

# Estimation of the Prevalence of Tramadol and Cannabis Abuse among Drivers Involved in Road Traffic Accidents Admitted to Alexandria Main University Hospital: A Prospective Study

Rania Abdel Mageid<sup>1</sup>

## ABSTRACT

**Introduction:** In Egypt, many drivers are regular users of illicit drugs assuming that they reduce tiredness and sleepiness during working hours but unfortunately road traffic accidents result. Cannabis and tramadol are particularly important and used with high frequency among Egyptians. The aim of this work was to estimate prevalence of tramadol and cannabis abuse among drivers involved and/ or injured in road traffic accidents.

**Material and Methods:** A prospective case-control study was conducted on drivers involved in road traffic accidents and admitted to Emergency Department at Alexandria Main University Hospital during a period of one year. The Control group was randomly selected from patients admitted to the same department during the same period. Injury Severity Score was calculated and urine samples were collected to be screened for detection of tramadol and/or cannabis metabolite by One Step Drug Screen Test Device.

**Results:** The study was performed on a number of 427 drivers; 20.8% of them gave positive results. An equivalent number of the control group was randomly selected from patients admitted during the same time period. Among that group, 22% were positive for tested illicit drugs. Therefore, there was no significant difference in the prevalence of substance abuse between both groups. Cannabis was the most common drug abused among drivers (59.6%) meanwhile there was a significant increase in incidence of consumption of tramadol among controls (40.4%). Mean value of Injury Severity Score was significantly higher ( $P \leq 0.001$ ) in drugged drivers.

**Conclusion:** Cannabis was the most illicit drug frequently consumed among drivers.

**Keywords:** Drug Abuse, Drugged Driving, Egypt, Injury Severity Score.

key risk factors related to one's behavior like high speed and drunk-driving.<sup>3</sup> It is well known that use of any psychoactive or mind-altering substance makes it highly unsafe and illegal to drive a car as this puts at risk not only the driver but also passengers who share the road.<sup>6</sup> Driving performance can be impaired by a wide variety of illicit as well as prescription drugs which can affect the functions of the central nervous system that are essential for safe driving.<sup>7</sup> Many of over-the-counter (OTC) medications like antihistamines are known to cause slow reaction time and improper coordination, even in the morning, the residual effects of these drugs can impair driving.<sup>8</sup>

The effects of specific drugs of abuse differ depending on how they act in the brain, but all seem to impair cognitive functions of the brain, like perception, attention, concentration, coordination, reaction time and judgment.<sup>9</sup>

Marijuana and opioids are the most popular substances used by drug abusers in Egypt,<sup>10,11</sup> both are known to impair the psychomotor skills and consequently the driving performance, so they increase the risk of being involved in a motor vehicle crash.<sup>12,13</sup> Unfortunately, many truck and microbus drivers on different roads are regular users of drugs during working hours, assuming that those drugs will reduce their tiredness and sleepiness.<sup>14</sup> Therefore, in order to estimate the size of the danger that driving under the influence of drugs poses to traffic safety, it is necessary to assess the prevalence of driving under the influence of drugs. The aim of the present work was to estimate the prevalence of tramadol and cannabis abuse among drivers involved and/ or injured in road traffic accidents; as well as estimation of the association between use of illicit drugs and severity of injuries in such cases. Also to assess the prevalence of both drugs among subjects rather than drivers to provide a rough idea about the magnitude of the problem in Egypt.

## MATERIAL AND METHODS

A prospective case-control study was conducted on a random sample of drivers of motor vehicles who were involved and/ or injured in RTA and referred to the Emergency Department at Alexandria Main University Hospital during a period of one

## INTRODUCTION

Along with heart diseases, cancer and stroke, traffic crashes are an important leading cause of death all over the world.<sup>1,2</sup> According to the World Health Organization (WHO), India has the highest number of road deaths followed by China and United States, while Egypt ranks in the top ten for the frequency of road deaths.<sup>3</sup> The global status report on road safety 2015, reflecting data from 180 countries, indicated that deaths due to traffic crashes is about 1.25 million per year worldwide, and showed that low and middle income countries have more than 90% of deaths.<sup>4</sup> Losses in Road Traffic Accidents (RTA) do not include only human casualties, other aspects of losses include property damages and permanent infirmities or the bad psychological effects on the survived cases together with their families and friends.<sup>5</sup>

WHO works with many organizations from different countries around the world targeting reduction of RTA and highlighting

<sup>1</sup>MD, Lecturer, Department of Forensic Medicine and Clinical Toxicology, Faculty of Medicine, Alexandria University, Alexandria, Egypt

**Corresponding author:** Rania Abdel Mageid, Lecturer, Department of Forensic Medicine and Clinical Toxicology, Faculty of Medicine, Alexandria University, Alexandria, Egypt

**How to cite this article:** Rania Abdel Mageid. Estimation of the prevalence of tramadol and cannabis abuse among drivers involved in road traffic accidents admitted to Alexandria main university hospital: a prospective study. International Journal of Contemporary Medical Research 2017;4(4):848-852.

year (from 1st of October 2015 to end of September 2016). The Control group was randomly selected from patients and/or traumatized subjects admitted to the same Emergency Department during the same time period. Approval of the ethics committee at Faculty of Medicine, Alexandria University was obtained before proceeding in the study. A written informed consent was obtained from each subject involved in this study. All subjects were ensured about the confidentiality of their information.

As the lower limit for obtaining driving license in Egypt is 18 years old, the age of all participating subjects was above that limit.

**Exclusion criteria**

1. Drivers who were actually dead or fatally injured on arrival.
2. Vehicles' occupants (rather than drivers) who may be injured in the accidents.
3. Drivers with history of administration of other psychoactive drugs or alcohol over the last few hours.
4. Drivers with history of neurological disease that may affect driving performance (e.g. epilepsy).

**Procedure:** For each case:

1. A data collection sheet was fulfilled including age, sex, occupation, residence, marital status, medical history, drug history, history of tobacco smoking and drug abuse.
2. Injury Severity Score (ISS) was calculated; it is an internationally accepted scoring system developed to assign the level of injury severity for patients with multiple injuries.<sup>15</sup> The range of ISS scores is (1-75), ISS less than 25 represents mild injury, 25-50 is moderate injury and more than 50 is considered severe.<sup>15,16</sup>
3. A simplified chart was used to assign the score, that chart was constructed by Lorne Greenspan and his colleagues to provide a simple and concise guide for scoring injuries.<sup>17</sup>
4. A urine sample (5 ml) was collected in a clean dry container, and then was screened for detection of tramadol and/or cannabis (11-nor- $\Delta^9$  - THC-9 COOH, active substance of cannabis) by one step drug screen test device. It is an immunoassay test for qualitative detection of drugs and/or their metabolites. The lower limits (cut-off) of detection of tramadol and THC metabolite were 100ng/ml and 50ng/ml respectively.<sup>18,19</sup>

**STATISTICAL ANALYSIS**

Data was collected and analyzed using statistical package for social science (SPSS, version 20) software for Windows. The data was statistically represented quantitatively as means and standard deviation for the numerical variables, which were further analyzed by the use of Student t-test. Nominal variables were represented as percentages and were further analyzed by the use of non-parametric tests (Chi square test and Fisher's exact test). *P* values less than 0.05 were considered statistically significant. The given graphs were created using Microsoft excel software 2010.

**RESULTS**

The study was carried out on drivers who were involved in RTA and referred to Emergency Department during a period of one year. Unfortunately many of them refused to participate in the study and therefore were excluded, so the study was performed

on a number of 427 drivers, among that case group, 89 subjects (20.84%) tested positive for tramadol, THC or both.

An equivalent number (427 subjects) of the control group was randomly selected from patients and/or traumatized subjects admitted to the Emergency Department during the same time period. Among that group, 94 (22%) tested positive for tramadol, THC or both.

Therefore, there was no significant difference in the prevalence of substance abuse between both groups (OR = 0.933, 95% CI 0.673-1.294, *P*= 0.36).

Regarding age distribution, there was a significant difference in mean age of both groups (*p* = 0.003). Control group members were older than cases that mean age of cases and controls were 36.52± 9.4 and 42.45± 16.3 respectively. Distribution of participants according to their age group is shown in Table-1.

It was noticed that males significantly outnumbered females in both groups (*p* < 0.001); they constituted 86.5% of the case group (77 subjects) and 68.1% of the control group (64 subjects). For the educational level, it was observed that most of subjects among cases and controls had middle level education 41.6% and 35.1% respectively. High educational level was more evident in the control group (24.5%) than in the case group (15.7%).

There was a statistically significant relation between marital status and substance abuse ( $X^2 = 13.75$ , *P*= 0.008) in the case group, as it was of the highest prevalence among married subjects (55%). For the controls, there was a significant association where  $X^2 = 9.2$ , *P*= 0.01 and most of abusers were widows or divorced (41.3%)

As regards the association between drug abuse and tobacco smoking, it was found that it was highly significant ( $X^2 = 89.4$ , *p*< 0.001), as 93% of isolated cannabis users were tobacco smokers and it was positive in 87% of subjects who abused both drugs. While for isolated tramadol abusers, tobacco smoking was positive in only 28.7% of them.

Figure-1 demonstrates distribution of consumption of studied illicit drugs in both groups. It shows that cannabis was the most commonly abused drug in both groups, also there was no significant difference in the prevalence of isolated cannabis abuse between cases (59.6%) and controls (55.3%) (OR= 1.189, 95% CI 0.66-2.139, *P* = 0.6). On the other hand there was a significant increase in the prevalence of consumption of isolated tramadol among control group (40.4%) compared to the case group (12.4%), (OR=0.2, 95% CI 0.098-0.442, *P* < 0.001). For consumption of both substances, the prevalence was significantly higher among cases (28.1%) compared to controls

Case/ Control	Age group (years)	No	%
Case	18 - <25	12	13.5
	25 - <35	32	36.0
	35 - <45	27	30.3
	45-60	18	20.2
	Total	89	100%
Control	18 - <25	26	27.7
	25 - <35	10	10.6
	35 - <45	17	18.1
	45-60	19	20.2
	> 60	22	23.4
	Total	94	100%

**Table-1:** Distribution of participants according to their age group

(4.3%), (OR= 8.78, 95% CI 2.91-26.48,  $P < 0.001$ ).

Figures-2,3 demonstrate distribution of consumption of studied illicit drugs by age in both groups. In the case group, it was observed that most of cannabis consumers (47.16%) were 25- <35 years old. For tramadol, most of its consumers (54.5%) were 35- <45 years old. Among the control group, about one third of cannabis consumers (32.6%) were above 60 years, on the other hand 31.5% of tramadol abusers were 18- <25 years old.

Injury Severity Score (ISS) was calculated for all drivers (427 drivers), it was noted that mean value of ISS in subjects tested positive for drug abuse was significantly higher than that for subjects tested negative ( $22 \pm 18.3$  and  $9.7 \pm 5.5$  respectively) ( $P \leq 0.001$ ).

Injuries were mild in 61.8% of cases, moderate in 33.7% and severe in 4.5% of cases.

It was found that mean value of ISS was significantly higher ( $P \leq 0.001$ ) in those subjects consumed both cannabis and tramadol ( $40.2 \pm 12.6$ ) ranging from 14 to 51, followed by tramadol consumers ( $18.5 \pm 11.5$ ) with a range of 5-35, while it was least in those consumed cannabis only ( $11.7 \pm 10$ ) with a range of 2-21.

Regarding the occupation, it was noticed that 62.8% (59 subjects) of the control group were technicians, while students constituted 23.4% (22 subjects). Unemployed, employee and drivers formed 8.5%, 3.2% and 2.1% respectively.

There was a significant relation between the occupation and the type of abused substance where  $\chi^2 = 16.8$ ,  $P = 0.03$ .

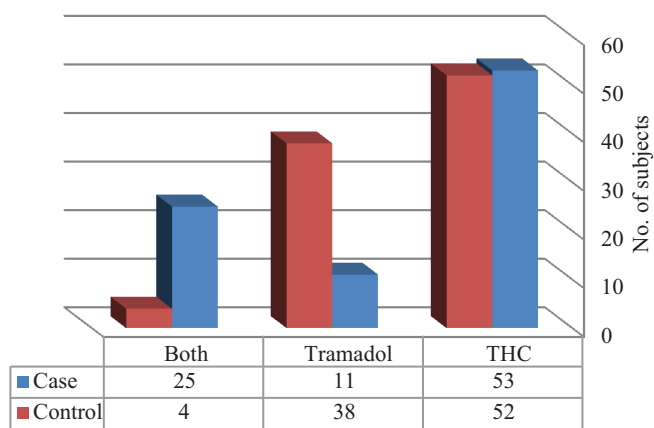
**DISCUSSION**

This study was of case-control design, which was similar to what was performed by many previous researchers<sup>20-22</sup> in their studies on drug abuse among drivers.

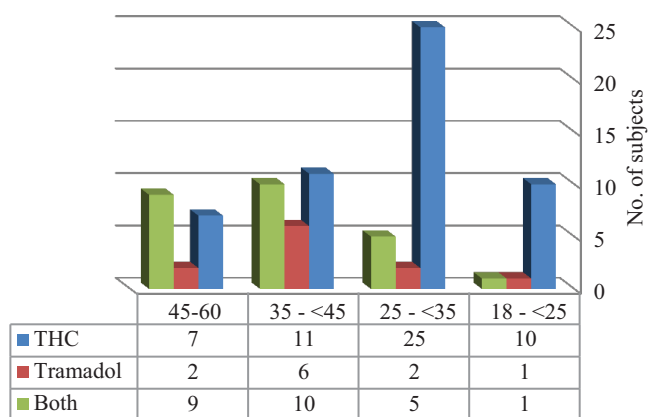
All participating subjects in the current study were above 18 years old (the lower limit for obtaining driving license in Egypt). This was in accordance with a previous Iranian study<sup>20</sup>, where the same lower limit for driving license is established. On the other hand, Negm M and Fouad A (2014)<sup>13</sup> conducted a study on Egyptian school students aged 13-18 years to estimate prevalence of substance abuse in Zagazig.

Study results indicated that prevalence of drug abuse was considerable in both cases and controls (20.8% and 22% respectively) with no significant difference in that prevalence between both groups. Similar to our results, in a study conducted in United States, no difference in the prevalence of drug consumption was found between those who were admitted to emergency department for RTA and those admitted for other causes.<sup>23</sup> But this was different from what was found by Meibodi MK<sup>20</sup> where prevalence of positive substance abuse was significantly higher in the control group compared to the case group (OR=0.7, 95% CI 0.6- 0.9,  $P=0.009$ ), this may be explained by differences in the type of drugs analyzed, method of verification (screening, confirmatory tests or questionnaire) or may be the difference in sample size.

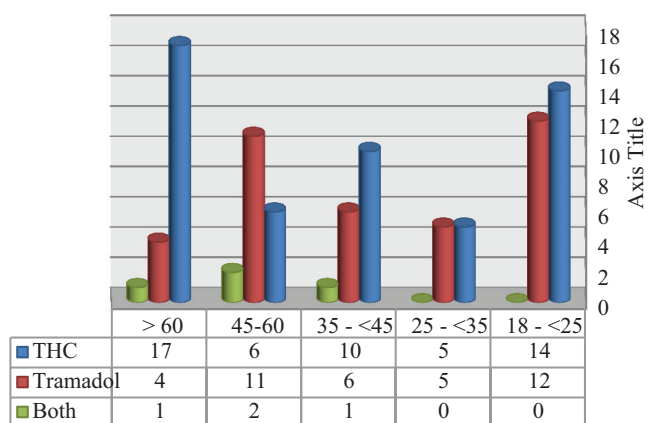
In the current study, control group members were significantly older than cases ( $p= 0.003$ ), this also was in agreement with previous studies<sup>20,24</sup>, where most of drivers injured in RTA were of young age; it is clear that with physiologic aging of people, the proper functioning of body systems decreases, so the number



**Figure-1:** Distribution of consumption of studied illicit drugs in both groups.



**Figure-2:** Distribution of consumption of studied illicit drugs by age among cases.



**Figure-3:** Distribution of consumption of studied illicit drugs by age among controls.

of elder drivers reduces and hence decreasing the chance of being involved in RTA, on the other hand, most control subjects are usually transferred to emergency department due to geriatric diseases.<sup>25</sup>

Regarding the most represented age group among cases, it was observed that most of cannabis consumers (47.16%) were 25- <35 years old. For tramadol, most of its consumers (54.5%) were 35- <45 years old. This result was a very bad indicator as those age groups are the most active and productive that supposed to be involved in the country development. This was consistent with what was proved by Hamdi et al<sup>26</sup>, as they proved that adult

age groups showed a high representation among drug abusers in Egypt. But, a previous study on drivers in Luxembourg found that most of cannabis abusers were at younger age group (18-25 years old),<sup>27</sup> and the same was observed in an American study in 2013 where the rates of Marijuana use was high (around 30%) in young adults.<sup>28</sup> This may be explained by the cultural environment where there is wide availability of the drug at younger age.

In our study, males significantly outnumbered females in both groups; this was similar to findings of many published studies.<sup>13,20,27</sup> Again, this was the same observation recorded by an Egyptian cross-sectional descriptive community-based study<sup>26</sup> where 67.5% of the whole sample was males. This may be due to the upper hand of males in Arabian countries where they can work more and so earn money more than females, they usually are involved in groups at school or at work and so more exposed to peer pressure.

There was a significant relation between marital status and substance abuse ( $P=0.008$ ) in both cases and controls, this was in line with results of previous researches<sup>26,29</sup> which pointed to a significant relationship between interrupted family life and substance abuse either as a cause or a result.

Cannabis was found to be the most commonly abused drug in both groups, this was the same observation of Loffredo et al<sup>11</sup> in their study of the pattern of substance use by Egyptian youth, they noted that smoking cigarettes and using hashish were the most common practices. Also, Negm and Fouad<sup>13</sup> concluded the same observation among adolescent school students in Zagazig. Again 77% of the substance users were using cannabis in a previous large scale Egyptian study.<sup>26</sup>

This may be explained by the relatively cheap price of cannabis, also the belief that it gives feeling of happiness and increases the sexual power. Moreover, many of its users think that it is not forbidden by the religion as it is a natural plant.

In the current study, the association between drug abuse and tobacco smoking was highly significant, this observation was logic that the most common route of cannabis administration is smoking and those consumers were, in most of cases, tobacco smokers at the beginning. Previous studies on substance use by Egyptians concluded similar results.<sup>11,26</sup>

It was noted that mean value of ISS in drivers tested positive for drug abuse was significantly higher than that for drivers tested negative. This was in agreement with the results of a previous study performed in Iran.<sup>20</sup> Also, it was noted that mean value of ISS was significantly higher in those subjects consumed both cannabis and tramadol, this was a logic result that the synergistic effect of both drugs increase the impairment of brain faculties and in turn increase the seriousness of the accidents and hence the severity of injuries. These results were also consistent with a previous Egyptian study on trauma patients that showed that tramadol overdose increased the risk of RTA.<sup>30</sup> On the other hand, some studies have shown that cannabis abuse was not associated with the risk of injuries in RTA.<sup>31</sup>

Most of subjects among cases and controls had middle level education (41.6% and 35.1% respectively), which was in agreement with Hamdi et al.,<sup>26</sup> this may support the expectations that good education and religion awareness can control substance abuse. High educational level was more evident in the control group (24.5%) than in the case group (15.7%), this

may be explained by the nature of the career; most of drivers in Egypt are of middle or low educational level.

Regarding the relation between the occupation and substance abuse among the control group, it was noticed that 62.8% of the control group were technicians. These findings may be related to the lower educational level of those practicing these occupations, together with their relatively high income, so they usually consume drugs. This was in accordance with what was observed by Hamdi et al;<sup>26</sup> they found that substance use and abuse was common among merchants (38.9%) and technicians (37.6%).

#### Limitations of the Study

The one step drug screening test device used in this study, provides only a qualitative screening result, so a secondary confirmatory method like High Performance Liquid Chromatography (HPLC) was needed.

False positive or false negative results may be produced.

#### CONCLUSION

The present study did not confirm direct relationship between drug abuse and risk of traffic injuries, nevertheless the severity of injuries was higher in drivers tested positive for drug abuse. Furthermore, cannabis was the most illicit drug frequently consumed among drivers.

#### ACKNOWLEDGEMENT

I would like to thank all subjects included in this work that without their cooperation, this research would not have been possible. I also thank all members of Emergency Department and of course Forensic Medicine and Clinical Toxicology Department at Alexandria Main University for their valuable advices and cooperation.

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**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 25-03-2017; **Accepted:** 22-04-2017; **Published:** 02-05-2017