

Prevalence of Post-traumatic Stress Disorder Symptoms among Road Traffic Accident Victims: A Cross-sectional Study from Gujarat, India

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ABSTRACT

Introduction: Road Traffic Accidents (RTAs) can develop Post-Traumatic Stress Disorder (PTSD) due to emotional trauma, which significantly affects the quality of life. Despite satisfactory psychological recovery for many RTA victims, a notable percentage of survivors continue to live with PTSD without diagnosis or treatment. In India, the rising number of RTAs necessitates research into their psychological impacts to inform healthcare strategies and interventions.

Aim: To assess the prevalence of PTSD symptoms among RTA survivors and explore the association between PTSD and socio-demographic and clinical variables.

Materials and Methods: A cross-sectional descriptive study was conducted and data was collected from selected trauma centres in Gujarat state, India, from April to May 2024. The study involved 380 participants who had experienced RTAs within 30-40 days prior to data collection. Data collection employed an interviewer-administered questionnaire with two sections: a demographic and clinical questionnaire and the PTSD Checklist (PCL-5) for PTSD symptom assessment. The

PCL-5 is a 20-item tool, with scores ranging from 0 to 80, where a score of ≥ 33 indicates PTSD symptoms. Data were analysed using Statistical Package for the Social Sciences (SPSS) version 23.0, employing descriptive statistics, Chi-square tests, and Confidence Intervals (CI) to determine the significance of associations at a p-value < 0.05 level.

Results: The prevalence of PTSD symptoms among RTA survivors was 46.3%, with a mean \pm SD PTSD score of 29.41 \pm 10.68. The highest rates of PTSD were observed among younger individuals {18-25 years, 55 (52.4%)} and females 43 (47.3%). Education (p-value=0.027) and monthly income (p-value=0.011) were significantly associated with higher PTSD prevalence. Among clinical variables, the type of vehicle involved in the accident was associated with PTSD prevalence (p-value=0.012).

Conclusion: The prevalence of PTSD symptoms among RTA survivors was 46.3%. Lower education levels, lower income, and involvement in two or three-wheeler accidents were significantly associated with a higher prevalence of PTSD.

Keywords: Acute stress disorder, Epidemiology, Mental health, Occurrence, Survivors, Trauma

INTRODUCTION

Psychological trauma is an overwhelming event that triggers distress beyond a person's capacity to process the associated emotions and thoughts [1]. Traumatic events are common worldwide, and while most people remain mentally unaffected, a significant minority develop psychiatric disorders, with PTSD being the most prevalent and leading to considerable functional impairment [2]. PTSD differs from the typical challenges individuals face when adapting after a distressing event [2,3]. The broad concept of PTSD has been studied in adults, with national surveys in the United States reporting lifetime prevalence rates of 7.3% and 7.8% for PTSD [4]. As per the International Classification of Diseases-11 (ICD-11) and the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV), PTSD is manifested through symptoms such as re-living the trauma in the form of dreams, memories, flashbacks, or nightmares, which are connected with overwhelming emotions, particularly fear, and severe physical sensations. This continuous threat causes disturbances in various aspects of life [5].

A RTA involves at least one moving vehicle and results in injury or death [6]. Over 3,000 people lose their lives daily, and tens of millions suffer injuries or disabilities annually on roads worldwide [7]. Non fatal injuries, including serious ones, can significantly affect the quality of life for crash survivors and their families, as well as create a substantial burden on society [8]. RTA victims are generally

treated by emergency room physicians and trauma surgeons who concentrate on physical injuries. As a result, psychological issues often go unnoticed, leading to significant consequences for the victims, their families, and society [9-11]. Some studies show that nearly half of individuals who survive RTAs go on to develop PTSD [12,13]. Around 10% of PTSD patients develop chronic PTSD, which can lead to lifelong psychological issues and additional mental issues like depression, anxiety, and substance abuse. This increases healthcare service usage and burdens the healthcare system. PTSD victims also face a higher risk of developing non psychiatric illnesses, even after considering factors such as age, social status, economic factors, and major depression [14].

Although the majority of trauma victims face challenges in various areas of their lives due to trauma, many do not seek treatment or intervention to deal with psychological stress caused by it [15,16]. The increasing levels of vehicular mobility in India also increases the need for research into the psychological effects of Motor Vehicle Accidents (MVAs). Thus, researchers aim to uncover the prevalence of PTSD among RTA survivors, shedding light on this hidden aftermath of trauma. Additionally, this study is one of the few in India exploring the prevalence of PTSD symptoms among RTA victims, focusing on the impact of socio-demographic and injury factors [17,18]. It is a novel study in this geographical area, assessing PTSD symptoms in RTA victims using the PTSD Checklist (PCL-5).

MATERIALS AND METHODS

In the present study, the researcher used a cross-sectional study design to collect samples from the trauma centres of Dr. ND Desai Hospital in Nadiad, Civil Hospital in Nadiad, and Anand Orthopaedic Hospital in Anand, from April to May 2024. The Institutional Ethical Committee granted permission for the conduction of the study (CHA/IEC/ADM23/08/995.03).

Inclusion criteria: All participants experienced RTAs within 30-40 days prior to data collection and were conscious and oriented. Participants aged between 18 to 45 years who were able to read or write in Gujarati or English were included in the study.

Exclusion criteria: RTA victims who were critically ill and required basic life support beyond oxygen support, or who had a known history of psychiatric illness and were receiving any psychological therapies or medications, were excluded from the study. Additionally, road traffic victims who lost a body part due to traumatic injury were also excluded from the study.

Sample estimation: According to the PTSD prevalence rate in a previous study [18], the sample size requirement for the present study was calculated using the following formula:

$$n = n = (Z_{1-\alpha/2})^2 \times (p)(q) / (d)^2$$

The calculated size of sample was 345 in number, with the inclusion of 10% drop out rate, 380 was the final sample size.

Data collection procedure: The consecutive sampling technique was used, and all individuals involved in RTAs were identified through their visits to trauma centres or by contacting them via phone to inquire about their willingness to participate in the study. Participant selection was conducted by checking the inclusion and exclusion criteria. Consent was obtained from the participants, and the prevalence was assessed 30 to 40 days after the accidents. An interviewer-administered questionnaire was used to collect the data, which consisted of two main sections.

In Section I, a self-made demographic and clinical questionnaire based on previous studies [19,20] was utilised. In Section II, the PTSD Checklist (PCL-5), developed by the Veterans Affairs (VA) National Centre for PTSD [21], was used to assess PTSD symptoms.

The demographic and clinical questionnaires measured the following parameters- age (in years), gender, education, occupation, monthly income (in rupees), health insurance status, Medicolegal cases (MLC) case status, history of previous RTAs, history of hospitalisation due to RTAs, type of vehicle involved in the accident, receipt of first aid at the accident site, co-morbidity of physical illness, any surgeries following the accident, substance consumption before or during the accident, and areas of injury. The tool was translated into the local language (Gujarati) and validated by experts from various departments like including psychiatric nursing, psychology, psychiatry, language, and statistics, to check

its relevance and appropriateness before starting the data collection procedure.

PTSD symptoms were assessed using the PTSD Checklist (PCL-5). This tool consists of 20 items, each scored from 0 to 4 and categorised as follows: 'not at all (0), a little bit (1), moderately (2), quite a bit (3), and extremely (4).' The total score ranges from 0 to 80. According to the Department of Veterans Affairs National Centre for PTSD, a score of 33 or higher [18] on this checklist indicates that a person has PTSD symptoms. Permission to use this checklist was obtained from the VA National Centre for PTSD [21]. The internal consistency of the translated tools was pretested and assessed for reliability using Cronbach's alpha, which yielded a reliability score of 0.754.

STATISTICAL ANALYSIS

Data analysis was performed using SPSS version 23.0. Frequency distributions were used to assess the socio-demographic and clinical characteristics. PTSD scores were calculated using descriptive statistics like including the mean±Standard Deviation (SD). The association was tested using the Chi-square test, and a 95% CI was calculated to determine the level of significance at p-value <0.05.

RESULTS

Most victims were aged 36-45 years, with 158 (41.6%) and male 289 (76.1%). Educationally, the largest group had secondary education 119 (31.3%). The majority were involved in business or other professions 231 (60.8%), with a significant portion earning a monthly family income of 5,000-10,000 rupees, 154 (40.5%). Only 19 participants (5.0%) had health insurance, and 216 (56.8%) had a medico-legal case, with 151 cases (39.7%) settled and 65 cases (17.1%) ongoing.

Regarding clinical characteristics, most participants had no prior accident history 349 (91.8%) or hospitalisations 366 (96.3%). Two-wheeler accidents were the most common 278 (73.2%). First aid was administered to 68 victims (17.9%). A minority 20 (5.3%) had pre-existing illnesses, and 112 participants (29.5%) underwent surgery postaccident, with leg plating being the most frequent surgical procedure 64 (16.8%). None of the participants had consumed substances before or during the accident. Internal injuries were found in 267 victims (70.3%), particularly in the lower extremities 92 (24.2%) and head/face 57 (15.0%). External injuries were present in 231 participants (60.8%), mainly bruises or abrasions on multiple body parts 82 (21.6%). Demographic variables and the prevalence of PTSD symptoms are depicted in [Table/Fig-1].

The overall prevalence rate of PTSD symptoms was found to be 46.3% (n=176). The mean PTSD symptom score was 29.41, representing a mean percentage of 36.8%, with a standard deviation

Demographic variables	Category	No. of sample	Frequency of PTSD	% of PTSD	χ ²	Df	p-value
Age in years	18-25	105	55	52.4	2.160	2	0.340
	26-35	117	51	43.6			
	36-45	158	70	44.3			
Gender	Male	289	133	46.0	0.042	1	0.837
	Female	91	43	47.3			
	Transgender	0	0	0.0			
Education	Primary	56	38	67.9	12.644	5	0.027
	Secondary	119	51	42.9			
	Higher secondary	96	39	40.6			
	Graduate	43	19	44.2			
	Post-graduate and above	3	1	33.3			
	No formal education	63	28	44.4			

Occupation	Homemaker/no jobs	55	26	47.3	3.370	3	0.338
	Private job sector	88	34	38.6			
	Government job sector	6	2	33.3			
	Business/others	231	114	49.4			
Monthly family income in rupees	<5000	69	42	60.9	11.102	3	0.011
	5000-10,000	154	75	48.7			
	10001-15000	95	35	36.8			
	>15000	62	24	38.7			
Do you have health insurance?	Yes	19	8	42.1	0.143	1	0.706
	No	361	168	46.5			
Was MLC case done?	Yes	216	94	43.5	1.575	1	0.209
	No	164	82	50.0			
If MLC done,	Still going on	65	27	41.5	1.722	1	0.289
	Settled	151	67	44.4			

[Table/Fig-1]: Prevalence of PTSD symptoms and the association between PTSD symptom score and demographic variables (N=380).

of 10.68. The prevalence of PTSD symptoms among RTA victims according to various demographic categories showed that younger victims (ages 18-25) had the highest PTSD rate, at 52.4% (n=55). Females showed a slightly higher prevalence 43 (47.3%) than males 133 (46.0%). Primary education was correlated with the highest PTSD rate 38 (67.9%). PTSD was more prevalent among those with a monthly income below 5,000 rupees 42 (60.9) and among individuals with business or other professions 114 (49.4%). Health insurance showed minimal impact, with 168 (46.5%) of uninsured victims experiencing PTSD. MLC were associated with a lower PTSD prevalence 94 (43.5%) compared to non MLC cases 82 (50%).

The prevalence of PTSD symptoms among RTA victims based on clinical variables indicated that victims with previous accidents 17 (54.8%) and those who had been previously hospitalised 7 (50.0%) exhibited higher PTSD rates. Victims of two-wheeler accidents 136 (48.9%) and three-wheeler accidents 24 (54.5%) had higher PTSD prevalence compared to those involved in four-wheeler accidents

5 (20.8%). First aid did not significantly impact PTSD rates. Those with physical comorbidities had a lower PTSD rate 6 (30%) than those without 170 (47.2%). The PTSD prevalence was similar for those who had surgery after the accident 52 (46.4%) and those who did not 124 (46.3%). No substance use was reported. Internal injuries showed a PTSD rate of 124 (46.4%), with specific injuries such as hip injuries 5 (71.4%) and back injuries 1 (100%) having higher rates. External injuries exhibited a PTSD prevalence of 106 (45.9%), with bruises or abrasion on upper extremity showing the highest rate (56.8%, n=21). Clinical variables and the prevalence of PTSD symptoms were depicted in [Table/Fig-2].

Among the socio-demographic variables of the subjects, education (p-value=0.027) and monthly family income (p-value=0.011) were significantly associated with PTSD symptoms. Among clinical variables, the type of vehicle involved in the accident (p-value=0.012) also showed a statistically significant association with PTSD symptoms, as depicted in [Table/Fig-2].

Clinical variables	Category	No. of sample	Frequency of PTSD	% of PTSD	χ^2	df	p-value
Previous history of Road Traffic Accident (RTA)	Yes	31	17	54.8	0.986	1	0.321
	No	349	159	45.6			
Previous history of hospitalisation due to Road Traffic Accident (RTA)	Yes	14	7	50.0	0.079	1	0.778
	No	366	169	46.2			
Type of vehicle involved in accident	Two-wheeler	278	136	48.9	10.891	3	0.012
	Four-wheeler	24	5	20.8			
	Pedestrians	34	11	32.4			
	Three-wheeler	44	24	54.5			
Did you receive first aid at accidental place?	Yes	68	30	44.1	0.161	1	0.688
	No	312	145	46.5			
Co-morbidity at present	Yes	20	6	30.0	2.260	1	0.133
	No	360	170	47.2			
Did any surgery after accident	Yes	112	52	46.4	0.001	1	0.977
	No	268	124	46.3			
If surgery done, specify	Hip surgery	7	5	71.4	4.360	6	0.628
	Knee surgery	2	0	0.0			
	Plating in leg	64	27	42.2			
	Plating in hands	17	9	52.9			
	Elbow surgery	8	4	50.0			
	Shoulder surgery	14	7	50.0			
Consumption of substance before or during accident	Yes	0	0	0.0	No statistics are computed		
	No	380	176	46.3			
Internal injury?	Yes	267	124	46.4	0.006	1	0.940
	No	113	52	46.0			

Mention the internal injury	Fracture	56	29	51.8	6.382	8	0.604
	Head/Face injury	57	24	42.1			
	Hip injury	7	5	71.4			
	Injury to back	1	1	100.0			
	Injury to lower extremity	92	38	41.3			
	Injury to upper extremity	30	16	53.3			
	Multiple injury	4	1	25.0			
	Shoulder injury	20	10	50.0			
External injury?	Yes	231	106	45.9	0.043	1	0.835
	No	149	70	47.0			
Mention the external injury	Bruises or abrasion on face and head	66	23	34.8	5.441	5	0.364
	Bruises or abrasion on lower extremity	44	22	50.0			
	Bruises or abrasion on multiple place	82	39	47.6			
	Bruises or abrasion on shoulder	2	1	50.0			
	Bruises or abrasion on upper extremity	37	21	56.8			

[Table/Fig-2]: Prevalence of PTSD symptoms and the association between PTSD symptom score and clinical variables (N=380).

DISCUSSION

Several studies have consistently reported high prevalence rates of PTSD symptoms among RTA survivors, supporting the current finding of 46.3%. Soori H et al., found that 40.06% of RTA survivors exhibited PTSD symptoms, emphasising the psychological impact of traffic accidents [22]. Similarly, another study by Fekadu W et al., reported that 46.5% of survivors developed PTSD [23], closely aligning with these results and highlighting the significant mental health burden faced by this population.

However, the prevalence of PTSD in the present study was higher than that in studies conducted in West Africa (26.43%), Raipur, India (22.6%), and Ethiopia (15.4%) [19,24,25]. This variation in PTSD prevalence could be attributed to differences in the timing of PTSD assessments, the instruments used, and factors such as country, race, gender, and education level.

Younger victims (18-25 years) showed the highest PTSD prevalence. However, these findings differ from a previous study by Arora D et al., in which participants older than 45 years had an increased chance of developing PTSD [18]. A possible reason could be the preponderance of younger individuals in the current study, as well as their developmental stage in coping strategies and limited life experiences.

Females exhibited a slightly higher occurrence of PTSD compared to males, consistent with previous research by Yimer GM et al., which found that women have a higher likelihood of developing PTSD after trauma [20]. Biological, psychological, and social factors may contribute to this gender disparity. Regarding education and income, primary education was correlated with the highest PTSD rate. Lower educational attainment may be associated with reduced access to coping resources and support systems. Similarly, victims with a monthly income below 5,000 rupees showed a higher prevalence of PTSD. Financial strain can exacerbate stress and limit access to mental health services, compounding the impact of trauma. These findings are supported by the study of Daddah D et al., indicating that lower socio-economic status is a risk factor for PTSD [24].

Two-wheeler accidents had a higher incidence of PTSD compared to four-wheeler accidents. Two-wheeler riders are more exposed and vulnerable to severe injuries, which increases the psychological impact of the accident. Similar to previous findings by Bedaso A et al., victims with prior accidents and those who have been previously hospitalised were more prone to PTSD, as repeated exposure to trauma can compound psychological distress [19]. Details of the previous studies are provided in [Table/Fig-3] [18-20,22-26].

S. No.	Author's name and year	Place of the study	Number of subjects	Parameters assessed	PTSD prevalence	Conclusion
1	Soori H et al., (2021) [22]	Tehran	350 samples	Acute stress disorder and post-traumatic stress disorder was assessed.	40.6%	About half of the population were having acute stress disorder and they met to the diagnostic criteria of PTSD. Thus, high prevalence of PTSD among RTA patients is emphasise on follow-up and need for the control.
2	Fekadu W et al., (2019) [23]	Northwest, Ethiopia	299 samples	PTSD, depression symptoms, alcohol use disorders and sleep disturbance were assessed among RTA survivors.	46.5%	About half of the RTA survivors developed PTSD, psychiatrist needs to link this finding and special attention is required.
3	Daddah D et al., (2022) [24]	Benin	734 samples	PTSD prevalence and risk factors were checked.	26.43%	This study emphasised on early diagnosis and multidisciplinary approach for PTSD management after RTA.
4	Ratnani D (2022) [25]	Raipur, India	300 samples	Prevalence of PTSD was checked among RTA survivors.	22.6%	The prevalence of PTSD was significantly varied according to country, race, gender and education level.
5	Bedaso A et al., (2020) [19]	Southern Ethiopia	416 samples	PTSD, common mental disorders and depressive symptoms were assessed among RTA victims.	15.4%	Prevalence of PTSD was high and time since accident happened, common mental disorders, previous history of RTA, depressive symptoms were significantly associated with PTSD. Hence, adults in emergencies or in orthopaedic settings need to be screened and managed for PTSD symptoms.
6	Arora D et al., (2021) [18]	Hilly Indian state (Rishikesh)	250 samples	PTSD occurrence and depression were assessed.	32.4%	This study recommended for urgency to develop multidisciplinary approach with the inclusion of mental health services in trauma centres.

7	Yimer GM et al., (2023) [20]	Northeast Ethiopia	405 samples	PTSD and their determinants checked.	NA	PTSD was high among RTA victims. This study emphasised on development of multidisciplinary team. Additionally, RTA victims with low social support, injuries, comorbidity, death witnessed, and female gender need to be screened as a routine check-up after accident.
8	Alenko A et al., (2019) [26]	Southwest Ethiopia	398 samples	PTSD, trauma screening and substance use risk were assessed.	12.6%	This study focused to develop guidelines and strategies to screen and manage PTSD symptoms among road traffic crashes drivers.
9	Present study, 2024	Gujarat, India	380 samples	PTSD prevalence and risk factors were checked.	46.3%	Addressing psychological impact in RTA victims. Supportive care needs to be provided to improve the quality of life after accidents.

[Table/Fig-3]: Comparison of previous studies and present studies in term of PTSD prevalence among RTA victims.

Internal injuries showed a 46.4% PTSD rate, with specific injuries such as those to the hip (71.4%) and back (100.0%) exhibiting higher rates. The severity and location of injuries can significantly impact psychological outcomes. Severe or debilitating injuries can lead to prolonged physical pain, disability, and loss of independence, all of which contribute to the development of PTSD. These findings align with research indicating that injury severity is a predictor of PTSD [18].

Education and monthly family income were significantly associated with PTSD symptoms, highlighting the role of socio-economic factors in trauma recovery. Additionally, the type of vehicle involved in the accident showed a statistically significant association with PTSD symptoms, emphasising the need to address specific risk factors related to different types of RTAs. The findings were consistent with previous studies by Yimer GM et al., and Daddah D et al., which also showed significant associations with education and monthly income [20,24].

In the present study, the researchers acknowledge the presence of unmeasured variables that could potentially influence the findings. These variables might include factors such as pre-existing mental health conditions, social support systems, and witnessed death, which were not captured in this data due to logistical constraints and privacy concerns. There are plans for subsequent research phases to address these issues. The lack of data on pre-existing mental health conditions could mean that some individuals identified with PTSD post-accident might have had a predisposition to mental health issues, thus skewing the PTSD prevalence upwards. Similarly, unmeasured data regarding witnessing death or social support could either exacerbate or mask PTSD symptoms. Research that includes a comprehensive assessment of mental health history has reported lower PTSD prevalence, suggesting that unmeasured pre-existing conditions in this study might contribute to higher PTSD rates. Future studies should aim to include comprehensive baseline assessments of mental health and social support to better isolate the impact of RTAs on PTSD development.

The high prevalence of PTSD among RTA survivors underscores the need for comprehensive trauma care that includes psychological assessment and intervention. Emergency physicians and trauma surgeons should be trained to recognise PTSD symptoms and refer patients to mental health services. Additionally, policies should be implemented to provide financial and social support to low-income and less-educated survivors to mitigate the impact of trauma.

Future research could focus on long-term psychological outcomes, the efficacy of early nursing interventions or supportive therapies on mental health, and the longitudinal impact of PTSD among this population. Additionally, this study serves as a foundation for health policy reform, which could strengthen psychiatric nursing care for emergency patients. By focusing on high-risk factors and high-risk groups, there is significant potential to improve the quality of life for RTA victims through effective and timely nursing care.

This research can be essential in psychiatric nursing, aiding the development of educational curricula and training programs for nurses. Lastly, it emphasises the role of nurses in providing comprehensive trauma care for RTA victims.

Limitation(s)

This study was conducted on a small scale and used non probability sampling techniques, which limits the generalisability of study results beyond the research settings. Additionally, the study's cross-sectional design limits the ability to establish causality between the identified factors and PTSD. Longitudinal studies are needed to track the development of PTSD over time and identify long-term predictors. Future research should also explore the effectiveness of early interventions and support systems in reducing the prevalence of PTSD among RTA survivors.

CONCLUSION(S)

The findings indicate that 46.3% of PTSD symptoms among RTA victims are influenced by socio-demographic and clinical factors. Addressing the psychological impact of RTAs through integrated trauma care and support systems is crucial for improving the quality of life for survivors and reducing the long-term burden on healthcare systems. This study emphasises the need for nursing interventions for PTSD symptoms among RTA victims, highlighting the necessity of incorporating these practices into nursing care. The high occurrence of PTSD symptoms also identifies a lack of mental health services in trauma care, as health workers are more engaged in providing treatment for physical injuries. In light of these results, a multidisciplinary approach is suggested for psychiatric evaluation and tailored therapeutic strategies.

Acknowledgement

Author acknowledges the authority of Civil hospital, Nadiad, Dr. N.D. Desai Hospital, Nadiad and Anand Orthopaedic Hospital, Anand for providing permission to collect information of RTA victims from trauma centre and CHARUSAT university for providing support. Researcher also provide heartily gratitude to the RTA victims for becoming part of the study.

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AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Aug 10, 2024
- Manual Googling: Sep 12, 2024
- iThenticate Software: Sep 26, 2024 (14%)

ETYMOLOGY: Author Origin**EMENDATIONS:** 7Date of Submission: **Aug 09, 2024**Date of Peer Review: **Sep 10, 2024**Date of Acceptance: **Sep 27, 2024**Date of Publishing: **Oct 01, 2024**