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Pattern of Pediatric Maxillofacial Injuries at a University Hospital of Eastern Nepal

• Mehul R Jaisani[1] • Ashok Dongol[1] • Pradeep Acharya[1] • Anjani Kumar Yadav[1] • Chandrakant Pasvan[1] • Bandana Koirala[2] • Sean Laverick[3]

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Mehul R Jaisani
mehul.jaisani@bpkihs.edu

https://orcid.org/0000-0002-8489-6179

[1] Department of Oral and Maxillofacial Surgery, B. P. Koirala Institute of Health Sciences, Dharan, Nepal.

[2] Department of Pediatric dentistry, B. P. Koirala Institute of Health Sciences, Dharan, Nepal.

[3] Department of Oral and Maxillofacial Surgery, Ninewells Hospital, NHS Tayside, Dundee, UK.

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Abstract

Background: Although facial injuries are far more uncommon than other injuries, they pose a great challenge. We aimed to evaluate the demographic distribution and pattern of maxillofacial injuries (MFIs) among pediatric patients in Eastern Nepal.

Methods: This cross-sectional study was conducted in the university hospital of B. P. Koirala Institute of Health Sciences, a tertiary care center in Eastern Nepal. All consecutive patients less than 15 years of age who visited the out-patient unit of the maxillofacial surgery department, or pediatric emergency service of the hospital from 1 September 2018 to 31 August 2019 and had MFIs were enrolled. Demographic characteristics of the patients, mechanism of injury, time to presentation, type of facial injury and any other associated injuries were recorded.

Results: Thirty-six patients (12 girls and 24 boys) with an age (median (IQR)) of 4 (1.7 to 8.75) years presented to the hospital with a history of pediatric MFI. The delay in hospital presentation (median (IQR)) was 3.5 (1.6 – 6.3) h. Falls at home (69.4%) and road traffic accidents (27%) were the most common causes of trauma. Isolated MFI was present in 72.2% of the patients. Isolated soft tissue injury (55.6%) was the most common type of MFIs followed by the combination of hard and soft tissue injuries (36.1%).

Conclusion: Pediatric MFIs are not uncommon. Falls at home and RTAs are the most common causes of MFIs in children below the age of five years.

Keywords: Facial injuries; Jaw fractures; Maxillofacial injuries; Pediatric dentistry

Declarations

Ethics approval and consent to participate: Ethical approval was obtained from Institutional review committee, B. P. Koirala Institute of Health Sciences, Dharan, Nepal (Ref. no.: 165/076/077- IRC) and informed consent was taken from the legal guardian of the participants.

Consent for publication: Not applicable

Availability of data and materials: The full data set supporting this research is available upon request by the readers.

Competing interest: None

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Pediatric trauma has been highlighted as a global health priority [1]. The majority of global pediatric mortality and morbidity from injuries occur in low-income and middle-income countries [2, 3]. Although injuries to the face are far more uncommon than other injuries, craniofacial injuries cause significant morbidity [4]. Maxillofacial injuries (MFI) are challenging because of not only the technical difficulty of repairs but also the subsequent emotional and functional consequences associated with long-term disfigurement for patients [5].

The prevalence of facial trauma increases progressively with increasing age. Only one percent of facial fractures occur in children younger than five years, whereas one to 14.7% occur in patients older than 16 years [6]. This variation can be attributed to the changes in the facial skeleton secondary to advancing age. At an early age, cranial injuries are more common than facial fractures owing to the frontal protrusion of the cranium and the relative retrusion of the face. However, with increasing age and physiologic development, the face undergoes a downward and forward projection, with the mid-face and mandible becoming more prominent. Children are less susceptible to fractures than adults, because of the structure of bone in the pediatric facial skeleton. Moreover, the thick layer of adipose tissue that overlies much of the pediatric facial skeleton and the fat pads that surround the upper and lower jaws also help to protect these bones [7].

To the best of our knowledge, there are no reports regarding the incidence of pediatric MFIs in the Eastern Nepal. Hence, we aimed to record and analyze the pattern of facial and other associated injuries in children below 15 years of age presenting to a tertiary care level hospital in Eastern Nepal.

METHODS

After ethical approval from the Institutional Review Committee of B. P. Koirala Institute of Health Sciences (BPKIHS), this cross sectional study was conducted over a period of one year from 1 September 2018 until 31 August 2019. All the consecutive patients below 15 years of age presenting to pediatric emergency service or outdoor clinics of the maxillofacial surgery department at BPKIHS, a tertiary level hospital in Eastern Nepal, after sustaining MFIs were included. Incompletely filled records or patients not consenting to the study were excluded.

The data was collected through a predesigned structured proforma. Demographic characteristics of the patient, mechanism of injury, and time to presentation at the hospital in addition to the type of facial injury and presence of any other associated injuries were recorded. Data was entered into Microsoft Excel version 2016. Descriptive analysis (mean/ median, standard deviation (SD)/ interquartile range (IQR) and frequency) of the collected data was performed using SPSS version 16.

RESULTS

Within the study period, 36 patients (12 girls and 24 boys) with an age (median (IQR)) of 4 (1.7 - 8.75) years presented to BPKIHS with a history of MFI; 23 patients (63.9%) belonged to less than 5 years and 8 patients (22.2%) belonged to the age group of 6 - 10 years. Twenty-five patients (69.4%) presented to the hospital within five hours from the time of injury **(Fig. 1)**. The delay (median (IQR)) from the time of the accident to the hospital presentation was 3.5 (1.6 - 6.3) h.

Home was the most common place (63.89%) where the injury occurred followed by the road (25%) **(Fig. 2)**. The majority (69.4%) had fall injury followed by the road traffic accidents (RTA) (27%). There were one case each of animal bite, physical assault and injury with object (pencil). Isolated pediatric MFIs occurred in 72.2 **(Fig. 3)**. Head injury was the most common type of associated injury followed by orthopedic injury.

Soft tissue injury in isolation (55.6%) was the most common type of facial injury followed by the combination of hard and soft tissue injuries (36.1%). Isolated hard tissue injury was seen in only 8.3% of the patients. The most predominant type of soft tissue injury was intra-oral laceration (61.1%). Only 22.2% of patients sustained isolated extra-oral wounds; laceration (38.9%) was the most common type of extra-oral soft tissue injury **(Table 1)**. Combined extra-oral and intra-oral wounds were found in 33.3% of the patients. Hard tissue injuries affected 15 patients **(Table 2)**.

DISCUSSION

We found that the majority of the patients with MFIs below 15 years reporting to this institute belonged to under five years of age, which was in contrast to the world literature. Reports of the incidence of injury below five years are low conforming to the children being less active, lighter in weight with

Table 1: Pattern of soft tissue injury. Values are presented as percentage of total patients.

Type of injury	Pattern of soft tissue injury	
	Extraoral	Intraoral
Abrasion	16.7	0
Laceration	38.9	61.1
Stab Injury	0	5.6
Ecchymosis	0	2.8

Table 2: Pattern of hard tissue injuries (n = 15). Values are presented as number.

Pattern of injury		Number
Isolated Dentoalveolar Injury		4
Isolated Mandible Fracture	Body Fracture	1
	Parasymphysis Fracture	1
Isolated Midface Fracture	Zygomatico Maxillary Complex	5
	Orbital Wall Fracture	1
	Lefort-II and palatal split	1
Combined (Dentoal-veolar and facial bone fracture)	Mandible (multiple site)	1
	Zygomatico Maxillary Complex	1

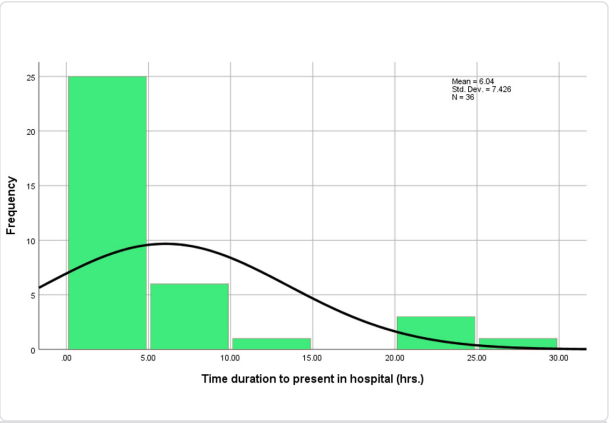

Figure 1: Time to presentation to the hospital.

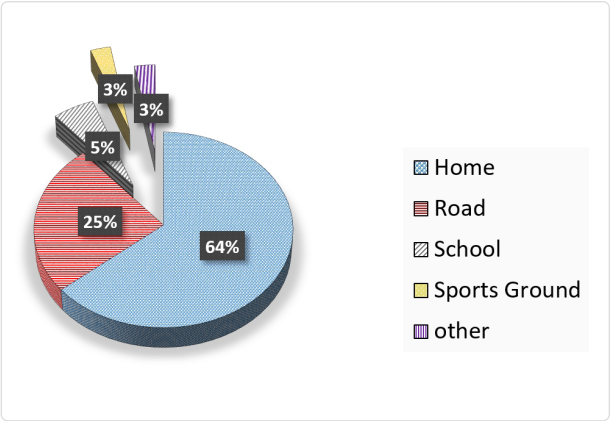

Figure 2: Place of Injury.

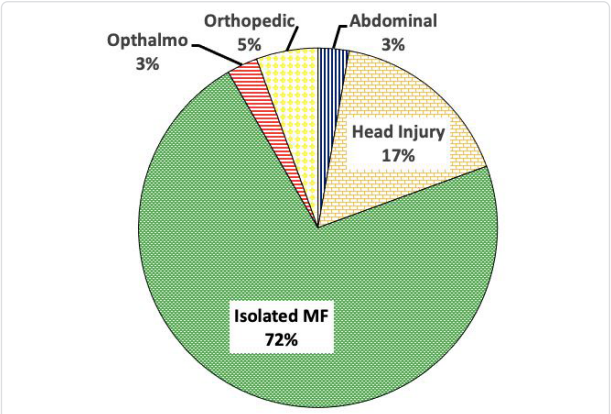

Figure 3: Pattern of co-existing injuries.

less frequent and heavy falls [8]. Further, this age group of children is under parental care, resulting in a lower incidence of facial injury [9].

The preponderance of boys over girls (2:1 ratio) was observed in our study; a similar observation was reported from India which can be attributed to the higher level of physical activity among boys [9].

The most common etiology for pediatric MFIs was falls which occurred at home followed by RTA. Another study also reported that the major cause of pediatric injury in Nepal was fall which occurred at home, followed by animal bites and RTA [10]. The major area where pediatric injury happen in Nepal is at home followed by the highways/ roads. Present observations are thus in consensus with the national pediatric injury trend as well as with the world literature. Fall is the commonest cause of injury overall worldwide and in younger children (< 5 years) [11 - 13].

Any form of injury to the facial soft tissue envelope or the hard tissue underneath can be termed as 'facial trauma'. It includes trauma to the skin, underlying skeleton from the eyebrows to the chin, neck and mouth including the teeth. Facial trauma occurs in isolation or with injuries in other parts of the body depending upon the mechanism of injury. In this study, 28.8% of the patients had concomitant injuries. The most common co-existing injury was head-related injury followed by the orthopedic injury. Head, extremity, abdominal and thoracic injuries are commonly associated with pediatric facial fracture [13 - 15].

We observed that soft tissue injuries are very common in pediatric patients. They can present

either in isolation or in association with the fracture of the facial skeleton underneath. Soft tissue injury in association with facial fractures was seen in 36.1% of cases which is consistent with the literature [6]. We found that the most common type of soft tissue injury was intraoral laceration, highlighting the importance of thorough intraoral examination.

Hard tissue injury in the form of facial fracture and/ or dentoalveolar injury occurred in 41.7% of our patients. The site and the pattern of the fractures are influenced by the etiology, force of impact, and the child's stage of development [16]. With advancing age, the site of facial fracture in children tends to shift from the upper to the lower portion of the face [17]. Children below two years of age are more likely to sustain frontal region injuries, while older children are prone to injuries in the lower jaw. The most predominant type of hard tissue injury observed in our study was mid-face fracture (19.4%) which involved zygomaticomaxillary complex (16%) followed by the dentoalveolar injury (16%). However, our findings are in contrast to the other epidemiological studies on pediatric injury where mandible fractures were the most common type of pediatric maxillofacial fracture [18 - 20]. Perhaps this could be due to the fact that our study duration was only one year whereas the other studies have collected the data for at least five years [18 - 20]. We observed dentoalveolar injury with/ without facial fracture in 16% of our patients. The incidence of these injuries is variably reported at 8.82% to 40% [19, 20]. The spectrum of dentoalveolar injuries includes tooth avulsion, concussion, Ellis class fracture, intrusion, extrusion, and dentoalveolar fractures. The majority of our patients reported within five hours of injury. This highlights the adequate use of healthcare facilities within the eastern part of the nation.

The incidence of pediatric fractures ranges from 1.4% to 15.0% of all maxillofacial fractures below 16 years of age with a lower incidence of 0.87-1% seen below five years of age [21, 22]. The major cause of pediatric maxillofacial injuries like fall and RTA suggests potential areas of injury prevention by creating a 'safe environment' for kids at home.

A national maxillofacial trauma registry or a similar multicentric study in future could truly reflect the incidence of maxillofacial injuries in this group of population. Further, the results of this study can provide the foundation to compare if there exists any difference in the pattern of MFI between developed and developing nations.The main limitation of this study was that we studied only the pediatric patients presenting to one center of Nepal over a small duration. The strength of this study is that the data has been collected in a prospective and systematic manner from the emergency as well as from the outdoor clinics thus avoiding recall bias or incompletely filled data entries.

CONCLUSION

Maxillofacial injuries are not uncommon in pediatric age group. The majority were found to be below the age of five years. Fall at home and RTA are the most common causes of MFIs in children below the age of five years.

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