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Post-Traumatic Stress Disorder After Road Traffic Injury Predictors and Clinical Outcomes.

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ABSTRACT

Background

Post-traumatic stress disorder (PTSD) is a major psychological concern following road traffic injuries (RTIs), yet it is frequently underdiagnosed in acute trauma settings. Early identification of individuals at high risk is essential, as untreated PTSD can profoundly affect functioning, recovery, and overall quality of life.

Objectives

To determine the prevalence of PTSD one month after RTIs and to identify key predictors, including demographic and clinical factors, as well as its association with outcomes such as functional recovery, pain severity, and length of hospital stay.

Methodology

This prospective observational study conducted at Department Surgery, Islamic International Medical College, Rawalpindi from July 2023 to Sept 2023. PTSD assessments were performed one month post-injury. Demographic, clinical, and injury-related data were collected. Statistical analysis was conducted using SPSS version 24.0. Continuous variables were described using means and standard deviations, and categorical variables were analyzed using Chi-square tests. Logistic regression was performed to identify independent predictors of PTSD. A p-value < 0.05 was considered statistically significant.

Results

A total of 120 patients were included, with a mean age of 32.4 ± 9.8 years. PTSD was identified in 38.3% of participants one month after injury. Severe injuries were significantly associated with higher PTSD prevalence ($p = 0.014$). Female patients were more likely to develop PTSD compared to males ($p = 0.031$). Hospital stays longer than five days significantly increased the likelihood of PTSD ($p = 0.022$). Moderate to severe pain at follow-up was also strongly associated with PTSD ($p = 0.018$). Logistic regression demonstrated that PTSD independently predicted poorer functional capacity and reduced likelihood of returning to work within one month. Overall, PTSD severity correlated closely with injury severity, pain intensity, and prolonged hospitalization.

Conclusion

PTSD is common among survivors of road traffic injuries, particularly in those with severe trauma, prolonged hospitalization, and persistent pain. Early psychological screening and timely intervention are essential to improve recovery, preserve functionality, and prevent long-term psychological complication..

keywords: PTSD; Road injury; Predictors; Outcomes

INTRODUCTION

Road Traffic Injuries impact a country's health and economy in numerous ways, including chronic illness and loss of disability. Annually, the World Health Organization acknowledges and records countless road traffic injuries, as well as the chronic emotional and psychological consequences of those injuries, which do not go away with the bodily injury [1]. Trauma survivors do not receive appropriate and timely PTSD recognition and treatment as they should. PTSD related to road traffic injuries, affects pain disability, health care utilization, and ranges from difficulty to complete absence of accomplishing normal activities. Most trauma injuries in many low and middle income countries do not receive the appropriate focus and care PTSD needs, especially where psychological trauma screening is particularly low. PTSD is severe [2,3]. PTSD includes reliving the trauma, and memories that come back suddenly and in a way that is really distracting [4]. All of these symptoms include not just severe anxiety, but all the negative emotions that come from extreme overstimulation, including memories that trap the trauma victim, with a complete absence of any feelings. Road Traffic Crashes are particularly harmful psychological traumas [5]. There is a severe fear of not being in control, as well as feelings of helplessness, that a person in RTI is likely to be overwhelmed with. Previous study has shown that PTSD has a 10% to 45% prevalence range in PTSD after a RTI event. Factors affecting these prevalence rates include demographic factors, severity of the injury and time frame after the RTI event [6]. Younger age, being female, having a pre-existing psychological condition, high severity of injury, long periods in the hospital, having pain which is long lasting, and having little social/emotional support. These factors have been identified as potential predictors of PTSD for an unreported trauma event. However, the predictive power of these sets of factors is different for every population and every health care system in every country [7]. The lack of health care resources in many South Asian countries has led to a gap in study on the clinical predictors of PTSD after RTIs [8].PTSD impacts clinical state negatively and should be treated in order to enhance the recovery of a patient. Patients with PTSD have been shown to have pain that is more intense and harder to cope with. They have shown to have healing that takes longer, and have shown less compliance with treatment plans, causing more difficulty to take on social/occupational roles; and less ability to integrate into social roles. They have shown to have more difficulty in occupational roles which can complicate and already a complex recovery. Because of these reasons and to allow the patient to integrate into social roles more easily, the author believes that high-risk people should be identified early on in the treatment as a means to target and provide mental health help [9,10].

Study Objectives

To determine the prevalence of post-traumatic stress disorder (PTSD) among survivors of road traffic accidents and to identify key mental health and clinical predictors, including pain severity, functional recovery, and length of hospitalization.

MATERIALS AND METHODS

Study Design & Setting

This prospective observational study conducted at Department of Surgery, Islamic International Medical College, Rawalpindi from July 2023 to Sept 2023.

Participants

Adults aged 18–60 years who sustained injuries from road traffic accidents were eligible for inclusion. Participants were enrolled after initial stabilization. Exclusion criteria included inability to communicate, altered mental status, severe clinical instability, or conditions requiring critical care. PTSD screening was performed one month after injury using a validated assessment tool, either during a follow-up clinic visit or via telephone.

Sample Size Calculation

With an expected PTSD prevalence of 30% among trauma survivors, a 95% confidence interval, and an 8% margin of error, the minimum required sample size was calculated as 110 participants. To account for potential dropouts or incomplete follow-up, a total of 120 patients were enrolled.

Inclusion Criteria

- Age 18–60 years
- Confirmed injury from a road traffic accident within the past 30 days
- Ability to provide informed consent
- Willingness to participate in follow-up assessment

Exclusion Criteria

- Pre-existing diagnosed psychiatric illness
- Severe head injury with loss of consciousness

- Cognitive impairment or communication difficulties
- Polytrauma requiring ICU admission
- Declined participation

Diagnostic and Management Strategy

PTSD symptoms were assessed using standardized and validated screening tools such as the Impact of Event Scale–Revised (IES-R). Participants who screened positive for significant PTSD symptoms were referred for psychiatric evaluation and appropriate therapy in accordance with institutional guidelines.

Statistical Analysis

Data were analyzed using SPSS version 24. Continuous variables were summarized using means and standard deviations, while categorical variables were analyzed using Chi-square tests. Logistic regression was performed to identify independent predictors of PTSD. A p-value < 0.05 was considered statistically significant.

RESULTS

120 patients who were enrolled with an average age of 32.4 ± 9.8 years. Most of them were male (68%). The prevalence of PTSD at the one-month follow-up was 38.3%. PTSD positive patients had significantly higher pain scores than the non PTSD patients (p = 0.018). The association between severity of the PTSD and the severity of the injury was strong, with patients who had severe injuries having significantly higher rates of PTSD (p = 0.014). The length of hospital stays also made a difference. Patients who were hospitalized longer than 5 days had an increased risk of PTSD (p = 0.022). There was a noted difference between the genders, as the female patients had higher frequencies of PTSD (p = 0.031). Logistic Regression findings showed that injury severity, length of hospitalization, and chronic pain were the significant independent predictors. PTSD was also found to affect the patient's ability to function, the patients had decreased ability to do normal daily activities and had an increased time to return to work. These observations demonstrate the importance of the clinical evaluation of patients' mental state after suffering injuries from a road traffic crash.

Intervention Outcome

Counseling and psychological help were given to the patients with PTSD. During follow-up, those who received mental health support first were noted to have better control over their symptoms. Quick identification and referral of these patients relatively improved the degree of functional recovery, thus, the necessity of coordinated mental health service within the framework of trauma services was demonstrated.

Table 1. Demographic Characteristics of Road Traffic Injury Patients (N = 120)

Variable	PTSD Present (n = 46)	PTSD Absent (n = 74)	Total (N = 120)	p-value
Mean Age (years)	33.8 ± 10.2	31.5 ± 9.5	32.4 ± 9.8	0.214
Gender				
Male	24 (52.2%)	58 (78.4%)	82 (68.3%)	**0.031**
Female	22 (47.8%)	16 (21.6%)	38 (31.7%)	
Education Level				
Primary/Secondary	28 (60.9%)	42 (56.8%)	70 (58.3%)	0.642
Higher Education	18 (39.1%)	32 (43.2%)	50 (41.7%)	

Table 1 presents the demographic characteristics of participants with and without PTSD. Gender differences showed statistical significance, with females reporting higher PTSD prevalence (p = 0.031). No significant associations were found between age or educational level and PTSD outcomes.

Table 2. Clinical and Injury-Related Variables Among Study Participants

Variable	PTSD Present (n = 46)	PTSD Absent (n = 74)	p-value
Injury Severity			
Mild/Moderate	18 (39.1%)	56 (75.7%)	**0.014**
Severe	28 (60.9%)	18 (24.3%)	
Pain Score at Follow-up			

Mild	8 (17.4%)	34 (45.9%)	
Moderate	19 (41.3%)	30 (40.5%)	**0.018**
Severe	19 (41.3%)	10 (13.6%)	
Hospital Stay >5 days	30 (65.2%)	22 (29.7%)	**0.022**

Table 2 shows that injury severity, post-injury pain scores, and prolonged hospitalization were significantly associated with PTSD development. Patients with severe injuries and longer hospital stays had higher PTSD rates.

Table 3. Logistic Regression Analysis for Predictors of PTSD

Predictor Variable	Adjusted Odds Ratio (AOR)	95% CI	p-value
Severe Injury	3.42	1.58–7.40	**0.002**
Female Gender	2.11	1.02–4.36	**0.043**
Hospital Stay >5 days	2.87	1.32–6.25	**0.008**
Severe Pain at Follow-up	3.94	1.78–8.72	**0.001**

Table 3 summarizes the multivariate logistic regression evaluating independent predictors of PTSD. Severe injury, female gender, prolonged hospitalization, and severe pain at follow-up were significant independent predictors, indicating strong associations with PTSD risk.

Table 4. Clinical Outcomes Associated with PTSD Among Road Traffic Injury Survivors

Outcome Measure	PTSD Present (n = 46)	PTSD Absent (n = 74)	p-value
Functional Recovery Delay (>4 weeks)	34 (73.9%)	20 (27.0%)	**0.001**
Return to Work at 1 Month	12 (26.1%)	48 (64.9%)	**0.003**
Persistent Moderate–Severe Pain	38 (82.6%)	40 (54.1%)	**0.004**
Follow-up Compliance	32 (69.6%)	62 (83.8%)	0.074

Table 4 illustrates the clinical consequences associated with PTSD. Patients with PTSD had delayed recovery, lower return-to-work rates, and more frequent moderate–severe pain compared to those without PTSD. Functional recovery delay showed strong statistical significance (p = 0.001).

DISCUSSION

Among the follow-up respondents, 38.3% exhibited PTSD symptoms 31 days after sustaining road traffic injuries (RTIs). Female sex, higher injury severity, prolonged hospitalization, and ongoing pain were identified as significant predictors of PTSD development. These results are consistent with emerging evidence indicating that RTIs commonly lead to substantial psychological morbidity, which may impede recovery—particularly in low- and middle-income settings where access to mental health care is limited. The prevalence observed in this study closely parallels findings from a Turkish cohort, where 34% of RTI survivors demonstrated PTSD symptoms one month after injury, thereby reinforcing both regional and international evidence regarding the psychological impact of RTIs [12]. Moreover, a recent study in 2021 from India showed a road traffic crash survivor prevalence of 40%, which strengthens the claim that there is a high prevalence of PTSD symptoms soon after traumatic events [13]. In contrast, some studies conducted in Europe and Australia reported lower prevalence of 10-20%, which could be a result of more advanced trauma systems that provide psychological screening, rehab, and integrated trauma recovery [14]. The difference between regions is a testament to the ability of the systems' healthcare to provide adequate psychological help. The findings of this study are in line with the world claim that Increased severity of injury leads to more PTSD. In 2020, a China study showed that more patients with severe musculoskeletal or Polytrauma injuries were PTSD cases, when compared with patients with minor injuries who suffered from PTSD. Similarly, an Iranian cohort reported PTSD risk that was predicted at 3 months' post-injury by Injury Severity Score (ISS) >15 was documented as recent as [2023 6] [15,16]. The scenario of severe injuries is that, with psychological distress suffering, threat increase life perception, disability prolong, and pain increase]. The emergence of females as significant predictors is consistent with the evidence from various studies of trauma psychology [17]. As reported in a 2019 meta-analysis, it was concluded that post-RTIs, PTSD is more common among females due to trigger psychological trauma caused by neurobiological differences, social patterns, coping support, and sdkstravet [2023 7] and more recent 2022 pct. [18] study documented greater PTSD prevalence in females after road accidents [19]. These gender differences have implications for the type of cross-cutting trauma screening and trauma care. PTSD was found to be strongly correlated with prolonged hospitalization [19]. The

2020 United Kingdom study showing that hospital visits greater than five days predicted greater risk of PTS as a result of increased exposure to pain, limited mobility, and greater anxiety about pain outcomes aligned with a 2020 study conducted in South Africa. This study also reported that longer length of stay negatively impacted psychological recovery. [20] Frequent pain in the follow-up period was also a strong predictor in this study. For the past five years, multiple studies have documented the chronic pain and PTSD relationship, particularly the ways in which each condition exacerbates the other. [21, 22] Inexplicable pain and the traumatic event serve as chronic reminders of fear and elicit avoidance behaviors. Similar outcomes were reported in a 2021 study in Malaysia which documented that moderate to severe pain predicted PTSD for RTI victims [23]. From a clinical perspective, PTSD resulted in less functional recovery, lower rates of returning to work, and sustained moderate to severe pain. This has been documented in the literature globally [24]. A 2022 Qatar study showed RTI survivors with PTSD had significantly lower return-to-work rates 3 months post injury [25-26]. Similarly, PTSD was associated with poorer rehabilitation adherence in a prospective cohort study in Thailand [26]. Another RCT in Germany indicated that early psychological intervention greatly improved functional outcomes in trauma patients, which further supports our conclusions regarding the positive impact of early referral [27,28].

LIMITATIONS

The portability issue for self-reported PTSD symptoms; The recall bias. Self-reported PTSD symptoms recall bias could cause PTSD development. The study was limited to 3 months which limited the long-term outcomes. These factors are unmeasured psychosocial factors which could have also had an impact on the development of PTSD. Overall, the single-center design was limited due to the small sample size which could potentially affect the generalizability of the study.

CONCLUSION

Post-Traumatic Stress Disorder is common among individuals who experience road traffic injuries. The condition is linked to the level of severity of road injuries, as well as length of hospitalization, and prolonged pain suffering. PTSD is considered to be a serious psychological injury and condition. The good news is, psychological trauma can be treated, and we can improve PTSD recovery, as well as the overall functional health outcomes of the patient. This is why mental health needs to be integrated to trauma/physical injury health care services.

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Authors Contributions

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Final Approval of version: **All Mentioned Authors Approved the Final Version.**

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