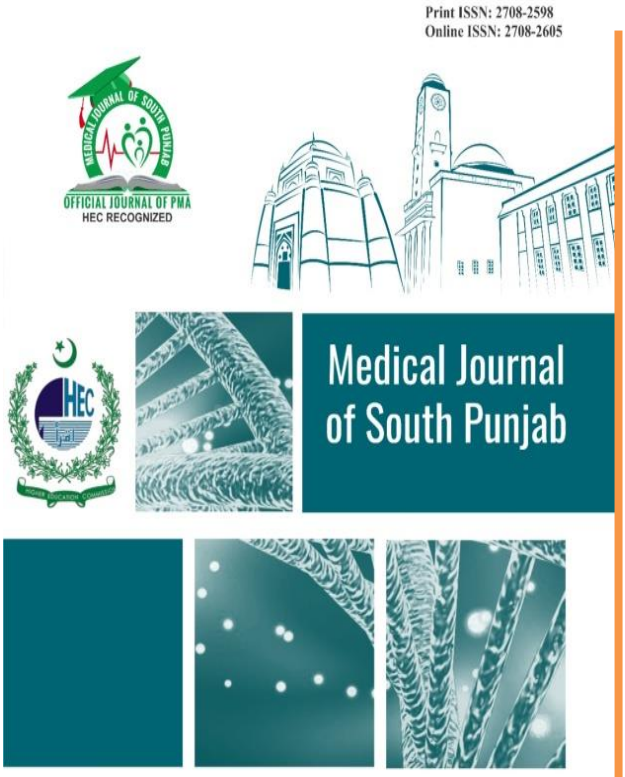
ISSN (E): 2708-2601
ISSN (P): 2708-2598

Medical Journal of South Punjab
Article DOI:10.61581/MJSP.VOL06/02/09
Volume 6, Issue 2, 2025



Frequency of peripheral nerve injury in oral and maxillofacial trauma

Publication History

Received: Feb 03, 2025 Revised: Feb 23, 2025
Accepted: June 10, 2025 Published: Jun 30, 2025

Authors and Affiliation:

Sundas Iqbal Aslam[1], Jehan Alam[2], Neha Joel [3]
[1-3] Jinnah Postgraduate Medical Centre, Karachi, Pakistan
[*]**Corresponding Author Email**: sundasiqbal1247@gmail.com

Conflict of Interest:

Author(s) declared no conflict of interest.

Acknowledgment:

No Funding received.

Citation: Aslam SI, Alam J, Joel N. Frequency of peripheral nerve injury in oral and maxillofacial trauma. Medical Journal of South Punjab. 2025 September 30; 6(2):68-73.

Please scan me to access online.

An official publication of
Medteach Private Limited, Multan, Pakistan.
Email: farman@mjsp.com.pk, Website: https://mjsp.com.pk/index.php/mjsp

Medical Journal of South Punjab
Volume 6, Issue 2, 2025; pp: 68-73
Original Article

Frequency of peripheral nerve injury in oral and maxillofacial trauma

Sundas Iqbal Aslam[1], Jehan Alam[2], Neha Joel [3]
[1-3] Jinnah Postgraduate Medical Centre, Karachi, Pakistan
[*]**Corresponding Author Email**: sundasiqbal1247@gmail.com

ABSTRACT

Objective: To assess the peripheral nerve injury incidence among patients suffering from oral and maxillofacial trauma.

Methods: This cross-sectional study included 100 patients presenting with maxillofacial trauma to the Department of Oral and Maxillofacial Surgery at Jinnah Postgraduate Medical Centre, Karachi, from 13th July 2024 to 12th January 2025. Data regarding demographics, etiology of trauma, site of injury, fracture type, and presence of peripheral nerve injury were collected. Trigeminal, facial, and concurrent nerve injuries were assessed clinically. Statistical analysis was performed to evaluate associations between nerve injuries and clinical variables.

Results: The mean age of participants was 32.5 ± 11.4 years, with males comprising 72% of the sample. Road traffic accidents were the leading cause of trauma (54%), followed by assault (22%) and falls (12%). Peripheral nerve injury was present in 18% of patients. Trigeminal nerve injury occurred in 14%, facial nerve injury in 4%, and combined nerve injury in 2% of cases. A significant association was found between the presence of fractures and nerve injury ($p < 0.05$).

Conclusion: Peripheral nerve injuries are a notable complication of oral and maxillofacial trauma account for 18% of patients, with trigeminal nerve involvement being more frequent than facial nerve injury.

Keywords: Maxillofacial trauma, trigeminal nerve injury, facial nerve injury, peripheral nerve injury, mandibular fractures.

1. INTRODUCTION

Trauma is still among the primary causes of death in the first 40 years of life. The World Health Organization estimates that around 15-20 million individuals are injured annually, and close to 1 million die annually as a result of road traffic accidents (RTAs)[1]. The World Health Statistics (2008) indicated that RTAs caused a significant proportion of deaths in the population and it is estimated that it would be the fifth leading cause of deaths in the population by the year 2030[2]. In developing nations, 7.4-8.4%[3] of the maxillofacial injuries are considered an emergency and need to be attended to by medical personnel, which is very dangerous to life. The incidence and intensively of maxillofacial trauma have been progressively increasing, partly because its use of road transport has enhanced, and the social-economic activities of people are expanding[4]. The etiology of maxillofacial trauma has changed over the last thirty years and this change is quite heterogeneous depending on the socioeconomic status, culture, geography, and age[5,6].

The trigeminal nerve (35%), and the facial nerve (16%) are the most affected nerves in oral and maxillofacial trauma. The most commonly affected one is the inferior alveolar nerve, a peripheral branch of the trigeminal nerve, which is usually injured during a fracture of the mandible angle, then comes the mental nerve, which is often injured during a fracture of the mandible parasymphysis[6]. The masseteric and auriculotemporal nerves cannot often be involved in condylar fractures, and buccal and lingual nerves can be damaged in intraoral lacerations during fractures of the mandibular body. Zygomaticomaxillary complex fractures in particular are more susceptible to the infraorbital nerve[7]. Injury to the facial nerve is usually correlated with parotid area condylar fractures or soft tissues injuries. The exact pathophysiology of nerve injury in maxillofacial trauma is not always clearly described, but it can be due to direct damage, such as displacement of nerve, traction by dislocated fractures, compression, or even partial/total transection, or indirect, e.g. compression of nerve by displaced bone fragments, edema of soft tissues or secondary ischemia[8].

The facial nerve injury has great effect on social life of a patient. After nerve injury the patient can't produce wrinkles on forehead, can't close his eye, can't smile, angle of mouth is deviated towards the unaffected side and saliva is drooling from his mouth[9]. The effected eye becomes dry and if sustain for long time it results in loss of vision. All these effects restrict the social activities of a patient.Post-traumatic trigeminal and facial nerve injuries result in a reduced quality of life for patients but their frequency in maxillofacial trauma is poorly documented in the local literature[10].

Therefore this study will be conducted at our local population to document and evaluate the frequency of nerve injuries associated with maxillofacial trauma among the local population. This information will help to highlight the magnitude of problem and the surgeons has to focus on the management of these nerve injuries as they are often not addressed following the treatment of maxillofacial fractures.

2. METHODOLOGY

The study was conducted in the Department of Oral and Maxillofacial Surgery at Jinnah Postgraduate Medical Centre, Karachi, from 13th July 2024 to 12th January 2025 after obtaining approval from the institutional ethical committee. The sample size was calculated using OpenEpi Online software, based on a reported prevalence of trigeminal nerve injury of 5.5%, with a 95% confidence level and a 5% margin of error, which yielded a required sample of 80 participants. However, approximately 100 patients were enrolled within the six-month study period. The sample size was calculated

using the formula $n = [DEFF \times Np(1–p)] / [(d^2/Z^2(1−\alpha/2) \times (N−1) + p(1−p))]$. A non-probability consecutive sampling technique was employed, and the study design was descriptive and cross-sectional. All eligible patients were informed about the study objectives, the use of their information for research purposes, and the associated risk–benefit ratio, after which written informed consent was obtained. A structured proforma was used to record demographic data and study variables, including etiology, type of bony trauma, type of soft tissue injury, and the presence or absence of peripheral nerve injury.

Patients aged 18 to 50 years of either gender who came with the first presentation of oral and maxillofacial trauma were added. Systemic diseases leading to neurological impairments (including diabetic neuropathy, multiple sclerosis, hemiplegia, paraplegia, or Bell palsy) and who were not caused by trauma were excluded, as well as psychiatric patients and those unwilling to be involved. The diagnosis was made in all participants on the basis of the history of facial skeletal trauma and the detailed clinical examination in which the maxillofacial hard and soft tissues were inspected and palpated. Peripheral nerve injury was examined with assessing the sensory capacity of the trigeminal nerve bilaterally with cotton pellets of light touch and pin-prick testing with sterile dental needle. Motor activity was evaluated using facial expression tests whereby patients were requested to frown, eyebrow raise, close eyes, open teeth, smile and make whistling motions; the lack of any of these functions was taken to be evidence of an injury on the peripheral nerve. Radiographic assessment consisted of anterior- posterior images of the face, mandibular condyle, angle, body, and parasymphysis fractures orthopantomogram, and zygomatic complex fracture evaluation in submentovertex and paranasal sinus images.

The data were analyzed and entered into SPSS version 25. Both quantitative and qualitative variables underwent descriptive statistics. Quantitative variables, including age, were used to obtain the means and standard deviations (or medians and interquartile ranges), whereas categorical variables, such as gender, age groups, etiology, type of bony trauma, type of soft tissue injury, and peripheral nerve injury, were used to obtain frequencies and percentages. Stratification was done to control the effect modifiers such as gender, age, etiology, type of bony trauma and soft tissue injury and then the chi-square test was used to determine whether the modifiers were associated with peripheral nerve injury. A p-value of 0.05 and below was found significant.

3. RESULTS

The sample size of the study was 100 patients with the mean age of 32.511.4 years. Most of the patients were males (72%), and females made up 28 percent of the sample. With reference to etiology of trauma, road traffic accidents (54%), assault (22%), falls (12%), firearm injuries (6%), sports-related injuries (4%), and other causes (2%), were the most common. Table-1

Fractures of bones were found on 68 percent of patients in the study and 32 percent of those who never experienced fractures. The mandible (35.3%), maxilla (20.6%), zygoma (14.7%), multiple bones (14.7%), dentoalveolar region (8.8%), and frontal bone (5.9%), were the most affected bones among the fractured. A third of patients (74 percent) had soft tissue injuries and a quarter (26 percent) had no soft tissue injuries. Table-2

In the study, soft tissue injuries were most commonly observed on the cheek, affecting 16 patients (21.6%), followed by the infraorbital region in 14 patients (18.9%) and the forehead in 10 patients (13.5%). Injuries to the chin were also noted in 10 patients (13.5%), while the lower lip was affected in 8 patients (10.8%) and the upper lip in 6 patients (8.1%). Intraoral injuries were seen in 6 patients (8.1%), and multiple injury

sites were reported in 4 patients (5.5%). Table-3.

In this study, peripheral nerve injury was observed in 18% of patients, which was statistically significant (p = 0.002). Trigeminal nerve injury occurred in 14% of patients (p = 0.005), while facial nerve injury was seen in 4% of cases (p = 0.041). Both trigeminal and facial nerves were injured simultaneously in 2% of patients, but this was not statistically significant (p = 0.112). Table-4

Table 1. Demographic Characteristics and Etiology of Trauma (n = 100)

Variable	Categories	n	%
Age (years)	Mean ± SD	**32.5 ± 11.4**	—
Gender	Male	**72**	72%
	Female	**28**	28%
Etiology of Trauma	RTA	**54**	54%
	Assault	**22**	22%
	Fall	**12**	12%
	Firearm	**6**	6%
	Sport	**4**	4%
	Others	**2**	2%

Table 2. Bone Fracture Distribution and Soft Tissue Injury (n = 100)

Variable	Categories	n	%
Bone Fracture	Yes	**68**	68%
	No	**32**	32%
Type of Bone Fracture	Maxilla	**14**	20.6%
	Zygoma	**10**	14.7%
	Mandible	**24**	35.3%
	Dentoalveolar	**6**	8.8%
	Frontal Bone	**4**	5.9%
	Multiple Bones	**10**	14.7%
Soft Tissue Injury	Yes	**74**	74%
	No	**26**	26%

Table 3. Pattern of Soft Tissue Injuries (n = 74)

Soft Tissue Injury Site	n	%
Forehead	**10**	13.5%
Infraorbital region	**14**	18.9%
Cheek	**16**	21.6%
Lower lip	**8**	10.8%
Upper lip	**6**	8.1%
Chin	**10**	13.5%
Intraoral	**6**	8.1%
Multiple injuries	**4**	5.5%

Table 4. Frequency and Type of Nerve Injuries

Variable	Category	n (%)	p
Peripheral Nerve Injury	Yes	**18** (18%)	**0.002**
	No	**82** (82%)	
Trigeminal Nerve Injury	Yes	**14** (14%)	**0.005**
	No	**86** (86%)	
Facial Nerve Injury	Yes	**4** (4%)	**0.041**
	No	**96** (96%)	
Both Nerves Injured	Yes	**2** (2%)	**0.112**
	No	**98** (98%)	

4. DISCUSSION

In this study, 54% of maxillofacial trauma cases resulted from road traffic accidents (RTAs), followed by assault (22%), falls (12%), firearm injuries (6%), sports-related injuries (4%), and others (2%). This is broadly in agreement with a global meta-analysis of pediatric and adolescent facial trauma conducted by Mohammadi et al[11]in which RTC (road traffic crashes) were the most common cause (33.8%), followed by falls (20.7%), violence (9.9%) and sports (8.1%).

In a 5-year review of 3360 patients by Khan et al[12] RTAs accounted for 78% of injuries. The male predominance and peak age in the third decade in this series also mirrors many prior reports including that large series where the male-to-female ratio was ≈6.3:1 and most patients in the 20–30 year age group.

In this study bone fractures was found in 68% of patients, with the mandible being the most common fractured bone (35.3%), followed by maxilla (20.6%), zygoma (14.7%), multiple bones (14.7%), dentoalveolar region (8.8%) and frontal bone (5.9%). While there is considerable variability across literature, many studies report the mandible as the most frequently fractured bone. For instance, in a 10-year retrospective review of 1007 patientsconducted by Juncaret al[13] reported that mandible was involved in 62.16% of fractures.

Another long-term review of 8,818 patients conducted by Motamediet al[14] found mandibular fractures to represent 65.1% of cases, followed by mid-face bones including zygoma and maxilla. That said, the overall fracture-rate in this study (68%) appears somewhat lower than in some of these series possibly because some prior studies included only patients with fractures, whereas this sample may have included both fracture and non-fracture injuries.

In this study, soft-tissue injuries were present in 74% of patients. The

cheek was the most commonly involved site (21.6%), followed by infraorbital region (18.9%), forehead (13.5%), chin (13.5%), lower lip (10.8%), upper lip (8.1%), intraoral injuries (8.1%), and multiple sites (5.5%). The frequency of soft tissue injury in this cohort is comparable to that reported in a large review conducted by Maniaciet al[15], in which soft tissue injuries occurred in around 78.6% of maxillofacial trauma cases, with lacerations, contusions and abrasions being the most common types.

Regarding peripheral nerve injury, this study observed nerve injury in 18% of patients, with trigeminal nerve injury in 14%, facial nerve injury in 4%, and both trigeminal + facial injury in 2% (though the combined injury was not statistically significant). In comparison, the large 3360-case study by Khan et al[12] reported sensory deficit in 34.7% and motor deficit in 6.83%.

A cross-sectional Iranian study of 495 patients conducted by Poorian et al[16]reported nerve injuries in 67.7% of cases, among them the inferior alveolar was most commonly affected (39.1%), followed by infraorbital nerve (27.2%), and facial (motor) nerve injury was seen in about 1%. On the other hand, a prospective 2023 study from Pakistanconducted by Dildar et al[17]found trigeminal nerve injury in 37.8% and facial nerve injury in 2.1%. An older study conducted by Renziet al[18] also documented extremely high rates of trigeminal nerve impairment, 70.9% of patients with facial fractures had post-traumatic trigeminal nerve impairment in a 12-month follow-up study.

Tayyabet al[19] reported that trigeminal nerve injury occurred more frequently than facial nerve injury in their study. In contrast, Othman et al[20] from Iraq found that facial nerve injury was more common among presenting patients, which contradicts the findings of the current study.

5. CONCLUSION

Peripheral nerve injuries are a notable complication of oral and maxillofacial trauma account for 18% of patients, with trigeminal nerve involvement being more frequent than facial nerve injury.

6. REFERENCES

1. Gupta A, Babu AK, Bansal P, Sharma R, Sharma SD. Changing trends in maxillofacial trauma: a 15 years retrospective study in the southern part of Haryana, India. Indian J Dent Res. 2018;29:190–5.
2. Niazi TM, Subramanian AKR, Diana C, Pughalaendhi N, Gurunathan U, Kathiresan NGS. Prevalence and Pattern of Adult Maxillofacial Injuries: An Institutionbased Retrospective Study. J Pharm Bioallied Sci. 2020 Aug;12(Suppl 1):S472-S479.
3. Bali R, Sharma P, Garg A, Dhillon G. A comprehensive study on maxillofacial trauma conducted in Yamunanagar India. J Inj Violence Res. 2013; 5(2):108–16.
4. Giri KY, Singh AP, Dandriyal R, Indra N, Rastogi S, Mall SK et al. Incidence and pattern of mandibular fractures in Rohilkhand region, Uttar pardesh state, India: a retrospective study. J Oral BiolCraniofac Res. 2015; 5(3):140–5.
5. Abhinav RP, Selvarasu K, Maheswari GU, Taltia AA. The patterns and etiology of maxillofacial trauma in south India. Ann Maxillofac Surg. 2019; 9(1):114–17.
6. Al-Bokhamseen M, Salma R, Al-Bodbaij M. Patterns of maxillofacial fractures in Hofuf, Saudi Arabia: A 10-year retrospective case series. Saudi Dent J. 2019; 31(1):129–36.
7. Patiguli NW, Buhailiqiguli M, Guli, Adilijiang S, Adili M. Epidemiology and pattern of oral and maxillofacial trauma. J Craniofac Surg. 2020; 31(5):517–20.
8. Tayyab TF, Khan AW, Geelani SR, Akram MA, Anwar A, Jan ZA.

Incidence of peripheral nerve injury incidence among patients suffering from oral and maxillofacial trauma. Pak J Med Health Sci. 2022 May 1;16(03):1001-3.

9. Sivolella S, Brunello G, Ferrarese N, Puppa AD, D'Avella D, Bressan E, Zavan B. Nanostructured guidance for peripheral nerve injuries: a review with a perspective in the oral and maxillofacial area. Int J Molecul Sci. 2014 Feb 20;15(2):3088-117.
10. Khan TU, Rahat S, Khan ZA, ShahidL, Banouri SS, Muhammad N. Etiology and pattern of maxillofacial trauma. PLoSOne. 2022;17(9):e0275515.
11. Mohammadi H, Roochi MM, Heidar H, Garajei A, Dallband M, Sadeghi M, Fatahian R, Tadakamadla SK. A meta-analysis to evaluate the prevalence of maxillofacial trauma caused by various etiologies among children and adolescents. Dent Traumatol. 2023;39(5):403-417.
12. Khan TU, Khan ZA, Khalid MU, Afsar R, Qayum Z. Pattern of maxillofacial trauma: a five years study of 3360 cases. *Professional Med J*. 2015;22(12):1606–1611.
13. Juncar RI, Tent PA, Harangus A, Juncar M. Patterns of facial fractures and associated soft tissue injuries: a retrospective study on 1007 patients. ActaClin Croat. 2022 Nov;61(3):412-420.
14. Motamedi MH, Dadgar E, Ebrahimi A, Shirani G, Haghighat A, Jamalpour MR. Pattern of maxillofacial fractures: a 5-year analysis of 8,818 patients. J Trauma Acute Care Surg. 2014 Oct;77(4):630-4.
15. Maniaci A, Lentini M, Vaira L, Lavalle S, Ronsivalle S, Rubulotta FM, Lentini L, Paternò DS, Galletti C, Sorbello M, Lechien JR, La Via L. The Global Burden of Maxillofacial Trauma in Critical Care: A Narrative Review of Epidemiology, Prevention, Economics, and Outcomes. Medicina (Kaunas). 2025 May 18;61(5):915.
16. Poorian B, Bemanali M, Chavoshinejad M. Evaluation of Sensorimotor Nerve Damage in Patients with Maxillofacial Trauma; a Single Center Experience. Bull Emerg Trauma. 2016 Apr;4(2):88-92.
17. Dildar Z, Ishaq M, Khan AA, Ullah S, Yasir A, Mahmood T. Open AccessOriginal Article Frequency of Common Nerve Injuries in Patients with Oral and Maxillofacial Trauma. Pak Armed Forces Med J [Internet]. 2025 Aug. 30 [cited 2025 Dec. 7];75(4):788-91.
18. Renzi G, Carboni A, Perugini M, Giovannetti F, Becelli R. Posttraumatic trigeminal nerve impairment: a prospective analysis of recovery patterns in a series of 103 consecutive facial fractures. J Oral Maxillofac Surg. 2004 Nov;62(11):1341-6.
19. Tayyab TF, Khan AW, Geelani SRR, Akram MA, Anwar A, Jan ZA. Frequency of Peripheral Nerve Injury Frequency among Patients Suffering from Oral and Maxillofacial Trauma. Pak J Med Health Sci2022 ;16(03):1001–1001.
20. Othman A, Al-Mofreh Al-Qahtani F, Al-Qahtani H, Jaber M, Bishawi K, Hassan Khamis A, et al. Traumatic brain injuries and maxillofacial fractures: a systematic review and meta-analysis. Oral MaxillofacSurg 2023;27(3):373–385.