

# Predictors of Post-Traumatic Stress Disorder among Victims of Serious Motor Vehicle Accidents

Naema Khodadadi-Hassankiadeh<sup>1</sup>, PhD candidate; Nahid Dehghan Nayeri<sup>2</sup>, PhD; Hooman Shahsavari<sup>3</sup>, PhD; Shahrokh Yousefzadeh-Chabok<sup>4,5</sup>, MD; Hamid Haghani<sup>6</sup>, PhD

<sup>1</sup>Department of Community Health Nursing Group, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran;

<sup>2</sup>Nursing and Midwifery Care Research Center, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran;

<sup>3</sup>Department of Medical- surgical Nursing, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran;

<sup>4</sup>Department of Neurosurgery, Guilan Road Trauma Research Center, Guilan University of Medical Sciences, Rasht, Guilan, Iran;

<sup>5</sup>Neuroscience Research Center, Poursina Hospital, School of Medicine, Guilan University of Medical Sciences, Rasht, Guilan, Iran;

<sup>6</sup>Department of Biostatistics, School of Medical Sciences, Iran University of Medical Sciences, Tehran, Iran

## Corresponding author:

Nahid Dehghan Nayeri, PhD; Nursing and Midwifery Care Research Center, School of Nursing and Midwifery, Nosrat St., Towhid Sq, Postal code: 14197-33171, Tehran, Iran  
Tel: +98 21 66937120; Fax: +98 21 66927171; Email: nahid.nayeri@gmail.com

Received: 19 November 2016 Revised: 26 March 2017 Accepted: 4 April 2017

## ABSTRACT

**Background:** Compelling evidence has shown that motor vehicle accidents have an enormous impact on mental health. Post-traumatic Stress Disorder (PTSD) is one of the most common psychological consequences in adult survivors of accidents, so it is important to understand the prevalence and predictors of this issue since delay causes damage to crucial daily functioning.

This study aimed at investigating the prevalence and predictors of PTSD after motor vehicle accident.

**Methods:** This cross-sectional study was conducted on 528 injured patients six weeks to six months after motor vehicle accident in Imam Reza Clinic of Poursina hospital, Rasht in 2015. Data collection tools were three questionnaires including post-traumatic stress-self report (PSS), Beck Depression Inventory (BDI-II), and the Numeric Rating Scale (NRS) for pain. The data were analyzed in SPSS (Version 19) using Chi-square, Fischer's exact test and multivariate logistic regression. Significance level was considered  $P \leq 0.05$ .

**Results:** The prevalence of PTSD and depression was 30.49% and 19.89% in participants, respectively. Chi-square test indicated a significant relationship among age ( $P=0.02$ ), sex ( $P<0.001$ ), education level ( $P<0.001$ ), work status ( $P<0.001$ ) and PTSD. Participants who reported pain ( $P<0.001$ ) and depression ( $P<0.001$ ) were more likely to have high score of PTSD than the others. Multivariate logistic regression showed this significance in sex, depression, age, educational status and pain, as constant risk factors in developing PTSD after accident.

**Conclusion:** This study suggests that primary care setting should be readily prompted for diagnosis of these disorders in non-treatment seeking individuals in the community.

**KEYWORDS:** Post-traumatic stress disorder, Depression, Motor Vehicle accident

**Please cite this article as:** Khodadadi-Hassankiadeh N, Dehghan Nayeri N, Shahsavari H, Yousefzadeh-Chabok Sh, Haghani H. Predictors of Post-Traumatic Stress Disorder among Victims of Serious Motor Vehicle Accidents. *IJCBNM*. 2017;5(4):355-364.

## INTRODUCTION

Motor vehicle accidents (MVA) have been reported as the third cause of mortality in Iran. According to reports, they are responsible for 22.7% of the total disabilities and 17% of the total deaths in Iran.<sup>1</sup> Unfortunately, a large number of physical and mental disabilities are seen after accidents occur.<sup>2</sup>

Post-traumatic Stress Disorder (PTSD) is one of the most common psychological consequences in adult MVA survivors; thirty-five studies have reported the prevalence rate of PTSD between 6%-45%<sup>3</sup> which, if left untreated, can bring about significant and permanent outcomes.<sup>4</sup> Many sufferers do not usually seek psychological assistance (psychotherapy and pharmacotherapy) because of avoidance symptoms<sup>5</sup> or stigma.<sup>6</sup> Therefore, many psychological problems of PTSD victims have remained unsolved.<sup>7</sup>

PTSD is associated with high costs for both individuals and society at large. Since MVA victims are afflicted with PTSD, they experience much more physical, psychological and functioning problems.<sup>8</sup> In the 5th edition of "Diagnostic and Statistical Manual (DSM-5)" published in 2015, we came across a new definition of post-traumatic stress disorder where twenty symptoms in four clusters of "re-experiencing (intrusions), avoidance, arousal and negative alternations in cognitions and mood development" have been highlighted.<sup>4</sup>

Progressive PTSD is associated with changes in health behaviors such as smoking, substance use,<sup>5</sup> alcohol use,<sup>9</sup> developing somatic disorders,<sup>10</sup> and risk of HIV,<sup>11</sup> with increasing tendency to commit violence and suicide.<sup>12</sup>

Prior research has suggested a significant relationship between PTSD and major depression disorder (MDD).<sup>13</sup> Moreover, PTSD can be a potential cause for future depression. Co-morbid depressive symptoms in PTSD is linked to poor health-related quality of life.<sup>14</sup> The results of a research emphasize the importance of taking co-occurring depression

symptoms into consideration by clinicians and using interventions to promote adaptive cognitions about suicide among people suffering from PTSD.<sup>14</sup>

Studies on risk factors for PTSD among MVA survivors have found that subjective pre- and post-trauma risk factors have a major role in developing PTSD.<sup>15</sup> Consistent predictors of PTSD after MVA include prior mental disorder,<sup>3</sup> length of hospital stay,<sup>13</sup> acute pain,<sup>16</sup> litigation (to seek the services of a lawyer and begin litigation),<sup>3</sup> lack of social support,<sup>17</sup> persistent physical problems,<sup>3</sup> financial problems,<sup>18</sup> job withdrawal<sup>19</sup> female sex,<sup>20</sup> and younger age group.<sup>3,21</sup>

However, little is known about differential predictors of these conditions in which such factors can be assessed following MVA, in order to screen for those most vulnerable to PTSD and target treatment efforts accordingly.<sup>15</sup> Previous studies suffer from insufficient sample size.<sup>3</sup> Several other studies have assessed these risk factors in war veterans with PTSD.<sup>22</sup>

In Iran, due to lack of mental health consultants in hospitals, the survivors are discharged without receiving services such as screening, counseling and psychological care.<sup>23</sup> We hypothesized that some pre- and post-accident factors can be associated with worse mental health. A few studies have assessed PTSD in six weeks to six months post-MVA in the north of Iran. Therefore, this study aimed to investigate the prevalence and predictors of PTSD after motor vehicle accident.

## MATERIALS AND METHODS

We conducted a cross-sectional study from March 2015 to September 2015 on patients referred to Imam Reza Clinic of Poursina Teaching hospital, Rasht who had been exposed to MVA. This hospital is the main center for admission of MVA injuries in Guilan province and neighboring provinces such as Mazandaran. The subjects were eligible if they had the following inclusion criteria; at least 15 years of age, passed six weeks to six months after

accident, Persian speaking ability, no recent severe psychological problem (e.g. psychosis or mania), no severe internal or brain disease, and no acute physical pain inhibiting the process of interview. Exclusion criteria included suicidal and homicidal behavior, verbal or linguistic problems, psychotic symptoms (e.g. hallucination), alcohol or substances intoxication at the time of interview, re-current accident, and recent grief.

After explaining the study objectives and obtaining written informed consent, we interviewed the participants privately to evaluate the inclusion and exclusion criteria. A trained psychiatric nurse (one of the study researchers) interviewed the participants. 528 eligible participants were interviewed and included in the study six weeks to six months after MVA. Other characteristics of the accident were obtained using HIS (hospital information system). Then, the questionnaires, demographic and post-traumatic stress-self report (PSS) (DSM-5 version), Beck Depression Inventory (BDI-II), and Numeric Rating Scale (NRS-11), were filled out through interview.

Foa et al. (1993) developed PSS and assessed its reliability (0.74) and validity (0.91). It was then modified by Elhai et al. (2012) according to DSM-5 content, generating a 20-item questionnaire (3 questions are about clinical symptoms of PTSD added to previous 17 questions). Although we could use old standard Persian tools, the researchers of this study preferred to use a tool covering all symptoms of this disorder recommended in most recent psychological textbooks. Thus, this is the first Persian study examining the validity and reliability of PSS (DSM-5). Besides, because the questions of this new version covered all items of the older one, practically two tools were used in one study. (PSS17 Foa and PSS20 Elhai). Our tool examines the most stressful accident in the previous month and contains 20 items with a score of zero to 3. The minimum and maximum scores are 1 and 60 (0=not at all, 1=once in a week (rarely), 2=two to four times

a week (sometimes) and 3=five times and more in a week (always).

In four clusters of symptoms; re-experience of accident while awake or asleep (questions 1-5), avoidance meaning ignoring any symptom which simulates the incident for the person (questions 6-7), negative changes in mood and cognition characterized by symptoms of guilt (questions 8-14), irritability characterized by symptoms of anger and nervousness (questions 15-20).<sup>4,24</sup> Scores higher than 17 were considered cut-off for inclusion in study.<sup>25</sup> 0.94 alpha coefficients and a good validity were reported for this tool. The goodness-of-fit for DSM-5 symptoms was obtained very good based on confirmatory factor analysis and none of the factors was more correlated with depression.<sup>4</sup>

To assess the content validity, we distributed the questionnaires among ten experts; eight research members of Guilan Road Trauma Research Center (one psychiatrist, three psychologists, three neurologists, one neuroscientist, and two psychiatric nursing faculties of Nursing and Midwifery School and for face validity; ten victims of traffic accidents admitted to the orthopedic ward of hospital with symptoms of acute stress, with secondary and high school education and willing to cooperate were questioned. Thus, the questions were read to them. If the subjects expressed confusion or the questions seemed ambiguous, the questionnaire was updated based on the comments and suggestions.

Its reliability was calculated by the internal consistency and Cronbach's alpha coefficient ( $\alpha=0.88$ ), so the PSS questionnaire showed a favorable reliability and validity.

The BDI-II was a validated and reliable scale with 21 self-report items widely used by both clinical and non-clinical adult population. It assesses the depression symptoms over the past month using a four-point Likert scale with frequency/intensity of behavioral anchor points (0="Not at all," to 3= "always"). According to the original scale, total scores of the scale may range from 0 to 63. In this study, the cut-off point was

considered  $\geq 17$  which required consulting a psychologist or psychiatrist in previous studies. The classification of depression scores is as follows: 0–16 (without depression), 17–27 (mild depression), 28–34 (moderate depression), and 35–63 (severe depression).<sup>26</sup> Persian language translations of the BDI-II also were produced by Ghassemzadeh et al. (2005), proving a good test-retest reliability ( $r=0.74$ ) and a very good internal consistency ( $\text{Alpha}=0.87$ ). Cronbach's cognitive subscale was 0.83 and Cronbach's somatic-vegetative subscale was 0.71.<sup>27</sup>

The validity and reliability of NRS-11, an 11-point scale widely used for patient self-reporting of pain, were assessed. We recorded the severity of pain experienced by the MVA injured ones in the last 24 h using NRS (0 to 10 points, 0: no pain, 10: worst imaginable pain). It is appropriate for adults.

In a study, 0.96 and 0.95 reliability of NRS-11 were observed in literate and illiterate patients with rheumatoid arthritis, respectively before and after medical consultation. For construct validity, a correlation (ranging from 0.86 to 0.95) existed between NRS and Visual Analog Scale for Pain (VAS) in patients with rheumatic and other chronic pain conditions (pain 6 months).<sup>28</sup> Many studies have also used this instrument in Iran.<sup>29</sup>

We found that 528 patients could complete the survey. The number of exclusions is as follows: suicidal thought ( $n=5$ ), homicidal thought ( $n=2$ ), speech or language difficulties ( $n=6$ ) and psychosis symptoms ( $n=1$ ), second recent accident (within the last month which could inhibit PTSD diagnosis due to similar symptoms to acute stress disorder) ( $n=2$ ), current alcohol use ( $n=1$ ), new grief ( $n=1$ ), and refusal to participate ( $n=7$ ).

Ethical approval was obtained from the Human Subjects Ethics Sub-committee of Tehran University of Medical Sciences (Code: IR.TUMS.REC.1395.2798). The study goals were explained for each participant and then they filled the written consent form. Finally, all survivors with PTSD were invited to use the free psychiatric nurse counseling at the

hospital, by ensuring the preservation of the name and their privacy.

The demographic as well as other data were analyzed using descriptive statistics including frequencies, percentages, means, standard deviations, and logistic regression in SPSS statistical software (version 19.0). In order to assess the research objectives, chi-square test/fisher exact test was used to determine the relationship between the risk factors and probable PTSD (P-PTSD). Then, the significant variables were included in the model using multivariate logistic regression to identify the constant predictors of PTSD after MVA. The significance level was considered  $P \leq 0.05$ .

## RESULTS

The majority of the participants were under 30 years of age ( $n=267$ ) with a mean age of 33.59 and standard deviation of 13.29 years old (15–79 years old). Age had a significant relationship with P-PTSD ( $P=0.02$ ). The demographic and clinical characteristics of the participants are shown in Table 1. The majority of the participants were male, but the females had higher scores in PSS than the males ( $P<0.001$ ). The majority of P-PTSD participants were married, but the results suggested no statistically significant relationship between marital status and PSS score ( $P=0.49$ ). Almost 44.10% had high school education who were also more likely to have higher scores of PTSD than other educated sub-categories ( $P<0.001$ ). Results suggested that the self-employed ones reported significantly more PTSD than other occupations ( $P<0.001$ ).

Nearly half of the participants in the P-PTSD group had low income. Yet, economic status was not related to PTSD ( $P=0.70$ ).

There was no link between P-PTSD and prior disability ( $P=0.32$ ), prior serious MVA ( $P=0.22$ ), prior serious trauma ( $P=0.58$ ) and physical chronic disease ( $P=0.91$ ) (Table 1).

In our population, 30.49% of participants on the PSS scale met the screening criteria for P-PTSD and 19.89% met our criteria for depression on the BDI-II test. There were also

**Table 1:** Demographic and clinical characteristics of 528 MVA patients

Variables	Category	P-PTSD <sup>a</sup> N (%)	N-PPTSD <sup>b</sup> N (%)	P value
Age	<30	92 (57.14)	175 (47.68)	*0.02
	≥30	69 (42.86)	192 (52.32)	
Sex	Male	94 (58.39)	292 (79.56)	**<0.001
	Female	67 (41.61)	75 (20.44)	
Marital status	Married	100 (62.11)	217 (59.13)	**0.49
	Single	52 (32.30)	129 (35.15)	
	Divorced	3 (1.86)	9 (2.54)	
	Widowed	6 (3.73)	8 (2.18)	
	Separated	0 (0.00)	4 (1.09)	
Education	Illiterate	9 (5.59)	14 (3.81)	**<0.001
	Primary	18 (11.18)	82 (22.34)	
	Secondary	31 (19.25)	91 (24.80)	
	High school	71 (44.10)	145 (39.51)	
	University	32 (19.88)	35 (9.54)	
Work Status	Employed	20 (12.42)	46 (12.53)	**<0.001
	Self-employed	51 (31.68)	157 (42.78)	
	Housewife	39 (24.22)	44 (11.99)	
	Jobless/Farmer/Worker	41 (25.47)	104 (28.34)	
	University Student	9 (5.59)	11 (3.00)	
	Student	0 (0.00)	1 (0.27)	
	Soldiers	1 (0.62)	4 (1.09)	
Economic status	Poor	74 (46.54)	178 (48.77)	**0.70
	Moderate	75 (47.17)	161 (44.11)	
	Good	10 (6.29)	24 (6.58)	
	Very good	0 (0.00)	2 (0.55)	
Prior disability	Yes	13 (8.07)	40 (10.90)	*0.32
	No	148 (91.93)	327 (89.10)	
Prior serious MVA	1	36 (22.36)	113 (30.79)	**0.22
	0	110 (68.32)	224 (61.04)	
	2	6 (3.73)	15 (4.09)	
	>2	9 (5.59)	15 (4.09)	
Prior serious Trauma	Yes	25 (15.53)	64 (17.44)	*0.58
	No	136 (84.47)	303 (82.56)	
Physical Chronic Disease	Yes	38 (23.60)	85 (23.16)	*0.91
	No	123 (76.40)	282 (76.84)	
Current depression	Normal	76 (47.20)	62 (16.89)	**<0.001
	Depress	85 (52.80)	305 (83.11)	

\*Chi-square test; \*\*Fisher exact test; <sup>a</sup>P-PTSD: Probable post-traumatic stress disorder <sup>b</sup>N-PPTSD: non-probable post-traumatic stress disorder

high rates of co-morbidity; depression and P-PTSD co-occurred in 33.54% post MVA.

The mean of pain in P-PTSD was 2.59 (SD=6.05). As reported, there was no pain in almost a quarter of P-PTSD sufferers; however, results revealed that pain was significantly related with P-PTSD (P<0.001). There were no significant differences in the amount of pain in terms of sex (P=0.11) (Table 2).

The variables that appear to be “significantly” related with P-PTSD including in multivariate logistic regression, such as age, work status, education, Pain, gender and depression.

Multivariate logistic regression indicated that some variables were associated with P-PTSD Age (OR, 5.58; 95% CI=3.03-10.25), education (OR, 0.49; 95% CI=0.27-0.90), pain

**Table 2:** Comparison of pain in P-PTSD/N-PTSD, male/female at sixth week-sixth month post-MVA (participant=528)

Variable	Category	P-PTSD N (%)	N-PTSD N (%)	P value	Male N (%)	Female N (%)	P value
Pain	No	41 (25.47)	175 (47.68)	* $<0.001$	157 (40.67)	59 (41.55)	*0.11
	Mild	57 (35.40)	125 (34.06)		138 (35.75)	44 (30.99)	
	Moderate	51 (31.68)	62 (16.89)		83 (21.50)	30 (21.13)	
	Sever	12 (7.54)	5 (1.36)		8 (2.07)	9 (6.34)	

\*Fisher exact test

(OR, 0.38; 95% CI=0.24-0.61), sex (OR, 0.25; 95% CI=0.15-0.43), depression (OR, 0.09; 95% CI=0.04-0.19), and work status (P=0.41) had no significant relationship with P-PTSD (Table 3).

Table 3 shows that the first and most significant predictor affecting PTSD after MVA is depression. In non-depressed base group, the risk of P-PTSD decreased 0.09%. The second predictor was age. In people under 30 years old in the base group, the risk (odds ratio) of P-PTSD increased 5.58%. The next variable was sex. In the male base group, 0.25% decrease was observed in the risk of P-PTSD. The next predictor was pain. The risk of P-PTSD in the base group with no pain decreased 0.38%. The final predictor was education. In illiterate base group participants, 0.49% decrease was recorded for the risk of P-PTSD.

## DISCUSSION

P-PTSD was common among the patients at week sixth to month sixth post-MVA. Less than

half of our participants met the screening criteria for P-PTSD. Prior studies on road accidents reported a similar prevalence of PTSD.

An explanation for the high percentage of participants showing P-PTSD is the use of self-report screening instruments. These are known to overestimate mental health problems compared to structured clinical interviews by a psychologist. Another explanation can be the cultural differences.<sup>13</sup> In Iran, for instance, the rate of motorcycle accidents involving victims with no helmets has been reported extremely high.<sup>30</sup> Such accidents put the victim in higher levels of stress in contrast to car accidents though in many other cultures motorcyclists are obliged to use helmet.<sup>31</sup> Therefore, motorcycle accident is not the common cause of stress in European countries.

In the present study, the age distribution was mostly young ages and less than thirty years. We found a significant relationship between P-PTSD and age. Several studies have shown that young age was one of the best predictors of development of new-onset of PTSD;<sup>21</sup> this was consistent with our

**Table 3:** Final Step of Multiple Logistic Regression Model of Predictors of Dependent Variable of PTSD at the sixth week and sixth month (participants=528)

Predictors	Categories	B	SE	W	Sig	OR	CI
Age	<30	1.71	0.31	30.67	<0.001	5.58	3.03-10.25
	≥30						
Education	Below High School High School/University	-0.70	0.30	5.31	0.02	0.49	0.27-0.90
Pain	No/Mild Severe	-0.95	0.23	15.92	<0.001	0.38	0.24-0.61
Sex	Male Female	-1.35	0.26	26.28	<0.001	0.25	0.15-0.43
Depression	No Moderate/Severe	-2.35	0.35	44.95	<0.001	0.09	0.04-0.19
work status	Employed/Self-employed Jobless/Farmer/Worker	0.19	0.23	0.66	0.41	1.20	0.76-1.91

result. Moreover, older people were reported to learn coping mechanisms from past experience; also, older age was associated with less sensitivity, fewer negative beliefs and decreased mood symptoms.<sup>32</sup>

Similar to other related studies, the majority of participants in our research were men, perhaps because most drivers are men in Iran. Results of the present study also support a link between P-PTSD and female sex; women are at a greater risk of developing PTSD.<sup>20,33</sup> It seems that low perceived control in women compared to men may be the cause of severe PTSD in them.<sup>34</sup>

Our results found no relationship between P-PTSD and marital status. However, another study showed an association between PTSD and relationship ruptures, which might be due to the psychological impact of the separation. A research stated that support from family and friends reduced PTSD.<sup>17</sup> In the same line with the current study, several researchers found marital status as a non-predictor of PTSD.<sup>32,35</sup>

The present study revealed a relationship between the level of education and PTSD. Participants with high school education had more P-PTSD. In line with our findings, education significantly predicted mild PTSD<sup>36</sup> in another study, showing an association between higher education with higher rates of PTSD. The affected victims who had knowledge of the probable consequences of the accident were concerned about their personal goals and probable future ambiguities.<sup>32</sup>

This study found a connection between work status and P-PTSD, but the result of the logistic regression did not confirm it. Then, having a job even with high income had no protective role against PTSD. A connection between a functional impairment and PTSD was observed in this study;<sup>37</sup> of course in the present study, the work status belonged to before the MVA, not after it.

Like work, the economic status had no relationship with P-PTSD. The majority of our study samples had a low income. This finding is inconsistent with another study that

found the moderate income as a significant predictor of PTSD.<sup>38</sup> It is possible that in the present study, the exact income was not clear because due to the compensation claim, the exact financial status may have not been stated. However, even high income did not show to have a protective role against stress.

The majority of the injured ones in our study complained of mild pain, indicating lack of complete recovery. However, P-PTSD was associated with pain. Based on evidence, one of the consistent predictors of PTSD was persistent physical problems.<sup>3</sup> Some studies have found the importance of cataclysmic processes in perceiving the vulnerability to pain and a possible mechanism for co-occurrence of pain and PTSD over time.<sup>39</sup>

Prevalence of depression in our study population was high as in a recent study, which reported much higher depression due to air crash.<sup>13</sup> MVA injured patients with P-PTSD revealed higher occurrences of depression compared with those without PTSD. These results are in contrast with others reporting PTSD co-occurrence with major depressive disorder.<sup>32</sup> PTSD co-morbidity has been associated with more severe and chronic symptomatology.

However, some gender differences have been noted; women have a higher rate of co-morbid depression and pain, and the experience of pain for women seems to be related to pain report and sensitivity, while for men it has been largely related to functional impairment,<sup>40</sup> but in our study sample, there was no gender difference in pain.

Because of the study's design, the causality of the association between PTSD and pre- and post-MVA factors could not be determined. PSS (DSM5) has not been standardized in Iran. A definitive diagnosis can only be made using a long diagnostic interview by a psychologist using instruments such as the Clinician Administered Scale for PTSD. To assess certain variables, such as financial status, a separate standard questionnaire was not used.

However, the current study was conducted in the main trauma center for MVA referrals

in northern Iran, so the sample size was good and not biased. Still the results should be cautiously generalized. This is among the few nursing studies that evaluated PTSD symptoms according to DSM-5 in four clusters among MVA survivors through interview. Randomized controlled trial studies and nurse-led interventions (through consultation) on PTSD after MVA are recommended.

## CONCLUSION

This study revealed that MVA survivors had significant rates of PTSD and depression; also, age, educational status, pain, sex, and depression are constant predictors of P-PTSD. This finding makes the hospital staff aware of these disorders and the need for assessment which can be useful in caring as well as treatment. There may also be more simple methods of prevention that can be useful in acute settings such as early monitoring of mental health which is particularly important in the first month after an MVA and the availability of specialist nurse/counselors to discuss about pain and depression management with patients. This study concluded that primary care settings' personnel should be aware of prompt diagnosis of such psychological disorders, particularly in non-treatment seeking individuals in the community.

## ACKNOWLEDGMENT

This study is extracted from a PhD thesis at Tehran University of Medical Sciences (proposal code; 9121199006). We offer our special thanks to Tehran University of Medical Sciences for their scientific and economic support and Clinical Research Development Unit of Poursina Hospital, Guilan University of Medical Sciences, dear participants and Fatemeh Javadi for translating the manuscript.

**Conflict of Interest:** None declared.

## REFERENCES

1 Hamzeh B, Najafi F, Keramatian B, et al.

- Epidemiology of traffic crash mortality in west of Iran in a 9 year period. *Chinese Journal of Traumatology*. 2016;19:70-4.
- 2 Irish LA, Gabert-Quillen CA, Ciesla JA, et al. An examination of PTSD symptoms as a mediator of the relationship between trauma history characteristics and physical health following a motor vehicle accident. *Depression and Anxiety*. 2013;30:475-82.
- 3 Heron-Delaney M, Kenardy J, Charlton E, Matsuoka Y. A systematic review of predictors of posttraumatic stress disorder (PTSD) for adult road traffic crash survivors. *Injury*. 2013;44:1413-22.
- 4 Elhai JD, Miller ME, Ford JD, et al. Posttraumatic stress disorder in DSM-5: Estimates of prevalence and symptom structure in a nonclinical sample of college students. *Journal of Anxiety Disorders*. 2012;26:58-64.
- 5 Trusz SG, Wagner AW, Russo J, et al. Assessing barriers to care and readiness for cognitive behavioral therapy in early acute care PTSD interventions. *Psychiatry*. 2011;74:207-23.
- 6 Nielson JL, Megler JD. Ayahuasca as a Candidate Therapy for PTSD. In: Labate BC, Cavnar C, editors. *The therapeutic use of ayahuasca*. Germany: Springer; 2014. p. 41-58.
- 7 Roberts AL, Gilman SE, Breslau J, et al. Race/ethnic differences in exposure to traumatic events, development of post-traumatic stress disorder, and treatment-seeking for post-traumatic stress disorder in the United States. *Psychological Medicine*. 2011;41:71-83.
- 8 Bryant J, Sanson-Fisher R, Stevenson W, et al. Protocol of a multi-centre randomised controlled trial of a web-based information intervention with nurse-delivered telephone support for haematological cancer patients and their support persons. *BMC Cancer*. 2015;15:295.
- 9 Jakupcak M, Hoerster KD, Blais RK, et al. Readiness for change predicts VA mental healthcare utilization among Iraq



- and Afghanistan war veterans. *Journal of Traumatic Stress*. 2013;26:165-8.
- 10 Britvić D, Antičević V, Kaliterna M, et al. Comorbidities with Posttraumatic Stress Disorder (PTSD) among combat veterans: 15 years postwar analysis. *International Journal of Clinical and Health Psychology*. 2015;15:81-92.
  - 11 Marshall BD, Prescott MR, Liberzon I, et al. Posttraumatic stress disorder, depression, and HIV risk behavior among Ohio Army National Guard Soldiers. *Journal of Traumatic Stress*. 2013;26:64-70.
  - 12 Rojas SM, Bujarski S, Babson KA, et al. Understanding PTSD comorbidity and suicidal behavior: associations among histories of alcohol dependence, major depressive disorder, and suicidal ideation and attempts. *Journal of Anxiety Disorders*. 2014;28:318-25.
  - 13 Gouweloos J, Postma IL, Te Brake H, et al. The risk of PTSD and depression after an airplane crash and its potential association with physical injury: A longitudinal study. *Injury*. 2016;47:250-6.
  - 14 Lee DJ, Liverant GI, Lowmaster SE, et al. PTSD and reasons for living: Associations with depressive symptoms and alcohol use. *Psychiatry Research*. 2014;219:550-5.
  - 15 Trickey D, Siddaway AP, Meiser-Stedman R, et al. A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents. *Clinical Psychology Review*. 2012;32:122-38.
  - 16 Cifu DX, Taylor BC, Carne WF, et al. Traumatic brain injury, posttraumatic stress disorder, and pain diagnoses in OIF/OEF/OND Veterans. *Journal of Rehabilitation Research and Development*. 2013;50:1169-76.
  - 17 Woodward MJ, Eddinger J, Henschel AV, et al. Social support, posttraumatic cognitions, and PTSD: The influence of family, friends, and a close other in an interpersonal and non-interpersonal trauma group. *Journal of Anxiety Disorders*. 2015;35:60-7.
  - 18 Pietrzak RH, Van Ness PH, Fried TR, et al. Trajectories of posttraumatic stress symptomatology in older persons affected by a large-magnitude disaster. *Journal of Psychiatric Research*. 2013;47:520-6.
  - 19 Kenardy J, Heron-Delaney M, Warren J, Brown EA. Effect of Mental Health on Long-Term Disability After a Road Traffic Crash: Results From the UQ SuPPORT Study. *Injury*. 2015;46:883-90.
  - 20 Ranney ML, Patena JV, Nugent N, et al. PTSD, cyberbullying and peer violence: prevalence and correlates among adolescent emergency department patients. *General Hospital Psychiatry*. 2016;39:32-8.
  - 21 Bhat W, Marlino S, Teoh V, et al. Lower limb trauma and posttraumatic stress disorder: A single UK trauma unit's experience. *Journal of Plastic, Reconstructive & Aesthetic Surgery*. 2014;67:555-60.
  - 22 Pompili M, Sher L, Serafini G, et al. Posttraumatic stress disorder and suicide risk among veterans: a literature review. *The Journal of nervous and mental disease*. 2013;201:802-12.
  - 23 Khodadadi N, Ghanbari A, Yosefzadeh SH, et al. A study on acute stress, post-traumatic stress disorder and quality of life in injured accident survivors admitted to Rasht Porsina Hospital during 2009-10. *Feyz Journal of Kashan University of Medical Sciences*. 2011;14:520-5. [In persian]
  - 24 Foa EB, Cashman L, Jaycox L, Perry K. The validation of a self-report measure of posttraumatic stress disorder: The Posttraumatic Diagnostic Scale. *Psychological Assessment*. 1997;9:445-51.
  - 25 Saberi HR, Abbasian H, Kashani MM, Esfahani AN. Post-traumatic stress disorder: A neglected health concern among commercial motor vehicle drivers. *The International Journal of Occupational and Environmental Medicine*. 2013;4:185-94.
  - 26 Beck AT, Steer RA, Ball R, Ranieri W. Comparison of Beck Depression

- Inventories-IA and-II in psychiatric outpatients. *Journal of Personality Assessment*. 1996;67:588-97.
- 27 Ghassemzadeh H, Mojtabai R, Karamghadiri N, Ebrahimkhani N. Psychometric properties of a Persian-language version of the Beck Depression Inventory-Second edition: BDI-II-PERSIAN. *Depression and Anxiety*. 2005;21:185-92.
- 28 Hawker GA, Mian S, Kendzerska T, French M. Measures of adult pain : Visual Analog Scale for Pain (VAS Pain), Numeric Rating Scale for Pain (NRS Pain), McGill Pain Questionnaire (MPQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP). *Arthritis Care & Research*. 2011;63:S240-S52.
- 29 Babajani S, Babatabar Darzi H, Ebadi A, et al. The effect of foot reflexology massage on the level of pain during chest tube removal after open heart surgery. *Iranian Journal of Critical Care Nursing*. 2014;7:15-22.
- 30 Abedi L, Sadeghi-Bazargani H. Epidemiological patterns and risk factors of motorcycle injuries in Iran and Eastern Mediterranean Region countries: a systematic review. *International Journal of Injury Control and Safety Promotion*. 2015;24:263-70.
- 31 Berecki-Gisolf J, Yiengprugsawan V, Kelly M, et al. The impact of the Thai motorcycle transition on road traffic injury: Thai Cohort Study results. *PloS One*. 2015;10:e0120617.
- 32 Palgi Y. Predictors of the new criteria for probable PTSD among older adults. *Psychiatry Research*. 2015;230:777-82.
- 33 Chossegros L, Hours M, Charnay P, et al. Predictive factors of chronic post-traumatic stress disorder 6 months after a road traffic accident. *Accident Analysis & Prevention*. 2011;43:471-7.
- 34 Ullman SE, Peter-Hagene L. Social reactions to sexual assault disclosure, coping, perceived control, and PTSD symptoms in sexual assault victims. *Journal of Community Psychology*. 2014;42:495-508.
- 35 Gelkopf M, Berger R, Bleich A, Silver RC. Protective factors and predictors of vulnerability to chronic stress: A comparative study of 4 communities after 7 years of continuous rocket fire. *Social Science & Medicine*. 2012;74:757-66.
- 36 Contractor AA, Durham TA, Brennan JA, et al. DSM-5 PTSD's symptom dimensions and relations with major depression's symptom dimensions in a primary care sample. *Psychiatry Research*. 2014;215:146-53.
- 37 Ayer L, Danielson CK, Amstadter AB, et al. Latent classes of adolescent posttraumatic stress disorder predict functioning and disorder after 1 year. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2011;50:364-75.
- 38 Contractor AA, Elhai JD, Fine TH, et al. Latent profile analyses of posttraumatic stress disorder, depression and generalized anxiety disorder symptoms in trauma-exposed soldiers. *Journal of Psychiatric Research*. 2015;68:19-26.
- 39 Carty J, O'Donnell M, Evans L, et al. Predicting posttraumatic stress disorder symptoms and pain intensity following severe injury: The role of catastrophizing. *European Journal of Psychotraumatology*. 2011;2.
- 40 Aversa LH, Stoddard JA, Doran NM, et al. PTSD and depression as predictors of physical health-related quality of life in tobacco-dependent veterans. *Journal of Psychosomatic Research*. 2012;73:185-90.