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SUBSTANCE ABUSE AND DRIVING BEHAVIOR AMONG PROFESSIONAL MINIBUS DRIVERS AT ZAGAZIG CITY, SHARQIA GOVERNORATE, EGYPT.

By

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Abstract

Introduction: According to The Egyptian Central Agency for Public Mobilization and Statistics (CAPMAS), 72% of road traffic accidents occur due to aberrant driving behavior. Substance abuse particularly cannabis is commonly used among Egyptian commercial drivers and seriously affects safe driving. **Aim of work:** To assess the magnitude of substance abuse among a sample of professional minibus drivers, Zagazig city, Sharqia Governorate, Egypt, to investigate their driving behavior and to determine the predicting factors for the risky driving behavior as a major cause of road accidents. **Materials and Methods:** A cross sectional study was conducted in Al Ahrar main public station, Zagazig city, Sharqia Governorate, Egypt on a sample of 130 commercial drivers. A structured questionnaire was introduced to all participants and included data on socio occupational status and the driving behavior questionnaire (DBQ) which is composed of 26 items. Substance abuse was screened through rapid assessment urine test. **Results:** Among the participants, 57.7% tested positive for substance abuse and the most common abused substance was cannabis which represented 80% of the positive participants. The DBQ scores were higher among substance abused drivers with statistical significant difference particularly in most of violations and error items. The predictors for aberrant driving behavior were low income, excessive speeding, previous involvement in road traffic crash and substance abuse. **Conclusion:** Illicit drugs are commonly used by Egyptian professional drivers and seriously affect safe driving.

Regular traffic police campaigns for screening of substance abuse among commercial drivers and applying of road safety awareness program can lower the prevalence and burden of road traffic accidents in Egypt.

Keywords: Substance abuse, Driving behavior, Professional drivers, Risk factors and Safety programs.

Introduction

Illicit drugs use is becoming a worldwide prominent public health problem. A total of 246 million people aged between 15 and 64 years worldwide are reported as illicit drug users in 2013 by the World Drug Report of the United Nations Office on Drugs and Crime (UNODC, 2015). In Egypt, drug abuse becomes an alarming problem in the last years that continues to cause national and societal concern (Hamdi et al., 2016).

Road traffic accidents are uprising global problem that are annually killing more than 1.25 million people. Most of them are in the highly productive age ranged between 15–29 years. By 2030, road traffic accidents are expected to become the seventh leading cause of death worldwide. So, the newly agenda of 2030 for Sustainable Development has set a goal of halving the deaths resulting from road traffic accidents by 2020(WHO, 2018).

Egypt is one of the top countries that reported for high frequency of road deaths (WHO, 2013(. It is reported by The Egyptian Central Agency for Public Mobilization and Statistics that individual behavior is responsible for 60% of road accidents including excessive speed, drivers' poor concentration, wrong passing and the loose of control (Ali et al., 2014). It was reported that Arab countries including Egypt have a substantial higher road accident fatality rate than USA and European countries (Bener et al., 2008).

Driving under the effect of illicit drugs like cannabis, opioid, cocaine, and hallucinogens represents major threat to public safety (Lipari et al., 2016); as it predisposes to health hazards , not only to the driver but also to the passengers and others on the road (Alvarez et al., 2015). Substance use can affect seriously drivers' brain functions essential for safe driving like perception, attention, balance and coordination leading to severe

car crashes and horrible accidents (Berning et al., 2015). There are many abused drugs, even if ingested in small quantities affect safe driving, increase the risk of accidents even if there is no sign of impairment in driver's abilities (Lillsunde et al., 2012).

Studies of World Health Organization from low and middle income countries reported that a considerable percentage of professional drivers abuse drugs and stimulants to keep awake and reduce tiredness during their long working hours (Yunusa et al., 2017). In Egypt, many drivers are regular users of marijuana and tramadol assuming that they reduce fatigue and sleepiness during work (Abdel Mageid, 2017).

Giving insight on substance abuse and driving behavior among professional drivers could help in setting the pillars for development of preventive health education programs for safe driving to reduce the frequency and severity of road traffic accidents and its economic and psychological burden on the community. Up to authors knowledge there are limited number of researches studied the association between substance abuse and driving behavior in Egypt.

Aim of work

The aim of the current study was to assess the magnitude of substance abuse among a sample of professional minibus drivers, Zagazig city, Sharqia Governorate, Egypt, to investigate their driving behavior and to determine the predicting factors for the risky driving behavior as a major cause of road accidents.

Materials and Methods

Study design: It is a cross-sectional study.

Place and duration of the study: The study was conducted at "Al Ahrar station" which is the main public station at Zagazig city from June 1st to December 30th 2017 at Zagazig city, Sharqia Governorate.

Study sample: The total number of minibus drivers at Al Ahrar station was 252. A sample of 153 drivers was calculated using Epi info program at confidence interval 95% power of test 80%. The substance abuse' prevalence among Egyptian drivers was 53.3%. The participant drivers were selected

randomly after application of the following exclusion criteria: history of neurological disease that may affect driving performance (e.g. epilepsy) and history of taking any medications that might result in false positive results of screening urine test of substance abuse like tegretol (carbamazepine) gives false positive results for Benzodiazepines. After application of the exclusion criteria only 130 drivers accepted to contribute in the current study. Participants were interviewed through a 30 minutes semi structured interview. The questionnaire was introduced to them, and then they gave a urine specimen for the screening test after assuring their data confidentiality.

Study methods:

A- Pre designed questionnaire

A predesigned questionnaire consisted of three main parts, was constructed based on relevant studies:

Part One contained socio-demographic data like age, gender, marital status, level of education.

Part two included occupational data like years of driving practice, daily driving hours, annual kilometers as measured by the distance car' meter, use of seat belt, exceeding speed limits according to each road limits of speed and previous involvement in road accidents or injuries.

Part three concerned with drivers' behavior. The Manchester Driver Behavior Questionnaire (DBQ) was originated by Reason et al., 1990. DBQ is one of the most commonly used tools in traffic Psychology for determining self-reported driving style and exploring the relationship between driving behavior and accident involvement. Driving behaviors differ between different cultures and countries due to the potential interpersonal variations in their traffic environment.

An adjusted version of the DBQ was developed by Bener et al., 2008 to match the Arab culture and was tested for validity and sensitivity in Arab Golf region to measure the aberrant drivers' behavior. The modified version used by Bener et al., 2008 in the Arab Gulf area was adapted in the current study and it was composed of 26 items violations (10 items, e.g "Overtake a slow driver on the right lane"), lapses (8 items, e.g "Get into the wrong lane when approaching a

roundabout or a junction") and errors (8 items, e.g "Attempt to overtake someone turning"). The items were scored on a six-point Likert-type response scale (0 = never, 1 = hardly ever, 2 = occasionally, 3 = quite often, 4 = frequently, and 5 = nearly all the time).

Pilot study

An Arabic translation was conducted on the questionnaire by a bilingual investigator. Then it retranslated to English by a bilingual expert. The necessary modifications have been done to ensure clarity of all questions and ease of understanding. The questionnaire has been tested on 10 drivers. The reliability coefficient test (Cronbach's alpha) was high for all questions. The results of the pilot study were consistent with the study results therefore; it was included in the main survey.

B- Laboratory investigations (Drug testing)

- Urine samples collection procedure

During the interviews, urine specimens were collected from each participant without prior announcement in order to avoid adulteration or replacement of drug free samples (Wu, 2001). The urine sample was taken in a place without a sink, water source or any possible contaminants (Tai et al., 2005). Drivers were inquired to bring their urine samples in sterilized containers which were clearly labeled, properly wrapped, and then transported to the laboratory at Zagazig University Hospitals for drug testing.

-Technique for drugs testing

In the laboratory unit, adulterant testing was done to assess for urine samples integrity (specific gravity and creatinine). Urine specimens were screened for Cannabis (THC), Morphine (MOP), Tramadol (TRA) and Benzodiazepines (BZO) using one step multi-drugs test. The one step multi-drugs test sheet (urine), is an immunoassay test used for qualitative measuring of drugs or their metabolites. It is a quick screening test of urine based on the standard of competitive binding and was obtained from Abon Biopharm Hangzhou Co., Ltd. throughout testing the urine sample moves upward by capillary action. If the concentration of the drug is below its cut-off concentration in the urine specimen it

will not saturate the binding sites of its specific antibody. Reaction will occur between the antibody and the drug-protein conjugate then a noticeable colored line will be verified in the test line region of the specific drug strip. Saturation of all the antibody binding sites occurs if the drug presents above the cut-off concentration. Consequently, the colored line will not form in the test line region. A drug-positive urine specimen will not produce a colored line in the specific test line region of the strip because of drug competition, while a drug-negative urine specimen will produce a line in the test line region because of the absence of drug competition. A colored line will always appear at the control line region to serve as a procedural control. This ensure that the proper volume of specimen has been added and membrane wicking has occurred (Hawks and Chiang, 1986).

Consent

An Informed consent was obtained from every single participant after clarifying the aim of the study and assuring their data privacy.

Ethical approval

Approval to conduct the research was obtained from Zagazig University' Institutional Review Board and the reference number is ZU- IRB#:4159.

Data management

The SPSS program (Statistical Package for Social Science) version 19 was used in statistical data analysis. Quantitative data were represented as mean and standard deviation and qualitative data was represented as frequencies and percentages. Student's t test; was used to compare between group means. Multiple regressions were used to identify the significant predictors of the aberrant drivers' behavior. p-value ≤ 0.05 was considered statistically significant and ≤ 0.01 was considered highly significant.

Results

Table (1): Socio-demographic characteristics of the study participants.

Characteristics	Frequency (No=130)	%
Age (years)	**Mean±SD (range) (yrs)** 34.44±9.69 (19-50)	
18-29	56	43.1
30-39	23	17.7
40-49	42	32.3
≥50	9	6.9
Educational Level		
Read and write	48	36.9
Primary	4	3.1
Intermediate	73	56.2
Secondary and high	5	3.8
Marital Status		
Single/ Divorced/ Widow	37	28.5
Married	93	71.5
Residence		
Rural	74	56.9
Urban	56	43.1
Smoking		
Yes	107	82.3
NO	23	17.7
Income:		
Unsatisfied	56	43.1
Satisfied	74	56.9

Table 1 represented a total of 130 minibus drivers participated in this study; their age ranged from 19 to 50 years old with mean ± SD 34.4±9.69. Only 3.8% has secondary and high educational level while the rest of them have intermediate and low education. Most of drivers were married 71.5 %, smokers 82.3%, and live in rural areas 56.9%.

Table (2): Driving background and experience of the study participants.

Characteristics	Frequency (No=130)	%
Years of driving experience		
< 5 years	56	43.1
5-10 years	23	17.7
> 10 years	51	39.2
Daily driving hours		
< 8 h	28	21.5
≥8h	102	78.5
Annual Distance (range) (Km)	**Mean±SD** 20908.3±314.4	
Use of seatbelt		
No	105	80.8
Yes	25	19.2
Excessive speeding		
Yes	104	80.0
NO	26	19.2
Previous involving in a road traffic crash/ accident		
Yes	78	60.0
NO	52	40.0
Have you ever cause a road traffic crash? (from number of yes above)		
Yes	26	33.3
NO	52	66.7
History of Injury in a road		
Yes	26	33.3
NO	52	66.7

Table 2 showed that less than half of the drivers (43.1%) had < 5 years driving experience while 39.2% drive for more than 10 years. Majority of the drivers (78.5%) work 8 hours and more daily with mean distance of 20908.3±314.4 Km annually. The largest percentage of the studied drivers (80.0%) don't use seatbelt and exceed speed during driving and 60% of them reported previous involving in a road traffic crash/ accident while 33.3% of them reported that they were the cause for occurrence of the traffic crash with resulting road injury.

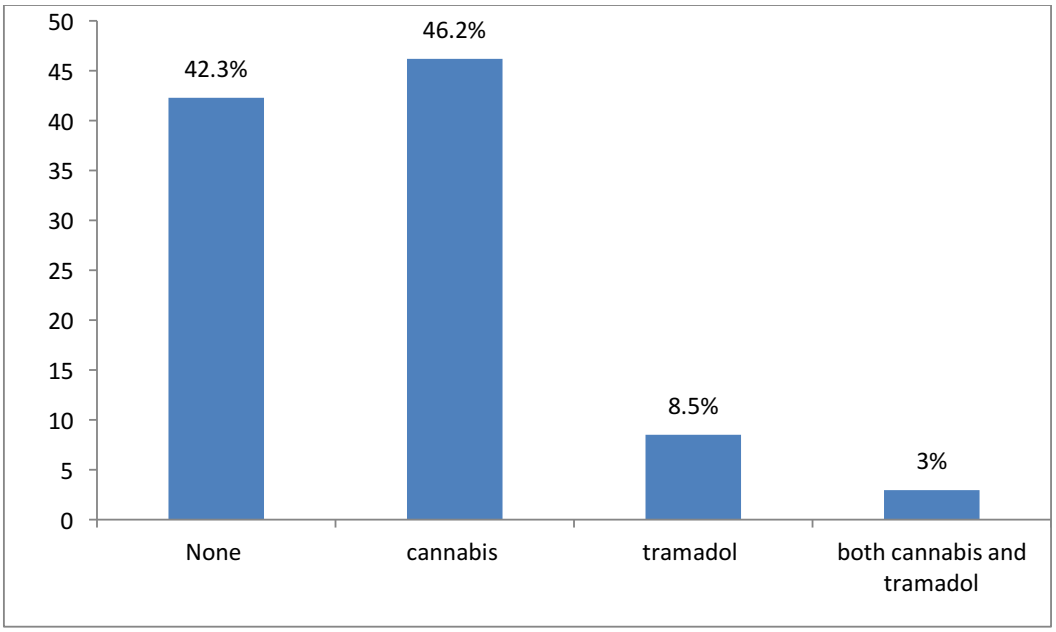

Figure 1: Rapid urine screening test.

Figure 1 demonstrated the results of rapid urine screening test. All the tested urine specimens were negative for Morphine (MOP) and Benzodiazepines (BZO). Among the participants, 60 subjects (46.2%) tested positive for cannabis, 11subjects (8.5%) for tramadol and only 4 subjects (3.0%) for both cannabis and tramadol.

Table (3) Means and standard deviations of Driver Behavior Questionnaire (DBQ) single items in relation to substance abuse.

Variables	+ve substance abuse	-ve substance abuse	p
Violations	**Mean ±SD**	**Mean ±SD**	
Drive very close to the car in front (V1)	1.52±1.09	1.18±0.86	0.06
Cross a junction after the traffic lights turned red (V2)	1.38±1.21	0.89±1.01	0.01*
Disrespect the speed limits late at night or early in the morning (V3)	1.84±1.18	1.61±1.13	0.2
Disrespect the speed limits on a motorway (V4)	1.66±1.21	1.25±1.10	0.04*
Have an aversion, indicating hostility (V5)	1.65±1.59	0.90±1.09	0.003**
Overtake a slow driver on the right lane (V6)	3.33±1.29	2.92±1.63	0.1
Get involved in racing with other drivers (V7)	1.85±1.17	1.56±1.13	0.1
Get angry by another driver's behavior, give chase (V8)	2.16±1.37	1.63±1.43	0.03*
Sound your horn to show your annoyance to another driver (V9)	3.96±0.90	3.47±1.48	0.02*
Stay in a motorway closed ahead until the last Minute (V10)	1.84±1.18	1.50±1.12	0.1
Total mean score	2.65±0.85	2.12±0.73	0.001**
Errors	**Mean ±SD**	**Mean ±SD**	**P**
Attempt to overtake someone turning (E1)	1.68±1.12	0.67±0.96	0.001**
Miss 'Give Way' signs (E2)	2.69±2.09	1.27±1.48	0.001**
Fail to notice that pedestrians are crossing (E3)	1.58±1.48	1.01±1.04	0.01*
Queuing, nearly hit the car in front (E4)	0.37±0.48	0.43±0.50	0.4
On turning right/left nearly hit a two wheeler (E5)	1.56±1. 05	1.87±1.29	0.1
Fail to check your rear-view mirror (E6)	1.10±0.89	1.30±0.87	0.2
Under estimate the speed of an oncoming vehicle (E7)	1.48±1.44	0.63±1.04	0.001**
Apply sudden brakes on a slippery road (E8)	2.06±1.53	0.94±1.16	0.001**
Total mean score	1.56±0.51	1.02±0.50	0.001**

Lapses	Mean ±SD	Mean ±SD	p
Get into the wrong lane when approaching a roundabout or a junction (L1)	1.57±1.05	0.96±0.83	0.001**
Misread the signs and exit from the roundabout on the wrong road (L2)	1.57±1.05	1.03±0.83	0.002**
Forget where you left your car in the car park (L3)	1.84±0.97	1.98±4.36	0.7
Hit something when reversing that you had not previously seen (L4)	1.22±0.70	1.14±0.80	0.5
Attempt to drive away from the traffic lights (L5)	1.24±0.69	0.90±0.77	0.01*
Switch on one thing, such as headlights, when you meant to switch on something else, such as wipers (L6)	0.96±0. 90	1.03±0.88	0.6
Intending to drive to destination A and, you 'wake up' to find yourself in destination B, because the latter is your more usual destination (L7)	1.33±1.21	1.38±1.22	0.8
Have no clear recollection of the road (L8).	0.38±0.49	0.41±0.49	0.7
Total mean score	1.26±0.60	1.10±0.81	0.2

*: Statistically significant ** : Highly statistically significant

Independent sample t test was used for testing the difference between the two group means

Table 3 compared the violations, errors and lapses of Drivers Behavior Questionnaire (DBQ) by substance abuse. The reported data showed higher mean scores of violations among positive than negative substance abused in all items and only with statistical significant difference in certain items like crossing red light (V2), disrespect to speed limit on a motorway (V4), having an aversion indicating hostility (V5), getting angry by another driver's behavior (V8) and sounding horn to show annoyance to another driver (V9) ($P< 0.05$). For errors, the highly statistical significant difference ($p<0.01$) was found for the following items; attempt to overtake someone turning (E1), miss 'Give Way' signs (E2), fail to notice that pedestrians are crossing (E3), under estimate the speed of an oncoming vehicle (E7) and apply sudden brakes on a slippery road (E8).

As regard lapses, there was no significant difference found between positive and negative substance abused drivers except for only three items; get into the wrong lane when approaching a roundabout or a junction (L1), Misread the signs and exit from the roundabout on the wrong road (L2), and attempt to drive away from the traffic lights (L5).

Table (4): Regression analyses, illustrating the factors predicting risky driving behavior among professional minibus drivers.

	Drivers behavior								
	Violations			Errors			Lapses		
Background variables	**SEB**	**β**	**t**	**SEB**	**β**	**t**	**SEB**	**β**	**t**
Constant	1.416		1.456	.949		.166	1.171		.295
Age	.025	.101	.358	.017	-.010	-.038	.020	.253	.898
Educational Level	..253	.104	.346	.170	-.250	-.846	.209	.383	1.274
Marital status	.293	.161	1.028	.197	-.095	-.622	.243	.013	.086
Smoking	.429	-.120	-.621	.288	.349	1.839	.355	-.010	-.051
Income	.316	-.063	-.341	.212	-.421	-2.321*	.261	-.224	-1.211
Driving background (Work determinants)	**SEB**	**β**	**t**	**SEB**	**β**	**t**	**SEB**	**β**	**t**
Constant	.600		3.816	.428		2.134	.396		-3.015
Years of driving experience	.086	.167	1.803	.062	.002	.023	.057	-.003	-.043
Daily driving hours	.190	.074	.794	.136	-.006	-.058	.125	.039	.537
Use of seatbelt	.161	.003	.042	.115	.026	.337	.106	-.038	-.639
Excessive speeding	.170	.268	3.320**	.122	.215	2.557*	.112	.787	12.254**

Previous involving in a road traffic crash	.139	.607	7.503**	.099	.574	6.813**	.092	-.060	-.930
Substance abuse	**SEB**	**β**	**t**	**SEB**	**β**	**t**	**SEB**	**β**	**t**
Constant	.101		22.102	.065		17.032	.086		13.233
Urine analysis	.097	.234	2.724**	.063	.404	5.002**	.083	.093	1.061

*: Statistically significant **: Highly statistically significant

Table 4 illustrated the factors predicting risky driving behavior among the studied minibus drivers. Concerning background variables, only satisfied income showed significant negative correlations with errors. As regard work determinants, excessive speeding showed significant association with all of the violations, lapses and errors.

Previous involving in a road traffic crash was highly significantly associated with both violations and errors. Regarding the substance abuse, it was significantly associated with violations and errors behavior among the studied drivers.

Discussion

To our knowledge there are a very limited number of researches on substance abuse and driving behavior among professional drivers in Egypt. The present study investigated the aberrant driving behavior and use of illicit drugs among a sample of Egyptian professional drivers as a main leading cause of road traffic accidents. The mean age of the studied drivers in the present study was 34.44±9.69 as the minimum age of getting the driving license in Egypt is 18 years old. Most of the studied drivers (96.2%) have intermediate and low education and 43.1% reported that they have unsatisfied income (Table 1). These findings were similar to sample characteristics of Aglan and Adawi, 2016; Badawy, et al., 2016 and Hamdi et al., 2016. This could be clarified through the fact that driving as a job in Egypt does not require a high education level so most of commercial drivers have middle or low education.

Although 56.9% of the participants have more than 5 years of experience in professional driving (Table 2), most of them do not drive safely due to their behavior of not using a seat belt (80.8%), excessive speed (80%), and previous involving in road traffic crash (60%). This may be explained by the fact that the young drivers have more of a risk taking behavior and most of the participants in the current study are young. In addition, Egypt is considered a lower- middle income country according to the World Bank, 2017 and Shinar (1998) which reported that, drivers in the middle income level countries were more subject to interpersonal struggles because of disrespect for rules, issues with enforcement and less developed infrastructure. All of these factors can lead to higher risk of road traffic crash.

Cannabis was reported to be the most commonly abused drug in Egypt because of its relatively cheap price and the belief that it increases the sexual power and gives feeling of happiness. Also, many of cannabis abusers consider it a natural plant so it is not forbidden by the religion (Abdel Mageid, 2017).

The results of the urine screening test in the present study revealed that 57.7% of the studied drivers are drug abusers. Most of them 80% are cannabis abusers, 14.7% are tramadol abusers while 5.3% abuse both cannabis and tramadol (Figure 1). These results are in consistent with the results of previous literatures in Egypt where El Gohary et al., 2015 found that out of positive cases of drug abuse among injured drivers in motor vehicle accidents, cannabis represents 70.9% followed by tramadol 38.7%. Also, Aglan and Adawi 2016 studied incidence of drug abuse among cab drivers reported that among drug abuser drivers the most common abused substance was cannabis (THC) (90.6%), then tramadol 59.4%.

The Manchester Driver Behavior Questionnaire (DBQ) is composed of three main components; violations, errors and lapses. Violations and errors can cause death as they are possibly dangerous. Specifically, violations was stated to be linked with speeding and parking offences, loss of control and passive way priority' accidents (Mesken et al., 2002).

The results of the present study showed higher statistical significant difference between participants who were tested positive for substance

abuse than those with negative results especially for most of the violations then errors items and also for some lapses items. Moreover, the substance abuse was a significant determinant for both violations and errors among the studied participants through the multiple regression analysis (Table 3&4). These results are in accordance with previous literatures reported that driving under the use of illicit drugs makes it highly dangerous and risky for both the driver and the passengers who share the road. As illicit drugs are known to affect the psychomotor skills and therefore affects the driving performance and the cognitive functions of the brain, like attention, perception, coordination, attentiveness, response time and judgment, so they surge the risk of being involved in a motor vehicle crash (Alvarez et al. , 2015; Kenntner-Mabiala et al., 2015 and Asbridge, 2014).

On exploring the other determinants of the risky driving behavior among the studied participants through multiple regression models, from the back ground variables only income was inversely correlated with errors (Table 4). Previous literatures stated that low socioeconomic status is associated with higher risk of road traffic injury (Jafarpour and Rahimi-Movaghar 2014). Also, drivers with low income usually in need to earn more money so they are in hurry to make more trips in short time and in consequence commit errors.

From the driving background variables excessive speeding was a significant predicting factor for the three items of risky driving behavior (violations, errors and lapses) and previous involvement in road traffic crash was a significant predictor for both violations and errors (Table 4). These results were in consistent with that of Shams and Rahimi-Movaghar, 2009 who stated that some driving behavior patterns like speeding is considered risky driving behavior and could place drivers at risk for morbidity and mortality. Also, Ansari et al., 2000 reported that most of road traffic crashes are linked to drivers' errors and 50% are associated with excessive speeding and safety rules violation.

Conclusion

Driving is a complex behavior and the effect of illicit drugs makes it more complicated that can easily

leads to aberrant driving behavior and on consequence to high prevalence of road accidents. There is a crucial need for activation of sudden road checks of substance abuse among professional drivers by regular traffic police campaigns. In addition, application of road safety awareness program directing towards improving driving behavior so can reduce the prevalence of road traffic accidents and decrease its economic and psychological burden on both community and government.

Conflict of interests

The authors declared that there is no conflict of interests exists.

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