and blood glucose index

The body mass index (BMI) levels were classified according to the guidelines of the Brazilian Association for the Study of Obesity and Metabolic Syndrome (ABESO, 2016), subjects were considered low weight if their BMI was  $<18.5$ , considered normal if BMI was  $18.5-24.9 \text{ kg / m}^2$ , overweight if the BMI was  $25.0-29.9 \text{ kg / m}^2$ , grade I obesity if the BMI was  $30.0$  to  $34.9 \text{ kg / m}^2$ , obesity grade II, if the BMI was  $35.0$  to  $39.9 \text{ kg / m}^2$ , and obesity class III if the BMI was  $\geq 40.0 \text{ kg / m}^2$ .

Blood pressure measurements were taken with a properly calibrated aneroid device certified by the Brazilian National Institute of Metrology, Quality and Technology (InMetro). According to the VI Brazilian Arterial Hypertension Guidelines of the Brazilian Cardiology Society (BRASIL, 2010), subjects with greater than or more to 18 years old were classified as hypertensive if their systolic blood pressure (SBP) was greater than or equal to  $130 \text{ mmHg}$  and their diastolic blood pressure (DBP)

was greater than or equal to  $80 \text{ mmHg}$  in a casual evaluation. If they mentioned a previous diagnosis of HAS or they chronically used antihypertensive drugs they were also classified as hypertensive.

Glycemic indexes were assessed by measuring the random capillary blood glucose with equipment from Advantage® (Roche Diagnostics), and with specific tests strips (ACCU-CHEK). Truck drivers were classified as having abnormal glucose levels if they used hypoglycemic drugs, regardless of the results of the capillary glucose test or according with the Brazilian Diabetes Society guidelines (BRASIL, 2015):

- ✓ Fasting  $> 99 \text{ mg/dl}$
- ✓ Postprandial ( $\geq 2\text{h}$ )  $> 140 \text{ mg/dl}$
- ✓ Random  $> 200 \text{ mg/dl}$

All of the truck drivers who exhibited abnormalities in the measured parameters were informed about their condition and about health care options. The truck drivers with high blood pressure values or abnormal capillary blood glucose levels were referred to the public or private health service of their preference.

### Statistical analyses

The descriptive analyses of frequency, medians, averages, and standard deviations for numeric variables were performed using Epi Info™ version 7.0. Fisher Exact test, Kruskal–Wallis, or Mann–Whitney U-tests, Pearson  $\chi^2$  (95% CI) were calculated ( $p < 0.05$ ).

### Ethical aspects

The study was approved by the Research Ethics Committee of the Federal University of Goiás (number 065/2013).

### RESULTS

The study included 155 male long distance truck drivers (Table 1). The median age of the participants was 41 years (21-72 years range) and 27.5% ( $n=43$ ) related previous diabetes, hypercholesterolemia, hypertension or cardiovascular disease. More than 50% of them had a family history of these chronic diseases. Regarding personal habits, 51% ( $n=76$ ) drank alcohol regularly, 30.3% ( $n=47$ ) used tobacco, approximately 80% ( $n=124$ ) did not practice regular physical activity and 58.3% ( $n=91$ ) did not have a healthy diet.

**Table 1.** Main social-demographic and clinical characteristics of long-distance truck drivers in the Middle-West, Brazil (n=155).

Characteristics	N	%
<b>Age (years)</b>		
Median (range)	41 (21-72)	
<b>Previous disease</b>		
Heart disease	1	0.6
Hypercholesterolemia	6	3.8
Diabetes and other disease	6	3.8
Diabetes	7	4.5
Hypertension	23	14.8
No diseases	112	72.5
<b>Family history</b>		
Hypercholesterolemia	3	1.9
Heart disease	5	3.2
Two of these diseases	18	11.5
Diabetes	29	18.7
Hypertension	32	20.6
No history	68	43.8
<b>Alcohol</b>		
Yes	76	51
<b>Tobacco</b>		
Yes	47	30.3
<b>Regular physical activity</b>		
No	124	80
<b>Healthy diet</b>		
No	91	58.3

Table 2 shows the classification of the stage of BMI, of hypertension and the cases of diabetes. Hypertension was observed in 19.3% (n=30) of the truck drivers, 17.4% (n=27) were classified in stage I and 1.9% (n=3) stage II. Of these, 38.3% (n=23) had a previous diagnosis of hypertension, and the vast majority regularly used prescribed antihypertensive medication (91,3%). In our study, 36 new cases of hypertension were detected. Only 20% of the

truck drivers were in an appropriate weight, 52.3% (n=81) were overweight and 27 % were obese: 17.4% (n=27) were class I, 7.7% (n=12) class II and 1.9% (n=3) class III. For 11% (n=17) of the truck drivers, glucose levels were  $\geq 200$  mg/dl, and it was considered altered glycemia, 76.5% (n=13) reported previous diagnoses of diabetes and 10/13 (76.9%) were using hypoglycemic drugs.

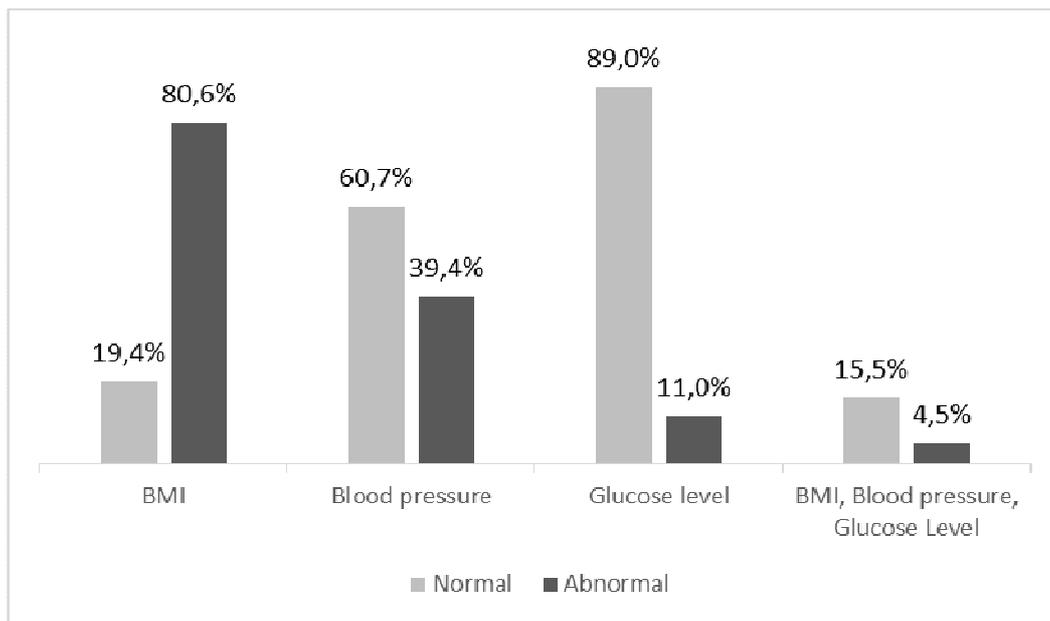
**Table 2:** Blood Pressure (PA), Body Mass Index (BMI) and Capillary Glucose Levels in Long Distance Truck Drivers (n = 155).

Characteristics	N	(%)
<b>Blood pressure</b> [systolic x diastolic (mmHg)]		
Average $\pm$ standard deviation	126.4 $\pm$ 0.9 x 84.1 $\pm$ 0.8	
Great $\leq 120 \times \leq 80$	72	46.5
Normal $\leq 130 \times \leq 85$	33	21.3
Limítrophe 130-139 $\times$ 85-89	20	12.9
Hypertension		
Stage I (140-159 $\times$ 90-99)	27	17,4

Stage II (160-179 × 100-109)	3	1.9
<b>Body mass index (kg/m<sup>2</sup>)</b>		
Average ± standard deviation	28.3 ± 4.6	
Low weight (< 18,5)	2	1.3
Normal weight (18,5-24,9)	30	19.4
Overweight (25,0-29,9)	81	52.3
Obesity class I (30,0-34,9)	27	17.4
Obesity class II (35,0-39,9)	12	7.7
Obesity class III (≥40,0)	3	1.9
<b>Random glucose levels (mg/dL)</b>		
Average ± standard deviation	125.03 ± 57.6	
Normal (≤200)	138	89.0
Altered (≥200)	17	11.0

The Figure 1 shows the prevalence of abnormal BMI, abnormal glucose levels and hypertension. The presence of hypertension, abnormal glucose levels and body mass index were simultaneously observed in 4.5% (n=7) of the truck drivers and 15.5% had only one

cardiovascular risk factor. The clinical characteristics of the participants showed that the BMI was abnormal in 80.6%, followed by the blood pressure in 19.3% and less frequent blood glucose in 11.0%.



**Figure 1.** Prevalence of abnormal BMI, Glucose level and Blood Pressure, isolated or in combination, in truck drivers from the Middle-West, Brazil.

The variables associated with hypertension or abnormal blood glucose levels or high body mass index are presented in Table 3. This analysis confirmed the association between a hyper caloric food, and sedentary lifestyle with a high body mass index. 50% of the truck drivers with an inappropriate feed had a sedentary lifestyle or had

high BMI. Furthermore, 28% of the participants with abnormal blood pressure had a sedentary lifestyle.

The prevalence of the regular consumption of alcohol and the use of tobacco or stimulants was not associated with abnormal blood pressure, glucose levels and BMI.

**Table 3.** Association between Blood pressure, Glucose level and Body Mass Index and lifestyle of truck drivers from Brazil (n=155).

	Blood pressure*		Glucose level		Body Mass Index <sup>#</sup>	
	Normal n (%)	Hypertension n (%)	Normal n (%)	Abnormal n (%)	Normal n (%)	Abnormal n (%)
<b>Healthy diet</b>						
Yes	54 (56.3)	37 (62.7)	78 (56.5)	13 (76.5)	16 (51.6)	75 (60.4)
No	42 (43.8)	22 (37.3)	60 (43.5)	4 (23.5)	15 (48.4)	49 (39.5)
<b>Physical activity</b>						
Yes	22 (22.9)	12 (20.3)	32 (23.2)	2 (11.8)	11 (35.5)	23 (18.5)
No	74 (77.1)	47 (79.7)	106 (76.8)	15 (88.2)	20 (64.5)	101 (81.5) <sup>#</sup>
<b>Alcohol</b>						
Yes	49 (51)	30 (50.8)	69 (50.0)	10 (58.8)	16 (51.6)	63 (50.8)
No	47 (49)	29 (49.2)	69 (50.0)	7 (41.2)	15 (48.4)	61 (49.2)
<b>Tobacco</b>						
Yes	29 (30.2)	18 (30.5)	40 (29.0)	7 (41.2)	10 (32.3)	37 (29.8)
No	67 (69.8)	41 (69.5)	98 (71.0)	10 (58.8)	21 (67.7)	87 (70.2)
<b>Glucose level</b>						
Normal	86 (89.6)	52 (88.1)	-	-	-	-
Abnormal	10 (10.4)	7 (11.9)	-	-	-	-
<b>Body Mass Index *</b>						
Normal	26 (27.3)	5 (8.5)	29 (21.0)	2 (11.8)	-	-
Abnormal	70 (72.9)	54 (91.5) *	109 (79.0)	15 (88.2)	-	-

\* p &lt; 0.05; OR = 4.0 (1.4 – 11.1); # p &lt; 0.05; OR = 2.4 (1.01 – 5.7)

## DISCUSSION

The current study showed an important overweight and obesity closely associated with hypertension among long distance truck drivers passing through the central western Brazil. A Brazilian study of RIBEIRO et al., 2013, with 258 truck drivers reported that 82% of truck drivers were overweight and obese and other studies around the world with professional drivers reported similar results (CABAN et al., 2011; BIGERT, 2008; AGUILAR-ZINSER et al., 2007). Altogether, these studies show a high rate of overweight and obesity among professional drivers in different regions of the world.

The majority of truck drivers of our study were sedentary. The high rates of overweight and obesity can be explained by long working hours, which contribute to physical inactivity. When driving, the low energy expenditure due to the lack of regular physical activity practices contributes to overweight, increasing damage to health with the onset of diabetes, hypertension, stress, depression and other pathologies (CODARIN et al., 2010). Furthermore, these professionals work mostly in irregular shift, which contributes to unhealthy eating habits such as eating high-calorie, especially during evening meals (SIEDLECKA, 2012).

According to Ulhôa et al., 2010, in a study with 460 truck drivers from a cargo carrier in the South and Southeast of Brazil, 65.5% of truck drivers drank alcohol. As noted in this study, alcohol is a problem that has been present in the lives of truck drivers often alcohol consumption among drivers occurs in moments of rest and also during meals and these drinks are purchased easily at gas stations and restaurants. The consumption of alcohol among these professionals is worrying, because drivers in these conditions can cause serious traffic accidents (DOMINGOS et al., 2010). More than 50% of truck drivers of our study drank alcohol.

About a third of the drivers evaluated have smoking daily. According to the Brazilian Society of Hypertension (BRASIL, 2011), smoking habit aggravates cardiovascular diseases, increasing heart rate and blood pressure, thereby causing atherosclerosis and causing hardening of the arteries.

Studies show that high blood pressure in combination with overweight increases the risk of onset of cardiovascular disease (BIGERT, 2008; JONSSON et al., 2008; KOTSIS et al., 2010).

High blood pressure was significantly higher among truck drivers with high body mass index in our study (91.5%). Hypertension in overweight individuals is four times greater than

hypertension in normal weight individuals (BIGERT, 2008). Some studies show that the prevalence of overweight and obesity in people with high blood pressure have very worrying values 72.6% in Sweden (JONSSON et al., 2008) and 77% in Greece (KOTSIS et al., 2010). This makes clear the relationship between obesity and hypertension.

According to Quintana (QUINTANA, 2011), the relationship between BMI and hypertension is directly proportional, since higher BMI, higher risks for developing hypertension. According to their studies, there are some known factors for the development of hypertension such as stress, anxiety, genetic factors and environmental factors such as obesity, physical inactivity and sodium intake excess. It is therefore crucial that this study group has greater control of high blood pressure rates to prevent future complications.

The glycemic rates, when uncontrolled, can lead to diabetes mellitus. Studies in other countries, demonstrate that the prevalence of diabetes in professional drivers in Hong Kong was 8.1% (WOOD, et al., 2007), in Kashan (CABAN et al., 2011) was 7% and in our study was more than 10%. This prevalence may vary in different populations considering factors such as genetics, diet, and culture (APOSTOLOPOULOS; PEACHEY; SONMEZ, 2011). The diabetes and cardiovascular diseases may arise due hypertension, which is a risk factor for the onset of these diseases (SYMONIDES; LEWANDOWISKI, 2008).

A high prevalence of physical inactivity, poor eating habits and obesity, smokers and the use of alcoholic drinks are some factors that contribute to the development of diabetes among this truck drivers. However, few studies have investigated the health status of professional drivers (MARQUESE; ULHÔA; MORENO, 2012)

Studies like FERREIRA, 2015, confirms that certain diseases such as obesity, hypertension, altered cholesterol rate, diabetes and postural changes may be incited by factors related to the organization of work of these professionals, such as long working hours, lack breaks, imposing short deadlines for cargo delivery and the precariousness of rest stations. All these factors described let the truck drivers vulnerable to these abnormalities. So it is necessary to improve the quality of life of this population, which is so important for the Brazilian economy.

Finally, it should be highlighted that the number of participants was limited and blood pressure were not measured several times to confirm that condition.

**CONCLUSION**

This study showed a high body mass index associated with sedentary lifestyle and

with hypertension among long distance truck drivers.

**RESUMO:** A alta prevalência de sobrepeso e obesidade foi observada entre os motoristas profissionais. Um risco aumentado de hipertensão e obesidade pode estar relacionada com a longa jornada de trabalho. Este trabalho objetivou avaliar o índice de massa corporal (IMC), o nível de glicose e a pressão arterial em motoristas de caminhão. Os motoristas de caminhão de longa distância foram recrutados em um posto de combustível, no Estado de Goiás, Brasil, entre abril de 2014 e junho de 2014. Um questionário foi aplicado. Foram realizados o teste de glicose ao acaso, aferição da pressão arterial, peso corporal e calculado o índice de massa corporal. As Análises estatísticas foram realizadas pelo programa EPI INFO 7.0. O nível de significância foi fixado em 5% ( $p \leq 0,05$ ). Foram incluídos no estudo um total de 155 motoristas de caminhão de longa distância do sexo masculino, 78,1% (121/155) disseram que eram sedentários, 30,3% (47/155) eram fumantes atuais, 51% (79/155) estavam usando bebidas alcoólicas com frequência e 58,3% (91/155) não têm uma alimentação saudável. Cerca de 40% (61/155) eram hipertensos ( $> 13 \times > 8$  mmHg), 11,6% (18/155) tinham hiperglicemia ( $> 200$  mg / dL), e 80% (123/155) eram obesos (IMC  $> 25$  kg / m<sup>2</sup>). Aproximadamente 90% dos motoristas de caminhão hipertensos apresentaram IMC elevado ( $p < 0,05$ ) e 81% com IMC elevado eram sedentários ( $p < 0,05$ ). Concluímos que a maioria dos caminhoneiros estudados tinham estilo de vida sedentário associado a alta prevalência de sobrepeso e obesidade. O IMC elevado foi diretamente associado com a hipertensão.

**PALAVRAS-CHAVE:** Glicemia. Pressão arterial. Índice de massa corporal. Caminhoneiros.

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