MED-PHOENIX: JOURNAL OF NATIONAL MEDICAL COLLEGE

ORIGINAL ARTICLE

AN EPIDEMIOLOGICAL SURVEY OF FATAL HEAD INJURIES AUTOPSIED AT A TERTIARY CARE CENTER IN DHULIKHEL, NEPAL

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Date of Submission : October 08, 2024
Date of Acceptance : October 13, 2024
Date of Publication : January 3, 2025

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Citation:
Khan AS, Karki A, Karki RK, Singh PK. An Epidemiological Survey of Fatal Head Injuries Autopsied at a Tertiary Care Center in Dhulikhel, Nepal. Medphoenix. 2024;9(2):11-14:
DOI:*https://doi.org/10.3126/medphoenix.v9i2.73406*

Conflict of interest: None, ***Funding:*** None

Publisher: *National Medical College Pvt. Ltd.*
MedPhoenix - Journal of National Medical College (JNMC); 2024,9(2), available at www.jnmc.com.np

ISSN:2631-1992 (Online); ISSN:2392-425X (Print)

ABSTRACT

Introduction: *The head is the most vital organ of body. National Advisory Neurological Diseases and Stroke Council has defined head injury as a morbid state, resulting from gross or subtle structural changes in the scalp, skull, and/or the contents of the skull, produced by mechanical forces. Traumatic brain injury has become a major health problem globally leading to morbidity and mortality which involves young aged individuals. Increasing use of motor vehicles among youths is one of the reasons for increasing traumatic brain injuries. Traffic safety laws has found to decrease the incidence of road traffic accidents and head injuries. Accidents at workplaces, mechanical violence, armed conflicts, terrorism and explosions are other causes of fatal head injuries. The present study aims at profiling the frequency of fatal head injuries, identify causes, common type and the most vulnerable population.*

Materials and Methods: *This is a retrospective study of 399 cases autopsied at Department of Forensic Medicine, Dhulikhel Hospital, Kathmandu University of Medical Sciences from October 2020 to April 2022 out of which 122 cases of fatal head injuries were studied.*

Results: *There are 104 male and 18 female of fatal head injuries. Individuals of 21-40 years are the most vulnerable victims. The study identifies road traffic accidents (50.81%) as the major cause of fatal head injury which is followed by physical assault (22.95%), fall from height (22.13%) and drowning (4.09%). Scalp contusion was seen in 44.26%. Skull was intact in 49.18%. Fracture of skull base was present in 19.67%. Combination of epidural, subdural and subarachnoid hemorrhages were present in 43.44%. Cerebral contusion and laceration were combinedly present in 13.11%.*

Conclusion: *Road traffic accidents are the major cause of head injuries leading to the premature death of male population predominantly. Other than road traffic accidents, physical assault, fall from height, fall of heavy objects on body and drowning are the other causes for head injury. Adults of productive age group 21-40 years are highly prone to mortality and morbidity due to road traffic accidents. Legal bodies should pay proper attention to the road safety level to minimize such incidents and prevent premature deaths. Appropriate safety precautions while driving or even travelling by any vehicle should be adopted by drivers and passengers on their own.*

Keywords: *Fatal Head Injury, Physical Assault, Road Traffic Accidents, Scalp Contusion*

INTRODUCTION

The term "head injury" is a broad category which refers to the injuries sustained to any or all of the head structures like scalp, skull, meninges and brain. National Advisory Neurological Diseases and Stroke Council has defined head injury as a morbid state, resulting from gross or subtle structural changes in the scalp, skull, and/or the contents of the skull, produced by mechanical forces.[1] Head injury and traumatic brain injury sound synonymous. Traumatic brain injury is defined as damage to the brain resulting from external mechanical force, such as rapid acceleration or deceleration, impact, blast waves, or penetration by a projectile.[2] Traumatic brain injury has become a major health problem globally leading to morbidity and mortality which involves

young aged individuals. Increasing use of motor vehicles among youths is one of the reasons for increasing traumatic brain injuries. Traffic safety laws have found to decrease the incidence of road traffic accidents and head injuries. Contusions are seen more frequently in older patients than diffuse injuries in young adults. Accidents at workplaces, mechanical violence, armed conflicts, terrorism and explosions are other causes of fatal head injuries.[3]

Traditionally, head injuries have been classified as open injuries, closed injuries, scalp injuries and skull injuries. Scalp injuries are further classified as closed (contusion) and open (puncture, laceration or avulsion). Skull fractures may be open or closed which are described as linear, comminuted or depressed. Skull fractures are usually found to be associated with varying degrees of brain injuries ranging from mild concussion to fatal hemorrhages. Primary brain injuries such as diffuse axonal injury, cerebral concussion, contusions and lacerations occur at the time of impact whereas secondary brain injury such as intracranial hematomas, cerebral edema, ischemia, infection, epilepsy, seizures and metabolic endocrine disturbances occur as a result from disturbance of brain and systemic physiology by the traumatic event.[4]

The present study aims at profiling the frequency of fatal head injuries, identify causes, common type and the most vulnerable population.

MATERIALS AND METHODS

This is a retrospective study of 399 cases autopsied at Department of Forensic Medicine, Dhulikhel Hospital, Kathmandu University of Medical Sciences from October 2020 to April 2022 out of which 122 cases were of fatal head injuries. The study participants included the deceased with any type of head injuries due to mechanical trauma, violence or road traffic accidents. All the cases of head injuries were included in the study. Decomposed bodies were not included in the study. The data from the record were initially entered in MS Excel and later analyzed in the SPSS 21 version for further evaluation. The data were categorized, tabulated and summarized in terms of frequency and percentage.

RESULTS

The present study shows most of the cases of head injuries involves male (104) predominantly as shown in figure 1., the ratio of male: female is 5.7:1.

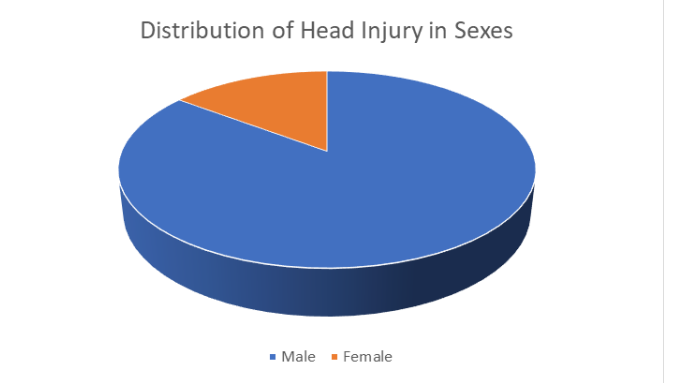

Figure:1. Distribution of head injury in sexes.

We found that most of the victims were adults of age group 21-40 years (45.9%) which was followed by 41-60 years (27.04%), 0-20 years (15.57%) and above 60 years (11.47%) (figure 2).

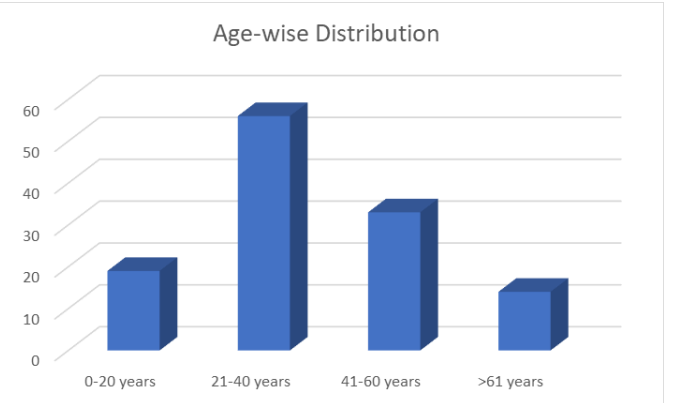

Figure: 2. Age-wise distribution of head injury.

Most common cause of head injury was found to be road traffic accidents which was observed in 50.81% which was followed by physical assault (22.95%), fall from height in (22.13%) and drowning (4.09%) (figure 3).

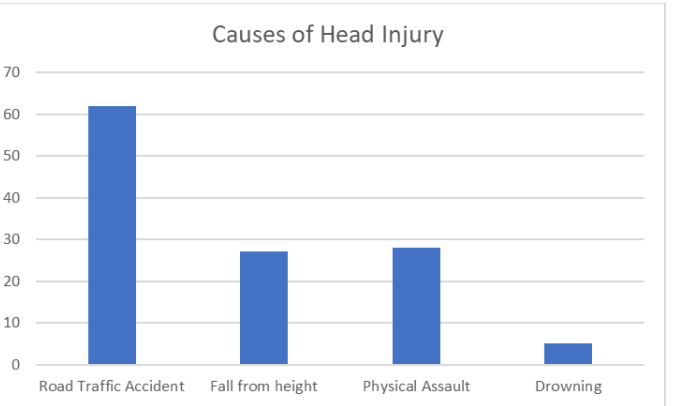

Figure 3: Causes of Head Injury.

More than three-fourth of the head injuries (88.52%) were caused by blunt force and the remaining were due to crushed injury to head (figure 4).

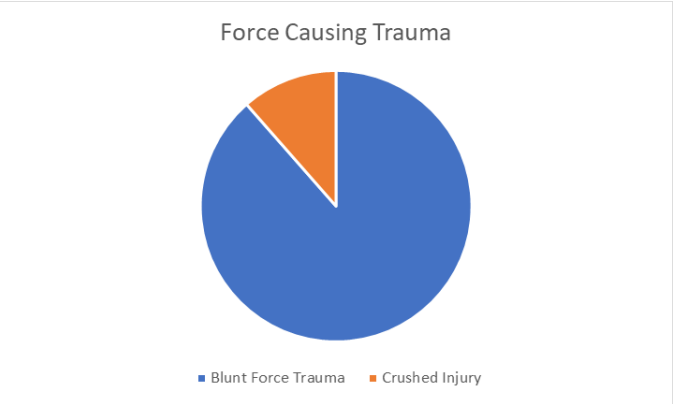

Figure 4: Distribution of force causing head injury.

In scalp, contusion was the most common injury present in 44.26% cases, laceration was present in 18.03% cases, scalp was crushed in 11.47% and combination of contusion and laceration was seen in 26.22% cases of fatal head injuries. No fracture of skull bone was observed in nearly half of the cases (49.18%); however simple fracture of skull bone was found to be more common as seen in 26.22%, compound fracture in 13.11% and crushing of skull bone was seen in 11.47%. Fracture of skull base was present only in 19.67% cases and absent in remaining cases. In 43.44% of cases, combination of epidural, subdural and subarachnoid hemorrhages were present. Subarachnoid hemorrhage was present in 23.77% cases, subdural hemorrhage in 17.21% and epidural hemorrhage present in 15.57% of cases. In brain, contusion and laceration were combinedly present in 13.11%, brain was crushed in 11.47% cases, laceration alone was present in 9.01% cases and contusion was present in 6.55% cases of fatal head injuries as depicted in table 1.

Table 1: Distribution of head injuries

Type of Injury	**Number of cases**	**Percentage (%)**
Scalp Injury		
Contusion	54	44.26%
Laceration	22	18.03%
Crushed	14	11.47%
Combination of contusion and laceration	32	26.22%
Fracture of Skull Bone		
Simple Fracture	32	26.22%
Compound Fracture	16	13.11%
Crushed	14	11.47%
No Fracture	60	49.18%
Fracture Base of Skull		
Present	24	19.67%
Absent	98	80.32%
Hemorrhage in Brain		
Epidural	19	15.57%
Subdural	21	17.21%
Subarachnoid	29	23.77%
Combination of all	53	43.44%
Injuries in Brain		
Contusion	8	6.55%
Laceration	11	9.01%
Crushed	14	11.47%
Combination of contusion and laceration	16	13.11%

DISCUSSION

Head injury or traumatic brain injury is a major health problem globally which leads to increased mortality and morbidity. Our study reveals road traffic accident as a leading cause of fatal head injuries which is in harmony with the findings from other studies.[1,2,5,9,11] In the context of Nepal, males are mostly involved in outdoor activities whereas most of the females still prefer to stay at household. Male are mostly engaged in driving as their way of living which could be a reason for the maximum number of incidences of fatal head injuries in male and people of 21-40 age group are most commonly affected which is consistent with other studies.[1,6,7,9,11] The finding contrasts with a study done at Chandigarh, India which shows maximum number of road fatalities in women.[8]

Most of the head injuries are sustained due to blunt force trauma. At autopsy, scalp contusion is seen in almost half of the cases which being common in fatal head injury cases which is similar to a study.[7,12,13] Skull bone was intact in almost half of the victims (49.18%), simple fracture of skull involving single bone or linear fractures are observed in maximum number of cases (26.22%) and fracture of base of skull was observed only in 19.27% cases which are similar with the findings from other studies. [7,12,13] Combination of epidural, subdural and subarachnoid hemorrhages are present most commonly which is seen in 43.44% cases after which subarachnoid hemorrhage was found to be more common accounting to 23.77% cases which is similar to other studies [6,10] but contrasts with the finding from similar study where subdural hemorrhage was most common.[7,9,13] In brain, contusion and laceration both are present in most of the cases i.e., 13.11%. the finding contrasts with other study where cerebral contusion alone is present more frequently.[7]

CONCLUSIONS

From the present study we conclude that road traffic accidents are the major cause of head injuries leading to the premature death of male population predominantly. Other than road traffic accidents, physical assault, fall from height, fall of heavy objects on body and drowning

are the other causes for head injury. Adults of productive age group 21-40 years are highly prone to mortality and morbidity due to road traffic accidents. Scalp contusion is seen in maximum number of cases. Fracture of skull bone is not found to be common, but it does not rule out the possibility of death in cases of head injuries. All types of cranial hemorrhages are present in almost half of the cases and combination of cerebral contusion and laceration are the most common brain injuries.

As the study points out road traffic accident as the leading cause for fatal head injuries, the legal bodies should pay proper attention to the road safety level to minimize such incidents and prevent premature deaths. Appropriate safety precautions while driving or even travelling by any vehicle should be adopted by drivers and passengers on their own, just not only leaving space for the government to tackle every problem. Timely transportation of the victim to the health facility, timely and proper management of the injury are the other factors which could further prevent untimely deaths.

FUNDING: Not any

CONFLICT OF INTEREST: No

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