Licit and Illicit Drugs among Danish Car Drivers

1 I. Behrensdorff and 2 A. Steentoft

1 Danish Transport Research Institute, Knuth-Winterfeldts Allé. Bygn. 116 Vest. DK-2800 Kgs. Lyngby, Denmark. 2 Institute of Forensic Medicine, Department of Forensic Chemistry, University of Copenhagen. Frederik V’s Vej 11. DK- 2100 Copenhagen Ø, Denmark.

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Abstract
This study illustrates the prevalence of licit and illicit drugs among 1000 randomly stopped Danish car drivers whom the police did not suspect to be under the influence of drugs. About 98% of the stopped drivers anonymously delivered a saliva sample and 66% returned a handed-out questionnaire. Confirming analyses revealed that 0.7% of the investigated saliva samples were positive for benzodiazepines and 1.3% for amphetamine, cannabis, cocaine or opiates. Questionnaire statements confirmed that some of the drivers indicate occasionally to drive despite a suspicion to be under the influence of illicit drugs (2.8%), illicit drugs including alcohol (4%), alcohol alone (24.5%) or potentially hazardous prescription drugs including alcohol (8.5%).

Introduction
A national review of international and Danish literature (1) demonstrated that both in Denmark and abroad only sparse or inadequate knowledge is available of the prevalence of drugged driving, and national statistics only inadequately report accidents involving drugged drivers. Two studies (2, 3) based on saliva samples have found that about one percent of the investigated German and Australian car drivers were positive for illicit drugs and three to four percent were positive for a licit drug. A Canadian roadside survey based on urine samples (4) found that 9.5% of the drivers were positive for a licit or illicit drug.

According to the Danish Road Traffic Act a person is not allowed to drive a motor vehicle if, due to illness, debility, strain, too little sleep or influence of drugs, he or she is incapable of driving properly. However, in Denmark the annual number of blood samples analysed for drugs other than alcohol has been very limited over the years (5). So the objective of this survey (6) was to provide some baseline data on the prevalence of licit and illicit drugs in the normal car driver population. The survey was conducted in 2000 in a mainly rural district far from the metropolitan area, with about 100,000 inhabitants.

Methods
Sample selection and procedure
The survey is based on collection of saliva samples from about 1000 randomly stopped drivers of cars and small vans to get a measure of the prevalence of benzodiazepines, amphetamine, cannabis, cocaine and opiates in the stopped drivers.
The survey included a questionnaire to get information from the stopped drivers on their use of medicinal drugs (prescription or non-prescription) and/or illicit drugs, partly within the last 24 hours, partly generally before driving. Besides drug consumption prior to driving, the questionnaire included questions on attitudes to police control of drivers’ use of potentially hazardous prescription and illicit drugs.

The police was in charge of collection of the saliva samples and currently sent them to the Department of Forensic Chemistry, University of Copenhagen, for analysis. The police had to follow an area-wise data collection plan adjusted for number of inhabitants and traffic volume in the study area. Otherwise, they had free hands to stop random drivers at convenient places during their daily patrols. All drivers participated voluntarily and anonymously, both in delivery of a saliva sample and filling-in of the questionnaire. Only drivers with a valid driving license, whom the police did not suspect to drive under the influence of drugs or alcohol, participated in the study.

The study design allowed matching of background data, saliva and questionnaire data by identical numbers on police registrations, saliva samples and questionnaire forms.

**Technical equipment and analytical methods**

The police used a RapiScan kit for saliva sample collection. At the Department of Forensic Chemistry, University of Copenhagen all collected samples were screened for benzodiazepines, amphetamine, cannabis, cocaine and opiates, i.e. those drugs included in the RapiScan screening system. After screening of some hundreds of the saliva samples by means of the RapiScan screening system it was obvious that the test was not reliable and reproducible. Therefore, the system was replaced by the Cozart ”Drugs of Abuse Microplate EIA” screening system that offered the same screening facility and range of drugs. It was assessed that neither of the two screening systems was able to detect all of the frequently used benzodiazepines on the Danish market.

Only samples that tested positive by the screening were subjected to further confirming analyses, such as gas chromatography-mass spectrometry (GC-MS) etc. The saliva samples were neither screened nor analysed for alcohol.

**Results**

Of the 980 stopped car drivers, 961 agreed to deliver a saliva sample, i.e. very few (1.9%) refusals/dropouts and a result very close to the target of 1000 samples.

**Screening and confirmed results**

Of the collected 961 samples, 896 had enough material for screening and, if positive, for subsequent GC-MS analysis. Screenings showed that 7.1% (64) of the 896 samples were positive for benzodiazepines, amphetamine, cannabis, cocaine or opiates. The 64 samples gave 69 findings: four were positive for both amphetamine and opiate, and one was positive for amphetamine, cannabis and opiate.

The confirming analyses showed that 2% (18) of the investigated samples were positive for licit or illicit drugs. Of these, 0.7% (6) were positive for benzodiazepines within the group of benzodiazepines that the screening instrument could test for. 1.3% (12) of the samples were positive for an illicit drug, such as amphetamine, cannabis, cocaine or opiates. Of these, the majority 0.8% (7) concerned cannabis. The screening and confirmed analysis results are illustrated in table 1.
Table 1. Screening and confirmed analysis findings of saliva samples (n=896)

<table>
<thead>
<tr>
<th>Methods</th>
<th>Amphetamine/ Metamphetamine</th>
<th>Cannabis (THC)</th>
<th>Cocaine</th>
<th>Opiates</th>
<th>Benzodiazepines</th>
<th>Total Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive/ Screening</td>
<td>14</td>
<td>21</td>
<td>2</td>
<td>24</td>
<td>8</td>
<td>69</td>
<td>7.1</td>
</tr>
<tr>
<td>Positive/ GC-MS etc.</td>
<td>1(1*)</td>
<td>7(1*)</td>
<td>1</td>
<td>3 (5*)</td>
<td>7(?)</td>
<td>18</td>
<td>2.0</td>
</tr>
</tbody>
</table>

* Not sufficient saliva for confirming analysis  
** ? = Trace of opiate, but below limit of quantification

Questionnaire results

The questionnaire results are based on statements from 636 (66%) of the drivers, who returned the questionnaire form. A total of about 6% (38) of the respondents have stated use of a licit or illicit drug within the last 24 hours, before they were stopped. 3% (19) stated use of a hypnotic, tranquilliser or analgesic drug, i.e. licit prescription drugs, which in Denmark are labelled with a red triangle or have a package insert that inform of a potentially “hazardous drug” in relation to road safety or machine handling. Most of these drivers (13) have stated daily use of their prescription drug.

2.8% (18) of the respondents have stated use of other types of prescription or non-prescription drugs, such as drugs against high blood pressure, stomach ulcer, etc., i.e. drugs that are not considered a hazard to road safety and not labelled with a red triangle. One driver stated use of cannabis within the last 24 hours. Table 2 illustrates respondents’ use of prescription drugs that may include benzodiazepines or other psychotropic substances, which may constitute a hazard to road safety, or prescription/non-prescription drugs, which are considered not to constitute a hazard to road safety within the last 24 hours.

Table 2. Respondents’ use of prescription “hazardous” or prescription/non-prescription “non-hazardous” or illicit drugs within the last 24 hours before they were stopped by the police for saliva collection (n=636).

<table>
<thead>
<tr>
<th>Type of drug</th>
<th>Number of statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescription, hazardous</td>
<td>19</td>
</tr>
<tr>
<td>Prescription/non-prescription, non hazardous</td>
<td>18</td>
</tr>
<tr>
<td>Illicit</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
</tr>
</tbody>
</table>

About half of the respondents have filled in four general questions concerning use of illicit drugs, illicit drugs including alcohol, potentially hazardous drugs including alcohol, or alcohol alone prior to motor vehicle driving. The following statements include answers from those drivers, who have ticked “yes” or “occasionally” to drive a motor vehicle despite a suspicion to be under the influence of licit or illicit drugs and/or alcohol. Some drivers have ticked affirmatively to more than one question:

- 2.8 % have stated occasionally to drive despite a suspicion to be under the influence of an illicit drug.
• 4% have stated occasionally to drive despite a suspicion to be under the influence of an illicit drug as well as alcohol.
• 8.5% have stated to drive a few hours after taking a potentially hazardous drug as well as alcohol.
• 24.5% have stated occasionally to drive despite a suspicion to be above the legal BAC limit of 0.5 percent.

**Police control of licit and illicit drugs**
The attitude among the respondents is clear: The vast majority strongly supports control of drugged driving. On average 96% of the respondents are of the opinion that the police should control drivers for use of potentially hazardous drugs, and 98% favour controls of illicit drugs. Among respondents, who have *not* taken prescription or illicit drugs within the last 24 hours, there is a stronger support to future police control of potentially hazardous drugs (93%) than among respondents, who *have* taken such drugs within the last 24 hours (85%) (p < 0.05). Both groups seem to support illicit drug controls almost to the same degree (94% and 90%, respectively). However, the number of respondents in the two groups is very uneven, as the “drug user group” is very small. Therefore, a comparison of the two groups is not reliable or meaningful.

Generally, the drivers who have filled in the questionnaire are of the opinion that the police should control for drugged driving, and saliva testing is a method that the police could use in future controls of licit as well as illicit drugs. This opinion is shared by 96% of the respondents. The result should be considered on the fact that all these respondents have had the experience of delivering a saliva sample at the roadside and apparently do not consider this method too embarrassing. The respondents’ attitudes to controls of drugged driving are illustrated in figure 1.

![Figure 1](image_url)

Figure 1. Respondents’ attitudes to future police controls of drugged driving, i.e. control of drivers for potentially hazardous prescription drugs and illicit drugs by use of saliva testing.
Characteristics of drivers who drive after use of a prescription or illicit drug

Matching of police registrations, forensic and questionnaire results has made it possible to throw light upon sex and age of those drivers whose saliva sample proved positive, or who have stated to drive despite a suspicion to be under the influence of a potentially hazardous (prescription drug) or illicit drug.

Taking all data into account, driving under the influence of an illicit drug or an illicit drug including alcohol seems in this study to be associated to especially men, aged 22-44 years. It should be born in mind that the forensic analyses did not include testing for alcohol. Driving under the influence of a potentially hazardous prescription drug seems in this study to be associated to middle aged or elderly drivers, both men and women.

Discussion

The prevalence of benzodiazepines, amphetamine, cannabis, cocaine and opiates has been investigated in a Danish rural area with a population of 100,000 inhabitants by collection of saliva samples from about 1000 randomly stopped anonymous drivers of cars and small vans. Only drivers, whom the police did not suspect to be under the influence of drugs (licit, illicit or alcohol) were included in the study.

Confirmed analyses revealed that 0.7% of investigated saliva samples were positive for benzodiazepines and 1.3% for amphetamine, cannabis, cocaine or opiates. Of this cannabis accounted for 0.8%. Internationally, only little research is available on the effect of a certain amount of drug found in saliva. Therefore, it is difficult to assess the significance of the analysis results in relation to practical vehicle handling and to the ability of the drug positives to safely drive a vehicle at the time, when the police collected the sample. A conservative estimate is that half of these drivers were impaired to a degree that might have been of importance in relation to road safety.

The results suggest that the prevalence of illicit drugs among Danish car drivers be of the same amount as in similar studies in Australia and Germany. Benzodiazepines seem of a lower amount, which may be attributed to the used screening methods, which did not include all the frequently used benzodiazepines in Denmark.

In addition to delivery of a saliva sample, 66% of the drivers participated in a questionnaire. The response rate suggests a wide support to the survey and great interest in the issue: licit and illicit drugs in traffic. Among others this is reflected in the questionnaire results, where 96% of the respondents state that in future the police should control drivers for potentially hazardous prescription and illicit drugs, and saliva testing is an acceptable method.

It is not possible to assess a potential effect of the dropouts on the overall result. Although the number of refusals/dropouts were very small (1.9% of the stopped drivers), even a few more drug-positives among those drivers, who did not deliver a saliva sample, might have influenced the final forensic result.

The participating drivers are considered representative as regards age, sex and amount of traffic compared with available data from national travel surveys. Therefore, the results are considered reliable and valid for the study area. The study area is a mainly rural district far from the metropolitan area, and as international studies have shown larger drug consumption in major cities than in provincial or rural areas, the results may not reflect national conditions.
Questionnaire statements from some of the drivers confirm that occasionally some of these drive despite a suspicion to be under the influence of an illicit drug (2.8 %), an illicit drug including alcohol (4%), or a potentially hazardous prescription drug including alcohol (8.5%), or alcohol alone above the legal limit (24.5%).

This indicates that alcohol is still the major drug among the driving population. However, it may be concluded that potentially hazardous prescription and illicit drugs - just like alcohol - may be found among randomly stopped Danish drivers. This points at the need of various initiatives to prevent driving under the influence of prescription and illicit drugs, and at the same time keep up prevention efforts against drinking and driving.

References


