

Alcohol and Psychoactive Drugs in Road Traffic Fatalities within Northern District of Amman

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Abstract

Objective: Several studies have demonstrated that alcohol and psychoactive drugs consumption are important risk factors underlying fatal accidents. This paper presents a prospective and a pilot study for toxicological findings in road traffic accident fatality victims within the northern district of Amman in order to have an overall picture of the occurrence of these substances in the victims in Jordan.

Method: Over a two-year period (2004-2005), 400 autopsies were conducted at Jordan University Hospital in which 94 (23.5%) were road traffic accident fatality victims. Biological specimens from these victims were collected. Toxicology screens for psychoactive drugs and alcohol were conducted on these specimens and the results were analyzed according to age, sex, and victim's status.

Results: The data showed that ethanol and psychoactive drugs were positive in 72.3%, n = 68 and for ethanol alone 23.4%, n = 22. The majority of victims were the driver (n = 29) and the highest percentage of positive findings occurred among them (20.2%, n=19). Males in the age group 19-29 were mostly involved (35.7%). Detected psychoactive drugs were benzodiazepines, opioids, barbiturates and anti-depressants. None of the collected specimens were positive for illicit cocaine, amphetamines, or cannabis.

Conclusions: The results of this study documented the presence of alcohol and psychoactive drugs in road traffic accident victims which could have some association between the uses of these substances and the accident involvement. However, due to some limitations, conclusions require further data collections, cooperation with related parties in Jordan, and utilizing simple and extended toxicological screens.

Keywords: RTA, Alcohol, Psychoactive drugs, Jordan, Fatality.

(J Med J 2013; Vol. 47 (1):66- 72)

Received

April 5, 2012

Accepted

May 29, 2012

Introduction

Road traffic accidents (RTA) constitute a major health and alarming problem in Jordan. They are considered the second leading cause of death and were responsible for more than 1,600 Jordanian

people killed in RTA during the years of 2004 and 2005.¹ The characteristics of RTA and the safety impact of policy measures undertaken in Jordan were earlier reported.²

It is well known that an important contributing

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factor to RTA is the use of alcohol and/or illicit drugs or medication on the behavior of people particularly during driving. Alcohol use significantly decreases driving safety due to its influence on the concentration, alertness and reflexes of an individual including drivers, pedestrians and vehicle passengers that increase the possibilities of their involvement in RTA.^{3,4}

Many publications from different countries stress on this issue. Alcohol was the important factor in the fatality of 58% and 42.4% of the pedestrians in South African and Slovenia during the period of 2001-2004 and 1999-2006, respectively.^{5,6} In the USA, alcohol related motor vehicle crashes has killed approximately 17,000 annually.⁷ The prevalence of alcohol and drugs in fatally injured drivers were described in a study in Ontario, Canada for the period of 2001-2005, which showed that alcohol above the legal limit of drinking and driving (≥ 80 mg/dl in blood) was present in 90.9% of the drivers, while drugs of abuse or drugs (Δ^9 -tetrahydrocannabinol, benzoylecgonine/cocaine, morphine, etc.) were present in 80.9% of the drivers.⁸ A study conducted on 1,047 fatally injured victims in the UK showed the widespread use of alcohol and drugs. Alcohol was detected in 68% of all victims, and the blood alcohol concentration was higher than the legal driving limit in over 60% of the victims. Illegal drugs were detected in 85% of the cases. Cannabinoids were found to be the most commonly detected drug.⁹ In Sweden, samples from 1,403 drivers involved in fatal accidents were analyzed for alcohol and drugs.¹⁰ The toxicological analyses revealed that alcohol above the legal limit for driving (> 0.2 g/L) was detected in 22% of the drivers, while drugs were found to be present in 253 cases (19%). Both licit and illicit drugs were detected in 28 cases (2%). Amphetamine was the most common illicit drug identified.¹⁰ The prevalence of cannabinoids, opiates, cocaine metabolites and amphetamines in blood samples from drivers killed in road accidents in France showed that cannabinoids were found in 39.6% of the total number of samples.¹¹ Delta 9-tetrahydrocannabinol (THC) was detected in the blood of 28.9% drivers and was the single drug of abuse in 80.2% of the positive cases.

It was associated with amphetamines in 7.4% and with opiates and cocaine in 1.9% and 4.8%, respectively. Amphetamines were present in 3.1% of the total number of samples, cocaine metabolites in 3%, and opiates in 3.5%.¹²

A much higher incidence of drug and/or alcohol in all fatalities were found in Thailand where alcohol use was found in 63.6% of cases. Drugs most commonly encountered were opiates (13.5%) and amphetamine (6%), together with a variety of benzodiazepine prescription medications. The prevalence of multiple drug use was shown only in 3% of all cases.¹¹

The literature showed that there are few reports addressing poisoning with alcohol and drugs in medico-legal and postmortem cases in Jordan.¹³⁻¹⁶ There were no documented reports relating to the role of alcohol or drug intake in RTA involvement in Jordan, in spite of the seriousness of RTA impact on individual health and the economy.

This prospective study is an attempt to evaluate the status of alcohol and psychoactive drugs in the fatalities involved in RTA over a two-year period (2004-2005) from the northern district of Amman. Comprehensive psychoactive drug and alcohol screens were conducted to blood, urine and vitreous specimens that were obtained at autopsy from RTA victims during that period.

Methods

Study Population

Jordan's population was 5,473,000 during 2005. The traffic institute in Jordan reported that more than 150,000 traffic accidents occurred during the years 2004 and 2005 with nearly 34,000 persons requiring medical care for road accident related injuries during this period. Fatality victims involved with RTA over this period in Jordan were 1,608 individuals,¹ and only 94 of them (5.84%) were autopsied at Jordan University Hospital (JUH) and accounted for 23.5% of the total autopsies that were conducted at JUH over that period. Usually medico-legally related deaths including RTA deaths, within the north of

Amman are referred to JUH. Biological samples of these victims were collected and toxicological analysis was conducted on them at the toxicology laboratory at JUH for the purpose of this study. Data containing the toxicological results were compiled according to age, sex, and the type of RTA involvement of the victims.

Alcohol and Toxicology Screen

Blood samples were obtaining from a femoral vein into tubes containing sodium fluoride as a preservative (1-2%, v/v) for alcohol level determination. Urine was utilized for an initial drug screen and vitreous humor for verification of the alcohol level. Alcohol determination was performed by a gas chromatography/flame ionization detector.¹⁴ A toxicology screen for psychoactive drugs was performed by a gas chromatography/mass spectrometry.¹⁷

Results

Samples were collected from 94 autopsies for the RTA victims and were submitted to the toxicology laboratory during the study period. The RTA victims included motor vehicle drivers, pedestrians and vehicle passengers who were in RTA and were brought to JUH within 24 hrs after a crash and autopsies were requested by the procurator fiscal.

The age distributions of the RTA fatalities are shown in table (1). The majority of victims were drivers (n = 29, 30.9%) followed by pedestrians (n = 23, 24.4%), and vehicle passengers (n = 19, 20.2%) where the status of other RTA fatalities (n = 23, 24.4%) could not be determined by the available data within the mortuary. The young age group (19-29) accounted for the majority of driver fatalities (n = 15, 51.2%), where the majority of them (96.5%) were males. This was followed by the next age group of (30-39) (n = 6, 20.1%). Pedestrian RTA fatalities were the commonest (n = 10, 43.5%) in the elderly (≥ 60) and followed by the young age group (≤ 18), (n = 6, 26.1%).

Table (1): Age distribution among RTA fatalities victims.

RTA victims (n, %)	Age ^a						Gender	
	≤ 18	19-29	30-39	40-49	50-59	≥ 60	Male (%)	Female (%)
Drivers (n = 29, 30.9)	0	15	6	5	2	1	n = 28, 96.5	n = 1, 3.5
Pedestrian (n = 23, 24.4)	6	3	2	1	1	10	n = 20, 86.9	n = 3, 13.1
Passengers (n = 19, 20.2)	1	13	3	0	1	1	n = 13, 68.4	n = 6, 31.6
Unknown (n = 23, 24.4)	2	6	5	2	3	5	n = 20, 86.9	n = 3, 13.1

The toxicology screen results that were conducted on the biological samples of the RTA victims (table 2) showed that positive results for drug and/or alcohol were 72.3%, (n = 68), and relatively highest among them were driver victims (n = 19, 20.2%). The positive results were generally categorized as alcohol, psychoactive drugs, and combined psychoactive drugs and alcohol to give an overall idea about status of the presence of psychoactive substances within specimens obtained from RTA victims (shown in figure 1). Alcohol was positive in 3% of drivers or passengers. Multiple drug findings were positive in about 3% of all RTA victims. A diagram showing the groups of these positive psychoactive drugs is presented in figure 2; they

included opioids, barbiturates, benzodiazepine and antidepressants. No positive results were found for illicit amphetamines, cocaine or cannabis.

RTA Category	Positive Toxicological Screen (n, %)
Drivers	n = 19, 20.2
Pedestrians	n = 16, 17.0
Vehicle passengers	n = 18, 19.1
Unknown	n = 15, 16.0

RTA driver victims were positive for only psychoactive drugs in 17%, for alcohol only in 1%, and for psychoactive drugs and alcohol in 2%.

A total of 3% of RTA driver victims had positive results for alcohol and 19% had positive results for drugs. Similar results were found for vehicle passenger victims with 3% positive for alcohol and 18% positive for psychoactive drugs. Fifteen percent of pedestrian RTA victims were positive for psychoactive drugs (with and without alcohol). Drugs only were the most common finding in all RTA victim categories.

For all RTA victims, the psychoactive drugs detected were opioids, barbiturates, benzodiazepines, and anti-depressants. Opioids were the main psychoactive drug positive in RTA driver victims (3.2%, n = 3), followed by benzodiazepines and anti-depressants, while barbiturates were of high frequency in car passengers (3.2%, n = 3) as shown in figure 2. Multiple psychoactive drug use was positive in 3.2% (n = 3).

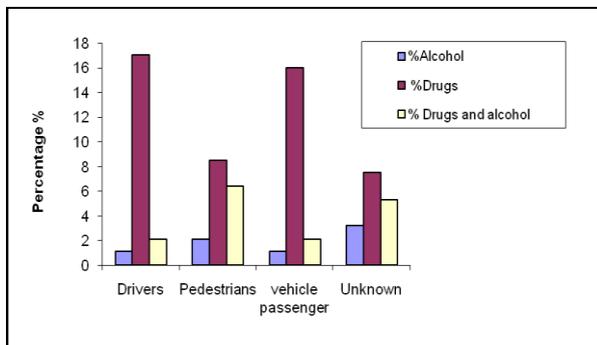


Figure (1): Psychoactive drugs and alcohol in RTA victims.

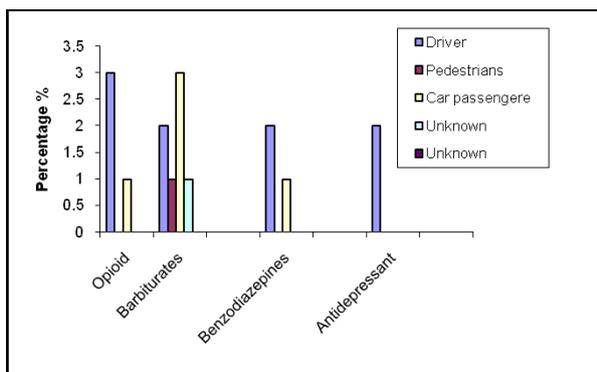


Figure (2): Psychoactive drugs detected in RTA victims.

Discussion

Jordan faces a serious and alarming traffic accident problem compared with developed and a number of developing countries. Jordan has experienced excessive human and economic losses as well as social and emotional impacts as a result of this problem.² Traffic accidents are a complex phenomenon. They are caused by a multitude of factors, including roadways and their environment, road users' behavior, and vehicle aspects.^{1,18} While the first single cause of accidents in Jordan is carelessness, aggressive driving behavior is believed to be the major contributory factor in traffic accidents. Alcohol and psychoactive drugs can alter perception and behaviors of those that consume them.¹⁹⁻²¹ This pilot study is an attempt to evaluate the role of alcohol and psychoactive drugs on fatalities involved in RTA.

Autopsies are usually conducted on the majority of RTA victims as a routine practice to establish the cause of death and biological samples are occasionally collected depending on the forensic pathologist suspicions for further investigation that might reflect sampling bias.¹⁶ For that purpose, the samples are routinely submitted to the Forensic Laboratory of the Public Security Directorate. The main strength of this study was the comprehensive screen for a relatively small number of autopsied RTA victims that were investigated during the two-year period of study, where they accounted for 23.5% of those autopsies that were performed at JUH over this period.

The results of this study documented the presence of alcohol and psychoactive drugs in RTA victims that could have some association between the uses of these substances in RTA. Alcohol and drugs were responsible for 60 deaths (0.98%) of all postmortems (n = 6,109) that were performed at JUH during 18 years (1978-1996); all alcohol deaths (30) occurred in males.¹⁶ Another study showed that alcohol was positive in 9.1%, 9.6%, 12.4%, and 13.6% of medico-legal cases seen at JUH emergency department, including vehicle passengers, pedestrians, victims of violence and vehicle drivers respectively,¹⁴

where 65% of them were referred to the emergency room by police. The alcohol and psychoactive drugs impair intellectual functions, judgment, and normal reflexes, so people under their influence might be reflected in several medico-legal problems including RTA.⁸⁻¹¹ These facts could also be observed in the results of this study. Toxicology results of RTA victims were positive for ethanol and psychoactive drugs (72.3%) and also positive for ethanol alone (23.4%). It looks that young drivers of ages less than 29 years and elderly of over 60 years are more commonly vulnerable to RTA involvement. The majority of victims were drivers (n = 29), and the highest percentage of positive findings occurred among them (20.2%). Young males in the age group 19-29 were mostly involved in a fatal road traffic accident (35.7%). Children, age group 5-10 years, and the elderly, age group over 60 years, are exposed to the highest level of pedestrian accident risk which accounted for 26.1%, n=6 and 41.7%, n=10, respectively. This finding was not related to alcohol or psychoactive drugs. The fact that and in spite of the humble number of those included in this study, the findings are consistent with what has been reported by Al-Masaeid, as an overall average of RTA general fatalities in Jordan.²

The number of RTA victims that were included in this study is relatively a small number and represented 5.84% of the total RTA victims over the two-year study period. Also, the data were collected in a local area within the northern part of Amman, and it is not representative of the Amman area or the country at large. However, the result of this study should be interpreted in the context of these limitations, including relatively limited numbers of cases included in the study and limited demographic distribution, that might result in the underestimation of the actual demographic representation for the overall population, insufficiency of accident circumstance related data, and lack of detailed comprehensive toxicological analysis involved.

Conclusion

The results of this study documented the presence of alcohol and psychoactive drugs in RTA victims that could have some association between the uses of these substances in RTA involvement. However, due to some limitations, other detailed conclusions require further recommendations such as extending the study to include wider populations at the national level, different regions of the country, further details of the accident, and other data such as police investigations and apply a more inexpensive and easier method of toxicological analysis such as immunoassays to cover a wider range of investigation.

Physicians should concentrate their advice for drivers and other patients on avoiding the use of psychoactive drugs or alcohol during their driving activity and hold several campaigns to increase awareness among the public about the potentially dangerous effects of such substances on driving. It is not only a real challenge, but also a significant investment towards improving public health in Jordan.

Acknowledgments

This work was supported by grant number (141/2002-2003) from the Deanship of Research at the University of Jordan.

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الكحول والأدوية النفسانية التأثير في ضحايا حوادث المرور ضمن منطقة شمال عمان

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الملخص

الهدف: أثبتت العديد من الدراسات أن تعاطي الكحول والأدوية نفسانية التأثير تمثل عوامل خطر مهمة وكامنة وراء حوادث المرور المميتة. وتعرض هذه الورقة دراسة مبدئية عن نتائج فحوصات سمية في ضحايا هذه الحوادث ضمن منطقة شمال عمان، وذلك لإعطاء صورة عامة عن وجود هذه المواد في هؤلاء الضحايا في الأردن.

الطريقة: بلغت عدد حالات التشريح القضائي التي تم إجراؤها في مستشفى الجامعة الأردنية في (2004-2005) 400 حالة، وكان منها 94 بنسبة (23.5%)، وفاة نتيجة حوادث المرور. وقد تم جمع عينات بيولوجية من هذه الضحايا، وتم إجراء فحوصات السموم للكحول والأدوية النفسانية التأثير عليها. وتم تحليل النتائج وفقا للسن والجنس وحالة الضحايا بهذه الحوادث.

النتائج: أظهرت البيانات أن الكحول والأدوية نفسانية التأثير كانت إيجابية في 72.3%، وعدددهم 68 وعلى الايثانول وحده 23.4%، وعدددهم = 22. وكانت غالبية الضحايا من السائقين، وعدددهم = 29، وأعلى نسبة من النتائج الإيجابية كانت بينهم (20.2%)، وعدددهم = 19. وكان معظمها (35.7%) من الذكور ذوي الفئة العمرية 19-29. كانت الأدوية النفسانية التأثير من مجموعات البنزوديازيبينات، والأفيونيات، والباربيتورات، ومضادات الاكتئاب. ولم تظهر نتائج ايجابية للكوكايين، أو الأمفيتامينات، أو القنب.

الاستنتاجات: وثقت نتائج هذه الدراسة وجود الكحول وأدوية نفسانية التأثير في ضحايا حوادث المرور، التي قد يكون لها بعض الارتباط بين استخدامها والتورط في هذه الحوادث. ومع ذلك، لا يمكن تعميم استنتاجات أخرى بسبب بعض المعوقات، حيث يتطلب ذلك مزيدا من جمع البيانات، والتعاون مع أطراف ذات العلاقة في الأردن والإفادة من فحوصات سمية بسيطة وموسعة.

الكلمات الدالة: ضحايا حوادث المرور، الكحول، الأدوية النفسانية التأثير، الأردن.