


ORIGINAL ARTICLE

The prevalence of illegal and alcoholic substances among motor vehicle crash survivors: results from a Level-I Trauma Center in Saudi Arabia

Mona Alsanae^{1*} , Fahad Allohidan², Fares F. Alharbi², Mohammed Alamri³, Munthir Almujaheed⁴, Nawfal Algerian⁵, Suliman Alghnam⁶

ABSTRACT

Background: Drug abuse is a public health problem in any country and road safety in particular as it poses serious consequences while driving, affecting the safety of all road users. This study aimed to investigate the drug prevalence and alcohol abuse among motor vehicle crash (MVC) survivors.

Methods: This descriptive study was based on a review of the retrospective chart involving patients that were admitted to the Emergency Department (ED) of a level-I trauma center in Riyadh following an MVC. Injured patients in 2018 were identified from the electronic medical record system, and substance investigation was documented. After the hospital discharge, the research team contacted patients via phone to obtain further details about the nature of the crash and illegal substance use.

Results: During the study, 209 patients were admitted to the ED following MVCs. The population was primarily males (84.7%) with an average age of 30 years. Forty subjects (19.14%) were screened for illegal substances by blood, urine, or both, 35 of which had confirmed intoxication. Alcohol was used in almost two-thirds of the 35 lab-confirmed intoxicated subjects ($n = 23$, 65.71%) either alone or in combination with other types of drugs.

Conclusion: The widespread use of alcohol and other drug abuse among those involved in MVC is alarming and endangers road safety. There is a need to implement well-defined guidelines to screen, detect, and impose a penalty on driving under the influence to reduce MVC and improve population health.

Keywords: Illegal substances, motor vehicle crash (MVC), Saudi Arabia, drug abuse, alcohol, Emergency Department (ED), trauma.

Introduction:

The World Health Organization (WHO) estimated that motor vehicle crashes (MVCs) would be the seventh leading cause of death by 2030 if precautionary measures would not be taken [1]. In addition, about 1.2 million deaths and 50 million injuries due to MVCs each year are expected to increase in the next 20 years [1]. In Saudi Arabia, according to the General Authority for Statistics, MVCs are the second leading cause of death [2]. Morbidity and mortality rates due to MVCs are considerably high compared to local and global countries [3]. The annual mortality rate due to MVCs is 24.8 per 100,000 population compared to other neighboring Gulf countries, which are as low as 10.5 per 100,000 in Bahrain [4]. Moreover, mortality from MVC represents

4.7% of all deaths in the Kingdom, while in the United States of America (USA), the United Kingdom (UK), and Australia, rates are around 1.7% [5].

Correspondence to: Mona Alsanae

Department of Emergency, Ministry of the National Guard - Health Affairs, Riyadh, Saudi Arabia.

Email: monamohammads@gmail.com

Full list of author information is available at the end of the article.

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Several factors increase the risk of MVC. These factors include limited enforcement of traffic laws, environmental factors, and a high prevalence of risky behavior among the younger population [3]. One study looked at the causes of MVC and found that 65% occurred due to violating traffic laws such as disobeying traffic signals [6]. A study revealed that many drivers use cell phones while driving and do not wear seat belts [7]. Also, in the literature, it has been well documented that substance abuse is associated with seeking emergency care after MVC [8]. Psychoactive substance abuse could affect the brain's cognitive and motor functions, leading to a threat to road safety [9]. A study found that driving under the influence of psychotic drugs was associated with a disturbance of concentration, reduced response time, increased trajectory, and poor judgment while driving [10].

Similarly, it is well documented that drinking alcohol increases the risk of injury as a result of violence or accidents [8]. Additionally, alcohol by itself is a significant risk factor for increased disability-adjusted life years worldwide [11]. Furthermore, the link between alcohol use, heavy drinking in particular, and the contribution to intimate partner violence has also been well established [12]. Studies found that over one-third of intimate partner violence cases involved an alcohol abusive partner, and 30% of reported cases in the United States (US) involved reporting heavy alcohol drinking before the assault happened [12].

Studies have shown that people who abuse drugs require ED care more and be hospitalized than people who do not abuse drugs [13]. In the US, it was found that there were 5.1 million ED visits that were drug-related in 2011, whereas 2.5 million visits were directly related to illicit drug use, drug abuse, or a combination of both [14]. This might also be the case among the number of road drivers. Quaglio et al. [15], reported that in Cairo 53.3% of cab drivers involved in non-lethal MVC use illegal substances. Similarly, Assari et al. [16], reported that 60% of the drivers involved in the deadly MVC in Iran used illegal substances. Substance abuse is a global public health concern. Furthermore, there are serious consequences of using illegal substances while driving as it affects the safety of all road users.

Developed countries have introduced drastic measures to combat drunk driving, which has led to greater control over the morbidity and mortality of MVCs [17]. For instance, random breath testing checkpoints have been implemented in some areas in the US to reduce the prevalence of alcohol drinking while driving [18]. Unfortunately, little attention has been paid to combining illicit drug use with traffic safety in developing countries [17]. Despite its importance, there is a lack of surveillance data and reports on this issue locally. Consequently, the literature is limited, which affects the ability to understand and assess the burden and plan for prevention. Furthermore, the decision to screen those in MVC for substance abuse is a gray zone in the healthcare system because there are no clear policies to follow regarding testing and reporting illegal substance use. This study aimed to investigate the prevalence of drug and alcohol abuse among MVC survivors that were

admitted to the Emergency Department (ED) of a level-I trauma center in Riyadh.

Subjects and Methods

This research design was a descriptive study based on a retrospective chart review and follow-up information about substance abuse was obtained through a phone survey of patients admitted to the ED at King Abdulaziz Medical City (KAMC) Riyadh in 2018 due to MVC. KAMC is part of the Ministry of National Guard-Health Affairs and operates with a capacity of 1,501 beds. This hospital is one of the leading trauma care providers in the nation, and the hospital is a certified provider of the Pre-Hospital Trauma and Life Support program.

Using the electronic medical record system, the research team identified patients via the chief complaint registered in the emergency department. A convenient sampling technique was used where records that meet the inclusion criteria were included in the study. The study was limited to any injury following an MVC, and any trauma case unrelated to MVC was excluded. In the study, 209 patients admitted to the ED due to MVC were included in the analysis.

Once patients were identified, trained data collectors surveyed the electronic medical records for relevant clinical data and substance intake details by reviewing drug and alcohol analyses for blood and urine samples. There was no clear policy about toxicology screening for patients who suffered MVC, and a patient is either screened or not based merely on a physician's clinical judgment. Several variables were collected, including age, gender, screening method (blood sample or urine sample), type of substance, level of substance, type of injury, severity, place of injury, and hospitalization period.

Due to the subjectivity of drug screening, the study aimed to employ another approach to investigate the prevalence of illegal substance use before the injury. After the hospital discharge, the research team contacted patients via phone to obtain more information about the nature of the crash. Participants who consented to be part of the study were asked a set of questions about the crash and substance abuse history. Additional information about illegal substance use was obtained to assess the association between MVC and drug abuse and the severity of the injuries among the abusers. Participants were also asked about illegal substance use in the past or immediately before the index injury.

The data were entered into an Excel spreadsheet and analyzed using STATA® version 16 (STATA Cooperation, TX). Categorical data such as gender were summarized using frequency and percentage, while numerical data such as age were reported as mean and standard deviation. The difference was assessed using chi-square test. *p*-value <0.05 was considered to be statistically significant.

Results

Patients were predominantly males (84.7%) with a mean age of 30 years. Most injuries were not severe (92.1% had a high GCS), and only five patients (2.4%) were admitted to ICU (Table 1).

Out of the patient population, only 40 (19.15%) were tested for substance abuse either by blood, urine, or both methods. Of those screened, 35 patients were confirmed to be intoxicated ($n = 209$, 16.75%). Patients with confirmed illegal substance use were further categorized by type. The most common intoxication was a combination of alcohol and other drugs ($n = 13$, 37.1%). The remaining intoxicated patients used either alcohol alone ($n = 10$, 28.6%) or other types of drugs ($n = 12$, 34.3%). Interestingly, alcohol was used in more than two-thirds of 35 lab-confirmed intoxicated patients ($n = 23$, 65.7%) either alone or with other drugs (Table 2).

Among the study population, only 70 patients (33.5%) responded to the phone follow-up interview. Of the patients who responded, seven had positive intoxication, according to the lab results. Among those, three (42.8%) confirmed being intoxicated at that time, while the remaining four denied it. The remaining 63 patients answered “no” when asked about being intoxicated. Nonetheless, one patient confessed to being intoxicated at the time of the crash despite a lack of screening during medical care (Table 3).

Half of the patients contacted via the phone were drivers of vehicles involved in the crash. Among those, four patients (5.7%) answered “yes” when asked if they were under the influence. Two patients (2.9%) acknowledged having a previous drug-related MVC. Also, eighteen patients (25.7%) reported a prior hospitalization due to an MVC. About 4.3% of the injured patients reported previous history of driving under the influence of substance abuse (Table 4).

Discussion

The current study found that the prevalence of illegal substance use is alarming and pose a serious threat to traffic safety and population health. Saudi Arabia prohibits alcohol use and illicit drugs utilization and marketing. Moreover, addictive behavior is stigmatized socially. Publishing statistics about such violations might pave the way and provide a solid basis from which a public health approach could be initiated, starting with a description of the problem to identify and evaluate solutions. Clearly, investing in public health to reduce this burden is of utmost importance.

Limited literature exists locally due to limitations in data availability and other logistical constraints. Nevertheless, a study from a referral center for addiction in Jeddah evaluated the prevalence of driving while under the effect of illicit drugs [17]. The study found that 93.1% of participants ($n = 101$) were under the influence of drugs at least once while driving in the past. Moreover, 25.7% of patients in that study were abusing alcohol [17]. Expectedly, the prevalence in the current study is lower due to differences between the two populations.

Compared to other countries, a study conducted in Jordan found that alcohol and psychiatric drugs were found to be positive in 36.5% of cases, and alcohol alone was found in 37.1% of cases. Significantly, most of the deaths occurred in young adults, and 29.6% were between the ages of 19 and 29 years. The psychotropic drugs found were benzodiazepines

Table 1. Demographic and outcome characteristics of the admitted patients following road traffic crashes ($N = 209$).

Category	Overall
Age Mean (SD)	30.03 (13.76)
Gender	
Male	177 (84.7)
Female	32 (15.3)
GCS score* n (%)	
Mild 15-14	186 (92.1)
Moderate 13-9	9 (4.5)
Severe <8	7 (3.5)
ICU admission** n (%)	
Yes	5 (2.4)
No	202 (97.6)
Admission period n (%)	
≤ 1 week	177 (87.2)
> 1 week	24 (11.8)
Died	2 (1)
Screening methods n (%)	
None	169 (80.9)
Blood	8 (3.8)
Urine	16 (7.7)
Both blood and urine	16 (7.7)
Intoxicated n (%)	
No	174 (83.25)
Yes	35 (16.75)

Table 2. Characteristics of those positive for illegal drugs ($n = 40$).

Category	Users
Age Mean (SD)	28.2 (7.58)
Gender if intoxicated	
Male	35 (100)
Type of drug	
Alcohol	10 (28.6)
Other	12 (34.3)
Both	13 (37.1)
Level of alcohol mean (SD)	18.65 (22.83)
Drug other than alcohol	
Amphetamine/ Opiate	1 (10.00)
Amphetamine/ Cannabis	1 (10.00)
Amphetamine/ Benzodiazepine	1 (10.00)
Benzodiazepine/ Cannabis	2 (20.00)
Benzodiazepine	2 (20.00)
Opiate	2 (20.00)
Zinc	1 (10.00)

and barbiturates [19]. In addition, a retrospective study conducted in Italy found alcohol use while driving up to 16.2% and 2.5% cocaine, followed by opiates (2.0%), cannabinoids (1.5%), and amphetamines (0.5%) [20].

Extreme prevalence of intoxication as it is found in both drivers and passengers. In many Western lands, driving under the influence of drugs or alcohol is a matter of law and order. These rules require that alcohol reaches a level

Table 3. Comparing reported vs. screening for illegal drugs (n = 70).

Lab results	Self-report use		Total
	Yes	No	
No	1	62	63
Yes	3	4	7
Total	4	66	70

Table 4. Reported drug use among patients contacted via phone following hospital discharge.

	N (%)
Driver	
Yes	34 (50.00)
No	34 (50.00)
Driver under the influence	
Yes	4 (5.71)
No	66 (94.3)
Drug kind	
Alcohol	1 (25.00)
Other	3 (75.00)
Drug other than alcohol	
Benzodiazepine	1 (33.3)
Cannabis	1 (33.3)
Unknown	1 (33.3)
Crash caused by another intoxicated driver	
Yes	1 (1.5)
No	62 (91.2)
Do not know	5 (7.35)
Accidents fault	
Driver not intoxicated	22 (31.4)
Driver intoxicated	4 (5.71)
Another driver intoxicated	34 (48.57)
Another driver not intoxicated	10 (14.29)
Any previous drug-related road traffic accident	
Yes	2 (2.9)
No	68 (97.1)
Any previous hospitalization due to a road traffic accident	
Yes	18 (25.7)
No	52 (74.3)
Ever driven while intoxicated?	
Yes	3 (4.3)
No	67 (95.7)
If previously driven while intoxicated, what is the substance kind?	
Cannabis	2 (66.7)
Unknown	1 (33.3)

that makes it difficult for a driver to drive safely or accept intolerance when drug addicts are persecuted when prescribed drugs or metabolites are found in their bodies

[21]. This could be a challenge for the Kingdom because there are no laws that allow police to immediately assess alcoholism in drivers who are suspected of being under the influence of alcohol.

It was found that the most common intoxication was a combination of alcohol and other drugs (37.1%). The remaining were intoxicated with either alcohol alone (28.6%) or other types of drugs (34.3%). In other words, alcohol was used in more than two-thirds of the current 35 lab-confirmed intoxicated patients (65.7%), either alone or in combination with other drugs. This is in parallel with previous relevant literature where alcohol abuse constitutes the majority of cases. In examining heroin-related deaths in Italy, Cittadini et al. [22], found that road crashes were the third most common cause of death for drug users accounting for 10% of deaths. Another study conducted in Italy found that 47.3% of patients injured in MVCs had positive blood alcohol levels and worse clinical outcomes [21]. A Swedish study that examined MVC deaths showed alcohol levels above the legal limit in 22% of cases, and 18% were positive for other drugs [23].

Another finding of the current study was that the patients were primarily males (84.7%) with a mean age of 30 years. This was consistent with international literature. In a Norwegian study, men were more often driving under the influence than women (48% compared to 38%) [6,8]. In Saudi Arabia, drugs are not as accessible to women as men due to society's conservative nature. Consequently, women might rely on rudimentary and volatile substances such as glue, gasoline, and shisha [23]. The other reason is that women were not allowed to drive in Saudi Arabia until September 2017, but the permission actively took effect in the last quarter of 2018.

As a result of the launch of the Saudi Vision 2030 projects, the State has seen significant progress in all sectors, and the health care system is one of its foundations [24]. Moreover, investment in road safety is one of the objectives of the Vision. The current study set the baseline for the burden of illegal substance use associated with traffic crashes. Also, it highlights the need to implement new guidelines to screen, detect, and impose a penalty on driving under the influence.

The current study has some public health implications. First, it emphasizes the need for educational and preventive measures to be directed to the public through awareness campaigns and a more responsible media engagement. Second, it calls for implementing policies to screen suspected violators by traffic police in the field via standard methods used in other countries. Furthermore, it is also recommended that police officers undergo training

to recognize intoxicated drivers to reduce the risk of MVCs.

This study was conducted in one of the largest trauma centers in the country. On the other hand, several limitations must be acknowledged. First, there was an inadequate response to the follow-up phone interview, which might have affected the current findings. Therefore, the percentage might not represent an actual number of cases because people tend not to report illegal substance abuse for many reasons, such as social stigmatization and legal consequences. Second, the MVC's occurred in 2018 might have been underestimated due to the inaccurate registration of the chief complaint of the database. Third, there was no standard approach to screening MVC patients in the first place. Unfortunately, there were no clear policies about toxicology screening for patients who suffer MVCs. Instead, it is based on the physician's clinical judgment. Lastly, this was a retrospective study, which includes the associated limitations of such a design.

Conclusion

This study has clearly shown the high prevalence of intoxication among those injured in MVC. It sets the baseline for the burden of illegal substance use associated with MVCs. This risky behavior is not only dangerous to those intoxicated but all road users. There is a need to implement new guidelines to screen, detect, and impose penalties on driving under the influence to reduce MVC and improve population health.

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Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication

Written informed consent was obtained from all the participants.

Ethical approval

The study was reviewed and approved by the King Abdullah International Research Center - Institutional Review Board (IRB: RC19/090/R). Date: 7 July 2019.

Author details

Mona Alsanae¹, Fahad Allohidan², Fares F. Alharbi², Mohammed Alamri³, Munthir Almujaheed⁴, Nawfal Aljerian⁵, Suliman Alghnam⁶

1. Department of Emergency, Ministry of the National Guard - Health Affairs, Riyadh, Saudi Arabia
2. Department of Psychiatry, Ministry of the National Guard - Health Affairs, Riyadh, Saudi Arabia
3. College of Public Health and Health Informatics, King Saud

Bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia

4. Department of Pediatrics, King Fahad Medical City, Riyadh, Saudi Arabia
5. General Administration of Medical Councils and Health Attaches, Ministry of Health, Saudi Arabia
6. Population Health Section, King Abdullah International Medical Research Center (KAIMRC), Riyadh, Saudi Arabia

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