

Psychoactive Substance Use Among Trauma Victims: A Preliminary Study

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Background: Psychoactive substance use has been linked to trauma. The present work has been done in our community to determine prospectively psychoactive substance use in 92 trauma victims (58.7% car drivers, 13% pedestrians, 10.9% bicyclists, and 17.4% victims of other forms of trauma).

Subjects & Methods: All were admitted directly from the scene of injury, screened for some psychoactive substances in urine samples, and interviewed for psychoactive substance use. A total of 42 out of 92 samples (45.65%) were screen-positive.

Results: The prevalence of positive screens among car drivers was 48.1%, among pedestrians was 33.3%, among bicyclists was 60%, and among victims of other types of trauma was 37.5%. Out of total of 42 screen-positive samples, 10 samples (23.81%) were positive for a single drug, 26 samples (61.9%) were positive for two drugs, and 6 samples (14.29%) were positive for three drugs. The samples were positive for cannabinoids, opiates, ethanol, benzodiazepines, and

barbiturates. Cannabinoids, opiates, ethanol and, benzodiazepines were the most frequently encountered substances. Patients psychiatric interview revealed that all the screen-positive victims had a history of current use of substances detected in urine, and some screen-negative victims had a history-of current use of cannabis and benzodiazepines. In addition, victims from both groups had a history of current use of nicotine (Smoking) and other substances as benzhexol (Parkinol) and some over-the-counter preparations. 36 victims (39.13% of total) had the criteria items of substance abuse, 18 victims (19.6% of total) had the criteria items of dependence on substances other than nicotine, and 50 victims (54.4% of total) had the criteria items of dependence on substances including nicotine.

Conclusion: These data are to be considered in determining legal responsibility, and in planning strategies, aiming at the prevention of substance related injuries.

Keywords: Trauma victims, Psychoactive substance, Substance use, Preliminary study.

Abbreviations:

DSM IV: *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition.

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INTRODUCTION

Trauma is an inevitable event in modern life, causing significant morbidity and mortality among the victims. There is a growing interest in investigating the etiology, contributing factors, and circumstances of trauma with the aim to find out suitable preventive measures.

Drug use has been implicated as a contributing factor to nearly all types of trauma including vehicular accidents (In cars, planes, boats, and trains), head injury, injury from falling, electrocution, and drowning (Sloan, et al. 1989, and Senay, 1991). In fact, drug use has been reported in a significant proportion of trauma victims all over the world (Rivara, et al. 1989; Kirby, et al. 1992; Rivara, et al. 1993; Li, et al. 1997; Borges, et al. 2004; and Blondell, et al. 2005).

In our community, there is a growing concern about the increasing incidence of traumatic injuries particularly road traffic injuries. It is an urgent need to investigate the causes and possible predisposing factors for such

injuries. The documentation and characterization of the presence of substance use in association with different forms of trauma is worthwhile. The present study aims at preliminary determination of the prevalence of psychoactive substance use in victims of vehicular trauma (Including drivers, pedestrians, and bicyclists), and non-vehicular trauma (Unintentional trauma & assault) presented to Mansoura Emergency Hospital from January 2006 through February 2007. This may be useful for legal purposes and for the prevention or reduction of psychoactive substance-related trauma.

PATIENTS AND METHODS

The potential study candidates were trauma victims who were admitted directly from the scene of injury to Mansoura Emergency Hospital, including car drivers (In particular), pedestrians, bicyclists, and victims of other traumatic conditions as unintentional trauma & assault. A total of 92 injured patients including 54 car drivers,

12 pedestrians, 10 bicyclists, and 16 victims of other traumatic conditions were studied. They were admitted to the hospital within few hours after the accident, and gave a free consent to participate in the study after being informed that the obtained results would be for medical and research purposes only without any legal responsibility on their part. Some victims were included on the request of their families and also after giving consent. Exclusion criteria included refusal or inability to give consent and being deemed inappropriate for the study by one's attending physician.

Urine samples:

About 10ml urine samples were obtained from the victims once they were catheterized on hospital admission. The samples were preserved at -20° C, and were analyzed for drugs only after obtaining the consent from the patient.

Laboratory analysis:

The samples were analyzed for a list of drugs of abuse in the hospital laboratory. The list included benzodiazepines, cannabinoids, barbiturates, opioids, ethanol, cocaine, and amphetamine. Immunoassay methods were applied for drug detection using Syva Solaris equipments.

Patient interview:

Patients were interviewed for the criteria of substance use disorders, whether dependence or abuse, as defined by "The Diagnostic and Statistical Manual of Mental Disorders", 4th edition (DSM-IV), developed by the "American Psychiatric Association" (Frances, et al. 1994). According to DSM-IV, dependence has seven criteria items, at least three of which are necessary to make a diagnosis of dependence (Table 1). Substance abuse, according to DSM-IV, means problematic drug use in the absence of compulsion, tolerance, and withdrawal (Table 1).

Patients were interviewed according to the instructions for clinical diagnostic interview for substance use disorders (Senay, 1997), by two psychiatrists who were blinded to the results of urine screens. The interview settings were conducted in privacy with insist on confidentiality. Patients were interrogated, in understandable language, about current substance use i.e. within 6 months prior to the injury (Soderstrom, et al. 1992), need to increase the dose of the drug to obtain the desired effects (Tolerance), symptoms occurring when doses were reduced or delayed (Withdrawal symptoms (Table 2) Patient interrogation lasted from 15-25 minutes according to the patient response. During the interview, two screening psychological tests were applied.

1. The drug Abuse Screening Test DAST (Skinner, 1982) which is 20 yes or no questions, 0=non reported, 1 -5=low level, 6—10=moderate level, 11-15=substantial level and 16-20=severe level.

2. The Fagerstrom's test for nicotine dependence, (Heatherton, et al. 1991). Which is a simple 6 yes or no question, 0:very low dependence 3:4=low dependence, 5=medium dependence, 8-10=very high dependence.

Table 1: Criteria items of dependence and abuse according to DSM-IV:

Dependence	Abuse
Three items of:	One or more of the following occurring over the same twelve month period.
1) Tolerance.	1) Recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home.
2) Withdrawal.	2) Recurrent substance use in situations in which it is physically hazardous.
3) The substance is often taken in large amounts or over a longer period than was intended.	3) Recurrent substance-related legal problems.
4) Any unsuccessful effort or a persistent desire to cut down or control substance use.	4) Continued substance use despite having persistent or recurrent social or interpersonal problems cause or exacerbated by the effects of the substance.
5) A great deal of time is spent in activities necessary to obtain substance or recover from its effects.	Never met criteria for dependence.
6) Important social, occupational, or recreational activities given up or reduced because of substance use.	
7) Continued substance use despite knowledge of having had a persistent or recurrent physical or psychological problems that are likely to be caused or exacerbated by the substance.	
(Frances, et al. 1994)	

Table 2: Drug classes about which patients were interrogated:

Drug class	Examples
Ethanol	Beer, wine, whisky, other beverages.
Cannabinoids	Hashish, bango.
Central nervous system depressants	Barbiturates (as comital), sedatives as benzodiazepine
Stimulants	Amphetamine, cocaine
Opioids	Morphine, heroin, codeine, nefopam.
Hallucinogens	Khat, LSD (lysergic acid diethylamide).
Inhalants	Glue, paint, hydrocarbons.
Over-the-counter drugs	Cough suppressant preparations, antihistaminics.
Nicotine	Cigarettes, pipes, goza.

RESULTS

Only 92 of a total 150 trauma victims (30.67%), gave a free (informed) consent to participate in the study from January 2006 through February 2007. The victims, were 88 males (95.7% of total), and 4 females (4.3% of total). Categories and age range of the studied trauma victims, as well as the number of screen positive samples in each category are shown in table 3. A total of 42 out of 92 samples (45.65%) were screen-positive.

The prevalence of positive screens among car drivers was 48.1%, among pedestrians was 33.3%, among bicyclists was 60%, and among victims of other types of trauma was 37.5%. The average age of screen-positive victims (27.6 ± 10.67 years) was lower than that of screen-negative victims (32.4 ± 11.75 years), but the difference was statistically insignificant (Table 3).

Table 3: Categorization and age range of the studied trauma victims:

	Car Drivers	Pedestrians	Bicyclists	Others	Total	Age (years) (Mean $\pm$ S.D.)
Number	54	12	10	16	92	
(% of total)	(58.7%)	(13%)	(10.9%)	(17.4%)	(100%)	
Screen +ve	26(48.1%)	4(33.3%)	6(60%)	6(37.5%)	42(45.7%)	27.6 $\pm$ 10.67
Screen-ve	28(51.9%)	8(66.7%)	4(40%)	10(62.5%)	50(54.3%)	32.4 $\pm$ 11.75

Test of significance for age difference: t-Student's test

t=1.45

*P - 0.12

* P is significant at values less than 0.05

Out of total of 42 screen- positive sample, 10 samples (23.81%) were positive for a single drug, 26 samples (61.9%) were positive for two drugs, and 6 samples (14.29%) were positive for three drugs. The samples were positive for cannabinoids, opiates, ethanol, benzodia-zepines, and barbiturates.

Cannabinoids, opiates, ethanol, and benzodiazepines were the most frequently encountered substances (Table 4).

Table 4: Drugs detected in screen- positive urine samples of trauma victims:

	Drugs detected in urine screen					Samples	Samples	Samples
	Canna-binoids	Opiates	Ethanol	Benzo-diazepines	Barbit-urates	+ve for 1 drug	+ve for 2 drugs	+ve for 3 drugs
No. of Samples &%	24 57.14%	18 42.86%	18 42.86%	14 33.33%	6 14.29%	10 23.81	26 61.90%	6 14.29%

No. = number

Patient interview revealed that all the screen-positive victims had a history of current use of substances detected in urine, and some screen-negative victims had a history of current use of cannabis and benzodiazepines. In addition, victims from both groups had a history of current use of nicotine (Smoking) and

other substances as benzhexol (Parkinol) and some over the counter preparations. The incidence of current substance use was significantly higher in the screen-positive than in the screen-negative victims for all substances detected in urine and nicotine (Table 5).

Table 5: History of current substance use as was given by the studied victims:

	Benzo-diazepines	Barbit-urates	Canna-binoids	Opiates	Ethanol	Nicotine	Other substances*
Screen +ve	18	6	26	18	18	36	6
Screen -ve	24	0	4	0	0	24	8
Fisher's exact test:							
**p	0.0073	0.088	0.0001	0.0003	0.0003	0.007	0.314
Total	22	6	30	18	18	60	14

*Other substances included benzhexol (Parkinol) and some over-the-counter preparations.

**P is significant at values less than 0.05

Pattern of substance use showed the criteria items of abuse in a total of 36 trauma victims (39.13% of total), with a significantly higher incidence in the screen-positive than in the screen-negative victims. Criteria items of dependence on substances other than, nicotine were present in a total of 18 victims (19.57% of total), and on substances including nicotine were present in a total of 50 victims (54.35% of total). The incidence of substance dependence, excluding or including nicotine, was significantly, higher in the screen-positive than in the screen-negative victims (Table 6).

Table 6: Pattern of substance use of the studied victims as diagnosed by interview:

	Abuse	Dependence (excluding nicotine)	Dependence (including nicotine)
Screen + ve victims	24	8	36
Screen - ve victims	12	-	14
Fisher's exact test:			
*p	0.0228	0.0003	0.0001
Total (% of total)	36(39.13%)	18(19.57%)	50(54.35%)

*P is significant at values less than 0.05

DISCUSSION

The association of psychoactive substance use and trauma has been documented in several studies. Berkelman, et al. (1985) reported a direct correlation between alcohol consumption and fatal injuries from assault. Welte and Abel, (1989) corroborated these findings by reporting that about half of 800 trauma fatalities had detectable levels of alcohol in blood. Other psychoactive substance use and dependence were reported in a significant proportion of trauma victims by (Soderstrom, et al. 1992, Borges, et al. 2004, and Blondell, et al. 2005).

In the present work, victims of particular types of trauma were selected (Car drivers, pedestrians, bicyclists, and victims of some forms of unintentional trauma & assault) as such victims might participated in the etiology of trauma whether directly or indirectly. For example, a driver who drives while under the effect of a benzodiazepine or cannabis may play a direct role in the occurrence of trauma, whereas a pedestrian under the effect of these substances plays an indirect role. 92 trauma victims (88 male victims of different forms of trauma and 4 female pedestrian victims), of the age range between 17 & 54 years, were studied. Male victims formed the vast majority of the study group (95.6% of total).

The results of the work showed that 45.7% of total trauma victims (42 patients) had screen +ve urine samples, the majority of whom (61.9%) were positive for two substances of the screen list. The substances

detected most frequently included cannabinoids, ethanol, opiates, and benzodiazepines. The detection of these substances in urine denotes recent intake, and that at least some of these victims were under the pharmacological influence of one or more substances at the moment of trauma. The association of psychoactive substance use and occurrence of trauma has been related to the effect of such substances on sensorium, ranging from minimal decrease in mentation to coma, and on personal judgment, reasoning, oculomotor skills, behavior, and response in such a manner that different forms of trauma may result (Madan, et al. 1999). Heavy cannabis intake may lead to acute confusional psychosis (Carney, et al. 1984).

Tetrahydrocannabinol, the active ingredient of cannabis, has been found to impair performance in aircraft pilot performance studies following smoking of one cigarette containing 20mg of the substance, although the user remained unaware of this influence (Leirer, et al. 1991). Alcohol, at certain levels in blood, impairs attention and motor co-ordination prolonging the reaction time (Minocha, et al. 1985). Benzodiazepines and barbiturates induce sedation, muscle relaxation, ataxia, and hypnosis (Aghababian and Restuccia, 1993). Other neurologic manifestations of psychoactive substance use include restlessness, incoherence, decreased pain perception, sensory deficit, hallucinations, loss of inhibition, increased or perhaps over-exaggerated self-confidence, impaired motor and intellectual performance, and inability of an intoxicated person to defend himself/herself during an assault (Madan, et al. 1999).

The incidence of substance abuse and dependence was higher in the screen-positive than in the screen-negative victims with a highly significant difference for most substances. This adds an additional explanation for the association of psychoactive substance use and trauma. Chronic substance use leads to a life style associated with trauma because risk-taking behaviors are common in patients who use illicit substances as a result of impaired judgment and reasoning secondary to substance use. Such patients may be more likely to act on risk-taking behaviors (Madan, et al. 1999).

The association of screen-positive urine with a significantly higher incidence of substance abuse and dependence refers to the beneficial value of urine-screening in predicting current substance abuse or dependence. This means that the screen-positive result most likely refers to a style of substance use characterized by chronicity, not merely recent substance intake; a point of significance in planning strategies that aim at reducing substance-related injuries. These results are corroborated by the report of Ryb, et al. (1999) who found that alcohol-positive blood samples provided a good ability to predict alcoholism among trauma victims, taking into account the limitations of the test for blood alcohol. However, patient interviews

revealed that some screen-negative trauma victims had the criteria items of current substance abuse and nicotine dependence. The presence of history of current substance use in some screen-negative victims may be explained by the absence of too recent substance intake so that the substance was either absent or present at very low concentrations in urine, or the substance of abuse or dependence was not included in the screening battery. This raises the importance of the combined benefit of laboratory screening tests and patients' interviews in diagnosing substance use disorders among the trauma victims.

It is to be noted that the results of the present work are limited by some limitations which include:

1. The studied sample of trauma victims may not express the true prevalence of substance use among trauma victims because victim selection for the study was affected either negatively by refusal to give consent for participation in the study (Many victims refused to give consent) or positively by giving consent on request of the victim's family due to a history of repeated motor car accidents.
2. Urine was screened by immunoassay methods that are known to be liable to cross reactivity and false results (Verebey and Buchan, 1997).
3. The screen did not include all substances of abuse as benzhexol and antihistamines.
4. The substance level in blood at the moment of the accident was not known, so that it is unknown whether the substance might effectively altered personal behaviour & hence played a role in the etiology of the accident or not.
5. History given by some victims may be unreliable because of possible denial which is a well-known classic characteristic of substance abusers (Verebey and Buchan, 1997).

However, despite the aforementioned limitations, the findings of the study highlights the possible role the psycho-active substance use may play in the etiology of some traumatic accidents. Most of these substances can alter personal behavior and response in such a manner that different forms of trauma may occur. It is obvious that this may dramatically alter the legal responsibility and consequences, and at the same time, highlights the importance of carefully assessing and screening trauma victims for psychoactive substance use by the available means which include screening laboratory techniques and interviews. It is recommended legislate obligatory screening of trauma victims specially victims of vehicular accidents (Drivers, bicyclists, and pedestrians) and assaults once they reach the hospital, or at least keep urine & blood samples for analysis by

the appropriate authorities if this is deemed appropriate for legal purposes. It is also recommended, in order to reduce substance-related injuries, to design strategies to identify populations at risk of substance use, with special attention to motorcar drivers and bicyclists, so as to implement treatment techniques to bring about abstinence. Methods of identification include laboratory tests and screening questionnaire.

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الملخص العربي

تناول المواد النشطة نفسياً بين ضحايا الإصابات: دراسة أولية

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هي الأكثر شيوعاً. وقد أوضحت المقابلات شيوع التعاطي الجاري أو الحالى للمواد المذكورة بين المصابين ذوى العيّنات الإيجابية، بينما كان بعض المصابين ذوى العيّنات السلبية فى حالة تعاطي جارى لمركبات القنب والبنزوديازيبين. كما كان هناك حالات تعاطي جارى لمركبات النيكوتين (التدخين) بين أكثر المصابين بالإضافة الى بعض العقاقير الأخرى مثل العقاقير المثبطة للسعال ومضادات الهستامين وعقار باركينول فى بعض المصابين ذوى العيّنات الإيجابية أو السلبية. وقد انطبقت علامات التعاطي السيء أو المؤذى لبعض المواد المنشطة نفسياً فى عدد 36 مصاباً (39.13% من جملة المصابين)، وانطبقت علامات الاعتمادية أو التعويل على بعض هذه المواد غير شاملة النيكوتين على عدد 18 مصاباً (19.6% من جملة المصابين)، بينما انطبقت علامات الاعتمادية أو التعويل على بعض هذه المواد شاملة النيكوتين على عدد 50 مصاباً (54% من جملة المصابين). هذه النتائج يمكن أن تفيد فى وضع الخطط التى تهدف الى منع أو تقليل دور المواد المنشطة نفسياً فى تسبب الإصابات.

لقد ارتبط تعاطي المواد النشطة نفسياً بحدوث الإصابات فى شتى أنحاء العالم. ولقد أجرى هذا البحث فى بيئتنا لدراسة تعاطي المواد النشطة نفسياً فى عدد 92 مصاباً (58.7% قاندي السيارات، 13% مشاة، 10.9% قاندي دراجات، 17.4% ضحايا أنواع أخرى من الإصابات). وقد تم استقبال جميع المصابين مباشرة من مكان الإصابة، وعمل مسح (كشف) لبعض المواد المنشطة نفسياً فى عيّنات من البول أخذت منهم. وعمل مقابلات مباشرة معهم لدراسة طريقة تعاطيهم لهذه المواد. وقد كانت نتائج تحليل عيّنات البول لبعض هذه الحالات فى 42 من 92 مصاباً (بنسبة 45.65%). وكانت نسبة العيّنات الإيجابية بين المصابين من قادة السيارات 45.1%، وبين المصابين من المشاة 33.3%، وبين المصابين من قادة الدراجات 10.9%. وبين بقية المصابين 17.4%. ومن بين 42 عينة إيجابية، كانت 10 عيّنات (23.8) إيجابية لمادة واحدة فقط، و26 عينة (61.9%) إيجابية لمادتين، و6 عيّنات (14.3%) إيجابية لثلاث مواد. وكانت العيّنات إيجابية لمركبات القنب والمورفينات والبنزوديازيبين والباربيتورات والإيثانول، حيث كانت مركبات القنب والمورفينات والبنزوديازيبين والإيثانول