

Pediatric Head Injuries in a Neurosurgery Center of Nepal: An Epidemiological Perspective

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Abstract Children aged 0-14 years constitute about 34.6% of the Nepalese population. Head injuries remain a significant factor among trauma related deaths. To carry out preventive measures for traumatic brain injuries we need epidemiological evidences so that preventive measures can be taken. The aim of this study was to explore the causes and outcome of traumatic brain injuries in children. This study was a descriptive study of all children who presented with head injuries to the Neurosurgery Unit of Manipal teaching Hospital in Pokhara. We studied demographic variables, causes of head injury, severity of head injuries, presenting features, operative procedures carried out and outcome of head injuries. Two hundred and eighty seven pediatric head injury patients aged 0 to 15 years were admitted from January 2013 to June 2014. The results indicated that fall from height accounted for 67.94% of head injury, majority of falls being from the windows and roofs. Mild head injuries were most common. Although majority of patients had a good recovery, mortality among severe, moderate and mild head injury was 44.44%, 3.33% and 0.91% respectively. Preventive measures should be taken to reduce these head injuries.

Keywords: Head Injury, Glasgow Coma Scale, Preventive Measures

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1. Introduction

Nepal is a developing country where almost one third of population is children. According to the population survey of 2014, 34.6% of population was below 14 yrs age [1]. Trauma is one of significant causes of death and disability among these children. Head injuries constitute the major cause of such. Though majority of head injuries are minor, even such mild traumatic brain injuries can leave significant impairments.

In developed countries like US and Europe there are population and hospital based data regarding these injuries. In Sweden, falls were the most common cause for head injuries in children aged 0-14 yrs and the incidence for hospitalizations was 70/100000 [2]. In the US, in a study done on head injuries carried out for patients aged 0-17 years, falls were the commonest cause in <5 yrs children whereas being struck by an object was the commonest cause of those aged 5-14 years [3]. In South Korea, collisions, falls and motor vehicle accidents were the causes of head injury in patients aged 0-18 yrs and were responsible from 32% of all emergency department admissions [4].

As in many developing countries, the epidemiological data are lacking in our part of the world. Our objectives were to collect data regarding the causes of traumatic brain injuries and their outcome in western region of Nepal. Such studies have been previously done in other

parts of Nepal as well [5]. Understanding the causes of head injuries are expected to provide significant preventive answers. This would help taking appropriate measure to prevent head injuries in children.

2. Methodology

2.1. Study Site

Manipal Teaching Hospital is 850 bedded first private medical college hospital of Nepal located in mid-western part of Nepal. It caters to a population of 1 million, residing mostly in the hilly areas of this western part of Nepal.

2.2. Study Design

This was a prospective descriptive study. All pediatric patients from birth to 15 years of age who were admitted to the hospital for head injury were taken for the study. The demographic characteristics, causes of head injury and associated injuries were noted in a proforma. Severity of brain injury was assessed by Glasgow coma scale and modified Glasgow Coma scale [6,7].

Mild, moderate and severe brain injury was taken as GCS score of 13-15, 9-12 and 3-8 respectively. Mild head injury patients were admitted to neuro ward and moderate and severe head injury patients were admitted to neuro ICU. Conservative and surgical management was done according to standard head injury protocols. Patients were

discharged home or rehabilitation center depending upon the need of the patient. Once discharged the patients were followed for a minimum of six months. The outcome was studied at six months according to Glasgow outcome scale [8]. Patients who were discharged from the emergency room, referred to other hospitals or whose follow up was incomplete were excluded from the study.

2.3. Study Variables

The following variables were studied for the study: age, sex, cause of head injury, presenting features, severity of brain injury, associated injuries, operative procedures and outcome.

2.4. Sample Size Calculation

In a pilot study done prior to the study with 100 head injury patients, falls were the most common cause for head injury with expected proportion=0.66, precision(%)=6, desired confidence level(%)=95, the required sample size was 239. [9].

2.5. Data Management

All data were collected in proforma. The data were entered in Microsoft Excel. The study variables were described in terms of frequencies and proportions.

2.6. Ethical Approval

The approval was taken from the institutional review board for the study.

3. Results

3.1. Demographics

There were total of 287 patients who were studied. The age distribution of patients is given in the following table (Table 1). Mean age of patients was 7.64 yrs. Similarly male and female patients were 196 (68.29%) and 91 (31.71%). Thus male female ratio was 2.15:1.

Table 1. Age distribution of patients

Age group	Number of patients	Percentage
0-4 yr	21	7.31
1-5yrs	74	25.78
5-10 yrs	90	31.35
10-15 yrs	102	35.54

3.2. Causes of Head Injury

Falls were the most common cause for head injuries in this study (67.94%) followed by road traffic accidents (25.78%). Other causes were assaults and sports related. Table 2 shows the frequencies of fall from different places.

Table 2. Causes for fall (N=195)

	No of patients	Percentage
Window	45	23.07
Roof	39	20
Hill	28	14.35
Stairs	36	18.46
Table/Chairs	15	07.69
Tree	20	10.02
Fall on ground	12	06.15

The falls were most common due to fall from windows. The other causes for fall were fall from unsecured roofs, hills, stairs, and trees. In road traffic accidents, pedestrian hit by a motor vehicle was the most common cause. Other patients who were involved in road traffic accidents were involved as a pillion rider and as a driver of cycles as shown in Table 3.

Table 3. Causes of Road Traffic Accidents (N=74)

	No of patients	Percentage
Pedestrian	60	81.08
Cycle rider	11	14.86
Pillion rider on bike	3	04.06

3.3. Presenting Features

Vomiting was the most common presenting complaint (39.02%) followed by loss of consciousness. As summarized in Table 4, eight percentages of patients had seizures by the time they arrived at hospital. Thirty six patients had nasal bleeding and ear bleeding. Weakness of limbs was present in 15 patients.

Table 4. Presenting Complain

Complaints on presentation	Number	Percentage
Vomiting	112	39.02
Lose of consciousness	90	31.35
Headache	69	24.04
Seizures	23	08.01
Weakness of limbs	15	05.22
Ear /Nose bleeding	36	12.54

3.4. Severity of Brain Injury

Majority of head injuries were mild (75.95%). Only 3.13 % patients had severe head injuries with GCS of 8 or less as shwon in Figure 1.

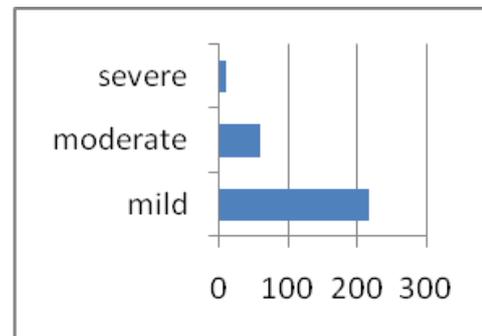


Figure 1. Bar Diagram Showing Severity of Traumatic Brain Injuries

3.5. Associated Injuries

With falls and road traffic accidents being the most common causes of head injuries, injuries to other parts of the body is also expected. Among all patients, 67 patients (23.34%) had associated injuries in addition to the head injuries. This included injuries to upper and lower limbs, spine, chest and abdomen and face as shown in Table 5.

Table 5. Associated Injuries (N=67)

Associated injuries	Number of patients	Percentages
Spine	9	3.13
Chest	11	3.83
Abdomen	6	2.09
Extremities	25	8.71
Face	15	5.22

3.6. Operative Procedures

Forty seven patients (16.37%) patients underwent surgical procedures. These included debridement under general anesthesia for scalp lacerations in 17 patients (36.17%), debridement and fracture elevation in 12 patients (25.25%), craniotomy for extradural (10 patients, 2.27%) and subdural hematomas (5 patients, 10.63%) and decompressive craniotomies in 3 patients (6.38%).



Figure 2. CT Scan Left frontal extradural



Figure 3. Left frontal extradural hematoma during hematoma following fall injury craniotomy and evacuation

3.7. Outcome

Majority of patients had good recovery which was in 251 patients (87.45%). Eight patients died, these included four patients among severe head injury patients, two patients among moderate injury patients and two among mild injuries. Thus mortality among severe, moderate and mild head injury was 44.44%, 3.33% and 0.91% respectively. Three patients were in a persistent vegetative state. Twelve patients had moderated disability and 9 patients had severe disability.

4. Discussions

Head injuries in children constitute a major cause of death and disability. As in other types of trauma, our focus should be in prevention of these injuries by taking appropriate measures.

Head injury in male children was more than in female children. There are obvious reasons for this as it is explained by the fact that boys are more outgoing than girls and are involved in assaults and road traffic accidents

more. This is also shown by studies done by Agrawal A et al and Bhargava P et al [5,9].

In this study, fall was the most common cause of head injuries. Fall was the most common cause of head injuries in studies done by Styrke J et al [2], Agrawal A et al [5], Bhargava P [10] and SirajMuset al [11].

Head injuries due to falls are largely preventable. We should not leave children unattended at heights; keep our windows secured and rooftops protected. In Nepal, young children are involved in collecting fodder from tree for the cattle at home. They should be prevented from carrying out such activities. Parents should be taught about all these preventive measures and also strictly bound legally. Children should be taught about precautions to be taken at home, during sports and on the roads through school health programs. Mothers and elder siblings should be especially taught about the safety issues at home to watch for young ones. By doing so, we can make a major impact for the reduction of pediatric head injuries.

5. Conclusion and Recommendations

Falls were the commonest cause of head injuries in this part Nepal. Though majority of patients had mild head injuries and majority had good outcome, severe head injuries carry significant mortality. Therefore, the government should bring child safety legislations to be implemented at home, play areas and roadside.

Declaration of Conflicting Interests

The authors declare that there is no potential conflicts of interest with respect to the research, authorship and /or publication of this article

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