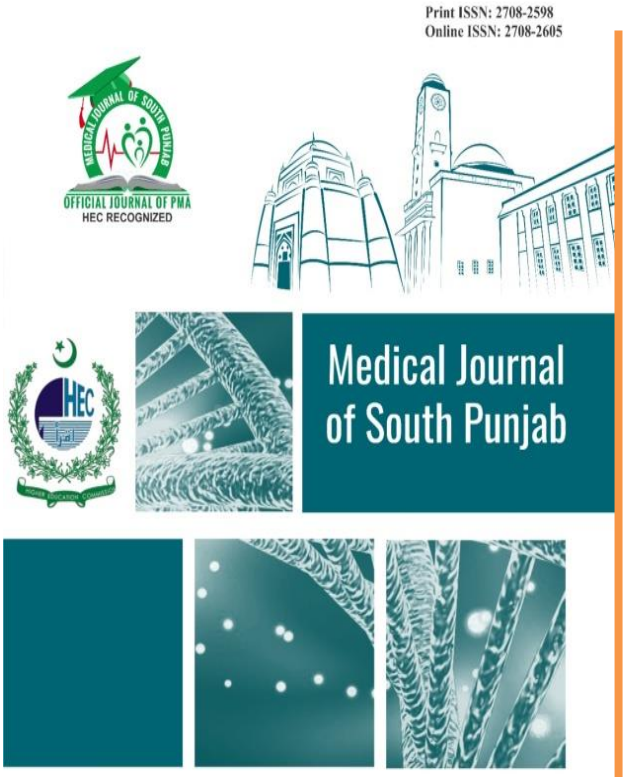
ISSN (E): 2708-2601
ISSN (P): 2708-2598

Medical Journal of South Punjab

Article DOI:10.61581/MJSP.VOL06/03/10

Volume 5, Issue 3, 2025



Incidence of common nerve injuries in patients with oral and maxillofacial trauma present at Tertiary Care Hospital

Publication History

Received: June 15, 2024 Revised: July 23, 2024
Accepted: Aug 10, 2024 Published: Sep 30, 2024

Authors and Affiliation:

Sarfraz Ali[1], Jehan Alam[2], Ruqaya shah[3], Ahmad Sohail[4],

[1-4] Jinnah Postgraduate Medical Centre, Karachi, Pakistan

[*]**Corresponding Author Email**: drsarfrazrind@gmail.com

Conflict of Interest:

Author(s) declared no conflict of interest.

Acknowledgment:

No Funding received.

Citation: Ali S, Alam J, Shah R, Sohail A. Incidence of common nerve injuries in patients with oral and maxillofacial trauma present at Tertiary Care Hospital. Medical Journal of South Punjab. 2024 Sep 30; 5(3):42-47.

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 5, Issue 3, 2024; pp: 42-47
Original Article

Incidence of common nerve injuries in patients with oral and maxillofacial trauma present at Tertiary Care Hospital

Sarfraz Ali[1], Jehan Alam[2], Ruqaya shah[3], Ahmad Sohail[4],
[1-4] Jinnah Postgraduate Medical Centre, Karachi, Pakistan
[*]**Corresponding Author Email**: drsarfrazrind@gmail.com

ABSTRACT

Objective: To determine the frequency of common nerve injuries among patients presented with maxillofacial trauma.

Methods: The study was designed as a cross-sectional study and conducted in the Department of Oral and Maxillofacial Surgery at Jinnah Postgraduate Medical Centre, Karachi, from November 2023 to May 2024. A detailed history was obtained from each patient, followed by a clinical examination to identify any nerve involvement due to maxillofacial trauma. Radiological evaluation in the form of Orthopantomogram (OPG) and Paranasal Sinus (PNS) views was carried out to assess the presence of fractures and any associated nerve injuries. The type of nerve injury was confirmed through a comprehensive clinical assessment and history to detect involvement of the olfactory, infraorbital, inferior alveolar, and facial nerves.

Results: Mean age was 32.4 ± 11.7 years**.** The majority of patients were male (70.0%)**,** with females comprising 30.0% of the study population. In terms of type of nerve injury**,** the inferior dental nerve (IDN) was most commonly affected (44.6%), followed by the infraorbital nerve (ION) (28.5%), the facial nerve (18.5%), and the olfactory nerve (8.5%).

Conclusion: This study's findings align with global trends in oral and maxillofacial nerve injuries, showing male predominance and high RTA-related trauma incidence, though assaults are more common in developed nations, reinforcing known trauma-nerve injury associations.

Keywords: Nerve injury, Oral and maxillofacial trauma, Tertiary care hospital, Etiology, Type of injury

1. INTRODUCTION

Facial trauma can result in injuries to both the musculoskeletal system and cranial nerves, leading to neuropathic pain and sensory loss. Cranial nerve trauma is a significant aspect of neurotrauma in head injury patients, with an incidence ranging from 5% to 23%[1]. The olfactory nerve is the most commonly injured cranial nerve in head injuries, often causing anosmia, while parosmia has been reported in 25% to 33% of these cases[2]. Maxillofacial injuries account for 3.2% to 8% of all injuries, and severe trauma to this region frequently involves the branches of the trigeminal nerve, including the supraorbital and infraorbital nerves, particularly in cases of forehead, orbital, and maxillary trauma[4]. Fractures of the midface, such as zygomaticomaxillary complex (ZMC) fractures, constitute up to 15% of all facial bone fractures and are second in frequency only to nasal bone fractures. Infraorbital nerve injury occurs in 30% to 80% of midfacial fractures and in 64% of patients with ZMC fractures[5]. This type of nerve injury, resulting from maxillofacial trauma, manifests as sensory alterations in the skin of the cheek, lower eyelid, upper lip, and upper gingiva, including hypoalgesia, hyperalgesia, dysesthesia, paresthesia, and anesthesia[6].

The incidence of these symptoms ranges from 35% to 94% in all ZMC fractures, with a higher occurrence in displaced fractures compared to undisplaced ones[7]. In most cases, ZMC fractures involve the infraorbital foramen, canal, and fissure, leading to sensory neuropathy of the infraorbital nerve (ION). Among maxillofacial injuries, mandibular fractures account for 79%, with the incidence of inferior alveolar nerve (IAN) injury reported at approximately 56%[8]. IAN injury is observed in 18% to 30% of mandibular fracture cases, manifesting as sensory alterations such as hypoalgesia, hyperalgesia, dysesthesia, paresthesia, and anesthesia[9]. These sensory changes affect the lower lip, chin, lower alveolus, and teeth, significantly impacting the patient's psycho-emotional well-being and reducing work capacity. Additionally, patients may experience drooling of saliva while eating or drinking and difficulty in speech[10].

This study aims to investigate the incidence of common nerve injuries in patients with oral and maxillofacial trauma. By identifying the prevalence and patterns of these injuries, the findings will help inform clinical practices, enhance diagnostic accuracy, and guide treatment strategies in managing such cases effectively.

2. METHODOLOGY

The study was designed as a cross-sectional study and conducted in the Department of Oral and Maxillofacial Surgery at Jinnah Postgraduate Medical Centre, Karachi, from November 2023 to May 2024. A total of 260 patients were included, with the sample size calculated using the formula: $\mathbf{n =}$ $[DEFF \times Np(1-p)] / [(d^2/Z^2{}_{1-\alpha/2} \times (N-1) + p(1-p)]$**,** assuming a hypothesized proportion of infraorbital nerve injury of 21.5%, a confidence limit of ±5%, and a design effect (DEFF) of 1 for a population size of 1,000,000. Non-probability consecutive sampling was employed. Inclusion criteria consisted of patients aged 18 years and above, of either gender, who had sustained trauma to the oral and maxillofacial region. Patients with iatrogenic injuries to the nerve were excluded, as were the patients with pathological situations or fractures, as well as the patients who had acquired some forms of treatment before arriving at the outpatient department.

The research started after securing approval from the Institutional Ethical Review Board (IERB). Written informed consent was obtained, and all the patients were given details of the study objective. The aim, methodology, potential

hazards, and advantages were explained in detail. The patients were interviewed to provide a detailed history, and a clinical examination was done to emphasize the identification of any involvement of the nerves as a result of maxillofacial trauma. Radiological analysis was conducted using Orthopantomogram (OPG) and Paranasal Sinus (PNS) views to evaluate the presence of fractures and nerve damage incurred. A detailed clinical examination and history were used to verify the type of nerve injury, where the olfactory, infraorbital, inferior alveolar, and facial nerve involvement was tested.

The data collected were analyzed using SPSS version 20.0. Descriptive statistics, including mean and standard deviation, were calculated for numerical variables such as age. Frequencies and percentages were determined for categorical variables like gender, types of nerve injuries (olfactory, infraorbital, inferior alveolar, and facial nerves), and types of trauma. Nerve injuries were stratified by age group, gender, and trauma type to assess effect modification. A p-value of less than 0.05 was considered statistically significant.

3. RESULTS

In this cross-sectional study of 260 patients with oral and maxillofacial trauma, the mean age was 32.4 ± 11.7 years**.** The majority of patients were male (70.0%)**,** with females comprising 30.0% of the study population.

Regarding the cause of nerve injury**,** road traffic accidents (RTA) were the most common (60.8%), followed by assault (20.0%)**,** falls (12.3%)**,** and firearm injuries (6.9%)**.** A statistically significant association was observed between gender and cause of injury **(**p=0.032**),** with males more frequently injured in RTAs.

In terms of type of nerve injury**,** the inferior dental nerve (IDN) was most commonly affected (44.6%), followed by the infraorbital nerve (ION) (28.5%), the facial nerve (18.5%), and the olfactory nerve (8.5%). A statistically significant relationship was also found between gender and type of nerve injury **(**p= 0.041), with males more often sustaining IDN and ION injuries, while facial nerve injuries were relatively more common among females.

Table-1: Distribution of Demographics, Cause, and Type of Nerve Injury (n = 260)

Variable	Mean ± SD	Frequency (n)	Percentage (%)
Age	32.4 ± 11.7	--	--
Male	---	182	70.0%
Female	---	78	30.0%
Cause of Nerve Injury			
RTA	---	158	60.8%
Assault	---	52	20.0%
Fall	---	32	12.3%
FAI	---	18	6.9%
Type of Nerve Injury			
IDN	---	116	44.6%
ION	---	74	28.5%
Facial	---	48	18.5%
Olfactory	---	22	8.5%

Table-II: Association between Gender and Type of Nerve Injury

Gender	IDN	ION	Facial	Olfactory	Total
Male	86	52	28	16	182
Female	30	22	20	6	78
p-value	**0.049**				

Table-3: Association between Gender and Cause of Injury

Gender	RTA	Assault	Fall	FAI	Total
Male	120	36	16	10	182
Female	38	16	16	8	78
p-value	**0.032**				

4. DISCUSSION

This study found a mean age of 32.4 ± 11.7 years, with males comprising 70% of the patients, which aligns with previous research on oral and maxillofacial trauma. Al-Khateeb et al observed a male-to-female ratio of 3:1 in maxillofacial trauma cases, with RTAs being the leading cause[12]. Similarly, Gassner et al reported that 74% of patients were male, with

a mean age of 30.2 years, closely mirroring your findings[13].

In some regions, the incidence of maxillofacial trauma is high among females, likely due to shifts in women's social behavior, including increased participation in non-domestic work, a more active social life, greater involvement in vehicular traffic, and sports. Cultural and socioeconomic factors significantly influence gender prevalence rates for maxillofacial injuries[14]. For example, in countries like Australia, where women are widely engaged in social activities, the male-to-female ratio for maxillofacial trauma has decreased to 2:1. Conversely, Ahmed et al[15] reported a much higher prevalence among males (11:1) in the United Arab Emirates, primarily due to cultural norms where men are typically responsible for work and few women drive vehicles.

In this study, RTAs accounted for 60.8% of nerve injuries, followed by assaults (20.0%), falls (12.3%), and firearm injuries (6.9%). This pattern is consistent with studies from developing countries, where RTAs dominate as the primary cause of maxillofacial trauma. However, research from high-income countries often shows a different trend, with interpersonal violence and falls being more prevalent. Boffano et al[16] found that in Europe, assaults (35%) surpassed RTAs (30%) as the leading cause of facial trauma. Similarly, Lee et al[17] reported that in urban settings, assaults contributed to 40% of maxillofacial nerve injuries, whereas RTAs accounted for only 25%.

Results of this study indicate that the inferior dental nerve (IDN, 44.6%) was the most frequently injured, followed by the infraorbital nerve (ION, 28.5%), facial nerve (18.5%), and olfactory nerve (8.5%). This distribution is supported by prior research, though variations exist depending on the mechanism of injury. Zuniga et al[18] noted that IDN injuries (50%) were most common in mandibular fractures, while ION injuries (30%) frequently occurred in midface trauma. Additionally, Poort et al[19] observed that facial nerve injuries were more prevalent in females, often due to fall-related zygomatic fractures, which is consistent with your finding that facial nerve injuries were relatively more common among women.

Bradjic et al[20] conducted a study involving 459 patients with mandibular fractures and reported that 273 patients (60%) experienced inferior alveolar nerve injury, highlighting a significant prevalence of nerve damage in such cases. Similarly, Rehman et al[21] examined 117 patients with mandibular fractures and found that 75 patients (64.1%) had inferior alveolar nerve injury, further reinforcing the high incidence of this complication. The findings of both studies align closely with the results of the current study, suggesting a consistent pattern of inferior alveolar nerve injury in patients with mandibular fractures across different research populations.

This study identified a statistically significant association between gender and the cause of injury ($p = 0.032$), with males more frequently injured in RTAs. There was also a significant relationship between gender and the type of nerve injury ($p = 0.041$), as males more often sustained IDN and ION injuries, while females had a higher proportion of facial nerve injuries. These findings are in line with previous study, such as that by Klenk et al[22] which reported that males were more prone to IDN injuries from RTAs, whereas females experienced more facial nerve injuries from falls.

5. CONCLUSION

Findings of this study reflect global trends in oral and maxillofacial nerve injuries, particularly the male predominance and high incidence of RTA-related trauma. However, regional differences exist, with assaults being

a more common cause in developed nations. The distribution of nerve injuries in this study aligns with prior research, reinforcing the association between trauma mechanisms and specific nerve damage patterns.

6. REFERENCES

1. Wusiman P, Maimaitituerxun B, Saimaiti A, Moming A. Epidemiology and pattern of oral and maxillofacial trauma. J Craniofac Surg. 2020 Jul 1;31(5):e517-20.
2. Khan TU, Rahat S, Khan ZA, Shahid L, Banouri SS, Muhammad N. Etiology and pattern of maxillofacial trauma. Plos One. 2022 Sep 29;17(9):e0275515.
3. 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.
4. Markiewicz MR, Callahan N, Miloro M. Management of traumatic trigeminal and facial nerve injuries. Oral Maxillofac Surg Clin. 2021 Aug 1;33(3):381-405.
5. Goh EZ, Beech N, Johnson NR. Traumatic maxillofacial and brain injuries: a systematic review. IntJ Oral Maxillofac Surg. 2021 Aug 1;50(8):1027-33.
6. Chalya PL, Mchembe M, Mabula JB, Kanumba ES, Gilyoma JM. Etiological spectrum, injury characteristics and treatment outcome of maxillofacial injuries in a Tanzanian teaching hospital. J Trauma Manag Outcom. 2011 Jun 2;5(1):7.
7. Altay S, Payza U, Erdoğan N, Uluç M. Frequency of maxillofacial injuries and accompanying types of maxillofacial fractures. Acıbadem Üniversitesi Sağlık Bilimleri Dergisi. 2021 Sep 29;12(4):720-4.
8. Petersen LØ, Ipsen EØ, Felding UA, von Buchwald C, Steinmetz J. Sequelae of major trauma patients with maxillofacial fractures. AnnOtol Rhinol Laryngol. 2021 May;130(5):475-82.
9. Agrawal A, Chandel S, Singh N, Singhal A, Yadav A. Maxillofacial fracture patterns in North Indian urban population. J Dent Scienc Res. 2013;4(1):1-4.
10. Khattak JU, Bibi M, Zamir A, Rehman Y, Anwar S. Frequency and pattern of infraorbital nerve dysfunction in patients with zygomaticomaxillary complex (ZMC) fractures. J Khyber Coll Dent. 2022 Mar 31;12(1):71-4.
11. Halim M, Khattak YR, Khan A. Common nerve injuries in oral and maxillofacial trauma: a cross-sectional study at Khyber College of Dentistry Peshawar. J Khyber Coll Dent. 2018 Jun 30;8(02):7-11.
12. Al-Khateeb T, Abdullah FM. Craniomaxillofacial injuries in the United Arab Emirates: a retrospective study. *J Oral Maxillofac Surg*. 2007;65(6):1094-1101.
13. Gassner R, Tuli T, Hächl O, Moreira R, Ulmer H. Craniomaxillofacial trauma: a 10-year review of 9,543 cases with 21,067 injuries. *J Craniomaxillofac Surg*. 2003;31(1):51-61.
14. Montovani JC, Campos LM, Gomes MA, Moraes VR, Ferreira FD, Nogueira EA. Etiology and incidence facial fractures in children and adults (in Portuguese). Rev Bras Otorrinolaringol. 2006; 72:235-41.
15. Al Ahmed HE, Jaber MA, Abu Fanas SH, Karas M. The pattern of maxillofacial fractures in Sharjah, United Arab Emirates: a review of 230 cases. Oral Surg Oral Med Oral Pathol Oral RadiolEndod. 2004; 98(2):166-70.

16. Boffano P, Kommers SC, Karagozoglu KH, Forouzanfar T. Aetiology of maxillofacial trauma: a review of published studies. *Int J Oral Maxillofac Surg.* 2015;44(11):1400-1411.
17. Lee KH, Snape L, Steenberg LJ, Worthington J. Comparison of interpersonal violence and motor vehicle accidents on the incidence of facial trauma. *J Oral Maxillofac Surg.* 2017;75(4):796-802.
18. Ziccardi VB, Zuniga JR. Nerve injuries after third molar removal. Oral Maxillofac Surg Clin North Am. 2007 Feb;19(1):105-15.
19. Poort LJ, van Neck JW, van der Wal KG. Sensory testing of inferior alveolar nerve injuries: a review of methods used in prospective studies. *J Oral Maxillofac Surg.* 2009;67(2):292-300.
20. Brajdić D, Virag M, Uglešić V, Aljinović-Ratković N, Zajc I, Macan D. Evaluation of the sensitivity of teeth after mandibular fractures. Int J Oral Maxillofac Surg. 2011;40(3):266-70.
21. Rehman A, Noreen R, Ahmad T, Shah SMA, Din Q. Inferior alveolar nerve injury in mandibular angle fractures-A study. J KCD 2013;4(1):16-9.
22. Klenk G, Kovacs A. Etiology and patterns of facial fractures in the United Arab Emirates. J Craniofac Surg. 2003; 14:78-84