



Impact of the psychoactive substances testing requirement on the consumption of amphetamines by truckers*

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Objective: to evaluate the impact of the hair drug testing requirement on amphetamine use by truck drivers.

Methodology: a cross-sectional exploratory descriptive study was conducted, with data collection in the Metropolitan Region of the capital of Rio Grande do Sul. To characterize the population and assess the impact of the test requirement, we applied a structured instrument with questions about personal and occupational information, use of amphetamines, Law 13,103/2015, and the hair test. **Results:** a total of 97 drivers were interviewed, with a mean age of 38 years, 99% were male. Regarding the use of amphetamines, 20.6% admitted to using this substance, being possible to observe that the number of users is higher among self-employed drivers and those who travel long distances ($p < 0.05$). **Conclusion:** this study indicates that the requirement of hair testing for drug use did not reduce the consumption of amphetamines by truck drivers. The other information collected points out, as possible causes, the working conditions and the poor road conditions, which require long working hours, as well as the ease of acquiring drugs and false reports for the tests.

Descriptors: Amphetamines; Traffic Accidents; Automobile Driver Examination; Occupational Health.

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Impacto da exigência do exame para substâncias psicoativas no consumo de anfetaminas por caminhoneiros

Objetivo: avaliar o impacto da exigência do exame para drogas em cabelos no consumo de anfetaminas por motoristas de caminhão. **Metodologia:** realizou-se um estudo exploratório descritivo, de corte transversal, com coleta de dados na Região Metropolitana da capital do Rio Grande do Sul. Para caracterizar a população e avaliar o impacto da exigência do exame, foi aplicado um instrumento estruturado com perguntas a respeito de informações pessoais, ocupacionais, uso de anfetaminas, sobre a Lei nº 13.103/2015 e o teste em cabelo. **Resultados:** foram entrevistados 97 motoristas, com idade média de 38 anos, sendo 99% do gênero masculino. Sobre o uso de anfetaminas, 20,6% admitiram fazer uso dessa substância, sendo possível observar que o número de usuários é maior entre os motoristas autônomos e que percorrem longas distâncias ($p < 0,05$). **Conclusão:** este estudo indica que a exigência da realização de exames para a detecção do uso de drogas em cabelos não reduziu o consumo de anfetaminas por motoristas de caminhão. As demais informações coletadas apontam, como possíveis causas, as condições de trabalho e as péssimas condições das estradas, as quais exigem a realização de longas jornadas de trabalho, bem como a facilidade para adquirir drogas e laudos falsos para os exames.

Descritores: Anfetaminas; Acidentes de Trânsito; Exame para Habilitação de Motoristas; Saúde do Trabalhador.

Impacto del requisito de prueba de sustancias psicoactivas en el consumo de anfetaminas por los conductores de camiones

Objetivo: evaluar el impacto del requisito de examen de drogas en el cabello en el consumo de anfetaminas por parte de los conductores de camiones. **Metodología:** se realizó un estudio exploratorio descriptivo, transversal, con recolección de datos en Región Metropolitana de la capital de Rio Grande do Sul. Para caracterizar a la población y evaluar el impacto del requisito de examen, se aplicó un instrumento estructurado con preguntas sobre información personal y ocupacional, uso de anfetaminas, sobre la Ley 13.103/2015 y la prueba del cabello. **Resultados:** se entrevistó a 97 conductores, con una edad promedio de 38 años, de los cuales el 99% eran hombres. Con respecto al uso de anfetaminas, el 20,6% admitió haber usado esta sustancia, y es posible observar que el número de usuarios es mayor entre los conductores autônomos y que viajan largas distancias ($p < 0.05$). **Conclusión:** este estudio indica que la exigencia de realizar pruebas para detectar consumo de drogas en el cabello no redujo el consumo de anfetaminas por parte de los camioneros. El resto de la información recopilada señala, como posibles causas, las condiciones laborales y viales, que exigen largas jornadas laborales, así como la facilidad para adquirir medicamentos y los informes falsos para los exámenes.

Descriptores: Anfetaminas; Acidentes de Trânsito; Examen de Aptitud para la Conducción de Vehículos; Salud Laboral.

Introduction

Brazil has one of the largest highway networks in the world, with 1,720,700 km. According to the National Confederation of Transport (NTC), only 12.4% of the roads are paved and 59.2% of the roads evaluated presented some type of problem in the general condition⁽¹⁾. In 2019, 55,756 traffic accidents with victims were recorded on federal highways, 3.3% more than in 2018. An increase in the severity of accidents was also observed, as the number of fatalities was 1.2% higher⁽²⁾.

Motor vehicle accidents are inevitable, but the risk of human error increases with the consumption of psychoactive substances. In the case of this study, the use of these substances by truck drivers is a risk factor for their involvement in traffic accidents⁽³⁻⁶⁾. The World Health Organization considers drug driving an emerging issue for road safety. The lack of information about drivers' drug use is a major gap in knowledge that is critical for decision making and policy making⁽⁷⁾. A study showed that the use of alcohol and other drugs was one of the main causes of accidents involving professional drivers in rural Iran⁽⁸⁾.

In Brazil, truck drivers can work autonomously, in cooperatives or attached to companies. In 2019, the fleet of freight vehicles was 1,088,358 vehicles registered with companies, 859,729 registered as self-employed and 22,865 vehicles from cooperatives, thus totaling 2,270,861 vehicles authorized to carry out freight transport⁽¹⁾. In 2019, there were 819 deaths of heavy transport vehicle occupants due to accidents, according to DATASUS⁽⁹⁾, but this database does not allow us to identify the involvement of drugs in these accidents.

In Brazil, amphetamines are important substances of abuse among truck drivers, who use the so-called "rivets" or "arrebites" in order to reduce sleep and fatigue during long trips. These substances are a reality in the lives of these professionals, particularly those who travel long distances, especially during the night and/or at dawn, because many sleep no more than six hours a day⁽¹⁰⁾.

Due to the illicit consumption of psychoactive substances and the increase in traffic accidents, on March 2, 2015, Law No. 13,103/2015 was published⁽¹¹⁾, which was hereinafter disciplined by Resolution No. 583, dated March 23, 2016⁽¹²⁾. This law requires the performance of toxicological tests with a wide detection window (90 days) on the consumption of psychoactive substances by professional drivers when they are licensed, renewed, or switched to categories C, D, and E of their National Driver's License (CNH), using hair or body hair as a sample. The toxicological exam must be done by laboratories accredited by the National Traffic Department (DENATRAN), which must have all its steps protected by a chain of custody, ensuring the traceability of the entire process⁽¹³⁾.

Hair differs from other human materials used for toxicological analysis, such as blood, urine or saliva, due to its substantially longer window of detection (from months to years), allowing retrospective investigation of chronic and past consumption⁽¹⁴⁾. This analysis does not evaluate recent use, nor does it allow one to say whether the individual is under the effect of psychoactive substances⁽¹⁵⁻¹⁶⁾. The cost of this type of analysis is higher than those performed on biological samples, such as urine, oral fluid or blood, because hair and/or hairs are more complex samples and require more sensitive methods for their analysis⁽¹⁷⁾.

The objective of this work is to evaluate the impact of Law 13,103/2015⁽¹¹⁾ on the use of amphetamines ("rivets") among truck drivers; to estimate the prevalence of amphetamines use among truck drivers who travel long distances; to verify the profile of truck drivers who use amphetamines and compare it with those who do not use rivets.

Null hypothesis: Law 13.103/2015⁽¹¹⁾ has not reduced the consumption of amphetamines by truck drivers who travel long distances.

Alternative hypothesis: Law 13.103/2015⁽¹¹⁾ reduced the consumption of amphetamines by truck drivers who travel long distances.

Method

This study is characterized as exploratory descriptive and cross-sectional. The sample was of convenience and the truck drivers were invited to participate, voluntarily and anonymously, while resting in the yards of gas stations. Data collection was initiated after oral consent and signing of the Informed Consent Form. This study was approved by the Research Ethics Committee of the Pontifical Catholic University of Rio Grande do Sul (REC Ordinance No. 3.103.952), according to Resolution No. 466/12 of the National Health Council⁽¹⁸⁾.

Inclusion criteria were drivers who have worked in the area for more than six months, travel long distances (>300 km *per* day), carry cargo, and have an E-class driver's license. A value greater than 300 km was defined as long distance because the city of Rio Grande is the main port of Rio Grande do Sul, and most of the goods to be distributed by road arrive at this port. The distance between this city and Porto Alegre is 324 km, and the metropolitan region is the destination or stopping point. The exclusion criteria were drivers who were under the influence of substances that could alter their mental state at the time of the interview.

Data collection was conducted from June to October 2019, in the morning, afternoon and evening shifts, in the Metropolitan Region of Porto Alegre, at gas stations used by truck drivers as stopping stations. The sample

size was determined by the number of drivers available at the sites during the survey period.

To collect occupational data and data on the consumption of psychoactive substances, a structured instrument was applied consisting of questions regarding personal and occupational information, drug use - especially amphetamines - impact that the requirement of Law 13,103/2015⁽¹¹⁾ obtained about the use of these substances by truckers and questions regarding the toxicological hair test. The collected information was organized in the Statistical Package for the Social Sciences (SPSS), version 17.0.

The description of quantitative data involved the use of the mean, standard deviation, and, in the case of asymmetry, the use of the median and the interquartile range. Categorical data were described by counts and percentages. For the categorical variables, a chi-square test was applied, and to verify the degree of association between variables, Cramer's V was used. The significance level adopted in this study is $\alpha = 0.05$.

Results

Of the 111 truck drivers approached, 14 (12.6%) did not agree to participate after being informed about the

research objective. After signing the Free and Informed Consent Term, 97 truck drivers, with ages between 23 and 63 years, and a mean age of 38 years, participated in the research. Of this total, 99% were male.

Regarding occupational characteristics, 45.3% said they had at least completed high school, 76.3% said they had worked in the profession for more than six years, and 61.9% were married or in a stable union at the time of the interview. Of the total number of interviewees, 20 (20.6%) affirmed that they use "rivets". When the drivers were asked if they knew the risks of driving under the influence of "rivets" and the risks of these substances to their health, 90.7% said that they knew.

When comparing the occupational characteristics of the group of drivers who used rivets with the group who did not use rivets, there was no significant difference regarding the level of education and marital status. However, when comparing between the two groups the type of employment relationship, the time in the profession, the distance traveled *per* day, and the hours traveled, the difference was significant ($p < 0.05$), as can be seen in Table 1.

Table 1 - Occupational characteristics of drivers grouped into amphetamine users or not (N=97). Porto Alegre, RS, Brazil, 2019

Occupational characteristics	Drivers who use "rivets" (n=20) %	Drivers who do not use "rivets" (n=77) %	Chi-square Value	p	Cramer's V Value																																																						
Type of employment contract																																																											
Autonomous	75	22	20.151	<0.001	0.456																																																						
Employed	25	78				Time in the profession						<2 years	5	6	12.281	0.015	0.356	2 to 5 year	35	13	6 to 10 years	45	28	>11 years	15	53	Drives (km/day)						<800	0	49	20.281	<0.001	0.457	800 to 1500	65	43	>1500	35	8	Drives (number of hours/day)						<8	0	10	11.413	0.003	0.343	8 to 16	55	77
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When drivers who used rivets were asked why they used these substances, the main reason was the need to keep to schedule (70%). Among them, 5% considered the purchase of rivets difficult, and none considered it very difficult. The main places of purchase cited were gas stations (70%).

Regarding Law 13.103/2015⁽¹¹⁾, which requires the performance of toxicological examination of wide window of detection for the consumption of psychoactive substances for professional drivers, when asked if the legislation interfered with their consumption of "rivets", 90% of drivers who use reported that it did not interfere. It is possible to observe other results obtained about Law 13,103/2015⁽¹¹⁾ and the toxicological examination on hair in Table 2.

Table 2 - Information from the questions regarding Law No. 13,103/2015⁽¹¹⁾ and the hair test. Porto Alegre, RS, Brazil, 2019

Drivers interviewed (n=97)	(%)
Considers that Law 13,103/2015 ⁽¹¹⁾ reduced the use of "rivets" among truck drivers?	
Yes	48
No	52
Have you ever had any problems performing the test on hair?	
Yes	4
No	96
How easy do you find it to get false reports for this test?	
Yes	49
No	51

When the interviewees were asked if they had ever been involved in accidents on the roads, 40.2% answered affirmatively. When comparing the rivet users group with the non-users group, regarding the involvement in accidents, it was possible to observe that there was no significant difference between the two groups.

Discussion

Even considering the small sample size, which can be a bias for the interpretation of the results, some interesting data were identified. It was possible to observe a significant number of "rivet" users among the interviewed truckers (20.6%). In other surveys conducted in Brazil, with the same population and already in effect of Law 13,103/2015^(11,19), the results were higher. Near the city of Anápolis (Goiás), on BR-153, 32.9% of 160 participating truck drivers reported using amphetamines. However, in another study, from 2017⁽²⁰⁾, also conducted near Anápolis (Goiás) and using self-reporting, 17% of 161 truck drivers said they had used a "rivet" in the three months prior to the survey.

When comparing the prevalence of amphetamine users interviewed in this survey to that of studies prior to Law No. 13,103/2015⁽¹¹⁾, it is possible to observe that this prevalence has increased. In a 2012 survey in the state of Rio Grande do Sul, by self-report, with the participation of 854 truck drivers, the prevalence of "rivet" users was lower (12.4%)⁽²¹⁾. In 2014⁽²²⁾, In the State of Rondônia and self-reported, 12.4% of 32 truckers reported using "rivets".

The comparison between studies conducted with this population before and after Law 13,103/2015⁽¹¹⁾ the fact that the new law that came into effect shows that it is not possible to say that there has been a decrease in the number of amphetamine users. On the contrary, an upward trend was observed. It is important to point out that, although the surveys were carried out in different states of the country, the population investigated travels all over Brazil. Therefore, there should be no difference in the results, even though the surveys were applied in different places and with different sample sizes. It is likely that there has been no reduction in the consumption of amphetamines because it is possible to obtain reports with false results and the main causes of the use of these substances, such as poor road quality, which makes it difficult to meet deadlines, have not been changed.

Regarding the places where truck drivers usually buy the "rivets"⁽¹⁹⁾, gas stations (31.5%) were identified as those with fewer purchase restrictions, followed by pharmacies (8.6%). Reports indicate that 38.3% of users stated that there was no difficulty in purchasing these substances. According to the 2017 survey⁽²⁰⁾, gas stations are the most cited (60%), followed by pharmacies (17%). In addition, 40% of the drivers participating in the same survey stated that they did not find it difficult to buy "rivets". In this study, gas stations were also the most cited places (70%) among amphetamine users, and only 5% admitted to having difficulty buying. However, no individual claimed to buy them in pharmacies.

In this study, when comparing the occupational characteristics of truck drivers to the use of "rivets", it was possible to observe that almost two thirds of the drivers who use amphetamines are not employed. This difference can be explained by the fact that self-employed drivers have longer working hours, shorter delivery times, do not enjoy all the labor rights of a regular driver, and their earnings are related to the number of trips made⁽²¹⁾.

Law 13.103/2015⁽¹¹⁾ also requires that professional drivers do not drive more than eight hours a day, and must take at least a thirty-minute break every five and a half hours. It can be seen that this is not being complied with, since most of the interviewees reported driving more than eight hours a day. In addition, most Brazilian roads have no place to stop for a break. Among the drivers who reported using "rivets", the main explanation for the consumption

was to meet schedule (70%), which may be related to the general state of the roads, which makes trips take longer. Also, the earnings of self-employed and cooperative drivers are related to the number of trips made.

There was a difference in distance traveled and driving time between the group of amphetamine users and non-users compared to the users doing longer journeys and traveling longer distances. This result is not surprising because to drive for such long periods drivers need central nervous system stimulants and amphetamines become their choice. In a study from 2014⁽³⁾, using self-report and laboratory analysis, it was found that 96% of amphetamine users reported using them to stay awake. The authors also identified a positive association between trucker use of amphetamines and longer trips.

Brazil is the only country that establishes the wide window hair test as a mandatory requirement for acquiring or renewing a professional driver's license. In the United States, Canada, and European countries that conduct tests to assess drug use by drivers, the sample used is blood, because it allows the detection of various substances and its levels better reflect their effects⁽²³⁾.

In Australia, oral fluid is the sample employed, as it assesses recent use, and the collection of this material has the advantage of being performed non-invasively, under direct observation, at the screening site, thus making it difficult for the donor to adulterate the sample⁽²⁴⁾. The use of hair or hairs in these countries is limited to criminal investigations, with the exception of Germany and Italy where hair testing is used for monitoring chronic drug use and when drivers need to prove abstinence in order to regain their driver's license, whose license has been revoked or suspended for the use of psychoactive substances⁽²⁵⁾.

The number of participants in this research was limited, however, field studies such as this one are costly and logistically challenging, making them infrequent⁽²³⁾. In addition, research on drug use has, as a possible source of error, the high number of individuals who refuse to participate, which can cause a selection bias. In this survey, 12.6% of the drivers did not want to answer the questionnaire, and yet 20.6% of the participants said they use amphetamines. The way the participants were selected made it possible to approach drivers from diverse backgrounds, since all those present at the gas stations were invited to participate, data were collected in the three shifts, and the data survey was conducted at gas stations where trucks transporting cargo to/from several Brazilian states and South American countries (mainly Uruguay, Argentina, and Chile) pass through.

Another limitation of this study was that it was based on self-report, as there is a greater risk of participants providing incorrect information. However, self-reports are still more reliable than sample surveys based on suspicion of drug use⁽²³⁾. Studies including laboratory analysis to

detect drug use may provide more reliable results, but they are more costly and have logistical issues that make them rare.

Despite these limitations, this study, by seeking to identify variables that determine the tendency to use or not the use of amphetamines by road professionals, contributed information not found in other studies, such as the fact that self-employed truck drivers or truck drivers linked to cooperatives make greater use of amphetamines, the obtaining of false reports of drug tests on hair is considered easy by 49% of respondents, in addition to the indication that Law No. 13,103/2015⁽¹¹⁾ had little impact on the consumption of "rivets" among truck drivers.

Conclusion

Despite the enactment of Law 13,103/2015⁽¹¹⁾, the consumption of amphetamines by truck drivers who drive long distances is still a reality on Brazilian roads. Possible causes for this use are the poor conditions of the roads, which make it difficult to deliver the cargoes on time. Its users know the risks of driving under the influence of these substances and what they cause to their health. Therefore, campaigns to raise awareness about the risk of using these substances cannot be carried out in isolation. It is necessary for governments and transportation companies to take initiatives to improve the working conditions of professional truck drivers in the country. More investment is needed in the road network to improve traffic flow and reduce travel times. Rest stops should also be provided on all roads where truck drivers travel so that they can rest with quality and safety.

In addition, greater enforcement is needed to hinder the sale of stimulants, as well as toxicological tests to evaluate recent consumption of psychoactive substances. These measures should help to prevent the use of amphetamines, whose main motive is to reduce drivers' sleep and fatigue, as well as to preserve drivers' health and reduce the number of accidents on the highways.

Having epidemiological data is fundamental to follow changes in the investigated populations and to define public policies. In this case, measures related to improvements in the road network and working conditions for this professional category must be implemented, as well as enforcement of existing legislation. New studies, which may continue those already available, should be conducted. In addition, identifying the risk factors for amphetamine use, such as assessing impulsivity and symptoms of depression, stress and anxiety in this population, may contribute to the development of prevention and treatment programs.

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