

Drugs Driving in Ireland — Preliminary Study of the Prevalence of Driving under the Influence of Drugs on Irish Roads

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Introduction

Driving under the influence of alcohol on Irish roads is well publicised. In 1999, of the 8,476 sampler submitted by the Gardai to the Medical Bureau of Road safety for alcohol analysis, 92 per cent were over the legal alcohol limit.

Driving under the influence of drugs has been illegal under statute in Ireland since the 1961 Road Traffic Act. An initial survey was carried out in the Medical Bureau of Road Safety between 1987 and 1991 to investigate driving under the influence of drugs on Irish roads. One thousand urine samples under the legal alcohol limit and 1,000 random samples were tested for the presence of cannabis, benzodiazepines and opiates. Screening results (using an EMIT system) showed 14.6 per cent of samples under the legal alcohol limit and 66 per cent of the random samples to contain drugs.

More recently, the European Monitoring Centre for Drugs and Drug Addiction (HMCDDA) has earned out extensive research into the role that drug use plays in impaired driving and traffic accidents in EU Member States. It is also responsible for identifying trends in driving under the influence of drugs across Europe.

To determine current trends in driving under the influence of drugs in Ireland, a survey earned out during 2000 and 2001 will investigate the presence of amphetamines, benzodiazepines, cannabis, cocaine, opiates and methadone in blood and urine samples taken by the Gardai under the Road Traffic Act 1994. As with the previous Study, 1,000 of these samples will be randomly selected and 1,000 will be under the legal alcohol limit for driving. The results of a preliminary study of 338 samples, showing current trends, will be presented here.

Principles of Enzyme Immunoassay (EIA)

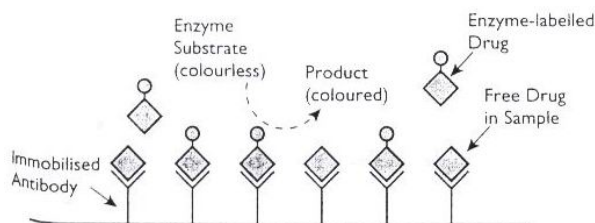


Figure 1: Principles of EIA.

Microplate Enzyme Immunoassay kits are used to screen for the following drugs:

| Kit | Analyte |
|------------------|---|
| Amphetamine: | Amphetamine, Methylenedioxyamphetamine (MDA) |
| Methamphetamine: | Methylenedioxymethamphetamine (MDMA) |
| Benzodiazepines: | Diazepam, Flunitrazepam, Flurazepam, Nitrazepam, Nordiazepam, Temazepam |
| Cannabis: | 11-nor-delta-delta-9-carboxy-Tetrahydrocannabinol |
| Cocaine: | Cocaine, Benzoyllecgonine, Ecgonine Methyl Ester |
| Opiates: | Codeine, Dihydrocodeine, Morphine, 6-MAM |
| Methadone: | Methadone, EDDP |

Materials

Cozart 96 well Blood/Serum EIA kits for Amphetamine, Methamphetamine, Benzodiazepines, Cannabinoids, Cocaine, Opiates und Methadone (Cozart Bioscience Ltd., UK). High and Low Blood Controls for proficiency testing (Cozart Bioscience Ltd.)
 Gilson 25µl Microman pipette (AGO Scientific Ltd.)
 Finnpiptette Multistepper (Brownes)
 Hamilton Microlab 500 series diluter.
 MRW automatic plate washer (Shaw Scientific Ltd.)
 Dynex MRX₁₁ Plate Reader (Shaw Scientific Ltd.)
 Revelation Software.

Procedure (Fig. 1)

- *Sample preparation* consisted of a one-in-five dilution with water. Blanks and controls were also diluted in the same way.
- *Control blood samples* were tested with each kit. Two levels of control were used: a low control with a concentration at the kit cut-off level and a high control. Controls had been spiked with the calibrator drug for the seven kits.
- A standard curve, blank blood, blank urine and high and low-level controls were tested with each batch of samples.
- The procedure provided with each kit was followed, and absorbance was read at 450 nm.
- A 10 per cent coefficient of variation was allowed for standard solutions and 20 per cent for controls and samples

RESULTS AND DISCUSSION

All samples submitted to the Medical Bureau of Road Safety between July 1, 1999 and December 31, 1999 that were under the legal limit for alcohol were tested for the

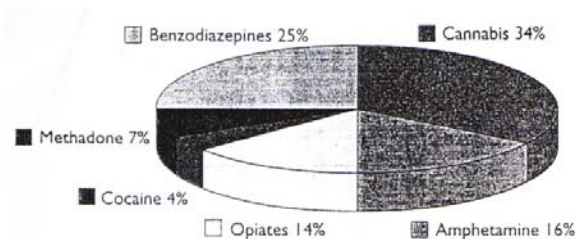


Figure 2: 37% of samples under the legal alcohol limit tested positive for drugs.

presence of drugs. In total, 338 samples were tested, 57 per cent of which were blood and 43 per cent urine. As it is the driver's choice which sample to give, the testing system had to allow for testing of both blood and urine. The traditionally used EMIT system was developed for urine testing and therefore lengthy extraction procedures are necessary for blood analysis. The Cozart Enzyme Immunoassay system is calibrated using serum standards but is readily adaptable for the analysis of urine in addition to blood, as drug concentration levels in urine are much higher than in blood. A simple dilution with water is all the preparation that is necessary.

Thirty-seven per cent of the samples tested were positive for drugs, the classification of which is represented in Figure 2. Cannabis was found most frequently followed by benzodiazepines. Cocaine was the least common, occurring in only four per cent of samples.

The occurrence of polydrug use was frequent. Results shown in Figure 3 indicate that 45 per cent of samples tested contained two or more types of drugs, with three per cent of samples containing five types of drugs.

Drugs and Alcohol

The interaction between alcohol and drugs can greatly enhance the impairment of a driver, e.g. a combination of alcohol and cocaine forms Cocaethylene, which itself is pharmacologically active. For this reason it is important to identify trends in driving under the influence of a combination of drugs and alcohol. Analysis of the results to date indicates that in the majority of samples where drugs are detected some

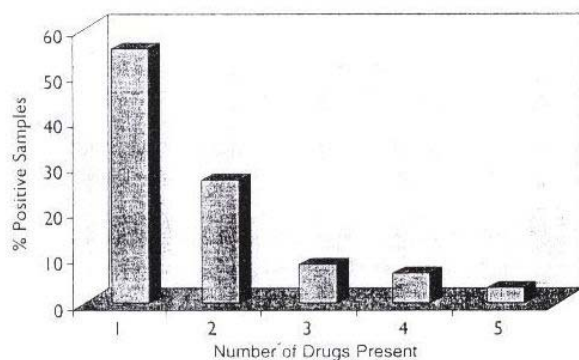


Figure 3: Prevalence of polydrug use in positive samples.

alcohol is present also. Although all the samples tested for drugs were under the legal alcohol limit, only 22 per cent of the samples contained no alcohol at all. In the majority of these samples, the incidence of polydrug use was very high. The frequency of the combination of alcohol and drugs are in Table 1.

Table 1: Combination of Drugs and Alcohol.

| Analytical Alcohol Level | Percentage of Positive Samples |
|---------------------------|--------------------------------|
| 0 – 10 mg/100ml blood | 22% |
| 0 – 10 mg/100ml urine | |
| 11 – 69 mg/100ml blood; | 48% |
| 11 – 99 mg/100ml urine | |
| 70 – 86 mg/100ml blood; I | 30% |
| 100 – 114 mg/100ml urine | |

Confirmatory Analysis

The results presented so far are based on screening tests that are used to identify particular classes of drugs present in a sample. Immunoassay screens often read higher concentrations due to the kit cross reacting with a variety of metabolites in a sample. Confirmatory analysis detects specific analyses. Screening results are also affected by the sample matrix, which is reduced in confirmatory analysis through extensive sample clean-up. It also eliminates false positives, in addition to aiding the interpretation of results

For these reasons, confirmatory analysis is necessary to identify and quantify drugs present in samples. All confirmatory analysis was carried out by the Toxicology Section of the State Laboratory. Confirmation of amphetamines, cannabis, cocaine and opiates was by Gas Chromatography with Mass Spectrometric detection (GC/MS) using a Finnegan Magnum ion-trap instrument run in Electron Ionisation mode.

Benzodiazepine and methadone confirmation was carried out by Dual-Column Gas Chromatography with Nitrogen-Phosphorus Detector.

Confirmatory Analysis - Results to Date

Amphetamines: 20 samples confirmed. 19 contained MDMA. Three samples contained amphetamine.

Benzodiazepines; 18 samples confirmed. Of these, eight did not contain any benzodiazepine tested for by the State Laboratory Further investigations into other possible benzodiazepines are being carried out. Diazepam occurred most frequently, present in nine of the positive samples.

Cannabinoids: Confirmatory analysis was carried out on 16 samples. The three that were found to be negative gave a screening result close to the kit cut-off of 10 ng/ml.

Cocaine: Only four samples screened positive for cocaine. The two samples that screened near the kit cut-off were confirmed to be negative. Cocaine was confirmed to be present in the remaining two samples.

Opiates: GC/MS analysis was carried out on eight samples. Two contained 6-monoacetylmorphine, the main heroin metabolite. Codeine only was present in one sample, which is present in over-the-counter painkillers.

Methadone: Confirmed present in all nine samples analysed for methadone.

Conclusions

The results presented here indicate that there has been a significant increase in driving under the influence of drugs in Irish roads since 1987, when 14.6 per cent of samples (under the legal alcohol limit) tested were found positive for drugs. This preliminary study has found that the percentage has risen to approximately 37 per cent.

The extensive survey being carried out in 2000/2001 will identify true trends in the types of drugs being taken, their combination with alcohol, and the extent of polydrug use.

This work also highlights the importance of confirmatory analysis in the interpretation of drug screening results.

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