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Drug use among Iranian drivers involved in fatal car accidents

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Background: Although the problem of substance use among drivers is not limited to certain parts of the world, most epidemiological reports on this topic have been published from industrial world.

Aim: To investigate pattern of drug use among Iranian drivers who were involved in fatal road accidents.

Methods: This study enrolled 51 Iranian adults who were involved in fatal vehicle accidents and were imprisoned thereafter. Data came from a national survey of drug abuse that was done among Iranian prisoners. The survey collected data at the entry to seven prisons in different regions of the country during a 4-month period in 2008. Self-reported lifetime, last year, and last month drug use was measured. Commercial substance screening tests were applied to detect recent substance use (opioids, cannabinoids, methamphetamines, and benzodiazepines).

Results: The commercial substance screening test showed three distinct patterns of recent illicit drug use: opioids (37.3%), cannabinoids (2.0%), opioids and cannabinoids (13.7%). 29.4% were also positive for benzodiazepines. The substance use screening test detected 23.5% of participants who had used drugs but did not disclose any substance use.

Conclusion: Opioids are the most common illicit drugs being used by Iranian drivers who are involved in fatal car accidents. The high rate of substance use prior to fatal car accidents in Iran advocates for the need for drug use control policies and programs as major strategies for injury prevention in Iran. There is also a need for substance screening among all drivers involved in fatal car accidents in Iran, as more than 20% of users may not disclose substance use.

Keywords: substance use, drugged driving, Iran, drivers, driving, road accidents, injury

INTRODUCTION

Driving under the influence of drugs happens for several reasons. Recreational drug use may be prevalent among people who drive (1). Drugged driving happens if the driver is a drug user (2, 3). Drugged driving may also happen among professional drivers who drive long distances (4). Drivers who drive under the influence of drugs pose serious risk to others on the road (4, 5).

Although various drugs have different effects, most substances affect driving tasks, even in low dosages (6). An increased risk of crash may exist even in the absence of outward signs of impairment in the driver (4, 6). Drug use also increases the probability of poor outcomes following car accidents (7). It has been shown that risk of death following traffic accidents increases when it is secondary to substance use (7–9).

Prevention of drugged driving is an essential strategy for prevention of mortalities and morbidities due to unintentional injuries. Authorities, however, cannot design evidence-based policies and programs such as continued drug use education and screening programs if they do not have access to epidemiological information. Such information is essential for the design and implementation of policies that should be enforced to reduce traffic accidents attributed to drugs (4).

As the epidemiological pattern of substance use varies from one geographic location to another, knowledge of local

epidemiological patterns of drugged driving is necessary for the improvement of road safety. Screening tests for substances in suspected cases are designed based on the epidemiological information about the type of drugs that are commonly used by drivers who are at high risk of accidents (10). For instance, in settings where opioids are not commonly used, suspected individuals for drugged driving undergo drug tests that do not cover opioids (1).

Besides the enormous economic burden of drugged driving and the fact that surveys on driving under the influence of substances have important implications for prevention (5), limited epidemiological knowledge exists on this problem in developing countries (1). Almost all published epidemiological knowledge in this field originates from North America, Europe, and Australia (2).

Different populations are being enrolled to the epidemiological studies on drugged driving (8, 9, 11–17). This includes general populations, drivers, professional drivers, and drivers who become involved in crashes (18, 19). One of the populations that is being studied in epidemiological surveys is drivers who are arrested or imprisoned following a fatal crash (20).

There is very limited information regarding drugged driving in Iran. Of the few studies that have provided epidemiological information on drugged driving (21–25), none have sampled drivers involved in fatal road accidents.

The main purpose of the current descriptive study was to investigate the problem of drugged driving in fatal car accidents in Iran. We also measured possible discrepancies between self-reported data and screening results for commonly used substances.

MATERIALS AND METHODS

DESIGN AND SETTING

This national cross-sectional study was carried out by the Health and Treatment Bureau of the Iran Prisons Organization, Tehran, Iran. Data collection was conducted from September to December 2008.

An ethics committee approved our study protocol. Informed consent was received from all participants. Our participants were reassured that data would be kept confidential. All data were registered anonymously. No incentive was given to the participants.

PARTICIPANTS AND SAMPLING

This study included 51 participants who were imprisoned because of motor vehicle accidents resulting in death. Participants were selected from 2,200 prisoners who participated in a national survey conducted in seven prisons in different regions of the country. Prisons were located at the following provinces: Tehran, Azarbayjan-e Sharghi, Golestan, Sistan and Balouchestan, Yazd, and Kermanshah. The study used a table of random numbers as the simple random strategy to include new prisoners.

MEASURES

At the time of entry to prison, participants underwent a structured interview using a checklist. Interviews were conducted in private settings. All interviewers were men with master's degrees in clinical psychology (the same gender as the participant).

Self-reported data on drug use during lifetime, last year, and previous month, were asked for the following drugs: cannabis, opium, opium derivates, powder heroin, compact heroin, Methamphetamine, cocaine, Lysergic Acid Diethylamide (LSD), and other drugs. Data were also collected on the mode of drug use, including: smoking, swallowing, sniffing, injecting, and inhaling.

DRUG SCREENING

Two milliliters of blood were drawn from each participant using vacutainer tubes. The blood was contained in a preservative and was screened for drugs using enzyme-linked immunosorbent assay and gas chromatography–mass spectrometry analysis. Commercial screening tests were used for marijuana, meth, and opioids. These tests detect the presence of delta-9-tetrahydrocannabinol (THC), the active ingredient in marijuana, and of cannabis and methamphetamine (12, 26).

DATA ANALYSIS

We used SPSS for data analysis. Due to the low sample size, this study only provided descriptive statistics. We reported frequency tables for categorical variables. Means and standard deviations (SD) were reported for continuous variables.

RESULTS

DESCRIPTIVE STATISTICS

All participants were men, and most were living in urban areas. Most participants were employed, married, and had not completed high school. Most participants did not have a history of previous imprisonment (**Table 1**).

Table 1 | Socio-demographic data among individuals who were imprisoned for fatal car accidents ($n = 51$).

	n	%
LIVING PLACE		
Urban	32	62.7
Rural	19	37.3
EDUCATIONAL LEVEL		
Illiterate	7	13.7
Read/write	2	3.9
Primary school	13	25.5
Guidance school	16	31.4
High school	3	5.9
Diploma	6	11.8
University	4	7.8
MARITAL STATUS		
Single	16	31.4
Married	34	66.7
Divorced	1	2.0
EMPLOYMENT		
Employed	47	92.2
Jobless	4	7.8
PREVIOUS IMPRISONMENT		
No	26	51.0
Once	18	35.3
Two times or more	7	13.7

Participants' ages ranged from 21 to 56 years, with a mean (SD) of 32.4 ± 7.9 years. Monthly income ranged from 0 to \$1,200, with a mean (SD) of $\$290 \pm 211$. Family size ranged from 1 to 14 persons with a mean (SD) of 4 ± 2 persons.

SELF-REPORTED RESULTS

Based on self-reported data, the most frequently used drug during the last 30 days was opium (25%) followed by heroin or opium derivate (20%). Eight percent reported cannabis use. Although 4% reported alcohol use in their life time, none of the participants reported alcohol use over the past 30 days. The most common mode of drug use was smoking (81% of cases), followed by swallowing (17.5% of cases) (**Table 2**).

DRUG SCREENING

Drug tests were positive for opioids, cannabis, and both in 37.3, 2.0, and 13.7%, respectively. Of all participants, 29.4% tested positive for benzodiazepines. The drug screening test detected that 23.5% of the total sample were drug users who had not reported drug use (**Table 3**).

Of the participants who had not reported drug use, 24% ($n = 12$) tested positive for illicit drugs. The false negative report of no drug use was seen for cannabis (10–12%), and opioids (6–14%), but not for Meth (0%) (**Table 4**).

Table 2 | Self-reported history of drug use among Iranian adults imprisoned for car accident offenses ($n = 51$).

	Lifetime		Last year		Last month	
	n	%	*n*	%	*n*	%
CANNABIS						
No	41	80	45	88	47	92
Yes	10	20	6	12	4	8
OPIUM						
No	30	59	36	71	38	75
Yes	21	41	15	29	13	25
METH						
No	49	96	49	96	51	100
Yes	2	4	2	4	0	0
ECSTASY						
No	50	98	50	98	51	100
Yes	1	2	1	2	0	0
HEROIN						
No	35	69	38	75	41	80
Yes	16	31	13	25	10	20
OPIUM DERIVATE						
No	14	27	38	75	41	80
Yes	37	73	13	25	10	20
OPIOIDS						
No	24	47	27	53	30	59
Yes	27	53	24	47	21	41
ANY DRUG						
No	24	47	27	53	30	59
Yes	27	53	24	47	21	41
ALCOHOL						
No	49	96	51	100	51	100
Yes	2	4	0	0	0	0

DISCUSSION

Based on our study, 60% of Iranian drivers who are involved in fatal car accidents use drugs. In the absence of drug screenings, 1/3 of the total number of drug users will be missed. As a result, investigation of drugged driving among Iranians who are involved in fatal car accidents should not merely rely on self-reported data. The most commonly used drugs among drivers involved in fatal crashes are opioids, followed by cannabis.

The high rate of drug use among Iranians who are imprisoned for fatal crashes can be explained by the known association between driving under the influence of drugs and the incidence and intensity of car accidents (9). Drugs impair mental function and reduce attention and concentration on driving tasks. In general, use of substances during driving may impair coordination, increase reaction time, and alter judgment of distance and speed. Drug use results in distortion of time, place, and space. Other effects of drug use are poor vision and muscle weakness. All

Table 3 | Drug test results among Iranian adults imprisoned for car accident offenses ($n = 51$).

	n	%
OPIOIDS		
Positive	26	51
Negative	25	49
METH		
Positive	0	0
Negative	51	100
CANNABIS		
Positive	8	16
Negative	43	84

Table 4 | Frequency of false negative of drug use among Iranian adults imprisoned for car accident offenses ($n = 51$).

	n	%
OPIOIDS		
Life time	3	6
Last year	5	10
Last month	7	14
CANNABIS		
Last month	6	12
Last year	5	10
Life time	5	10
METH		
Life time	0	0
Last year	0	0
Last month	0	0
ANY DRUG		
Last month	12	24
Last year	10	20
Lifetime	12	24

these consequences of drug use increase risk and severity of traffic accidents (4, 6).

We could not find any published information about the epidemiology of drug use among drivers who were involved in fatal crashes in Iran. Most of the available knowledge in Iran is about the pattern of illicit drug use among drivers. In one study, 0.42% of applicants for driving licenses in Iran had positive opioid test results (21). In another study in Kerman, Iran, between 14.6 and 26.5% of drivers were opium addicts (23, 24). Kerman has one of the highest prevalence of opium use in Iran (27, 28).

A major part of the literature has enrolled drivers who were suspected of driving under the influence of drugs (1, 29–32). There are also few international studies on individuals involved in car accidents (12, 20). In Australia, cannabis (46.7%) was the most commonly found drug in injured drivers involved in motor vehicle collisions. The second most prevalent substance was benzodiazepines (15.6%), followed by opiates (11%), amphetamines (4.1%) methadone (3%), and cocaine (1.4%) (33). In Australia, 2.7% of individuals involved in car accidents reported their use of cannabis before the crash (33). In Hong Kong, 10% of samples tested positive for drugs. (34).

Of the drivers killed as a result of road accidents, 48% tested positive for alcohol or drugs. From those drivers who tested positive, 27% were positive for alcohol only; 19% for cannabis only; 28% for alcohol and cannabis (but no other drug); and 25% for a combination of drugs, including the combination of alcohol and/or cannabis. Of all deceased drivers who were positive for a combination of drugs (other than alcohol or cannabis), 23% were positive for opioids; 31% were positive for benzodiazepines; and 42% were positive for methamphetamines (35).

In contrast to our study, in many industrial countries, marijuana and alcohol are the most prevalent substances found among impaired drivers who are involved in fatal or non-fatal vehicle crashes. Other illegal drugs such as cocaine, opiates, and amphetamines may have lower prevalence in industrial countries (3). In Iran, opioids are the most commonly found drug among these individuals.

The pattern of drug use in subgroups of a community is affected by the epidemiology of drug use in the general population. We believe that this is not an exception for the case of driving under the influence of drugs (36–41). In most western countries, marijuana and alcohol are the most prevalent drugs used by the general population (42). In Iran, the pattern of risk associated with drug use is different from western countries (43–49).

The most commonly used drugs in the general population of Iran are opioids (50). In Iran, three of four illicit drug users use opioids (51). In Iran, opium may be used for self-medication (52). Iran has a higher rate of opium use in comparison with other countries (53). Iran accounts for about 85% of worldwide seizures of opium and more than 30% of worldwide seizures of heroin and morphine (54). Traditionally, opioids have a long history for recreational and medical use in Iran. Geographic location of Iran has posed Iran to such risk, as Iran is on the main opium trade route from Afghanistan to Europe (55).

Regarding the common modes of drug use, smoking, and eating were the most common in our sample. This was expected, as smoking is the most frequent mode of opioid use by the Iranian general population (50). The same finding has been reported among professional drivers. Based on a recent national study, opioids (46.8%) and heroin (27.6%) were the two most common drugs used by Iranian professional drivers (56).

Based on our study, only 4% of individuals involved in fatal vehicle accidents report alcohol use. This rate was <1% among professional drivers who used drugs in Iran (56). Based on some, but not all reports, alcohol is not a commonly used substance in Iran (57). This might be partially due to the fact that alcohol is banned in the country. Over 98% of Iranians are Muslim, and Islamic instructions ban its use (58–60). There are also other parts of the world where alcohol is not a common substance used by drivers (5, 35).

Our findings may have important public health implications for reducing unintentional injury in Iran. Iran is a developing country with a high incidence of fatal road accidents compared to other societies (22, 61, 62). The rate of deaths due to road traffic accidents in Iran is also higher than the global average (22). Such high fatalities have been partly attributed to the high rate of drugged driving in this country (23).

The current study advocates for the design and implementation of road side drug screening. Such drug testing can be routinely implemented at police stations. Random screenings may be implemented. There is also a need for a revision in current policies regarding charges associated with drugged driving. More restrictive regulations may contribute to the prohibition of driving under the influence of drugs and may promote traffic safety in Iran.

Post-crash drug screening of drivers is not routine in several countries around the world. In several industrial countries, drug analysis is not conducted unless there is a request by a police officer. We believe that universal drug screening of drivers who are involved in fatal motor vehicle collisions is needed in Iran. We also believe that tests should cover opioids and cannabis use, while alcohol may not be a major problem.

Countries that do not implement drug screening tests may have high rates of drugged driving (33). An important component of road safety efforts is anti-substance driving policies. Such policies may decrease the societal burden attributed to drug use by motor vehicle drivers (63, 64). Drugs covered by the screening tests should be tailored to each country. The findings of this study on the pattern of drug use among Iranian drivers who have been involved in fatal accidents may help Iranian policy makers with designing and implementing such screening tests. Our study findings advocate for the universal screening of all fatal accidents, or at least selected screening of suspected drivers.

The disturbingly high rate of drug use among individuals who are involved in fatal car accidents in Iran is an alarm and requires further initiatives to prevent fatalities due to drug related motor vehicle accidents. Based on our results, drug impaired driving laws in Iran should be revised in several ways. New policies will empower police force to detect drivers that are impaired by drugs.

Our findings highlight the need for various preventive measures to enhance road safety in Iran. Health education programs of drivers should include persuasive communication messages that minimize the rate of substance use among drivers. For teen drivers, education by parents is key and may be effective (65, 66). These interventional programs should emphasize common licit

and illicit substances that influence driving performance and result in accidents and fatalities in each country (67). Intervention studies may test the efficacy of programs in changing driving behaviors and associated attitudes and beliefs among drivers (65, 66). Education material needs to be included in the education system and practiced from the school age. Education campaigns should also use public and mass media for education of the public. Strict regulations for issuing and renewing driver's licenses may also lower rates of drugged driving and prevent fatalities associated with road traffic accidents (56).

The current study had several limitations. The data were not updated, as data were collected in 2008. The sample size was also small. The results may not be representative of all drivers or fatal road accidents in Iran. Data were not available on professional drivers who drive for a living or they were merely vehicle operators. Also, we did not know the location of the accidents (metropolitan areas or high-speed inter-city highways). These limitations were present because the main study was not designed specifically for the investigation of the pattern of drug use among drivers who were involved in fatal accidents, but had instead aimed to investigate drug use among Iranian prisoners. The current study used only a subsample of the participants of the main study in whom reason for imprisonment was a fatal road accident. The study, however, had a few strengths, as well. This was one of very few studies on the pattern of drug use in fatal accidents in Iran. The study did not solely rely on self-reported data, as it also implemented screening tests. Further studies with large and random sample sizes are needed. Published guidelines should be consulted for future drugged driving research (12).

CONCLUSION

In Iran, relying on self-reported data will result in underestimation of contribution of drugged driving to the fatal road accidents in Iran. Thus, drug screening tests should be implemented for all, or at least suspected cases, of drugged driving. Opioids and cannabis should be included in drug screening protocols of Iranian drivers.

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