

# Incidence of Peripheral Nerve Injury Incidence among Patients Suffering from Oral and Maxillofacial Trauma

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## ABSTRACT

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

**Method:** This cross-sectional study was conducted in Department of Oral and Maxillofacial Surgery, Ayub Teaching Hospital, Abbottabad. Sample was of 187 patients, and data was collected using non-probability, Consecutive sampling technique.

**Results:** The findings showed that the age range of 10% patients was between 10-20years, age range of 40% patients was between 21-30years, age range of 32% patients was between 31-40years, and age range of 18% patients was >40years. The mean value of age of total sample was  $31.21 \pm 7.01$ . Males were 86% and females were 14% of entire sample. Trigeminal nerve injury was found in 35% patients whereas facial nerve injury was found in 16% patients.

**Conclusion:** The study concludes that the peripheral nerve injury incidence was 35% (trigeminal nerve injury) of oral trauma while in maxillofacial trauma (facial nerve injury) 16% in our setup.

**Keywords:** peripheral nerve injury, trigeminal nerve injury, facial nerve injury

## INTRODUCTION

Maxillofacial trauma is the most common trauma all over the world and more than 30% of the trauma cases suffered from fractured maxillofacial skeleton.<sup>1</sup> The most common causes of maxillofacial trauma are road traffic accidents, assaults, falls, work related injuries, firearm injuries, industrial trauma and sport injuries.<sup>2,3</sup>

The most important nerves which are damaged in oral and maxillofacial trauma are Trigeminal nerve (33.8%) and Facial nerves (14.1%).<sup>4,5,6</sup> The peripheral nerve branches of Trigeminal nerve are most commonly involved in maxillofacial trauma. The most commonly injured nerve is inferior alveolar nerve caused by mandibular angle fracture, followed by mental nerve due to mandibular parasymphysis fracture. While other branches which are rarely involved are auriculotemporal and masseteric nerves in condylar fracture, buccal and lingual nerves in intraoral laceration with mandibular body fracture. The infraorbital nerve is damaged in zygomaticomaxillary complex fracture.<sup>6</sup> Facial nerve is injured in condyle fracture and it can also get damaged in trauma of soft tissue in the parotid region.<sup>5</sup>

Even though the particular reason of these nerve injuries in maxillofacial trauma is generally indistinct but it could be the outcome of direct trauma to the nerve such as nerve dislocation, displaced fracture traction, compression and fractional or total nerve transection or it may result from indirect trauma to these nerves such as compression of nerve due to the displacement of fragments of bone or edema of soft tissue and secondary ischemia.<sup>6</sup>

Injuries to these nerves result in anaesthesia, paraesthesia, pain or combination of the three in involved sensory nerve area and loss of function can occur due to motor nerve injury. These nerve injuries can be categories as neurapraxia, axonotmesis and neurotmesis.<sup>5,7,8</sup> According to the category and gradation of anatomic injury, the functional impairment and facial receptivity can be moderate or severe, complete or partial and permanent or temporary.<sup>6,9</sup> Immediate repair of damaged nerves or repair within first 6-9 months of trauma can make it possible to achieve the successful restoration of neurosensory function.

Trigeminal and Facial nerve injuries generate painful anomalous sensory and functional disability which has a frequent affect on daily activities of the patients, for instance, speaking disability, chewing, mastication, kissing, brushing of teeth, smiling, whistling, emotional expression and the potential to conserve lip proficiency for oral maintenance and food swallowing and drinking fluids.<sup>6</sup> Even though such distressing affects can occur in these

patients but in spite of it, very scarce literature is available in terms of frequency in oral and maxillofacial trauma. The aim of current study is to provide evidence about the frequency of peripheral nerve injuries linked with oral and maxillofacial trauma in Pakistani population.

## MATERIAL AND METHOD

This Cross-Sectional Study was conducted in Department of Oral and Maxillofacial Surgery, Ayub Teaching Hospital, Abbottabad. The calculated sample size of Trigeminal nerve 33.8% and Facial nerve 14.1%, by taking margin of error as 5%, confidence interval as 95% and predictable %age of motor deficit as 14.7% (least percentage among sensory and motor nerve injuries) was 187 cases of oral and maxillofacial trauma. Data was collected using non-probability, Consecutive sampling.

### Sample selection:

#### Inclusion criteria:

- All patients above 10 years of age and below 45 years of age having oral and maxillofacial trauma for the first time.
- Both genders.
- All patients diagnosed by history of trauma to the facial skeleton and clinical examination including inspection and palpation of the maxillofacial hard and soft tissue.
- Patients having radiographic findings of oral and maxillofacial trauma of condyle fracture, mandibular angle fracture, body and parasymphysis fracture of mandible on posteroanterior view of the face, orthopantomogram and zygomatic complex fracture on submentovertex view and paranasal sinus view.

#### Exclusion criteria:

- Patients who had any preceding neurological disability due to any oral and maxillofacial trauma.
- Any systemic disease that may cause neurological deficit including both sensory and motor function deficit, such as diabetes (diabetic neuropathy), multiple sclerosis, hemiplegia, paraplegia, bell's palsy due to causes other than trauma and any other psychiatric problems.

All patients presenting at Department of Oral and Maxillofacial Surgery, Ayub Teaching Hospital, Abbottabad and meeting the inclusion criteria was examined in this study after approval from the hospital ethical committee. Patient's demographic details was recorded on a Proforma (annexed) after taking the informed consent of the patient for execution of many investigative measures, photographic assessment and reading of

radiographic findings for the patients evaluation as wells as for educational and scientific data collection reasons which later on will get published according to the need. Any soft tissue injury and bone fractured was documented. For the objective examination of sensory and motor disability after trauma, cotton pallets were used to examine gentle touch and sterile dental needle was used to have pin prick in the spreading of trigeminal (sensory) nerve bilaterally on the face. To assess any motor functional disability, facial expression were examined, for instance, patient was asked to show different movements of face such as, frowning, eyebrows lifting, tightly eye closing, presenting teeth, smiling, and making whistling gestures. Deprivation of all such functions was considered as peripheral nerve injury.

Data was entered in SPSS version 25.0 for data analysis. For age, Mean  $\pm$  standard deviation was calculated. Frequencies and percentages were computed for gender and presence of nerve injury.

## RESULTS

Age distribution among 187 patients was analyzed as 19(10%) patients were in age range 10-20 years, 75(40%) patients were in age range 21-30 years, 60(32%) patients were in age range 31-40 years, 33(18%) patients were in age >40 years. Mean age was  $31.21 \pm 7.01$ . Gender distribution among 187 patients was analyzed as 161(86%) patients were male and 26(14%) patients were female.

Table 1: Age Distribution (n=187)

Age	Frequency	Percentage
10-20 years	19	10%
21-30 years	75	40%
31-40 years	60	32%
40-45 years	33	18%
Gender		
Male	161	86%
Female	26	14%

Peripheral nerve injury of trigeminal nerve among 187 patients was analyzed as 65(35%) patients had trigeminal nerve injury while 122(65%) patients didn't had trigeminal nerve injury.

Table 2: Peripheral Nerve Injury Of Trigeminal Nerve (n=187)

Trigeminal nerve	Frequency	Percentage
Present	65	35%
Absent	122	65%
Total	187	100%

Peripheral nerve injury of facial nerve among 187 patients was analyzed as 30(16%) patients had facial nerve injury while 157(84%) patients didn't had facial nerve injury.

Table 3: Peripheral Nerve Injury Of Facial Nerve (n=187)

Facial nerve	Frequency	Percentage
Present	30	16%
Absent	157	84%
Total	187	100%

## DISCUSSION

Maxillofacial trauma is the most common trauma all over the world and more than 30% of the trauma cases suffered from fractured maxillofacial skeleton.<sup>1</sup> The most common causes of maxillofacial trauma are road traffic accidents, assaults, falls, work related injuries, firearm injuries, industrial trauma and sport injuries.<sup>2,3</sup>

Our study showed that thirty five percent patients had trigeminal nerve injury while 16% patients had facial nerve injury. Similar findings were observed in other studies as the most important nerves which are damaged in oral and maxillofacial trauma are Trigeminal and Facial nerves with 33.8% and 14.1% incidence respectively.<sup>4,5,6</sup>

The findings of current study revealed that facial injuries occurs more in patients between the age range of 10 to 45years

which is in line with the findings available in already existing literature.<sup>71,72,73</sup> In this age group, it is common to have maxillofacial injuries may be due to the high energy levels associated with this age group and involvement in everyday activities more profoundly. As the road accidents are the main cause of such trauma occurrence that is a possible reason of suffering of this specific age group. Majority of such road side trauma experienced by motor cyclists and in Pakistan, mostly male members of the family experience such trauma. Same findings were reported in existing literature which evident this phenomenon around the globe.<sup>74,75</sup>

The most prominent bone which suffers greater damage during road accidents is mandibular bone due to its morphology as this bone get hit on the ground during motor bike accidents and it broke.<sup>76</sup> Mandibular fracture was the most prevalent maxillofacial fracture in current study agreeing with findings of other studies.<sup>76,77</sup> On the other hand, a similar study reported that among maxillofacial fractures, common prevalence of nasal bone fractures is high subsequent to dentoalveolar fractures which contradicted the findings of current study. The reason of which was main etiologic reason was assault (61% participants were of violence cases). It was found that nasal bone got fracture in interpersonal violence events as this bone is the most prominent one and is soft bone due to which with less force it got fracture. In literature, massive discrepancy in reporting the injury of trigeminal nerve has found resulting in the reported incidence between a range from 1-90 percent.<sup>79</sup>

Pressure is also a cause of nerve injury in the current study as the nature of injury is neurapraxic. Injuries in mandibular braches was more among all other branches of facial nerve due to the greater exposure to injury because of its anatomical positioning. The damage to mandibular nerve branches was due to the blunt trauma or compression in most of the cases.

To conclude, the findings of current study reported that the incidence of peripheral nerve injury in oral trauma (trigeminal nerve injury) was 35% while in maxillofacial trauma (facial nerve injury) 16% in our setup.

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