

Drug Use by Truck Drivers in Brazil

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ABSTRACT *In Brazil, those who are suspected of driving under the influence of drugs are tested only for ethanol. Professional drivers, especially truck drivers, use stimulant drugs to prevent sleeping during long-distance driving. Surveys on the patterns of use of illicit drugs in the workplace have rarely been conducted in Brazil, in spite of the high costs and the potential risk to public health. Since 1996, the authors have been compiling the results of tests, performed in their laboratories, for drugs in urine samples from truck drivers. The drugs analyzed were: amphetamine, methamphetamine, cannabinoids and cocaine. Urine samples (728) were collected in three out of the five geographical regions of Brazil: southeast (517 samples), northeast (161 samples) and south (50 samples). Fluorescence polarization immunoassay and capillary gas chromatography/mass spectrometry were utilized for the urinalyses. The results obtained were as follows: 41 samples (5.63% of the total) tested positive for the drugs being studied. The frequency of positivity of samples was quite similar for the three regions: 6% in the south, 6% in the southeast and 4.35% in the northeast. However, distribution of the drugs in the samples showed regional variations. Results such as those that we have obtained can provide an estimation of the extent of drug use by truck drivers in Brazil.*

Introduction

The ingestion of illicit, prescription and non-prescription, drugs to enhance performance in the workplace is a common practice. Professional drivers, especially truck drivers, use stimulant drugs to prevent sleeping during long-distance driving (Verroken, 1996; Goldberg & Cone, 1994).

Evidence of alcohol use has been found in a higher percentage of deaths involving motor vehicle accidents and driving equipment than in other types of workplace fatalities.

In 1982, driving under the influence of drugs other than ethanol, especially prescribed ones, was described in a paper that illustrated a survey carried out in 1976 in three different groups of drivers in Sweden (Solarz, 1982). Drug measurements on blood samples collected in 1983 and 1978 from individuals suspected

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of driving under the influence of drugs, either alone or in combination with ethanol, were studied retrospectively in Oslo, Norway. Cannabinoids, diazepam, and amphetamines were the drugs most frequently found (Bjorneboe *et al.*, 1987). Due to the great number of accidents with serious consequences, which sensitized the American public to drug and alcohol abuse by transportation workers, the National Transportation Safety Board, in collaboration with the National Institute on Drug Abuse, investigated driver-fatal trucking accidents in eight states over a one-year period. Drug screening of blood samples collected from 168 fatally injured drivers showed that the most prevalent drugs were cannabinoids and ethanol (13% of the drivers). Cocaine (8% of the total), amphetamines (7% of the total) and ephedrine (7% of the total) were also detected (Crouch *et al.*, 1993). Also in America, urine tests to identify reckless drivers who were under the influence of cocaine and marijuana were conducted in Memphis, Tennessee, in 1992. Eighty-eight subjects who submitted urine samples (59% of the total) tested positive for either or both of these drugs (Brookoff *et al.*, 1994). In the European Roadside Testing Assessment project (ROSITA), the Institute of Legal Medicine Homburg/Saar co-operated with the traffic police in order to assess different roadside drug tests. From June to December 1999, voluntary roadside testing of saliva, sweat or urine was performed in 254 cases to confirm the initial suspicion that a driver had used drugs. In 203 out of 209 positive cases, the results were confirmed by GC/MS analysis. Consumption of a single drug was found in 156 cases (113 cannabinoids, 38 amphetamines, 3 opiates and 2 cocaine). Consumption of two drugs was found in 44 cases, and in 3 cases multiconsumption was discovered (Steinmeyer *et al.*, 2001).

In Brazil, people involved in motor-vehicle accidents on public roads or suspected of driving under the influence of drugs are tested for ethanol as part of the traffic police investigation. Tests are carried out either at the scene of the accident or during medical care of the victims. On the other hand, cases of accidental death at work, and work-related motor vehicle accidents on the roads, are Medical Examiner's cases during which routine tests for alcohol and other drugs are carried out.

Highway transportation of passengers and freight is the leading form of transportation in Brazil, which has a highway system amounting to a total of 1 670 148 kilometres, paved or not. At least three-fourths of Brazil's population and goods are transported by road, making truck drivers a very important workforce.

In part due to the general disregard of traffic laws in the country, road-traffic accidents claim the lives of roughly 50 000 Brazilians per year, yet the drivers responsible for these accidents are rarely held accountable. A new Transit Code took effect in 1998. This imposed a tough new set of traffic laws, which included the use and abuse of drugs while driving.

In Brazil, sparse statistics show that volatile compounds (glue sniffing), cannabis, cocaine, amphetamines and benzodiazepines are drugs commonly used by the general population. Consequently they are also likely to be involved in drug-related accidents in the workplace. Surveys on the patterns of use of these illicit drugs in the workplace have rarely been conducted in Brazil, in spite of the high costs, and the potential risk to public health, of these drug-related accidents.

Since 1996, in conjunction with the Brazilian organization Grupo Executivo de Redução de Acidentes de Trânsito (GERAT), the aim of which is to try to reduce traffic accidents in the whole country, we have been compiling the results of tests,

performed in our laboratories, for drugs in urine samples of truck drivers from three different geographical Brazilian regions. The drugs analyzed were: amphetamine, methamphetamine, cannabinoids and cocaine. These drugs were studied in particular because they can exert a very marked influence on a person's ability to drive a motor vehicle safely.

Analytical results, such as the ones that we have obtained from our studies, since 1996, can provide an estimation of the extent of drug use by truck drivers in Brazil.

Methods

Urine samples (728) obtained from truck drivers were collected in three out of five geographical Brazilian regions: southeast (517 samples), northeast (161 samples) and south (50 samples). The anonymous sample donors selected were not under suspicion of having driven under the influence of drugs, and the urine samples were collected under the direct observation of a sampling officer. The samples were kept in plastic bottles with numbered seals, and were maintained at 5°C until analyzed.

After the collection procedure truck drivers were asked to declare any medication taken previously (up to five days before). The bottles were safely transported to our laboratories—Laboratório de Análises Toxicológicas da Faculdade de Ciências Farmacêuticas, Universidade de São Paulo—where tests for the presence of the studied drugs are routinely performed.

Drug testing were performed by a combination of fluorescence polarization immunoassay (FPIA) and gas chromatography–mass spectrometry (GC–MS).

FPIA Assays

Urine samples were screened for amphetamine, methamphetamine, cannabinoids and cocaine using an automated TDx FLx system (Abbot Laboratories) with the appropriate reagent packs, calibrators, controls and buffer solution as supplied by the manufacturers (TDx and FLx System Assays Manual, 1994). The following 'cut off' values were used in the screening step: cannabinoids 50 ng/ml; cocaine metabolites 300 ng/ml; and amphetamine/methamphetamine 300 ng/ml.

GC–MS Analyses

The identity of all drugs detected in the screening test were confirmed by gas chromatography–mass spectrometry according to previously published methods (Mulé & Casella, 1998; Pflieger *et al.*, 1992). A Hewlett Packard GC instrument (Model 6890) equipped with a mass selective detector was used for the analyses. Data acquisition was performed in an HP1701AA ChemStation, Version A. The mass detector was operated in electron impact mode. A fused silica capillary column (Ultra 2 HP), 25 m × 0.2 mm id, consisting of cross-linked phenylmethylsilicone was used. The following 'cut off' values were adopted for the confirmatory techniques: 11-nor- Δ^9 -tetrahydrocannabinol-9-carboxylic acid 15 ng/ml; benzoylecgonine 150 ng/ml; and amphetamine/methamphetamine 200 ng/ml.

Results

The number of samples collected in each geographical region was in relation to both local dependence on the highway system and the social and economic status of the region: 71% (517) of the samples were collected in the southeast region, where the main roads of the country converge and which is by far the busiest and most important area in the country; 22% (161) in the northeast; and 7% (50) in the south.

The results of drug detection in the urine samples, as numbers and percentages in each region, are shown in Table 1. Other results are as follows: 41 samples (5.63% of the total) tested positive for the studied drugs. Frequency of positivity of the samples geographically were quite similar for the three regions: 6% in the south; 6% in the southeast; and 4.35% in the northeast.

Methamphetamine was not detected in any sample. The frequency at which the other drugs were encountered in positive samples was as follows. Amphetamine was present in 85.4% of positive samples, either as the only drug or in combination with cannabinoids (one sample). Cocaine was present in 4.9% of positive samples, either as the only drug or in association with cannabinoids (one sample). Cannabinoids were present in only 4.9% of positive samples.

Discussion

Seven hundred and twenty eight urine samples collected from truck drivers in three Brazilian geographical regions since 1996 were analyzed for cannabinoids, cocaine, amphetamine and methamphetamine in order to obtain a preliminary assessment of the use of such drugs in the transport workplace.

Distribution of the drugs in the samples showed variations related to the different regions. Cocaine use was restricted to the southeast region only, while cannabinoids were detected in samples from both the northeast and southeast regions. The use of amphetamine, a very popular drug world-wide among students, athletes and those working long hours, was spread over all three regions, despite it being an illicit drug in Brazil. The presence of amphetamine in all the positive samples was probably due to the use of the therapeutic drug fenproporex since amphetamine is one of its urine metabolites (Cody & Valtiers, 1996; Sznalwar, 1975). In fact, in 52.7% of analyses where amphetamine was detected fenproporex was also present.

It has been calculated that 60% of the world production of fenproporex was freely used as an anorectic and eventually as drug of abuse in Brazil (International

Table 1. Results of drug detection on truck drivers' urine samples presented as number (percent)

Origin	<i>n</i>	Anf	Met	Coc	Can	Assoc
Northeast	161	6 (3.72)	nd	nd	1 (0.6)	–
Southern	50	3 (6.00)	nd	nd	nd	–
Southeast	517	26 (5.02)	nd	2 (0.4)	1 (0.2)	2 (0.4)
Total	728	35 (4.8)	nd	2 (0.27)	2 (0.27)	2 (0.27)

Anf, amphetamine; Met, metamphetamine; Coc, cocaine; Can, cannabinoids; Assoc, multiple consumption of drugs (Can/Anf and Can/Coc); nd, not detected; *n*, number of samples by region.

Narcotic Control Board, 1998). It is not difficult to find some over-the-counter products labelled as 'natural' or 'herbal' appetite suppressors that contain synthetic substances like fenproporex.

Cannabis is not used as a performance-enhancing substance like amphetamine and cocaine. It is probably used as an anti-anxiety drug to reduce apprehension but it can affect psychomotor functions and can impair the user's ability to drive a motor car safely (Julien, 1995).

If we take into consideration the fact that the truck drivers selected to take part in this study were not suspected of driving under the influence of drugs, the results obtained can be considered alarming. The data collected in this study indicate the following user's profile: young males driving their own vehicle on a 10 to 14 hour journey in a medium-distance drive.

As a preliminary assessment this study confirms the necessity of continuing to collect baseline data for use in the future development of national drug policies.

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