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Assessment of Psychological Impact, Including Post-Traumatic Stress Disorder, in Patients with Maxillofacial Trauma: A Cross-Sectional Observational Study

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CONFLICT OF INTEREST
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ABSTRACT

Background: Maxillofacial trauma can produce visible facial changes, functional impairment, and substantial psychological distress. Post-traumatic stress symptoms may interfere with recovery, social reintegration, and adherence to rehabilitation, yet they remain under-recognized in routine maxillofacial trauma care in Pakistan.

Objective: To estimate the prevalence and severity of probable post-traumatic stress disorder (PTSD) symptoms one month after maxillofacial trauma and to identify demographic and clinical factors independently associated with probable PTSD.

Methods: A hospital-based cross-sectional observational study was conducted in the Department of Oral and Maxillofacial Surgery, Liaquat University of Medical & Health Sciences (LUMHS), Jamshoro/Hyderabad, from late November 2025 to March 2026. Using consecutive sampling, 233 patients aged 12 years or older with maxillofacial trauma were enrolled. The Impact of Event Scale-Revised (IES-R) was administered at one month after injury; a total score ≥35 was classified as probable PTSD for the primary analysis. Associations were examined using Pearson chi-square tests and multivariable logistic regression. A two-sided p-value <0.05 was considered statistically significant.

Results: Among 233 participants, 181 (77.7%) were male, the mean age was 29.4 ± 10.8 years, and road traffic accidents were the most common mechanism of injury (149/233, 63.9%). The mean IES-R total score was 31.3 ± 12.1. Probable PTSD was identified in 63 patients (27.0%; 95% CI: 21.7%–33.1%). Facial disfigurement was associated with a markedly higher prevalence of probable PTSD than absence of disfigurement (42.7% vs. 16.1%; p<0.001), and females had a higher prevalence than males (38.5% vs. 23.8%; p=0.035). In multivariable analysis, facial disfigurement (adjusted odds ratio [AOR] 3.41, 95% CI 1.84–6.32; p<0.001) and female sex (AOR 1.98, 95% CI 1.02–3.85; p=0.043) remained independent predictors, whereas age <35 years and road traffic accident mechanism were not independently associated with probable PTSD.

Conclusion: Probable PTSD symptoms affect approximately one in four patients one month after maxillofacial trauma. Visible facial disfigurement and female sex identify groups with greater psychological vulnerability, supporting routine psychological screening and timely referral as part of multidisciplinary maxillofacial trauma follow-up.

Keywords	maxillofacial trauma; post-traumatic stress disorder; psychological impact; Impact of Event Scale-Revised; facial disfigurement; Pakistan
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INTRODUCTION

Facial trauma represents an important component of the global injury burden and can result in fractures, soft-tissue injury, functional impairment, and visible changes in appearance. Global Burden of Disease estimates indicate millions of new facial fracture cases each year, with the mechanism and distribution of injury varying across regions [1]. In Pakistan, hospital-based studies consistently identify road traffic accidents as a major cause of maxillofacial trauma, particularly among young and economically active adults [2,3]. Local data also show that the mandible and midface are commonly affected, while occupational and environmental exposures contribute to fall-related injuries [4]. The consequences of maxillofacial trauma extend beyond anatomical repair. Facial appearance is closely linked to identity, communication, social interaction, and perceived attractiveness, and trauma-related changes may therefore generate persistent psychological distress. A 2024 systematic review and meta-analysis reported an estimated PTSD burden of approximately 27% during the first 1–3 months after maxillofacial trauma, with lower rates at later follow-up [5]. A contemporary scoping review similarly found that PTSD, anxiety, depression, and broader emotional distress are common after facial trauma and emphasized the need for psychological assessment within maxillofacial services [6].

Recent clinical studies suggest that the psychological response is influenced not only by the mechanism or anatomical severity of injury but also by the visibility and personal meaning of facial changes. In an Indian cohort, patients with facial and dental trauma who had disfiguring injuries experienced greater post-traumatic stress symptoms, and female patients demonstrated higher symptom scores during follow-up [7]. UK clinical-service data also found a substantial proportion of facial trauma patients screening positive for probable PTSD, frequently accompanied by anxiety or depressive symptoms [8]. Long-term registry data further support the possibility of persistent psychological morbidity after severe maxillofacial injury [9]. Pakistan-specific evidence regarding PTSD after maxillofacial fracture or soft-tissue trauma remains limited. However, studies of facial burn survivors show that visible facial injury is associated with psychological and social disability, poorer oral-health-related quality of life, and difficulties related to stigma and social comfort [10–12]. These observations indicate that the psychological consequences of visible facial injury are clinically important in the local setting, but they do not replace direct evidence from patients treated for maxillofacial trauma.

The Impact of Event Scale-Revised (IES-R) is a 22-item self-report instrument that assesses intrusion, avoidance, and hyperarousal following traumatic events and has been used in recent maxillofacial trauma research [7]. In the present study, an IES-R score ≥35 was used to identify probable PTSD symptoms at one month after injury. The study was undertaken to estimate the prevalence and severity of probable PTSD among patients with maxillofacial trauma at LUMHS and to examine whether demographic and clinical factors, particularly facial disfigurement, were independently associated with psychological morbidity. Regionally specific evidence may help support earlier identification of high-risk patients and integration of psychological care into routine maxillofacial trauma follow-up.

MATERIALS AND METHODS

This hospital-based cross-sectional observational study was conducted in the Department of Oral and Maxillofacial Surgery, Liaquat University of Medical & Health Sciences (LUMHS) Hospital, Jamshoro/Hyderabad, Sindh, Pakistan. The study was carried out from late November 2025, after ethical approval, through March 2026. The Research Ethics Committee of LUMHS approved the study (No. LUMHS/REC/-1314; dated 27 November 2025). Written informed consent was obtained from adult participants; for participants younger than 18 years, assent was obtained together with consent from a parent or legal guardian. Patients aged 12 years or older who presented with maxillofacial trauma, including facial fractures and/or soft-tissue injuries, and who were able and willing to complete the study assessment were eligible. Patients with a documented psychiatric disorder diagnosed before the index trauma, cognitive impairment that prevented completion of the questionnaire, or polytrauma requiring intensive care that made psychological assessment at the planned time point impractical were excluded. Non-probability consecutive sampling was used to recruit eligible consenting patients.

The required sample size was calculated using OpenEpi with an expected prevalence of post-traumatic stress symptoms of 27%, a 95% confidence level, and a 5% absolute margin of error. The initial estimate was 303 participants. Applying a finite population correction based on approximately 1,000 annual maxillofacial trauma presentations yielded a final required sample of 233 participants, which was achieved. At enrollment, demographic and clinical data were recorded on a standardized proforma, including age, sex, mode of injury, anatomical injury site, and the presence or absence of facial disfigurement. Clinical evaluation included medical history, physical examination, and radiographic imaging where indicated. For the present analysis, facial disfigurement was recorded as a binary clinical variable when a visible alteration in facial contour, symmetry, or scarring was apparent on examination. This operational definition should be interpreted as a clinical classification rather than a validated disfigurement severity scale.

Psychological assessment was performed at one month after injury using the Impact of Event Scale-Revised (IES-R). The IES-R comprises 22 items assessing intrusion, avoidance, and hyperarousal, with a total possible score of 0–88. A total IES-R score ≥35 was categorized as probable PTSD for the primary analysis. Because the study outcome was based on a screening instrument rather than a diagnostic interview applied to the entire cohort, all prevalence and association estimates are reported as probable PTSD rather than clinician-confirmed DSM-5 PTSD. Data were analyzed using SPSS version 26. Continuous variables were summarized as mean ± standard deviation and categorical variables as frequencies and percentages. Pearson chi-square tests were used to compare the prevalence of probable PTSD across categorical risk groups. Multivariable binary logistic regression was used to evaluate independent associations with probable PTSD, with age group, sex, road traffic accident mechanism, and facial disfigurement

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included in the model. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were reported. All tests were two-sided, and $p<0.05$ was considered statistically significant.

RESULTS

A total of 233 patients with maxillofacial trauma were included. The mean age was 29.4 ± 10.8 years (range 12–68 years). Most participants were male (181, 77.7%), giving a male-to-female ratio of approximately 3.5:1. The largest age group was 21–35 years (104, 44.6%), followed by 12–20 years (58, 24.9%), 36–50 years (51, 21.9%), and >50 years (20, 8.6%). Road traffic accidents were the leading mechanism of injury (149, 63.9%), followed by falls (34, 14.6%), assault (31, 13.3%), and other mechanisms (19, 8.2%). Soft-tissue injury without an underlying facial fracture was recorded in 79 patients (33.9%); mandibular fractures occurred in 61 (26.2%), zygomaticomaxillary complex fractures in 49 (21.0%), and other midface fractures in 44 (18.9%). Clinically apparent facial disfigurement was present in 96 patients (41.2%) (Table 1).

Table 1. Demographic and clinical characteristics of the study cohort (N=233)

Variable	Category	n (%)
Age group	12–20 years	58 (24.9)
	21–35 years	104 (44.6)
	36–50 years	51 (21.9)
	>50 years	20 (8.6)
Sex	Male	181 (77.7)
	Female	52 (22.3)
Etiology / mode of injury	Road traffic accident	149 (63.9)
	Fall	34 (14.6)
	Assault	31 (13.3)
	Other	19 (8.2)
Anatomical injury site	Soft tissue only	79 (33.9)
	Mandible fracture	61 (26.2)
	Zygomaticomaxillary complex	49 (21.0)
	Other midface fractures	44 (18.9)
Facial disfigurement	Present	96 (41.2)
	Absent	137 (58.8)

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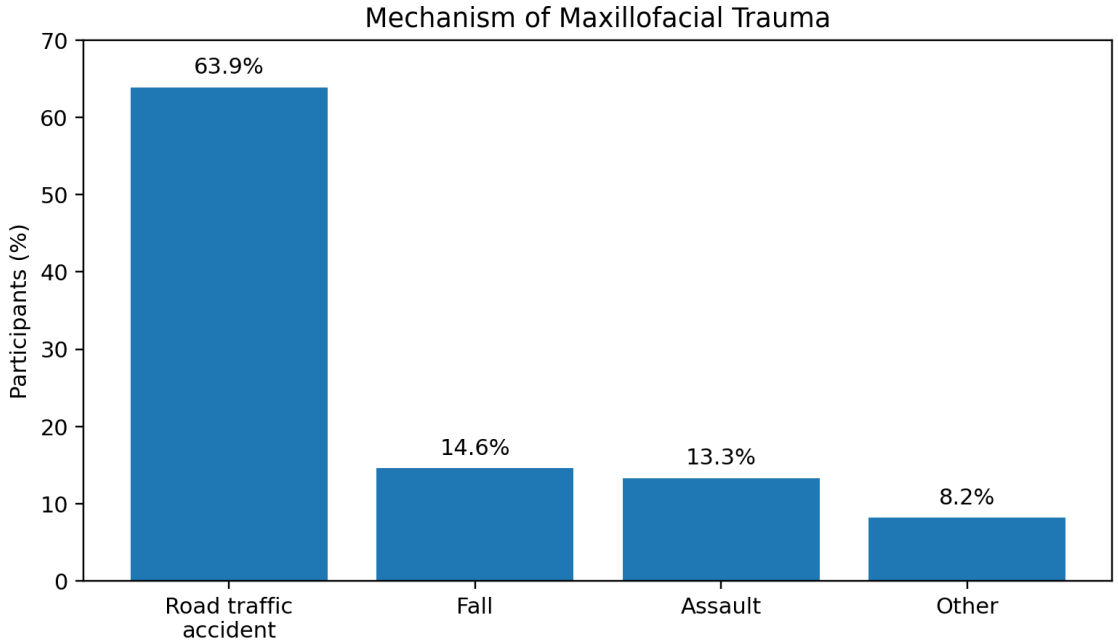

Figure 1. Distribution of maxillofacial trauma by mechanism of injury.

At one month after injury, the mean IES-R total score was 31.3 ± 12.1 (range 2–76). Intrusion had the highest mean subscale score (11.4 ± 4.8), followed by avoidance (10.7 ± 5.1) and hyperarousal (9.2 ± 3.9). Using an IES-R cutoff of ≥35, 63 of 233 patients met the study definition of probable PTSD, corresponding to a prevalence of 27.0% (95% CI: 21.7%–33.1%) (Table 2).

Table 2. IES-R total and subscale scores at one-month follow-up (N=233)

Subscale / outcome	Mean ± SD	Range	Prevalence, n (%)
Intrusion (0–32)	11.4 ± 4.8	0–28	—
Avoidance (0–32)	10.7 ± 5.1	0–27	—
Hyperarousal (0–24)	9.2 ± 3.9	0–21	—
IES-R total (0–88)	31.3 ± 12.1	2–76	—
Probable PTSD (IES-R ≥35)	—	—	63 (27.0)

Probable PTSD was substantially more frequent among patients with facial disfigurement than among those without disfigurement (41/96, 42.7% vs. 22/137, 16.1%; Pearson χ^2=20.32, p<0.001). Female patients also had a higher prevalence than male patients (20/52, 38.5% vs. 43/181, 23.8%; χ^2=4.43, p=0.035). Participants younger than 35 years had a numerically higher prevalence than those aged 35 years or older (29.6% vs. 21.1%), but this difference was not statistically significant (χ^2=1.81, p=0.179) (Table 3).

Table 3. Univariate associations with probable PTSD (IES-R ≥35)

Risk factor	Probable PTSD, n (%)	No probable PTSD, n (%)	χ^2	p-value
Facial disfigurement: present (n=96)	41 (42.7)	55 (57.3)	20.32	<0.001*
Facial disfigurement: absent (n=137)	22 (16.1)	115 (83.9)		
Female (n=52)	20 (38.5)	32 (61.5)	4.43	0.035*
Male (n=181)	43 (23.8)	138 (76.2)		

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Risk factor	Probable PTSD, n (%)	No probable PTSD, n (%)	χ^2	p-value
<35 years (n=162)	48 (29.6)	114 (70.4)	1.81	0.179
≥35 years (n=71)	15 (21.1)	56 (78.9)		

* Statistically significant at p<0.05. Pearson chi-square statistics were calculated from the observed counts shown in the table.

In multivariable logistic regression, facial disfigurement was the strongest independent predictor of probable PTSD (AOR 3.41, 95% CI 1.84–6.32; p<0.001). Female sex was also independently associated with probable PTSD (AOR 1.98, 95% CI 1.02–3.85; p=0.043). Age <35 years (AOR 1.42, 95% CI 0.71–2.84; p=0.318) and road traffic accident mechanism (AOR 1.63, 95% CI 0.85–3.12; p=0.141) were not independently associated with the outcome after adjustment (Table 4).

Table 4. Multivariable logistic regression of predictors of probable PTSD

Predictor	AOR	95% CI	p-value
Facial disfigurement (present vs. absent)	3.41	1.84–6.32	<0.001*
Female sex (vs. male)	1.98	1.02–3.85	0.043*
Age <35 years (vs. ≥35 years)	1.42	0.71–2.84	0.318
RTA mechanism (vs. non-RTA)	1.63	0.85–3.12	0.141

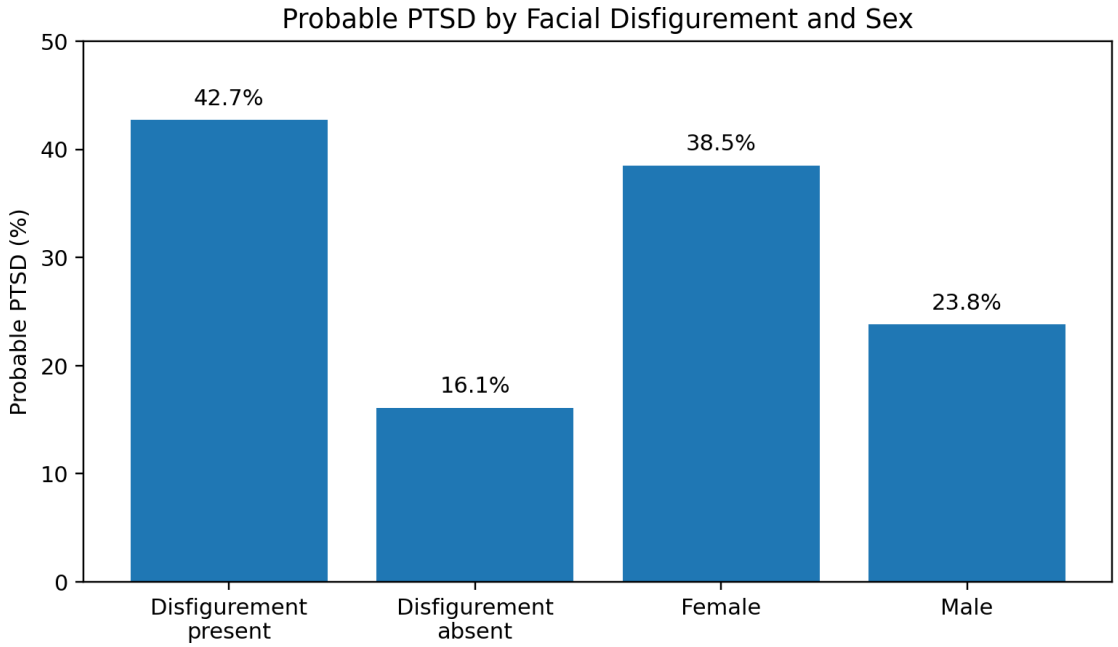

Figure 2. Prevalence of probable PTSD according to facial disfigurement and sex.

DISCUSSION

This study found that 27.0% of patients with maxillofacial trauma screened positive for probable PTSD at one month after injury. The finding indicates a substantial early psychological burden in a population whose treatment is often focused primarily on fracture stabilization, wound healing, restoration of function, and facial reconstruction. The predominance of young male patients and road traffic accidents in the cohort is consistent with contemporary Pakistani maxillofacial trauma series [2,3], while the psychological findings emphasize that physical recovery alone does not fully capture the consequences of facial injury. The observed prevalence closely matches the approximately 27% pooled estimate reported for PTSD during the first 1–3 months after maxillofacial trauma in a recent systematic review and meta-analysis [5]. It is also broadly consistent with clinical-service evidence showing that a sizeable subgroup of facial trauma patients screen positive for trauma-related psychological symptoms [8]. Differences between studies are expected because of variation in injury severity, timing of assessment, cultural context, sampling, and the instruments or thresholds

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used to define probable PTSD. In the present study, the IES-R was used as a screening measure; therefore, the 27.0% estimate should be interpreted as probable PTSD rather than a formal DSM-5 diagnosis [13].

Facial disfigurement emerged as the strongest independent predictor, with more than threefold higher adjusted odds of probable PTSD. This finding is clinically plausible because visible changes in facial appearance can repeatedly remind patients of the traumatic event and may affect self-image, communication, social confidence, and perceived acceptance. Recent work in patients with facial and dental trauma has similarly shown higher post-traumatic stress symptom scores among those with disfiguring injuries [7]. Pakistani studies in facial burn populations also demonstrate that visible facial injury is associated with psychological and social disability, impaired quality of life, and stigma-related difficulties [10–12]. Although burn trauma differs from fracture-pattern maxillofacial trauma, the local evidence supports the broader relevance of facial appearance to psychological recovery. Female sex remained independently associated with probable PTSD after adjustment, despite women representing a smaller proportion of the trauma cohort. Similar sex-related differences in post-traumatic stress symptoms have been reported in recent facial trauma research [7]. The present findings should not be interpreted as establishing a biological cause; rather, they identify female patients as a group in whom closer psychological assessment may be warranted. Possible explanations may include differences in trauma appraisal, social roles, perceived consequences of facial appearance, prior trauma exposure, or help-seeking patterns, none of which were directly measured in this study [14,15].

Road traffic accidents were the dominant injury mechanism but were not independently associated with probable PTSD in the multivariable model. Age below 35 years was also not an independent predictor. These findings suggest that, within this cohort, the visible consequence of injury and sex were more informative for identifying psychological vulnerability than age or mechanism alone. This distinction is important because a patient with apparently straightforward trauma may still experience clinically meaningful psychological symptoms if facial appearance has been altered. The clinical implication is that psychological screening should be incorporated into routine maxillofacial trauma follow-up rather than reserved for patients who spontaneously report distress [16-18]. A brief standardized tool such as the IES-R can help identify patients who may benefit from further mental health assessment, particularly those with visible disfigurement or other markers of vulnerability. Early psychoeducation, supportive counseling, and referral to psychology or psychiatry when indicated can be integrated with reconstructive and functional rehabilitation. Contemporary reviews and clinical-service studies support a multidisciplinary approach to psychological morbidity after facial trauma [19,20].

This study has several strengths, including a sample size of 233 patients, standardized one-month assessment, inclusion of both fracture and soft-tissue trauma, and multivariable analysis of clinically relevant predictors. However, important limitations should be recognized. The single-center design may limit generalizability to other regions and care settings. The IES-R is a screening instrument, so the outcome represents probable rather than clinician-confirmed PTSD. Assessment at one month does not establish persistence or chronicity, and longitudinal follow-up would be needed to determine symptom resolution or delayed persistence. Facial disfigurement was recorded as a binary clinical variable rather than with a validated severity scale, and the study did not formally assess depression, anxiety, pain, social support, previous trauma exposure, or socioeconomic stressors that may confound psychological outcomes. These limitations should be addressed in future prospective multicenter studies with repeated follow-up and formal diagnostic assessment.

CONCLUSION

Probable PTSD symptoms were present in 27.0% of patients one month after maxillofacial trauma at this tertiary-care center. Facial disfigurement and female sex were independently associated with greater odds of probable PTSD, whereas younger age and road traffic accident mechanism were not significant independent predictors. These findings support incorporating structured psychological screening into routine maxillofacial trauma follow-up, with particular attention to patients with visible facial changes and timely referral for mental health assessment when screening is positive. Longitudinal, multicenter research using validated disfigurement measures and clinician-administered diagnostic interviews is needed to clarify persistence of symptoms and guide integrated surgical and psychological care.

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