

Brief Report

Frequency of Alcohol and Substance Abuse Observed in Drivers Killed in Traffic Accidents in Hamadan, Iran

Saeed Afzali MD¹, Aliehsan Saleh MD², Mohammad Ali Seif Rabiei MD³, Kazem Taheri MD^{•1}

Abstract

Human factor is one of the most important causes for traffic accidents. This study has been designed to determine the presence of alcohol and drug abuse among drivers killed in car accidents in Hamadan, Iran during a one year period. This study was conducted as a post-mortem series design. Forensic autopsies were performed on all drivers killed in car accidents who were referred to the Hamadan Medico-legal Center. Alcohol and drug abuse was evaluated in these drivers. Of the 106 drivers killed in car accidents, 98.1% were male. Most were 20–30 years of age. In the majority of cases (83%) the toxicologic tests were negative. Higher level of education (diploma and higher) was related to higher alcohol or drug abuse compared with those whose educational status was less than a diploma (46.7%) or those who were illiterate (16.5%; Chi-square: 7.13; $P = 0.008$). There was a remarkable difference between drug or alcohol abuse and season. The majority of substance abusers were in the summer ($n = 13$, 59.1%); the least were in the spring ($n = 2$; 9.1%). This study shows that alcohol and drug abuse, in particular opiates, could be important factors in traffic accidents in Hamadan, Iran.

Keywords: Alcohol, forensic toxicology, mortality, substance abuse,

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Introduction

Accidents are amongst the major causes of worldwide morbidity and mortality. According to published data, various accidents are the third most important cause of overall mortality and the main cause of mortality among those 1–40 years of age throughout the world. Traffic accidents are responsible for 25% of injury-dependent mortalities. Annually, the number of people killed in traffic accidents is estimated at approximately 1.2 million worldwide, while the number of injured could be as high as 5 million.¹

In Iran, approximately 300,000 people are involved in traffic accidents of which 28000 die each year.

Injuries sustained in traffic accidents lead to economic losses of approximately 6 billion dollars yearly in Iran.² In a study by Akbari et al., unintentional accidents, particularly traffic accidents, have lead to 210754 years of beneficial life lost in Iran; however this amount is just 51093 years for intentional events.³

The results of the Kashani et al. study have shown that improper overtaking, speeding, lack of attention to the traffic ahead, vehicle defects, presence of pedestrians, livestock, and unauthorized vehicles are the primary causes of serious terrific injuries in Iran.⁴

In another study in Tehran the most common causes of traffic accidents were speeding, passing from the wrong side, and rapid lane changes by drivers.⁵

Traffic injuries, as with other traumas, are caused by various

factors that include human error, vehicle imperfections and road defects. This study intends to determine the human factor impact that is induced by drugs, narcotics and alcohol use on traffic fatalities during a one year period in Hamadan, Iran.

Materials and Methods

This study was conducted as a post-mortem series design. Forensic autopsies were performed on all drivers killed in automobile accidents, either at the scene or who died in the hospital less than 72 hours after the accident, and were referred to the Hamadan Medico-legal Center during 2008–2009 ($n = 106$). This study was approved by the Research Center for Behavioral Disorders and Substance Abuse, Hamadan University of Medical Sciences.

Generally all fatalities related to automobile accidents must be examined in the medico-legal centers in Iran in order to determine the cause of death. Cases were evaluated for alcohol and other potential drugs of abuse such as morphine, benzodiazepines, cannabis, phencyclidine and amphetamines. Appropriate samples were taken from all cases and sent to the medico-legal laboratory. A total of 2 mL of vitreous fluid for the measurement of alcohol levels, as well as blood and tissue samples to measure other drugs were obtained from victims.⁶ Alcohol levels were measured by gas chromatography using a Variant 3700. Other drugs were measured by HPLC using a Kenaver 10001. All cases that survived for more than three days after the accident or received any type of opiate medications in the hospital ($n = 6$) were excluded from our study because of their unreliable toxicologic evaluation results.

Data were collected by check list and analyzed by SPSS version 16.0.

Results

Of the 390 fatalities from automobile accidents during 2008–

Authors' affiliations: ¹Department of Forensic Medicine, Research Center for Behavioral Disorders and Substance Abuse, Hamadan University of Medical Sciences, Hamadan, Iran. ²Hamadan Medico-Legal Center, Research Center for Behavioral Disorders and Substance Abuse, Hamadan University of Medical Sciences, Hamadan, Iran. ³Department of Community Medicine, Hamadan University of Medical Sciences, Hamadan, Iran.

•Corresponding author and reprints: Kazem Taheri, Poisoning Ward, Farshchian Hospital, Hamadan, Iran.

Tel: +98 811 8285012, E-mail: saeid_tm@yahoo.com

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Table 1. Demographic characteristics of drivers.

	N	Percentage
Sex		
Male	104	98.1
Female	2	1.9
Age (yr)		
11–20	15	14.2
21–30	29	27.4
31–40	22	20.8
41–50	12	11.3
>50	28	26.4
Education		
Illiterate	11	10.4
Up to high school	80	75.4
Diploma	9	8.5
Undergraduate	6	5.7

Table 2. Toxicological tests results.

Total Prevalence	Toxicology test						Total
	Neg †	Eth*	Mop‡	Bzds¶	Eth +Mop	Mop +Amp§	
No.	88	2	12	2	1	1	106
Percentage	83	1.9	11.3	1.9	0.9	0.9	100

† Neg = negative; *Eth = ethanol; ‡Mop = morphine; ¶Bzd = benzodiazepines; §Amp = amphetamines; No = number of each group (Negative and positive toxicology tests)

2009 in Hamadan Province that were autopsied, 112 (28.72%) were drivers that had toxicological evaluations performed on their samples. Of these, 6 cases did not meet the exclusion criteria.

We determined the quantitative levels of alcohol in vitreous fluid and qualitative studies on blood and tissue samples for morphine, cannabis, phencyclidine, benzodiazepines and amphetamines. In 84 (80%) cases the results of alcohol and drug assessments were negative; the remaining 22 (20%) tested positive. The majority of cases with positive toxicological tests results were male.

Demographic data is shown in Table 1. Of the crude death toll (106 cases), the majority of cases occurred during the summer (51), followed by spring (36), winter (11) and fall (8). However, the fall season had the most proportional death rate with 5 out of 8 (62.5%) cases followed by summer (13 out of 51, 48.1%) winter (2 out of 11, 9.15%) and spring (2 out of 36, 5.6%). The most prevalent age group was 21–30 years of age, with 9 (41%) fatalities and the least was over 50 years of age, which had 1 (4.5%) fatality.

Among fatalities, the principal cause of death was head trauma that was observed in 57 (53.8%) cases. In 3 cases, the levels of vitreous fluid alcohol were 14, 42 and 47 mg/dL, and one of them also tested positive for morphine. None of these tested positive for phencyclidine and cannabis (Table 2). A higher level of education (diploma and higher) was related to higher alcohol or drug abuse compared to those who had less than a diploma (46.7%) or who were illiterate (16.5%). There was a remarkable difference between drug or alcohol abuse and seasonal pattern. The majority of abusers were in the summer, which had 13 (59.1%) cases; the least was observed in the spring, with 2 (9.1%) cases.

The Benferroni correction method was used to control for alpha error. This method is derived from an assumed significant level divided by the number of comparisons or p/n.

Discussion

The results of current study showed positive results in a considerable number of drivers' toxicological tests for alcohol and drugs.

Most studies worldwide^{6,7} have shown that men were more often involved in fatal traffic accidents than women, which was supported by the results of the current study. The majority of fatalities were in the 20–30-year-old age group, as has been previously confirmed.⁸

Although most fatalities were in this age range, however there was no significant statistical relationship between age and alcohol or drug use. Disobedience of traffic regulations by younger drivers, decline in driving skills among older drivers and not using safety equipment such as helmets and seatbelts might be possible underlying causes of traffic accidents in these age groups.^{1,9}

In support of another study,¹⁰ the current study showed that the mortality rate among less educated individuals was more than groups with more education; there was a significant relationship between education level and drugs and alcohol use.

In our study, as with other studies,^{10,11} road accidents occurred more frequently during the summer. Positive toxicology test results were also observed more frequently in the summer.

Jones et al. have reported that only 60% of autopsied cases had negative toxicological test results,⁷ however in our study we reported that 83% had negative results, most of which were motorcyclists.

Numerous studies have explained the important role of alcohol and drug abuse in traffic accidents. Goullè et al. observed a notable increase in traffic accidents among alcohol and drug users.¹² In this study cannabis was the more common illegal substance either used alone or in conjunction with alcohol. Benzodiazepines were the most common legal drugs among the fatalities, particularly in elder drivers.

Stoduto have reported that one third of fatalities had notable positive alcohol blood levels and 41.3% had positive toxicological test results for cannabis, cocaine and benzodiazepines.¹³

According to other studies,^{12,13} cannabis, cocaine, morphine, lorazepam and diphenhydramine were detected in addition to positive blood alcohol test results.

On the basis of a study performed in Japan, alcoholic consumption by drivers might cause a 4.08 increase in risk of serious traffic accidents.¹⁴ In our study, only 3 cases had positive alcohol levels

in their vitreous fluid, one of which also tested positive for morphine. All were motorcycle drivers. In Iran alcoholic consumption is forbidden due to legal and religious reasons, therefore its use is not prevalent. Thus, we cannot expect a large number of alcoholic drivers. It might be concluded that injuries from alcohol-related, deadly traffic accidents are not common.

The most prevalent drugs abused in our study were narcotics. Only one case used amphetamine compounds. The most prevalent legal drugs were benzodiazepines in 2 cases.

Injuries sustained from traffic accidents can be substantial. However this is a neglected global public health problem that necessitates concerted efforts for effective, sustainable preventive educational strategies about the deleterious effects of alcohol and drugs, both of which increase the risk of morbidity and mortality from traffic accidents. Informing and educating drivers can improve their knowledge about the rules of the road. Effective management and supervising are of benefit. Mandatory alcohol testing programs may contribute to a significant reduction in the role of alcohol in fatal traffic accidents.

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