

Post-Traumatic Stress Disorder: A Neglected Health Concern among Commercial Motor Vehicle Drivers

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Abstract

Background: Post-traumatic stress disorder (PTSD) is an anxiety disorder that may develop following a trauma. Iranian commercial motor vehicle drivers experience many road traffic accidents during their working life; this may increase the probability for developing PTSD, which in turn may lead to increased human errors as well as decreased work efficiency.

Objective: To examine the prevalence of PTSD and its associated factors among a group of Iranian commercial motor vehicle drivers.

Methods: In a cross-sectional study, 424 drivers who referred to participate in an annually training program were selected using a simple random sampling technique. They were requested to complete the Persian version of PCL-C and a data collection sheet about their occupational and demographic features.

Results: 385 (90.8%) of 424 studied drivers completed the study. 265 (68.8%) of the drivers had first-grade driving license. The mean±SD on-the-job daily driving was 10.2±2.8 h. 74 of 385 (19.2%; 95% CI: 15.3%–23.2%) met the PTSD criteria. Higher age and job experience as a professional driver, and having past history or past familial history of psychiatric disorders, were independent predictors of developing PTSD. The disease was more prevalent among drivers with first-grade driving license.

Conclusion: The prevalence of PTSD among Iranian commercial motor vehicle drivers is higher than the figures reported elsewhere. Measures to diagnose of such drivers and to ensure optimum follow-up of victims before return to professional driving should be considered.

Keywords: Stress disorders, post-traumatic; Accidents, traffic; Accidents, occupational; Occupational injuries; Prevalence; Iran

Introduction

Post-traumatic stress disorder (PTSD) is an anxiety disorder that may develop following a strain caused by an acute trauma. An affected individual may experience a state of fear,

horror, or helplessness. The syndrome can be regarded as a spectrum involving re-experience, avoidance, numbness and hyper-arousal. A variety of factors are proposed to be associated with PTSD among which trauma-related factors, and personal traits such as intelligence and

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TAKE-HOME MESSAGE

- PTSD is an anxiety disorder that may develop following a strain caused by an acute trauma.
- Some employees, like military personnel, police and fire officers, drivers, and hospital personnel are exposed to severe psychotic traumas, and thus are at risk of PTSD.
- In Iran, road traffic collisions are among main causes of DALYs.
- Drivers with first-grade license experienced a significantly higher incidents of PTSD compared to drivers with second-grade license.
- PTSD was more prevalent among drivers with prolonged working hours in interstate trips.

gender have been noted as the most important factors.¹ Previous studies have shown that more than 60% of males and 51% of females may experience at least a major stress event during their life.² The life time prevalence, however, in the community has been reported 5%–10%,³ signifying that only a few percentage of people who experienced a major traumatic event may develop PTSD. Moreover, other mental disorders are commonly associated with PTSD and almost two-thirds of victims suffer from other psychiatric disorders as well.

The type of job may affect the incidence of PTSD. Some employees, like military personnel, police and fire officers, drivers, and hospital personnel are exposed to severe psychotic traumas.^{1,4} Commercial motor vehicle drivers who experience road traffic collisions in person or who are involved passively in road traffic collisions of other drivers, are in particular risk of developing PTSD.^{4,5} In Iran, road traffic collisions are among main causes of disability-adjusted years of life lost (DALYs).^{6,7} In 2002, Iran had the highest road traffic collision-related death than any other country for which reliable esti-

mates can be found,⁶⁻⁸ although it has been decreased significantly in recent years by some law enforcements and mass education campaigns.⁹

There are few research studies on subsequent impairments following traumatic conditions and the causal factors among Iranian professional drivers. Almost 700 000 Iranian commercial motor vehicle drivers claim that they have an important role in national economy.¹⁰ The rise in road traffic collisions has increased the risk of psychotic traumas faced by drivers during their job and thus may increase the risk of PTSD and the related impairments which in turn, may lead to higher human errors, incidents, accidents, health problems as well as decreased work efficiency in this sector.

The objective of the present study was to determine the prevalence of PTSD and its associated factors among commercial motor vehicle drivers in Iran.

Materials and Methods

We conducted a cross-sectional study on 424 male drivers with more than one year of job experience, to determine the prevalence of PTSD and its associated factors. The sample size was calculated based on the data presented previously.¹¹

Occupational health services for Iranian professional drivers are provided and implemented by Iranian Ministry of Health and Iranian Ministry of Road and Urban Development and consist of two separate programs—issuing annual or bi-annual health certificate, and running annual safety and health training programs that are usually directed by general physicians and occupational medicine specialists throughout Iran. One-day training courses are performed at least twice a week in Baharloo Hospital, Tehran, Iran, where the survey was conducted. The participants in each training course

For a review on PTSD see www.theijoem.com/ijoem/index.php/ijoem/article/view/127

included 35–40 professional drivers. Our study sample was selected randomly from participants attending these training courses. Using a systematic random sampling technique, we selected drivers whose course registration numbers were multiples of five. Because the professional drivers in Iran are obliged to participate in the above-mentioned training programs, the sample was representative of Iranian professional drivers. Those professional drivers who only asked for renewal of their health certificates were excluded from the study in order to minimize reporting bias.¹² The survey was directed by a trained occupational medicine resident.

The participants were informed of the project and asked to complete a demographic data sheet and a PLC-C questionnaire. All cases with suspicious PTSD were informed of the possible disorder and its consequences and strongly advised to have follow-up visits. To make the diagnosis of PTSD, some of the suspected participants were referred to a psychiatrist, especially in those whose presentation was more complex.

PCL-C (civilian) questionnaire is a revision of the original questionnaire, PCL-M (military), the reliability and validity of which were examined against DSM IV criteria for National American PTSD Center.¹³ PCL-C is currently used as a screening tool to diagnose PTSD.^{14,15} The reliability and validity of Persian version of the questionnaire was tested in 2009.¹⁶ The questionnaire consists of 17 items based on DSM IV criteria. Items 1–5 are about re-experiencing, items 6–12 deal with avoidance and numbing signs, and items 13–17 measure hyper-arousal.

There are three scoring approaches. The first scoring method has a high precision, which based on Likert scale and classified at levels ‘1’ meaning “never,” ‘2’ “very rare,” ‘3’ “sometimes,” ‘4’ “often,” and ‘5’ “very often” that yields a final score



Road traffic collisions are among main causes of DALYs in Iran.

ranging from 17 to 85. The recommended cutoff point for the screening PTSD due to civil motor accidents is set at 44.¹⁷

An alternative scoring system is based on DSM IV criteria and requires a minimum score of ‘3’ meaning “sometimes,” at least for one statement in items 1–5, three statements in items 6–12, and two statements in items 13–17, to make the diagnosis of PTSD. The third approach is a combination of the two scoring systems. We used the first scoring method.

The institutional review board at Kashan University of Medical Sciences, Iran, approved the study.

SPSS® for Windows® ver 17 was used for statistical analysis. A *p* value <0.05 was considered statistically significant.

Results

Of 424 drivers studied, 385 (90.8%) completed the study. Almost all Iranian commercial motor vehicle drivers are male, and as expected, all participants in the current study were male. They had a mean±SD age of 35±9.0 years. More than half of the participants (*n*=227, 59%) did not complete high school education, 66 (17%) were single, and 265 (68.8%) had first-grade driving license. Of studied drivers, 257 (66.8%) worked on their

Table 1: Some demographic features of participants. Data are presented as mean±SD, median [IQR], or n (%)

Variable	Total (n=385)
Age (yrs)	35.45±9.04
Education	
<Diploma	227 (59.0%)
Diploma	139 (36.1%)
>Diploma	19 (4.9%)
Marriage	
Unmarried	66 (17.1%)
Married	319 (82.9%)
Number of child	2 [1]
History of psychiatric disorders	
Yes	23 (6%)
No	362 (94%)
History of psychiatric disorders in close family members	
Yes	39 (10.1%)
No	346 (89.9)

owned motor vehicles, 76 (19.7%) employed to work for other owners, and 52 (13.5%) were employed by local institutions and companies.

When the participants were asked about their mental health history, 23 (6%) reported previous experiences of mental and psychological disorders. Additionally, a total of 39 (10%) reported such disorders in their close family members. The mean±SD on-the-job daily driving was 10.2±2.8 hrs. Tables 1 and 2 show demographic and occupational characteristics of participants, respectively.

While the majority of the drivers reported work-related traumatic incidents during meddling or contribution in emergency and life-saving operations or as an eyewitness, a total of 111 (28.8%) was directly involved in traffic collisions leading to serious injuries or death. Overall, 74 of

385 (19.2%; 95% CI: 15.3%–23.2%) drivers had PCL-C score >44, and thus were considered to have PTSD following immediate exposure involvement in an occupational accident or as an overwhelmed spectator. While PTSD was diagnosed in 42 (37.8%) of 111 drivers who directly involved in traffic collisions resulted in a high damage, serious injury or death, it was found in only 31 drivers impressed by the accident scenes. PTSD was more likely in those drivers with a past history of neuropsychiatric disorders in themselves (OR=3.64, 95% CI: 1.53–8.69) or in their family (OR=5.12, 95% CI: 2.57–10.30) than those without. Tables 3 and 4 present the quantitative and qualitative variables compared in terms of PTSD, respectively.

The final mean±SD score of PCL-C questionnaire completed by participants was 29.3±15.2. The mean±SD scores of the five items in the questionnaire related to re-experiencing accidents, seven items dealing with avoidance and numbing, and the five items associated with hyper-arousal, were 9.3±5.4, 11.3±5.6 and 8.8±5.0, respectively. Table 5 compares the three subcategories of symptoms in terms of studied variables.

The mean±SD frequency of traffic collisions for the drivers while they were on duty was not significantly different (p=0.10) in between drivers with first-grade license (2.2±0.3) and second-grade license (1.6±0.8). The frequency was also not significantly different (p=0.58) between interstate working trip (2.0±0.2) and rural working trips (2.2±0.2) or between the group satisfied with their job and unsatisfied group (2.0±0.2 vs 2.4±0.2; p=0.31).

Discussion

We found a high prevalence of almost 20% of PTSD following road traffic colli-

sions among Iranian professional drivers, which is higher than the figures reported previously. A study reported an average PTSD prevalence of 15% including work-related trauma (10.7%) and non-occupationally trauma disorders (21.3%).⁵ In a survey carried out on 342 bus drivers, the prevalence was 9%.¹¹ Some researchers during their study conducted on train drivers found that PTSD defined solely in terms of avoidance and numbing would occur in 11.4%–12.7% and 9.6%–13.2% of participants, respectively.¹⁸ However, we could not make any comparison for lack of similar study on PTSD among Iranian drivers. International studies have reported a prevalence of PTSD of almost 1%–8% in general populations.¹⁹ However, we could not find any data on the prevalence in Iranian general population.

Some limited studies investigated the prevalence of PTSD in various occupations. The prevalence among ambulance drivers in Arak and Kashan was 36.4%;²⁰ it was 14.9% among military personnel.²¹

We found that professional drivers who exposed to road traffic collisions, whether involved directly or as an emergency personnel in life-saving operations, had a higher risk of developing PTSD. Iran has one of the highest mortality rates in traffic collisions, according to WHO. Road traffic collisions are considered the first cause of mortality in people under the age 40,⁷ and the second cause of mortality when adjusted for all ages.²² Figures showed a decrease in the rate of road collisions following some preventive actions taken by law enforcement in 2009.⁹ Some studies revealed that although the frequency of accidents remained the same for light and heavy vehicles, the mortality was significantly higher in accidents involved heavy vehicles.²³ This might justify the higher prevalence of PTSD among professional drivers. Road traffic collisions were the leading cause of PTSD among Iran Army

Table 2: Some occupational features of participants. Data are presented as mean±SD, median [IQR], or n (%).

Variable	Total (n=385)
Job experience (yrs)	10 [11]
On-the-job daily driving (hrs)	10.2±2.8
Type of driving license	
1 st grade*	265 (68.8)
2 nd grade [†]	120 (31.2)
Type of working trips	
Interstate	187 (48.6)
Rural	198 (51.4)
Driving position	
Chief driver	361 (93.8)
Assistant driver	24 (6.2)
Employment type	
Self employed	257 (66.8)
Work for other owners	76 (19.7)
Work for local companies	52 (13.5)
Job satisfaction	
Yes	117 (30.4)
Partially	207 (53.8)
No	61 (16)

*A type of Iranian driver's license for driving vehicles up to 3500 kg gross vehicle weight.

†A type of Iranian driver's license for driving vehicles above 3500 kg gross vehicle weight.

Forces during peacetime.²¹

A recent study on Montreal bus drivers,⁵ found that 10.7% of the drivers exposed to traumatic accidents suffered from PTSD. The rate in our study was much higher—37.8% of PTSDs occurred following traffic collisions. In addition to different criteria for defining traumatic accidents in these two studies, we can explain the significant difference by considering three possible points as follows: First, the perception of traumatic accident may be different for Iranian

Table 3: Distribution of quantitative variables stratified by PTSD. Data are presented as mean±SD, median [IQR]

Variable	Suspected PTSD (n=73)	No PTSD (n=312)	p value
Age (yrs)	38.4±10.1	34.8±8.7	0.002
Job experience (yrs)	13 [13]	10 [11]	0.028
On-the-job daily driving (hrs)	10.1±3.0	10.2±2.8	0.858
Family members	4.0±1.6	3.7±1.3	0.131
Number of road traffic collisions	2 [1]	1 [1.5]	0.340

and Canadian drivers. This means some drivers, depending on their context, may report a minor traffic collision as traumatic. The second point is the difference in the severity of accidents due to differ-

ent road standards and safety of vehicles in use. Another possible hypothesis may consider the diverse susceptibility of societies. The inclusion of these variables in future studies could be beneficial in bet-

Table 4: Distribution of qualitative variables stratified by PTSD

Variable		Suspected PTSD (n=73) n (%)	No PTSD (n=312) n (%)	p value
Education	<Diploma	46 (20.3)	181 (79.7)	0.434
	≥Diploma	27 (17.0)	131 (83.0)	
Marriage	Unmarried	9 (14)	57 (86)	0.225
	Married	64 (20.4)	255 (79.6)	
Type of driving license	1 st grade	62 (23.8)	203 (76.2)	0.001
	2 nd grade	11 (9.2)	109 (90.8)	
Type of working trips	Interstate	42 (23.0)	145 (77.0)	0.089
	Rural	31 (15.7)	167 (84.3)	
Driving position	Chief driver	66 (18.6)	295 (81.4)	0.188
	Assistant driver	7 (29)	17 (71)	
Employment type	Self employment OR Work for local companies	60 (19.4)	249 (80.6)	0.645
	Work for other owners	13 (17)	63 (83)	
Job satisfaction	Yes OR Partially	56 (17.3)	268 (82.7)	0.053
	No	17 (28)	44 (72)	
History of psychiatric disorders	Yes	10 (44)	13 (57)	0.005*
	No	63 (17.7)	299 (82.3)	
History of psychiatric disorders in close family members	Yes	19 (49)	20 (51)	<0.001
	No	54 (15.9)	292 (84.1)	

*Fisher's exact test

Table 5: Comparison of the three subcategories of symptoms in terms of studied variables. Data are presented as median (IQR).

Variable		Re-experiencing	p value	Avoidance/ Numbing	p value	Hyper-arousal	p value
Education	< Diploma	5 (8)	0.93	7 (8)	0.95	5 (7)	0.92
	≥ Diploma	7 (7)		9 (8)		7 (5)	
Marriage	Unmarried	5.5 (5)	0.05	7 (5)	0.22	5 (5)	0.41
	Married	7 (8)		8 (8)		6 (6)	
Type of driving license	1 st grade	7 (9)	<0.001	9 (9)	<0.001	7 (7)	<0.001
	2 nd grade	5 (5)		7 (4)		5 (4)	
Type of working trips	Interstate	8 (9)	<0.001	10 (9)	0.01	8 (7)	<0.001
	Rural	5 (6)		7 (6)		5 (6)	
Driving position	Chief driver	7 (7)	0.24	8 (8)	0.44	5 (6)	0.06
	Assistant driver	8 (10)		9 (9)		8 (9)	
Employment type	Self employment OR Work for local companies	7 (8)	0.58	8 (8)	0.35	6 (6)	0.81
	Work for other owners	6 (6)		7 (7)		5 (6)	
Job satisfaction	Yes OR Partially	6 (7)	0.04	7 (7)	<0.001	5 (6)	<0.001
	No	9 (10)		11 (10)		9 (10)	
History of psychiatric disorders	Yes	13 (7)	<0.001	15 (12)	<0.001	12 (7)	<0.001
	No	6 (7)		7 (7)		5 (6)	
History of psychiatric disorders in close family members	Yes	13 (12)	<0.001	15 (12)	<0.001	14 (13)	<0.001
	No	5 (7)		7 (7)		5 (5)	

ter understanding and explanation of the subject.

Furthermore, a previous study has reported the life-time prevalence of 7.7% of road traffic collisions for Iranian professional drivers,⁸ which is significantly lower than the figure of 28.8% observed in the current study. The difference may be explained by the different approaches used to collect data, as there is a lack of reliable national database. Some data gathering methods can lead to bias with resultant underestimating the risk.¹² For example, the road traffic collisions rate for heavy vehicles in France in 2003–06 was 7.3%,²⁴ whereas the rate in Iran seems to

be much higher.

We found that daily driving hours was significantly higher among Iranian professional drivers than the recommended working hours. Unusual working schedules and shift works may also expose the drivers to a higher risk. Previous reports proposed the unfavorable effects of extended working hours >50 hrs/wk.²⁵ Review of literature showed that extra working hours in driving operations may be associated with deteriorated general health status, increased injury incidence and higher risk of mortality.²⁶ A recent study showed that unusual working schedules >55 hrs/wk would expose the

employees to higher risks of developing distress symptoms.²⁵ In the current study, however, we observed no significant association between daily working hours and development of PTSD in the drivers.

While studies at national level suggested that drivers granted second-grade driving license were more involved in traffic collisions,²⁷ our study found no significant difference between the first-grade and the second-grade driving license drivers in terms of the frequency of accidents. However, we found that drivers with first-grade license experienced a significantly higher incidents of PTSD compared to drivers with second-grade license. This could be attributed to the type of vehicles used by these two groups of drivers. Although the frequency of accidents was not significantly different in the two groups, first-grade drivers involved more frequently in serious accidents.²⁴

We observed that PTSD was more prevalent among drivers with prolonged working hours in interstate trips. However, the difference was not statistically significant ($p=0.08$). Nevertheless, the scores related to triple components of the disorder—hyper-arousal, re-experiencing, numbing and avoidance—were significantly higher in drivers engaged in interstate trips than those who took rural trips. Although the figures indicate a higher number of traffic collisions inside cities, it appears that accidents in interstate trips may result in more serious outcomes to both health and properties.²⁸ Additionally, interstate drivers spend more times away from their family and have longer working hours and thus would be more vulnerable to develop PTSD.^{20,29,30}

While we expected a lower prevalence of PTSD in married drivers because of their family supports,^{20,29,30} we found no significant difference in the rate between single and married drivers. This may be explained by the extended periods that

drivers are away from their families, which in turn resulting in lacking of family support. This finding was in agreement with a study on Korean train drivers, which reported no association between the prevalence of PTSD prevalence and marital status.¹⁸

In our study higher age and working experience duration of the drivers had a strong association with development of PTSD. That was expected, as by increasing age and years of work, the cumulative probability of exposure to traffic collisions would increase. Several studies have already confirmed the vulnerability of older individuals to PTSD following stress-induced experiences.³¹ The result was in agreement with a study among army drivers that showed the average age and employment duration were higher in those personnel who had PTSD.²¹

We found no significant difference in the likelihood of PTSD between paid drivers and private drivers who owned their vehicles. Obviously, those who owned their vehicles enjoyed more secure jobs and probably a better insurance coverage. Previous reports showed that lack of social supports was a main risk factor for developing PTSD.³¹ A study on Brazilian professional drivers also indicated a higher risk of distress among paid drivers who worked on heavy vehicles.³⁰

We found that the likelihood of developing PTSD was significantly higher in professional drivers with a history of neuropsychiatric disorders in themselves or in their family than those without, which is in agreement with previous reports.³¹⁻³³

The likelihood of PTSD in did not relate to the level of job satisfaction. No association between the prevalence of PTSD and the level of education was also observed, which is in keeping with the Korean study.¹⁸

Some limitations in the current study should be noted. First, the cross-sectional

nature of the study would hamper discovering any cause-and-effect relationship in the studied variables. Second, it was not possible to apply psychiatric or psychological consultation to make a definite diagnosis of PTSD in all suspected persons. Third, we could not control for the “healthy worker effect,” and fourth, reporting bias that might be sources of underestimation of the rate in occupational medicine setting.

In conclusion, we found a high prevalence of PTSD among Iranian professional drivers that may deteriorate their life and lead to increased human errors and occupational accidents. Furthermore, the current study confirmed the need of more specific occupational health services for professional drivers, particularly establishment of a detailed neuropsychiatric evaluation during their periodic health examinations and after major occupational accidents. Countermeasures to ensure optimum follow up of victims before return to professional driving may be useful. Further studies are required to explore other probable causal factors.

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