



## Review

# The prevalence of alcohol and psychotropic drugs in fatalities of road-traffic accidents in Jordan during 2008–2014



Imad M. AL-Abdallat<sup>a, \*</sup>, Rayyan Al Ali<sup>b</sup>, Arwa A. Hudaib<sup>c</sup>, Ghada A.M. Salameh<sup>c</sup>, Rakiz J.M. Salameh<sup>c</sup>, Ahmed K.F. Idhair<sup>c</sup>

<sup>a</sup> Faculty of Medicine, Department of Pathology and Microbiology and Forensic Medicine, The University of Jordan, Jordan University Hospital, Amman, Jordan

<sup>b</sup> An-Najah National University, Nablus, Palestine

<sup>c</sup> The University of Jordan, Amman, Jordan

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## ABSTRACT

**Objective:** Several studies confirmed alcohol and psychotropic drug consumption as important risk factors underlying fatal accidents. This paper presents updated toxicological findings in the fatalities of road traffic accidents of Amman district, in order to have an overall picture of the occurrence of these substances in these victims in Jordan.

**Method:** Over a seven-year period (2008–2014), 2743, autopsies were conducted at Jordan University Hospital in which the sum of  $n = 311$  (11.38%) were victims of road traffic accidents. Blood samples from these victims were collected. Toxicology screening for psychotropic drugs and alcohol was conducted on these samples, and the results were analyzed according to age, sex and victim's status.

**Results:** This study revealed that Alcohol and psychotropic drugs were positive in 36.5% ( $n = 58$ ) of the cases, and for alcohol alone ( $n = 13$ , 37.1%). The majority of the victims were pedestrians ( $n = 155$ , 49.8%). Additionally, 29.6% ( $n = 92$ ) of the cases were of ages 19–29. Detected psychotropic drugs were benzodiazepines, barbiturates. None of the collected specimens were positive for illicit cocaine, amphetamines or cannabis.

**Conclusions:** The results from this study proved the existence of alcohol and psychotropic drugs in the victims of road traffic accidents; Indicating an association between the uses of these substances in accident involvement. Though having some limitations, other conclusions require further data collection, cooperation with related parties in Jordan, and utilizing simple extended toxicological screens.

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## 1. Introduction

Jordan road traffic accidents (RTA) reveal publicly a major health and an alarming problem. It was considered as the second-leading cause of death and the responsible for killing of 1552 Jordanian, during the years 2014 and 2013.<sup>1</sup> The attributes of RTA and safety impact of policy measures undertaken in Jordan were earlier reported.<sup>2</sup> The role of alcohol and illicit drugs in driver's impairment as well as to road safety has been a cause of concern and a prominent problem worldwide for a long time ago, knowing that druged driving not only puts the driver at risk but also passengers and

others who share the road. There has been a link between druged driving and the increased accident risks owing to their effects on the central nervous system, impairments vary between Alcohol and different types of illicit drugs. Alcohol, for instance, decreases significantly the driving skills and capabilities due to the influence on concentration, alertness and the reflexes of individuals, including drivers, pedestrians and vehicle passengers.<sup>3,4</sup>

Robust evidence of prevalence studies from different countries showed that higher rates of RTA primarily linked to Alcohol and illicit drugs or medications. In South Africa and Slovenia, Alcohol was the determining factor for 58% and 42.4% pedestrian's fatalities during the period of 2001–2004 and 1999–2006, respectively.<sup>5,6</sup> In the United States of America, alcohol-related motor vehicle crashes killed approximately 17,000 annually.<sup>7</sup> The prevalence of alcohol and drugs in fatally injured drivers was described in Ontario/Canada for the period of 2001–2005; the study showed that 90.9% of the drivers had alcohol above the legal limit for drinking and

\* Corresponding author.

E-mail addresses: [imadabdallat@yahoo.com](mailto:imadabdallat@yahoo.com) (I.M. AL-Abdallat), [rayyanali74@hotmail.com](mailto:rayyanali74@hotmail.com) (R. Al Ali), [arwahudieb@gmail.com](mailto:arwahudieb@gmail.com) (A.A. Hudaib), [gsalameh97@gmail.com](mailto:gsalameh97@gmail.com) (G.A.M. Salameh), [rakez83@yahoo.com](mailto:rakez83@yahoo.com) (R.J.M. Salameh), [ahmedkameidhair@gmail.com](mailto:ahmedkameidhair@gmail.com) (A.K.F. Idhair).

driving ( $\geq 80$  mg/dl in blood), while, 80.9% of the drivers had drugs of abuse in their systems like ( $\Delta 9$ -tetrahydrocannabinol, benzoyllecgonine/cocaine, morphine).<sup>8</sup> Recent roadside studies in 13 European countries revealed that alcohol was the most prevalent (3.48%) among drivers, followed by illicit drugs (1.9%, with cannabis most frequently detected), and medicinal drugs (1.36%).<sup>9</sup>

In Sweden, samples of 895 victims involved in fatal accidents were analyzed for alcohol and drugs. In 21% of fatalities, blood-alcohol concentration (BAC) was above the statutory limit of driving (0.2 g/L), but the median BAC was appreciably higher (1.72 g/L). Approximately 7% of the victims had illicit drugs (mainly amphetamine and cannabis), either alone (2.5%), together with alcohol (1.8%) or with a prescription drug (2%) in their blood. However, in 7.6% of crash victim's psychotropic prescription drugs identified, were mainly benzodiazepines, Z-hypnotics and tramadol.<sup>10</sup> The literature showed that there are few reports addressing poisoning with alcohol and drugs in medico-legal and postmortem cases in Jordan.<sup>11–15</sup> In spite of, the seriousness of RTA impact on individual's health and economy, there were no documented reports relating the role of alcohol or drug involvement in RTA in Jordan.

This prospective study is an attempt to evaluate the status of alcohol and psychotropic drugs in fatalities involved in RTA over a seven-year period (2008–2014) from the northern district of Amman. Therefore, comprehensive screening was conducted to blood, urine and vitreous specimens that were obtained at autopsy from RTA victims during that period.

## 2. Methods

### 2.1. Study population

A sum of 2743 Medico-legally-related deaths, including RTA deaths ( $n = 311$ ) from the period 2008–2014, within the north of Amman which is customary referred to Jordan University Hospital (JUH) included within this study. Biological samples of these victims collected, and toxicological analysis was conducted for them at the toxicology laboratory at JUH for this study. Data containing the toxicological results were compiled according to age, sex and the type of RTA involvement victims.

### 2.2. Alcohol and toxicology screen

Blood samples were obtained from a femoral vein into tubes containing sodium fluoride as preservative (1–2%, v/v) for alcohol level determination. Urine was utilized for initial drug screen and vitreous humor for verification of alcohol level. Alcohol determination was performed by a gas chromatography/flame ionization detector.<sup>14</sup> Toxicology screen for psychoactive drugs was performed by gas chromatography/mass spectrometry.<sup>15</sup>

## 3. Results

Twenty-four hours from car crashes RTA victims were brought to JUH. Victims included motor vehicle drivers, pedestrians and vehicle passengers. As requested from the prosecutor's office, forensic practitioner conducted the autopsies. Accordingly, collected a sum of samples from the 311 autopsies and submitted them for analysis at JUH laboratory.

As reflected from the distributions of RTA fatalities in Table 1, the majority of the victims were pedestrians ( $n = 155$ , 49.8%), others were drivers and passengers ( $n = 68$ , 21.9%), ( $n = 80$ , 25.7%), respectively. However, depending on the available data within the mortuary, the status of other RTA fatalities ( $n = 8$ , 2.6%) was not evident. Moreover, the young-active age group (19–29) accounted

**Table 1**  
RTA category depending on victim's status.

| RTA category | N (%)      |
|--------------|------------|
| Drivers      | 68 (21.9)  |
| Pedestrian   | 155 (49.8) |
| Passengers   | 80 (25.7)  |
| Unknown      | 8 (2.6)    |

**Table 2**  
Age distribution of victims.

| Age group (year) | N (%)      |
|------------------|------------|
| $\leq 18$        | 70 (22.5%) |
| 19–29            | 92 (29.6%) |
| 30–39            | 41 (13.2%) |
| 40–49            | 35 (11.3%) |
| 50–59            | 22 (7.1%)  |
| $\geq 60$        | 51 (16.4%) |

for the majority of fatalities ( $n = 92$ , 29.6%), then the age group ( $\leq 18$ ) ( $n = 70$ , 22.5%), the elderly ( $\geq 60$ ) ( $n = 51$ , 16.4) and at last the age group (30–39) ( $n = 41$ , 13.2%) as shown in Table 2.

In Table 3. The proportion of men exceeded that of women, 257 (82.6%) of the victims were males and 54 (17.4%) were females.

According to the subsequent toxicological analysis of biological samples obtained from the victims, 36.5% ( $n = 58$ ) confirmed presence of drug and/or alcohol, and was relatively the highest among Pedestrians ( $n = 25$ , 43.1%). Positive results were alcohol alone, psychotropic drugs, and combined drugs and alcohol to give an overall idea for the prevalence of these substances within specimens obtained from RTA victims, Table 4. Alcohol existed in 37.1% in both drivers and Pedestrians. The detected psychotropic drugs as presented in Fig. 1, including barbiturates, benzodiazepine, Paracetamol and all other drugs which contain Non-sedative-hypnotics, mainly antipsychotic, anticonvulsants, caffeine, antihistamines. However, none of the samples contained illicit amphetamines, cocaine or cannabis.

A total of 32.8% of RTA driver victims had positive alcohol and for psychotropic drugs. 43.1% of Pedestrians showed positive for alcohol and psychotropic drugs. 22.4% of pedestrians RTA victims were positive for psychotropic drug (with and without alcohol). Alcohol only was the most common finding in all RTA victim categories. For all RTA victims the psychotropic drugs detected were barbiturates (Phenobarbital), and benzodiazepines (diazepam, nordiazepam, chlordiazepoxide and carbamazepine with concentration found 1.3  $\mu\text{g}/\text{mg}$  blood). Other drugs (mainly, Phenytoin an anticonvulsant) alone (average concentration found range from 0.5 mcg/ml – 13 mcg/ml) or combined with benzodiazepines or atracurium (0.77 mcg/ml) were the main psychotropic drugs positive in RTA driver victims, followed by barbiturates.

## 4. Discussion

Traffic accidents in Jordan decreased from 768 in 2013 to 688 in 2014, and accordingly the resulting casualties showed a reduction in the severity rates from 0.37 to 0.13 (casualty/accident) during the same period.<sup>1</sup>

**Table 3**  
Gender of victims killed in traffic crashes.

| Gender | N (%)       |
|--------|-------------|
| Male   | 257 (82.6%) |
| Female | 54 (17.4%)  |

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