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Original Research Article

# Pattern of Head Injuries in Western Hilly Region of Nepal: A Hospital-based Cross-sectional Study

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## ABSTRACT

**Introduction:** Subtle or gross structural changes of scalp, skull and its contents due to application of direct or indirect external force are known as head injuries. Head being the most vulnerable and prominent part of body, injuries to it cause major mortality and morbidity globally. This study focussed to find the pattern of traumatic head injuries in patients presented to Lumbini Medical College Teaching Hospital, Palpa, Nepal. **Methods:** The data was collected from 252 patients (164 males and 88 females) with head injuries attending Emergency or out-patient department of Neurosurgery of the institute. All patients with traumatic head injuries (scalp injury, skull fracture, intracranial haemorrhage and brain injury) were included in the study and brought dead patients and patients with non-traumatic brain lesions were excluded. **Results:** Among the various modes of head injuries, the most frequent was road traffic accidents accounting 125 (49.60%) cases and fall from height 108 (42.86%) cases was second to it followed by physical assault 12 (4.76%) and others 7(2.78%). Manner of injuries were unintentional in 238 (94.44%) of cases. Among males, intentional injuries were present in 5 (2.98%) cases and among females, 9 (10.72%) cases presented with intentional injuries. In 105 (41.67%) of the cases, head injuries were associated with injuries to the other body parts as well. **Conclusion:** The most common cause of head injury was found to be road traffic accident followed by fall from height. Intentional injuries were more common in females when compared to males.

**Key words:** Fall from height, Fracture of skull, Head injury, Road traffic accidents

## INTRODUCTION

Application of direct or indirect mechanical force causing grossly evident or tenuous changes in the structure of the scalp, skull and/or the contents of skull is termed as head injury.[1] Being the most eminent part of the body, head is the usual target for blunt trauma caused by road traffic accidents, fall from height and physical assault. The contents of the skull are more vulnerable to blunt trauma than other parts of body with the same or even lesser

extent of application of mechanical force.[2,3] So, understanding head injuries is important for clinical practitioners to treat the patients as well as for forensic practitioners to deal with medicolegal queries.

Head injury is the single most common cause of mortality in vehicle accidents.[4] According to the World Health Organization, it may exceed a number of diseases to cause significant death and disability by the year 2020.[5] A study conducted in eastern part of Nepal reported road traffic accidents to be the commonest cause of head injuries while other studies in various parts of Nepal revealed fall from height being the commonest cause of head injuries.[6,7,8] According to a study conducted in Kathmandu, fall from height was the commonest mode accounting

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for 61% of head injuries in children.[9]

The objective of the present study was to determine the patterns of head injuries including modes of injury like road traffic accident, fall from height, physical assault and suicidal attempt presenting to Lumbini Medical College and Teaching Hospital (LMCTH), a tertiary care centre in the western hilly region of Nepal. It also aimed to determine their demographic profile like age, sex and time of occurrence of injury as well as to observe gender-based association of intentional and unintentional injuries.

## METHODS:

The present cross-sectional observational study was carried out in the Emergency Department (ED) and Out-Patient Department (OPD) of Neurosurgery, LMCTH from February 2019 to August 2019 after obtaining ethical approval from the Institutional Review Committee (IRC-LMC 11-J/018) and taking permission from the concerned departments.

The study was conducted in 252 patients with head injuries attending the ED or OPD of Neurosurgery. All patients with head injuries (scalp injury, skull fracture, intracranial haemorrhage and brain injury) were included in the study and brought dead patients and patients with non-traumatic brain lesions were excluded. An informed consent was taken prior to examination. In case of unconscious and in those patients unable to give consent, it was taken from legal guardian. History regarding age, sex and time of occurrence of injuries was taken before examination. Type of fractures and intracranial haemorrhages were recorded from radiological reports. All road traffic accident injuries and injuries due to accidental fall were grouped into unintentional injuries and those due to physical assault and suicidal attempt were grouped into intentional injuries.

Data were analysed with the help of Statistical Programme for Social Sciences (SPSS™) version 16. Various descriptive statistics like frequencies, mean, median, modes and ratio were used to compare the particular variables. Chi-square test was used to test association between gender and manner of injury. P value less than 0.05 was considered statistically significant.

## RESULTS:

The present study was carried out on 252 patients with head injuries reporting to the ED or OPD of Neurosurgery. The mean age was  $37.09 \pm 17.59$  years. The minimum age reported was two years and the maximum age was 79 years.

Out of 252 cases of head injuries, the number of males presented with head injuries was 168 (66.67%) and the number of females with head injuries was 84 (33.33%) with male to female ratio of 2:1. As shown in Table 1, most of the patients (52.38%) belonged to age group 21-40 years followed by age group of 41-60 years, 0-20 years and above 60 years respectively. Head injuries most commonly took place between 7:00-12:00 hours (55.56%) followed by 19:00-24:00 hours and 1:00-6:00 hours respectively. Among the various modes of head injuries, the most frequent was road traffic accident (49.60%) and fall from height was second to it followed by physical assault and others.

Table 1. Demographic profile of head injuries (N=252).

| Variables         | Categories            | Frequency (%) |
|-------------------|-----------------------|---------------|
| Age group (years) | 0-20                  | 38 (15.08)    |
|                   | 21-40                 | 132 (52.38)   |
|                   | 41-60                 | 58 (23.01)    |
|                   | >60                   | 24 (9.52)     |
| Time of injury    | 7:00-12:00 hours      | 140 (55.56)   |
|                   | 13:00-18:00 hours     | 40 (15.87)    |
|                   | 19:00-24:00 hours     | 63 (25.00)    |
|                   | 1:00-6:00 hours       | 9 (3.57)      |
| Mode of injury    | Road traffic accident | 125 (49.60)   |
|                   | Fall from height      | 108 (42.86)   |
|                   | Physical assault      | 12 (4.76)     |
|                   | Others                | 7 (2.78)      |

Table 2 shows the manner of injuries and its relationship with gender. Manner of injuries were unintentional in 238 (94.44%) cases and intentional in 14 (5.56%) cases. Among males, unintentional head injuries were present in 163 (97.02%) cases and intentional injuries were present in 5 (2.98%) cases. In contrast to it, 75 (89.28%) females presented with unintentional injuries and 9 (10.72%) females presented with intentional injuries. Intentional injuries were significantly more common in females compared to the males ( $p = 0.011$ ).

Table 2. Relationship between gender and manner of injuries

| Sex             | Manner of injury |             | Statistics                       |
|-----------------|------------------|-------------|----------------------------------|
|                 | Unintentional    | Intentional |                                  |
| Male (n = 163)  | 163              | 5           | $X^2(1, 252) = 6.391, p = 0.011$ |
| Female (n = 84) | 75               | 9           |                                  |

In 147 (58.3%) of the cases there were exclusive head injuries and in 105(41.67%) of the cases, head injuries were associated with injuries to other body parts as well. Fracture of skull was seen in 51(20.24%) of patients while in 201(79.86%) the skull bone was intact. Intracranial bleeding was present in 70 (27.78%) cases.

Table 3. Distribution of injuries on the parts of body other than head (n=105)

| Parts of the body   | Frequency (%) |
|---------------------|---------------|
| Face and Neck       | 37 (35.24)    |
| Upper extremities   | 27 (25.71)    |
| Lower extremities   | 12 (11.43)    |
| Abdomen             | 10 (9.52)     |
| Back and spine      | 7 (6.67)      |
| Chest               | 6 (5.71)      |
| Multiple body parts | 6 (5.71)      |

Injuries to the scalp in the form of abrasions, contusions and lacerations were found in most of the cases with the laceration being the most common scalp injury present in 128(50.79%) cases followed by contusion present in 77(30.56%) cases. Incised wounds were present in 2(0.79%) cases. Out of 105 cases of head injuries that were associated with injuries to other body parts, 37 (35.24%) had injury to face and neck. It was followed by association with upper extremities, lower extremities, abdomen, back and chest respectively as illustrated in Table 3. Among 51 subjects having skull fracture, 32 (62.8%) of the subjects sustained linear type of fracture followed by depressed and comminuted types which were seen in 15 (29.4%) and 4 (7.8%) cases respectively. Likewise, parieto-temporal region was the commonest site of fracture seen in 18 (35.3%) cases followed by equal number of temporal bone and frontal bone fracture each in 13 (25.5%) of the cases.

As shown in Table 4, out of the 70 cases of intracranial haemorrhage associated with head injury, the most common type was solitary subdural haemorrhage which was present in 32 (45.7%) of subjects followed by solitary epidural haemorrhage (15.7%), combination of epidural and subdural haemorrhage, combination of subdural and intracerebral haemorrhage and solitary intracerebral haemorrhage. Combination of epidural, subdural and intracerebral haemorrhages was seen in 2 (2.9%) cases which is equal to the frequency of combination of subdural and subarachnoid haemorrhages. Solitary subarachnoid haemorrhage was found in only 1(1.4%) case.

Table 4. Pattern of intracranial haemorrhage (n=70)

| Types of intracranial haemorrhage* | Frequency (%) |
|------------------------------------|---------------|
| SDH                                | 32 (45.7)     |
| EDH                                | 11 (15.7)     |
| EDH+ SDH                           | 9 (12.8)      |
| SDH+ICH                            | 7 (10.0)      |
| ICH                                | 6 (8.6)       |
| EDH+SDH+ICH                        | 2 (2.9)       |
| SDH+SAH                            | 2 (2.9)       |
| SAH                                | 1 (1.4)       |

\*SDH (Subdural haemorrhage), EDH (Extradural haemorrhage), ICH (Intracerebral haemorrhage), SAH (Subarachnoid haemorrhage)

## DISCUSSION:

In this study conducted to study the pattern of head injuries presenting to a tertiary care hospital in western hilly region of Nepal, the number of males sustaining head injuries was more than the number of females with ratio 2:1. Males are commonly involved in outdoor activities which may be the cause of males outnumbering the females. Analysis of the manner of injuries showed that intentional injuries were more commonly sustained by females. Females more commonly have to face domestic violence and physical abuse, so intentional injuries may be more frequent in the females. The most common age group presenting with head injuries was 20-40 years age group. This age group persons usually have to travel during their job-related works for caretaking of family members and further these groups are also involved in violent activities leading to head injuries. Similar observations were reported by, Shivkumar BC et al. and Patil A et al.[10,11] In contrast to this study, Akang et al. reported 4<sup>th</sup> decade

being the most frequent age group to sustain head injuries.[12]

Among the various modes of injuries road traffic accident was the prime mode for causing head injuries followed by fall from height and physical assault. The results revealed by Kumar L et al. and Kremer C et al. were in accordance with the findings of this study.[13,14] This may be explained by geographic characteristic of the region. In this hilly region, only lesser portion of the roads are blacktopped while most of them are under-constructed and potholed. People of this region have to travel through such roads for critical health service, quality education and jobs. Similarly, inhabitants of this region have to bring woods and leaves from sloppy hills for their cattle as their daily routine. So above mentioned facts point out road traffic accidents and fall from height to be the common causes of unintentional head injuries. Rapid urbanization, narrow and zig-zag roads in hilly regions, frequent landslides on roads could have added to make road traffic accident the most common mode.

In the present study, among 252 subjects, 105 (41.67%) subjects had head injuries with associated injuries to other body parts. Face and neck injuries were most commonly associated with head injuries followed by injuries to the upper extremities. Study conducted by Pate RS in central India population showed 84.14% of deceased with head injuries had injuries to the other body parts.[4] According to the study conducted by Joshi UM et al. the incidence of head injuries associated with face and neck injuries was 67% while result from Pate RS showed that in 33.50% there was association of face and neck injuries with head injuries.[4,15]

In this study fracture of skull was found in 51(20.23%) subjects and revealed linear fracture to be the most common fracture accounting for 62.8% followed by depressed fracture. Similar findings were presented by other researchers.[16,17] In case of road traffic accident or fall from height there is forcible impact against the broad resisting surface like ground that could be the cause of outnumbering of linear fracture as compared to the other types of skull fractures. The most common region of skull to get fractured was temporo-parietal region followed by frontal and temporal. This may be due to presence of multiple foramina at the base creating decreased resistance to the traumatic injury.

The most common intracerebral haemorrhage found in the study was subdural haemorrhage. A hospital based study conducted by Jha S et al. in eastern Nepal found that 50.6% of the cases had subdural haemorrhage.[18] Tandle RM et al, Menon et al., Sharma BR et al. and Atreya A in their studies found similar results.[19,20,21,22] According to the study conducted by Chandra J et al. among population of Delhi, subarachnoid haemorrhage was noticed as the most common intracerebral haemorrhage followed by subdural haemorrhage. [23]

There are some limitations of the study. It would have been better if the study could have included outcome of head injuries with respect to intracranial haemorrhage. Information regarding skull fracture of bones completely relied upon Computed Tomography Scans, so some minor fractures might have been missed.

## CONCLUSION:

In this study head injuries were found to be mostly caused by road traffic accidents followed by fall from height. Intentional head injuries to the female were significantly higher in number than to males which may be valuable for dealing with medicolegal issues. This study helps to contribute data regarding demographic profile of subjects sustaining head injuries and pattern of specific injuries to the head in the geographical service area of the hospital so that government as well as concerned public could take proper measures to avoid head injuries.

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