

The Prevalence of Illicit Drug and Alcohol Use in Trauma Patients

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Abstract

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Objectives: To determine the prevalence of psychoactive drug and alcohol use and their association with demographic factors such as age and gender, as well as accident characteristics among trauma patients presenting to the emergency department of Imam Khomeini Hospital in Sari, Iran.

Methods: This cross-sectional study was conducted over two years and included all eligible patients (aged 18 and above) who presented to the emergency department due to traffic accidents. Urine samples were collected for biochemical screening using multi drug assessing techniques. Demographic data, accident details, and medical history were also recorded and analyzed. Chi-square and independent t-tests were used to assess statistical associations.

Results: The most commonly detected substances were cannabis (48.5%), methamphetamine (18.2%), and benzodiazepines (19.2%). Although substance use was observed across different age groups and patient roles (pedestrian, driver, passenger, etc.), most cases showed no statistically significant association between substance use and demographic variables. Specifically, no significant associations were found for methadone ($p=0.382$), cannabis ($p=0.212$), methamphetamine ($p=0.292$), amphetamine ($p=0.232$), benzodiazepines ($p=0.134$), tramadol ($p=0.815$), morphine ($p>0.05$), or tricyclic antidepressants (TCA) ($p>0.05$) with age, gender, or the patient's role in the accident. The only statistically significant findings were the association between alcohol use and accident occurrence ($p=0.035$), as well as gender differences in alcohol consumption ($p=0.027$).

Conclusion: The findings highlight the need for continuous and comprehensive monitoring of drug use among trauma patients, with particular attention to alcohol consumption. The study underscores the importance of developing targeted interventions at both local and national levels to prevent substance-related traffic accidents.

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Introduction

The harmful effects of alcohol and illicit drug use in trauma-related injuries are well established in high-income countries (HICs). Numerous studies have identified substance use as a key contributor to both the occurrence and severity of physical injuries, as well as to mortality following accidents, particularly among patients presenting to emergency departments (EDs) (1, 2). These substances impair cognitive and physical functions, increasing individuals' vulnerability to road traffic incidents and violent behaviors (3). Alcohol, in particular, has been shown to substantially elevate the risk of both motor vehicle crashes and interpersonal violence (4). In the United States, for example, alcohol consumption contributed to over 88,000 deaths between 2006 and 2010, highlighting its role in injury-related mortality (5).

In low- and middle-income countries (LMICs), however, data on the prevalence and impact of alcohol and drug use among trauma patients remain scarce. This is despite World Health Organization (WHO) estimates indicating that 90% of global trauma-related deaths occur in LMICs (6, 7). A global study involving over 12,000 injured patients from 16 countries found that approximately 21% reported recent alcohol use, with substantial variation in the relative risk of injury due to alcohol—from 1.1 in Canada to 35.0 in South Africa—demonstrating significant geographic differences (8).

Several studies have identified alcohol and psychoactive substances (both legal and illicit) among ED patients (9, 10). However, research in sub-Saharan Africa and similar contexts remains limited, particularly regarding injured patients. Existing data suggest alcohol is the most commonly used substance in this population (11), and controlled studies confirm that illicit drugs impair key functions such as driving performance (12). Most prior research relies on patient self-reporting, yet biochemical tests offer more precise identification of substances, especially in patients with reduced consciousness or altered mental status (13). In Africa, few studies—mostly in Côte d'Ivoire, Ghana, and South Africa—have used objective biochemical testing (14–16), and most focus on non-injured patients (14).

Demographic factors also influence substance use patterns. Young men are more likely to test positive for alcohol and illicit drugs, whereas older patients more frequently use prescribed medications. A notable proportion of trauma cases, particularly among motorcyclists, test positive for at least one illicit substance (15). Standard methods for identifying alcohol and drug use include blood samples (for blood alcohol concentration, BAC), urine screening, and occasionally breath tests or self-reports (16, 17). Blood tests are the most accurate but less commonly used in resource-limited settings. Urine tests, though more

accessible, may overestimate recent use due to the longer detection windows of certain substances (18).

The accuracy of self-reporting also varies. Some researchers argue that self-reports, being independent of the time lag between injury and sample collection, may better reflect real-time BAC in certain settings (19). However, other studies report poor agreement between self-reports and lab tests, with frequent underreporting of illicit drug use. Although alcohol, opioids, illicit drugs, and benzodiazepines are established risk factors for severe injuries, the contribution of other psychoactive substances is underexplored and requires further study (20).

Despite the volume of research in HICs and some LMICs, there remains a considerable evidence gap in countries like Iran. Legal and cultural prohibitions, particularly against alcohol, can distort reporting and hinder data availability. Limited resources, lack of standardized screening protocols, and insufficient diagnostic capacity often lead healthcare providers to rely solely on clinical impressions or patient disclosures—methods that may not capture the full extent of substance use. Additionally, patterns of substance use are influenced by complex factors such as age, gender, education, socioeconomic status, and geography. Regions like Mazandaran, which include urban, rural, and coastal populations, may exhibit diverse substance use profiles. Furthermore, the psychological and social consequences of substance use among trauma patients—such as impacts on recovery, repeat ED visits, and post-discharge quality of life—are often overlooked. A comprehensive, multidimensional study that incorporates both objective and subjective data and examines biological, psychological, and social outcomes is needed.

This study aims to assess the prevalence of alcohol and illicit drug use among injured patients presenting to emergency departments in Iran. Specifically, it will compare the accuracy of self-reported substance use with that of biochemical testing, and evaluate the association between substance use and short- and long-term clinical outcomes, including 24-hour and 30-day mortality. By generating objective and context-specific data, the study seeks to inform the development of a national monitoring system for substance use in emergency care settings and support evidence-based policymaking in public health and injury prevention.

Materials and Methods

Study Design and Setting

This study was designed as a cross-sectional investigation to assess the relationship between alcohol and drug use and the severity of injuries resulting from traffic accidents. The research was conducted in the

emergency department (ED) of Imam Khomeini Hospital in Sari, Iran—a major trauma center serving an estimated population of 504,298 based on the 2016 national census. This setting was selected due to its high patient volume and function as a primary referral center for trauma cases in the region.

Study Population and Sampling

The study population included all trauma patients who presented to the ED due to road traffic accidents during the two-year study period. Patients were enrolled using a census sampling method; that is, all individuals who met the inclusion criteria were invited to participate. Inclusion criteria were: age ≥ 18 years and presentation to the ED following a road traffic accident (as a driver, passenger, pedestrian, cyclist, or motorcyclist). Exclusion criteria were: (1) lack of informed consent; (2) insufficient or absent urine sample; (3) patients with severe mental disorders who could not provide consent and had no legal guardians available to do so.

Data Collection Procedures

Data were collected from three primary sources: patient questionnaires, medical records, and biological samples (urine). Collection took place continuously over two years, during which the ED admitted approximately 200 trauma patients per year. All healthcare providers in the emergency department, including nurses and physicians, were informed about the study protocol.

Urine samples were collected after obtaining informed consent. In cases where immediate consent was not feasible—such as with unconscious or cognitively impaired patients—a routine clinical blood sample was collected and stored anonymously. Consent was later requested during hospitalization, and patients who declined participation at that stage were excluded, and their samples discarded.

Toxicological Analysis

Biological samples were analyzed to detect the presence of illicit substances. Weekly analyses were conducted using a two-step procedure: initial screening using multi drug urine assessing methods, Ethanol consumption was determined through questionnaires from the patient or the patient's companions.

The substances screened included amphetamines, cannabis (THC), cocaine and its metabolites, and opiate derivatives such as morphine and codeine. Additionally, prescribed medications such as diazepam and midazolam were assessed. For these drugs, patient records were reviewed to determine whether administration occurred before or after the accident and prior to blood sample collection. In cases where the ratio of diazepam to its metabolite *n*-desmethyldiazepam

suggested pre-injury use, the presence of diazepam was attributed, at least partially, to use before the incident.

Substances were classified into three main categories: (1) alcohol, (2) illicit drugs, and (3) prescribed psychoactive medications. These categories were not mutually exclusive; many patients had consumed multiple substances. In such cases, the substance considered most relevant to the clinical context was identified as the primary agent.

Injury and Accident Classification

Patient injuries were classified based on medical records and categorized by the mechanism and role in the accident—pedestrian, cyclist, motorcyclist, vehicle driver, or vehicle passenger. The questionnaires collected data on the timing and location of the incident, environmental conditions, and demographic variables including age and gender. Acute intoxications were classified primarily based on self-reporting, supported by toxicology results.

Sample Handling and Validity

Urine samples were anonymized and stored appropriately before analysis. Recent findings indicated that drug stability varied, with most substances remaining stable for up to one week at room temperature in the presence of fluoride preservative. Exceptions included zopiclone and cocaine, which degraded by up to 90% and 60%, respectively. These factors were taken into account in interpreting test results.

Ethical Considerations

The study protocol was approved by the Ethics Committee of Mazandaran University of Medical Sciences. All procedures followed the ethical principles outlined in the Declaration of Helsinki. Participants were informed about the purpose and confidentiality of the study. Written informed consent was obtained from all eligible individuals. For those unable to provide consent at the time of admission, consent was requested later during hospitalization. All questionnaire and biological data were handled confidentially and anonymized to ensure privacy. Additional approvals were obtained from the university's Vice-Chancellor for Research and Technology, and appropriate permissions were secured from the hospital administration prior to data collection.

Statistical Analysis

All statistical analyses were performed using SPSS software, version 25. Descriptive statistics were calculated for all variables. Bivariate associations between substance use (alcohol and/or drugs) and injury or patient characteristics were assessed using

cross-tabulation and chi-square (χ^2) tests. Odds ratios (ORs) were computed to estimate the strength of associations. Independent t-tests were used to compare means of continuous variables such as age, with results

presented as mean \pm standard deviation and 95% confidence intervals (CIs). A p-value of less than 0.05 was considered statistically significant.

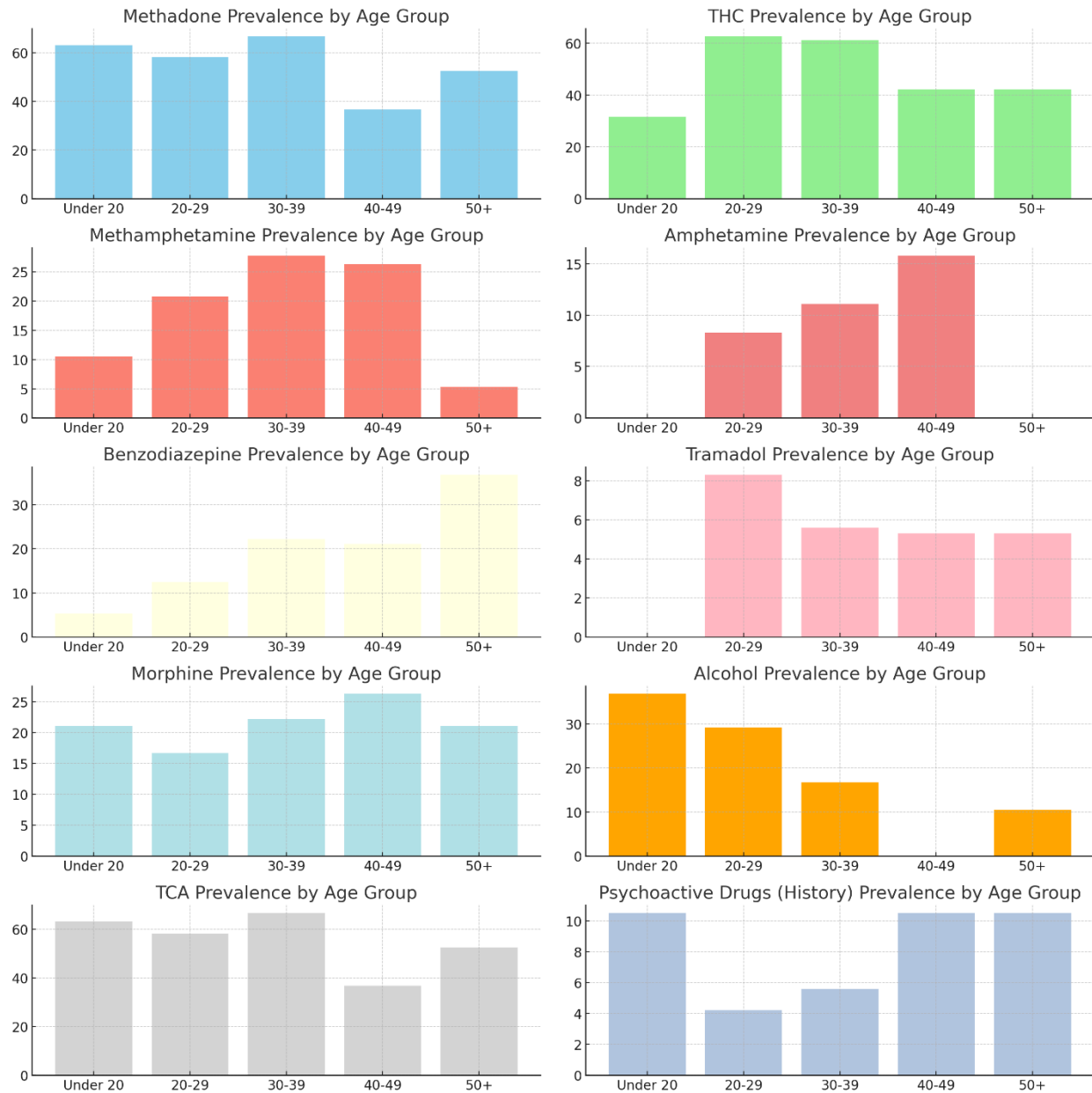


Figure 1: Prevalence of Substance Use Among Trauma Patients by Age Group

Results

A total of 99 trauma patients presenting to the emergency department of Imam Khomeini Hospital in Sari were included in the study. Urine samples were analyzed using a 10-panel drug screening test to determine the presence of illicit drugs, and psychoactive medications. Statistical analyses were performed using the Chi-square test, likelihood ratio, and Fisher’s exact

test to examine associations between substance use and demographic variables, including age, gender, and patient role in the accident (e.g., driver, pedestrian, passenger, or rider). (Figure 1)

Methadone (MTD)

Table 3 presents the results of methadone testing categorized by age group. The results indicated that:

- Age Group Below 20: None of the patients tested positive for methadone.
- Age Group 20-29: The highest prevalence of methadone consumption was observed in this group, with 58.3% testing positive.
- Age Group 40-49: A moderate prevalence of 36.8% was seen in this group.
In total, only 8.1% of the patients tested positive for methadone, while the majority (91.9%) were methadone-negative. (Table 1)

Table 1: Results of Methadone (MTD) Test by Age Group, Gender, and Accident Type

Group	Total	Negative (%)	Positive (%)	Sub-group
Age Group				
Under 20 years	19	7 (36.8%)	12 (63.2%)	Age Group: <20
20-29 years	24	10 (41.7%)	14 (58.3%)	Age Group: 20-29
30-39 years	18	6 (33.3%)	12 (66.7%)	Age Group: 30-39
40-49 years	19	12 (63.2%)	7 (36.8%)	Age Group: 40-49
50+ years	19	9 (47.4%)	10 (52.6%)	Age Group: 50+
Total (Age Group)	99	44 (44.4%)	55 (55.6%)	
Gender				
Male	82	74 (90.2%)	8 (9.8%)	Gender: Male
Female	17	17 (100.0%)	0 (0.0%)	Gender: Female
Total (Gender)	99	91 (91.9%)	8 (8.1%)	
Accident Group				
Pedestrian	10	7 (70.0%)	3 (30.0%)	Accident Group: Pedestrian
Vehicle Driver	36	34 (94.4%)	2 (5.6%)	Accident Group: Vehicle Driver
Vehicle Passenger	26	26 (100.0%)	0 (0.0%)	Accident Group: Vehicle Passenger
Motorcyclist/Cyclist	24	21 (87.5%)	3 (12.5%)	Accident Group: Motorcyclist/Cyclist
Total (Accident Group)	99	92 (92.9%)	7 (7.1%)	

Table 2: Results of Cannabis (THC) Test by Age Group, Gender, and Accident Type

Group	Total	Negative (%)	Positive (%)	Sub-group
Age Group				
Under 20 years	19	13 (68.4%)	6 (31.6%)	Age Group: <20
20-29 years	24	9 (37.5%)	15 (62.5%)	Age Group: 20-29
30-39 years	18	7 (38.9%)	11 (61.1%)	Age Group: 30-39
40-49 years	19	11 (57.9%)	8 (42.1%)	Age Group: 40-49
50+ years	19	11 (57.9%)	8 (42.1%)	Age Group: 50+
Total (Age Group)	99	51 (51.5%)	48 (48.5%)	
Gender				
Male	82	41 (50.0%)	41 (50.0%)	Gender: Male
Female	17	10 (58.8%)	7 (41.2%)	Gender: Female
Total (Gender)	99	51 (51.5%)	48 (48.5%)	
Accident Group				
Pedestrian	10	6 (60.0%)	4 (40.0%)	Accident Group: Pedestrian
Vehicle Driver	39	20 (51.3%)	19 (48.7%)	Accident Group: Vehicle Driver
Vehicle Passenger	26	10 (38.5%)	16 (61.5%)	Accident Group: Vehicle Passenger
Motorcyclist/Cyclist	24	15 (62.5%)	9 (37.5%)	Accident Group:
Total (Accident Group)	99	51 (51.5%)	48 (48.5%)	

The Chi-Square Test revealed no significant relationship between age and methadone use (p-value = 0.382, p > 0.05), indicating that age was not a determining factor for methadone consumption.

Further analysis by gender (Table 3) showed that 9.8% of male patients tested positive for methadone, compared to no female patients testing positive. The Chi-Square value was 1.804, and the p-value = 0.179, indicating no significant correlation between gender and methadone use.

Similarly, when examining methadone use across accident roles (Table 4), no significant association was found (p-value > 0.05), with methadone use occurring in pedestrians, drivers, passengers, and motorcyclists. (Table 1)

THC

THC use was found in 48.5% of the total sample, with the highest prevalence in the 20-29 age group (62.5%). A Chi-Square Test revealed no significant association

between age and hashish use (p-value = 0.212). (Table 2)

Gender analysis of hashish use showed an equal distribution among men (50.0% positive) and women (41.2% positive). The Chi-Square value was 0.439 (p-value = 0.508), indicating no significant association between gender and hashish consumption.

When analyzed by accident role, the consumption of hashish was found to be distributed among pedestrians, drivers, passengers, and motorcyclists, but no significant relationship with accidents was observed (p-value > 0.05). (Tables 2)

Table 3: Results of Methamphetamine (MET) Test by Age Group, Gender, and Accident Type

Group	Total	Methamphetamine Use (%)	No Methamphetamine	Sub-group
Age Group				
Under 20 years	19	2 (10.5%)	17 (89.5%)	Age Group: <20
20-29 years	24	5 (20.8%)	19 (79.2%)	Age Group: 20-29
30-39 years	18	5 (27.8%)	13 (72.2%)	Age Group: 30-39
40-49 years	19	5 (26.3%)	14 (73.7%)	Age Group: 40-49
50+ years	19	1 (5.3%)	18 (94.7%)	Age Group: 50+
Total (Age Group)	99	18 (18.2%)	81 (81.8%)	
Gender				
Male	82	16 (19.5%)	66 (80.5%)	Gender: Male
Female	17	2 (11.8%)	15 (88.2%)	Gender: Female
Total (Gender)	99	18 (18.2%)	81 (81.8%)	
Accident Group				
Pedestrian	10	4 (40.0%)	6 (60.0%)	Accident Group: Pedestrian
Vehicle Driver	39	7 (17.9%)	32 (82.1%)	Accident Group: Vehicle
Vehicle Passenger	26	4 (15.4%)	22 (84.6%)	Accident Group: Vehicle
Motorcyclist/Cyclist	24	3 (12.5%)	21 (87.5%)	Accident Group:
Total (Accident Group)	99	18 (18.2%)	81 (81.8%)	

Table 4: Results of Amphetamine (AMP) Test by Age Group, Gender, and Accident Type

Group	Total	Negative (%)	Positive (%)	Sub-group
Age Group				
Under 20 years	19	19 (100.0%)	0 (0.0%)	Age Group: <20
20-29 years	24	22 (91.7%)	2 (8.3%)	Age Group: 20-29
30-39 years	18	16 (88.9%)	2 (11.1%)	Age Group: 30-39
40-49 years	19	16 (84.2%)	3 (15.8%)	Age Group: 40-49
50+ years	19	19 (100.0%)	0 (0.0%)	Age Group: 50+
Total (Age Group)	99	92 (92.9%)	7 (7.1%)	
Gender				
Male	82	76 (92.7%)	6 (7.3%)	Gender: Male
Female	17	16 (94.1%)	1 (5.9%)	Gender: Female
Total (Gender)	99	92 (92.9%)	7 (7.1%)	
Accident Group				
Pedestrian	10	7 (70.0%)	3 (30.0%)	Accident Group: Pedestrian
Vehicle Driver	39	38 (97.4%)	1 (2.6%)	Accident Group: Vehicle Driver
Vehicle Passenger	26	25 (96.2%)	1 (3.8%)	Accident Group: Vehicle Passenger
Motorcyclist/Cyclist	24	22 (91.7%)	2 (8.3%)	Accident Group: Motorcyclist/Cyclist
Total (Accident Group)	99	92 (92.9%)	7 (7.1%)	

Methamphetamine

Results showed that 18.2% of the sample tested positive. The highest prevalence of methamphetamine use was found in the 30-39 age group (27.8%). However, the Chi-Square test indicated no significant relationship between age and methamphetamine use (p-value = 0.292). (Table 3)

Similarly, when analyzing by gender, 19.5% of male patients tested positive, compared to 11.8% of female

patients. The Chi-Square value was 0.568 (p-value = 0.451), which revealed no significant relationship between gender and methamphetamine use.

The consumption of methamphetamine was also observed across all accident groups but no significant association with accident occurrence was found (p-value > 0.05). (Table 3)

Amphetamine (AMP)

The study analyzed the prevalence of amphetamine (AMP) use among 99 accident victims. The overall prevalence of amphetamine use was 7.1%, with 92.9% of the patients testing negative for the substance. (Table 4)

The highest prevalence of amphetamine use was observed in the 20–39 age groups, with 8.3% in the 20–

29 years group and 11.1% in the 30–39 years group. However, no amphetamine use was detected in the under 20 years and 50+ years age groups. The Chi-Square test revealed no significant association between age and amphetamine use ($\chi^2 = 5.595$, $df = 4$, $p = 0.232$), indicating that age did not significantly influence the prevalence of amphetamine use.

Table 5: Results of Benzodiazepines (BZD) Test by Age Group, Gender, and Accident Type

Group	Total	Negative (%)	Positive (%)	Sub-group
Age Group				
Under 20 years	19	18 (94.7%)	1 (5.3%)	Age Group: <20
20-29 years	24	21 (87.5%)	3 (12.5%)	Age Group: 20-29
30-39 years	18	14 (77.8%)	4 (22.2%)	Age Group: 30-39
40-49 years	19	15 (78.9%)	4 (21.1%)	Age Group: 40-49
50+ years	19	12 (63.2%)	7 (36.8%)	Age Group: 50+
Total (Age Group)	99	80 (80.8%)	19 (19.2%)	
Gender				
Male	82	66 (80.5%)	16 (19.5%)	Gender: Male
Female	17	14 (82.4%)	3 (17.6%)	Gender: Female
Total (Gender)	99	80 (80.8%)	19 (19.2%)	
Accident Group				
Pedestrian	10	8 (80.0%)	2 (20.0%)	Accident Group: Pedestrian
Vehicle Driver	39	29 (74.4%)	10 (25.6%)	Accident Group: Vehicle Driver
Vehicle Passenger	26	23 (88.5%)	3 (11.5%)	Accident Group: Vehicle Passenger
Motorcyclist/Cyclist	24	20 (83.3%)	4 (16.7%)	Accident Group: Motorcyclist/Cyclist
Total (Accident Group)	99	80 (80.8%)	19 (19.2%)	

Table 6: Results of Tramadol (TML) Test by Age Group, Gender, and Accident Type

Group	Total	Negative (%)	Positive (%)	Sub-group
Age Group				
Under 20 years	19	19 (100.0%)	0 (0.0%)	Age Group: <20
20-29 years	24	22 (91.7%)	2 (8.3%)	Age Group: 20-29
30-39 years	18	17 (94.4%)	1 (5.6%)	Age Group: 30-39
40-49 years	19	18 (94.7%)	1 (5.3%)	Age Group: 40-49
50+ years	19	18 (94.7%)	1 (5.3%)	Age Group: 50+
Total (Age Group)	99	94 (94.9%)	5 (5.1%)	
Gender				
Male	82	77 (93.9%)	5 (6.1%)	Gender: Male
Female	17	17 (100.0%)	0 (0.0%)	Gender: Female
Total (Gender)	99	94 (94.9%)	5 (5.1%)	
Accident Group				
Pedestrian	10	10 (100.0%)	0 (0.0%)	Accident Group: Pedestrian
Vehicle Driver	39	36 (92.3%)	3 (7.7%)	Accident Group: Vehicle Driver
Vehicle Passenger	26	24 (92.3%)	2 (7.7%)	Accident Group: Vehicle Passenger
Motorcyclist/Cyclist	24	24 (100.0%)	0 (0.0%)	Accident Group: Motorcyclist/Cyclist
Total (Accident Group)	99	94 (94.9%)	5 (5.1%)	

Amphetamine use was slightly more common among men (7.3%) than women (5.9%). The Chi-Square test revealed no significant association between gender and amphetamine use ($\chi^2 = 0.044$, $p = 0.834$), suggesting that gender does not play a significant role in amphetamine consumption.

Amphetamine use was observed in all accident roles, with the highest prevalence in pedestrians (30.0%).

However, the association between amphetamine use and accident role was not statistically significant (p -value > 0.05), indicating that amphetamine consumption did not significantly correlate with the type of accident role. (Table 4)

Benzodiazepines (BZD)

The prevalence of benzodiazepine (BZD) use was examined among 99 accident victims. The overall prevalence of benzodiazepine use was 19.2%, with 80.8% of the patients testing negative for the substance. (Table 5)

The highest prevalence of benzodiazepine use was found in patients aged 50 years and older, where 36.8%

of individuals tested positive. The prevalence was also noticeable in the 30–39 years and 40–49 years age groups, with 22.2% and 21.1% testing positive, respectively. However, the Chi-Square test showed no significant association between age and benzodiazepine use ($\chi^2 = 7.035$, $df = 4$, $p = 0.134$), indicating that age did not significantly influence the prevalence of benzodiazepine use.

Table 7: Results of Morphine (MOR) Test by Age Group, Gender, and Accident Type

Group	Total	Negative (%)	Positive (%)	Sub-group
Age Group				
Under 20 years	19	15 (78.9%)	4 (21.1%)	Age Group: <20
20-29 years	24	20 (83.3%)	4 (16.7%)	Age Group: 20-29
30-39 years	18	14 (77.8%)	4 (22.2%)	Age Group: 30-39
40-49 years	19	14 (73.7%)	5 (26.3%)	Age Group: 40-49
50+ years	19	15 (78.9%)	4 (21.1%)	Age Group: 50+
Total (Age Group)	99	80 (80.8%)	19 (19.2%)	
Gender				
Male	82	66 (80.5%)	16 (19.5%)	Gender: Male
Female	17	14 (82.4%)	3 (17.6%)	Gender: Female
Total (Gender)	99	80 (80.8%)	19 (19.2%)	
Accident Group				
Pedestrian	10	7 (70.0%)	3 (30.0%)	Accident Group: Pedestrian
Vehicle Driver	39	33 (84.6%)	6 (15.4%)	Accident Group: Vehicle Driver
Vehicle Passenger	26	21 (80.8%)	5 (19.2%)	Accident Group: Vehicle Passenger
Motorcyclist/Cyclist	24	19 (79.2%)	5 (20.8%)	Accident Group: Motorcyclist/Cyclist
Total (Accident Group)	99	80 (80.8%)	19 (19.2%)	

Table 8: Results of Drug History (Drug HX) by Age Group, Gender, and Accident Type

Group	Total	Drug History (%)	No Drug History (%)	Sub-group
Age Group				
Under 20 years	19	2 (10.5%)	17 (89.5%)	Age Group: <20
20-29 years	24	1 (4.2%)	23 (95.8%)	Age Group: 20-29
30-39 years	18	1 (5.6%)	17 (94.4%)	Age Group: 30-39
40-49 years	19	2 (10.5%)	17 (89.5%)	Age Group: 40-49
50+ years	19	2 (10.5%)	17 (89.5%)	Age Group: 50+
Total (Age Group)	99	8 (8.1%)	91 (91.9%)	
Gender				
Male	82	7 (8.5%)	75 (91.5%)	Gender: Male
Female	17	1 (5.9%)	16 (94.1%)	Gender: Female
Total (Gender)	99	8 (8.1%)	91 (91.9%)	
Accident Group				
Pedestrian	10	1 (10.0%)	9 (90.0%)	Accident Group: Pedestrian
Vehicle Driver	39	2 (5.1%)	37 (94.9%)	Accident Group: Vehicle Driver
Vehicle Passenger	26	3 (11.5%)	23 (88.5%)	Accident Group: Vehicle Passenger
Motorcyclist/Cyclist	24	2 (8.3%)	22 (91.7%)	Accident Group: Motorcyclist/Cyclist
Total (Accident Group)	99	8 (8.1%)	91 (91.9%)	

Benzodiazepine use was slightly higher among men (19.5%) compared to women (17.6%). The Chi-Square test revealed no significant association between gender and benzodiazepine use ($\chi^2 = 0.032$, $p = 0.859$), suggesting that gender did not play a significant role in benzodiazepine consumption.

Benzodiazepine use was observed in all accident roles, with the highest prevalence among vehicle drivers (25.6%). However, no significant association was found

between benzodiazepine use and accident role (p -value > 0.05), indicating that benzodiazepine consumption did not significantly correlate with the type of accident role. (Table 5)

Tramadol (TML)

The overall prevalence of tramadol use was 5.1%, with 94.9% of patients testing negative for the substance. Tramadol use was more prevalent in the 20–

29 years age group (8.3%), although the differences between age groups were not statistically significant ($\chi^2 = 1.563$, $df = 4$, $p = 0.815$), indicating no meaningful correlation between tramadol use and age. (Table 6)

When analyzed by gender, 6.1% of male patients tested positive for tramadol, while no females tested positive. The Chi-Square test showed no significant

association between gender and tramadol use ($\chi^2 = 1.092$, $p = 0.296$).

Tramadol was detected across various accident roles, with drivers and passengers having the highest prevalence of use (7.7% in both groups). However, no significant relationship was found between tramadol use and accident occurrence (p -value > 0.05). (Table 6)

Table 9: Results of Alcohol Consumption by Age Group, Gender, and Accident Type

Group	Total	Alcohol Consumption (%)	No Alcohol Consumption (%)	Sub-group
Age Group				
Under 20 years	19	7 (36.8%)	12 (63.2%)	Age Group: <20
20-29 years	24	7 (29.2%)	17 (70.8%)	Age Group: 20-29
30-39 years	18	3 (16.7%)	15 (83.3%)	Age Group: 30-39
40-49 years	19	0 (0.0%)	19 (100.0%)	Age Group: 40-49
50+ years	19	2 (10.5%)	17 (89.5%)	Age Group: 50+
Total (Age Group)	99	19 (19.2%)	80 (80.8%)	
Gender				
Male	82	19 (23.2%)	63 (76.8%)	Gender: Male
Female	17	0 (0.0%)	17 (100.0%)	Gender: Female
Total (Gender)	99	19 (19.2%)	80 (80.8%)	
Accident Group				
Pedestrian	10	0 (0.0%)	10 (100.0%)	Accident Group: Pedestrian
Vehicle Driver	39	7 (17.9%)	32 (82.1%)	Accident Group: Vehicle
Vehicle Passenger	26	3 (11.5%)	23 (88.5%)	Accident Group: Vehicle
Motorcyclist/Cyclist	24	9 (37.5%)	15 (62.5%)	Accident Group:
Total (Accident Group)	99	19 (19.2%)	80 (80.8%)	

Table 10: Results of Tricyclic Antidepressant (TCA) Use by Age Group, Gender, and Accident Type

Group	Total	Negative (%)	Positive (%)	Sub-group
Age Group				
Under 20 years	19	7 (36.8%)	12 (63.2%)	Age Group: <20
20-29 years	24	10 (41.7%)	14 (58.3%)	Age Group: 20-29
30-39 years	18	6 (33.3%)	12 (66.7%)	Age Group: 30-39
40-49 years	19	12 (63.2%)	7 (36.8%)	Age Group: 40-49
50+ years	19	9 (47.4%)	10 (52.6%)	Age Group: 50+
Total (Age Group)	99	44 (44.4%)	55 (55.6%)	
Gender				
Male	82	66 (80.5%)	16 (19.5%)	Gender: Male
Female	17	14 (82.4%)	3 (17.6%)	Gender: Female
Total (Gender)	99	80 (80.8%)	19 (19.2%)	
Accident Group				
Pedestrian	10	8 (80.0%)	2 (20.0%)	Accident Group: Pedestrian
Vehicle Driver	39	16 (41.0%)	23 (59.0%)	Accident Group: Vehicle Driver
Vehicle Passenger	26	11 (42.3%)	15 (57.7%)	Accident Group: Vehicle Passenger
Motorcyclist/Cyclist	24	9 (37.5%)	15 (62.5%)	Accident Group: Motorcyclist/Cyclist
Total (Accident Group)	99	44 (44.4%)	55 (55.6%)	

Morphine (MOR)

Morphine was detected in 19.2% of the sample, with the highest prevalence observed in the 40–49 years group (26.3%). The Chi-Square test showed no significant relationship between morphine use and age ($p > 0.05$).

In terms of gender, 19.5% of male patients tested positive for morphine, compared to 17.6% of females. No significant association between gender and morphine use was found ($\chi^2 = 0.032$, $p = 0.859$).

Morphine use was observed across all accident roles, but no significant correlation was found between

morphine use and accident occurrence (p -value > 0.05). (Table 7)

Psychoactive Medication History

A total of 8.1% of patients reported a history of using psychoactive medications. The highest prevalence was found in both the under 20 years and 40–49 years age groups (10.5% in each). However, the Chi-Square test revealed no significant association between psychoactive medication history and age, gender, or accident role ($p > 0.05$).

The analysis of accident roles showed that psychoactive medication history was observed across all roles, but no significant relationship was found with the occurrence of accidents (p -value > 0.05). (Table 8)

Alcohol

The prevalence of alcohol consumption across age groups (Table 9) revealed that 19.2% of patients tested positive for alcohol, with the highest consumption observed in the under 20 group (36.8%). A Chi-Square test indicated a significant relationship between alcohol use and accidents (p -value = 0.035), suggesting that alcohol consumption was more prevalent among accident victims in younger age groups.

When examined by gender (Table 9), 23.2% of men tested positive for alcohol, compared to no women. The Chi-Square value was 4.875 (p -value = 0.027), indicating a significant association between gender and alcohol use.

However, when analyzing accident role (Table 9), alcohol use was observed across all groups, but no significant relationship with accident occurrence was found (p -value > 0.05).

Tricyclic Antidepressants (TCA)

The results for tricyclic antidepressant (TCA) use by age group showed that 55.6% of patients tested positive for TCAs, with the highest prevalence observed in the 30–39 age group (66.7%). The Chi-Square test revealed no significant association between age and TCA use (p -value > 0.05).

Gender analysis showed that 19.5% of men and 17.6% of women tested positive for TCAs. No significant relationship was found between gender and TCA use (p -value > 0.05).

Lastly, when analyzed by accident role (Table 4–29), TCA use was found across all groups, but no significant association with accident occurrence was detected (p -value > 0.05). (Table 10)

Discussion

Methadone was detected in 8.1% of patients, most commonly among those aged 20–29 and 40–49, but no statistically significant association with age, sex, or

accident role was observed. Cannabis (THC), with an overall prevalence of 48.5%, was among the most frequently detected substances, especially in the 20–39 age range. Again, no significant association with demographic or accident variables was found. Methamphetamine (MET) was present in 18.2% of patients, most frequently in individuals aged 30–49. Amphetamine (AMP) use was less common (7.1%) and concentrated in the 40–49 age group. Benzodiazepines (BZD) were identified in 19.2% of cases, primarily in patients aged ≥ 50 . Tramadol (TML) had the lowest overall prevalence (5.1%), and morphine (MOR) matched BZD in prevalence at 19.2%, with the highest frequency in patients aged 40–49. Notably, alcohol was the only substance that showed statistically significant associations with both age ($p = 0.035$) and gender ($p = 0.027$), being most prevalent among males under 30 years. Tri-cyclic antidepressants (TCA) had the highest overall use at 55.6%, particularly in patients aged 30–39, though this did not significantly vary by any demographic factor. Overall, while substances like TCA, THC, morphine, and BZD were frequently detected, only alcohol use showed a meaningful correlation with patient characteristics. This suggests that other substances, though prevalent, may be more evenly distributed across demographic groups or influenced by variables not captured in this study.

The findings of this study, which explored substance use among trauma patients in an emergency setting, align with previous research that has highlighted the frequent presence of alcohol, cannabis, and psychoactive medications among individuals presenting with injuries (21–24). Similar to past studies, alcohol emerged as the most statistically significant substance associated with demographic characteristics such as age and gender, particularly in younger male patients (25, 26).

Multiple studies conducted in urban emergency departments and trauma centers globally have consistently reported alcohol as the most prevalent substance among injured patients (21, 27). For example, research from Brazil and the United States has demonstrated that alcohol is commonly detected upon ED admission in cases of traffic accidents, violence, and falls (28). Studies also report that alcohol use is particularly prominent among younger males and individuals injured during nighttime hours (4, 29, 30).

Cannabis use was also widely observed in this study, corroborating earlier research in trauma settings where cannabis has been identified as a frequently used substance, often ranking just behind alcohol in prevalence. While the present study did not find a statistically significant relationship between cannabis use and accident involvement, previous investigations have raised concerns about its role in impairing

judgment and motor coordination, potentially increasing injury risk (31-33). However, like in our study, those investigations also noted inconsistencies in the statistical strength of this association.

Regarding stimulants such as methamphetamine and amphetamines, our study observed notable usage patterns that are consistent with trends identified in other trauma-focused research. Internationally, several trauma centers have documented a shift in the profile of substance use, with a growing proportion of patients presenting with stimulant-related intoxication. These substances are often linked to altered mental status, aggressive behavior, and prolonged hospital stays, even when they are not significantly associated with mortality or injury severity in every case (34, 35).

The detection of opioids, particularly morphine and tramadol, in the current study corresponds with previous work showing their regular presence in trauma and ED patients. While some opioids may be administered post-injury for pain management, the presence of opioids in pre-admission testing has raised clinical concerns, especially when used in combination with other depressants such as benzodiazepines. Earlier studies from trauma centers in North America and Europe have highlighted the clinical complexity of managing patients with opioid and sedative co-use due to increased risk of respiratory depression and poor outcomes (36, 37).

The high frequency of tricyclic antidepressants (TCA) and benzodiazepines observed in this study reflects findings from other emergency care studies, where such medications are often detected, especially among older patients or those with psychiatric comorbidities. However, as in our study, these medications have not consistently demonstrated a clear, statistically significant relationship with injury causation, suggesting their use may often be incidental rather than directly contributory to the traumatic event (47).

Most notably, the significant association between alcohol use and both age and sex observed in this study reinforces findings from numerous international trauma studies. Alcohol consistently emerges as a primary contributor to road traffic accidents and interpersonal violence. In contrast, other substances, despite their high detection rates, have shown more variable and context-dependent associations with injury occurrence and severity (38).

While the overall substance use patterns identified in this study mirror global trends observed in trauma and emergency care literature, the unique finding of alcohol being the only substance with a statistically significant link to demographics highlights its persistent and well-documented role in injury risk. These parallels support the importance of targeted interventions focusing on

alcohol use among high-risk groups in trauma prevention strategies.

Despite offering valuable insights into substance use patterns in trauma patients, this study faced several limitations. First, the small sample size limited the statistical power to detect significant associations. Second, the study was conducted in a single hospital, potentially limiting generalizability to other regions or populations. The reliance solely on urine testing presents another limitation, as it only detects recent use and does not indicate blood concentration, chronic use, or psychological impairment at the time of the incident. Blood level analysis—more indicative of real-time intoxication—was not performed.

Clinical outcomes such as injury severity, ICU admission, or mortality were not assessed, preventing conclusions about the impact of substance use on trauma severity. Furthermore, patient psychiatric or substance use histories were not comprehensively documented, and variables like psychiatric disorders, chronic use, and comorbidities were not controlled. Some data—such as drug history—relied on patient self-report, which may be subject to recall bias or intentional underreporting. The cross-sectional design limits causal interpretation; it cannot determine whether substance use directly caused the accidents or whether other factors (e.g., stress, fatigue) co-contributed. Lastly, while 10-panel kits offer broad detection, they may lack specificity and sensitivity for certain drugs or result in cross-reactivity, affecting test accuracy.

Conclusion

This study on 99 trauma patients found that while various substances—including antidepressants, cannabis, and opioids—were commonly detected, only alcohol showed a significant association with age and gender, being most prevalent among young men. No other substance was linked to patient demographics or accident role, highlighting alcohol as a key risk factor and underscoring the need for targeted prevention and broader research into substance-related trauma.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this study. The research was conducted without any financial or commercial interests influencing the design, execution, or publication of the findings.

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Ethical Approval

The study protocol was reviewed and approved by the Ethics Committee of Mazandaran University of Medical Sciences. All participants provided written informed consent prior to inclusion in the study. In cases

where consent could not be obtained at the time of admission due to clinical conditions, consent was requested later during hospitalization.

Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

References

- Cherpitel CJ. Focus on: the burden of alcohol use--trauma and emergency outcomes. *Alcohol Res.* 2013;35(2):150-4.
- Esmaeilnejad-Ganji S M, Karimi Nasab M H. Risk Factors for Fatal Traffic Accidents: A Narrative Review. *J Emerg Health Care* 2019; 8 (1) :1-9
- Blandino A, Cotroneo R, Tambuzzi S, Di Candia D, Genovese U, Zoja R. Driving under the influence of drugs: correlation between blood psychoactive drug concentrations and cognitive impairment. A narrative review taking into account forensic issues. *Forensic science international: Synergy.* 2022; 4:100224.
- Chikritzhs T, Livingston M. Alcohol and the Risk of Injury. *Nutrients.* 2021;13(8).
- LEAD A. Addressing Alcohol-Related Harms: A Population Level Response. 2019.
- Hofman K, Primack A, Keusch G, Hrynkow S. Addressing the growing burden of trauma and injury in low-and middle-income countries. *American journal of public health.* 2005;95(1):13-7.
- Juillard CJ, Mock C, Goosen J, Joshipura M, Civil I. Establishing the evidence base for trauma quality improvement: a collaborative WHO-IATSIC review. *World journal of surgery.* 2009;33(5):1075-86.
- Borges G, Cherpitel CJ, Orozco R, Bond J, Ye Y, Macdonald S, et al. Acute alcohol use and the risk of non-fatal injury in sixteen countries. *Addiction.* 2006;101(7):993-1002.
- Cherpitel CJ. Alcohol and injuries: a review of international emergency room studies. *Addiction.* 1993;88(7):923-37.
- Isles S, McBride P, Gee P, Fleischer D, Kappatos D, Pandey R, et al. Prevalence of psychoactive drugs in injured patients presenting to an emergency department. *Emerg Med Australas.* 2023;35(1):25-33.
- Belete H, Yimer TM, Dawson D, Espinosa DC, Ambaw F, Connor JP, et al. Alcohol use and alcohol use disorders in sub-Saharan Africa: A systematic review and meta-analysis. *Addiction.* 2024; 119(9):1527-40.
- Bogstrand ST, Normann PT, Rossow I, Larsen M, Mørland J, Ekeberg Ø. Prevalence of alcohol and other substances of abuse among injured patients in a Norwegian emergency department. *Drug and alcohol dependence.* 2011;117(2-3):132-8.
- Latkin CA, Edwards C, Davey-Rothwell MA, Tobin KE. The relationship between social desirability bias and self-reports of health, substance use, and social network factors among urban substance users in Baltimore, Maryland. *Addict Behav.* 2017;73:133-6.
- Chauhan RP, Dessie ZG, Noreddin A, El Zowalaty ME. Systematic Review of Important Viral Diseases in Africa in Light of the 'One Health' Concept. *Pathogens.* 2020;9(4).
- Fogerdi M, Zia R, Dalili A, Maleki F. Evaluation Of The Mechanism, Type, Severity And Pattern Of Injury In Multiple Trauma Patients Referred To The Emergency Department. *J Emerg Health Care* 2023; 12 (4) :82-94
- Normand J, Lempert RO, O'Brien CP, Council NR. Detecting and Assessing Alcohol and Other Drug Use. Under the Influence? *Drugs and the American Work Force: National Academies Press (US);* 1994.
- Wolff K, Gossop M. A brief overview of the detection of drug and alcohol use: The matching of purposes and procedures. K, Wolff, J, White, S Karch,,(Eds),

The SAGE handbook of drug & alcohol studies: Biological approaches. 2016:309.

18. Hadland SE, Levy S. Objective testing: urine and other drug tests. *Child and Adolescent Psychiatric Clinics*. 2016;25(3):549-65.
19. Dora J, Piccirillo M, Foster KT, Arbeau K, Armeli S, Auriacombe M, et al. The daily association between affect and alcohol use: A meta-analysis of individual participant data. *Psychological Bulletin*. 2023; 149(1-2):1.
20. Carmona Araújo A, Casal RJ, Goulão J, Martins AP. Misuse of psychoactive medicines and its consequences in the European Union—a scoping review. *Journal of Substance Use*. 2024;29(4):629-40.
21. Lau G, Ang JY, Kim N, Gabbe BJ, Mitra B, Dietze PM, et al. Prevalence of Alcohol and Other Drug Use in Patients Presenting to Hospital for Violence-Related Injuries: A Systematic Review. *Trauma Violence Abuse*. 2024;25(1):306-26.
22. Metrik J, Gunn RL, Jackson KM, Sokolovsky AW, Borsari B. Daily Patterns of Marijuana and Alcohol Co-Use Among Individuals with Alcohol and Cannabis Use Disorders. *Alcohol Clin Exp Res*. 2018;42(6):1096-104.
23. Gamboa D, Kabashi S, Jørgenrud B, Lerdal A, Nordby G, Bogstrand ST. Is alcohol and psychoactive medication use associated with excess hospital length-of-stay and admission frequency? A cross-sectional, observational study. *BMC Emerg Med*. 2024;24(1):63.
24. Cherpitel CJ, Ye Y, Watters K, Brubacher JR, Stenstrom R. Risk of injury from alcohol and drug use in the emergency department: a case-crossover study. *Drug Alcohol Rev*. 2012;31(4):431-8.
25. Schulte MT, Ramo D, Brown SA. Gender differences in factors influencing alcohol use and drinking progression among adolescents. *Clin Psychol Rev*. 2009;29(6):535-47.
26. White AM. Gender Differences in the Epidemiology of Alcohol Use and Related Harms in the United States. *Alcohol Res*. 2020;40(2):01.
27. Pauley A, Thatcher EC, Sarafian JT, Zadey S, Shayo F, Mmbaga BT, et al. Alcohol use among emergency medicine department patients in Tanzania: A comparative analysis of injury versus non-injury patients. *PLoS Glob Public Health*. 2023;3(11):e0001900.
28. Bombana HS, Bogstrand ST, Gjerde H, Jamt REG, Carvalho HBd, Andreuccetti G, et al. Use of alcohol and illicit drugs by trauma patients in Sao Paulo, Brazil. *Injury*. 2022;53(1):30-6.
29. Pedrelli P, Shapero B, Archibald A, Dale C. Alcohol use and depression during adolescence and young adulthood: a summary and interpretation of mixed findings. *Curr Addict Rep*. 2016;3(1):91-7.
30. Montazer S H, Hosseinienejad S M, Bozorgi F, Assadi T, Hashemi S N, Lotfipour M et al . Epidemiology of Injuries Caused By Motor Accidents in Patients Referred To Emergency Department of A Trauma Center Hospital in North of Iran. *J Emerg Health Care* 2019; 8 (1) :10-18
31. Preuss UW, Huestis MA, Schneider M, Hermann D, Lutz B, Hasan A, et al. Cannabis Use and Car Crashes: A Review. *Front Psychiatry*. 2021;12:643315.
32. Aston ER, Merrill JE, McCarthy DM, Metrik J. Risk Factors for Driving After and During Marijuana Use. *J Stud Alcohol Drugs*. 2016;77(2):309-16.
33. Sewell RA, Poling J, Sofuoglu M. The effect of cannabis compared with alcohol on driving. *Am J Addict*. 2009;18(3):185-93.
34. Girasek H, Nagy VA, Fekete S, Ungvari GS, Gazdag G. Prevalence and correlates of aggressive behavior in psychiatric inpatient populations. *World J Psychiatry*. 2022;12(1):1-23.
35. Caruso R, Antenora F, Riba M, Belvederi Murri M, Biancosino B, Zerbinati L, et al. Aggressive Behavior and Psychiatric Inpatients: a Narrative Review of the Literature with a Focus on the European Experience. *Curr Psychiatry Rep*. 2021;23(5):29.
36. Family HE, Vojt G, Poulter H, Bailey CP, Abdala Sheikh AP, Cavallo D, et al. A qualitative study of benzodiazepine/z-drug and opioid co-use patterns and overdose risk. *Harm Reduction Journal*. 2025;22(1):24.
37. van Amsterdam J, van den Brink W. Designer benzodiazepines: Availability, motives, and fatalities. A systematic narrative review of human studies. *Drug and Alcohol Dependence*. 2025:112708.
38. Garakani A, Murrough JW, Freire RC, Thom RP, Larkin K, Buono FD, et al. Pharmacotherapy of Anxiety Disorders: Current and Emerging Treatment Options. *Front Psychiatry*. 2020;11:595584.