

Original Article

# A Cross-sectional study: Head Injury in Children of Karachi

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## Abstract

A cross-sectional study was conducted to determine the prevalence, causes and outcome of head injury in children at Neurosurgery Department of Jinnah Postgraduate Medical Centre from 1st December, 2013 to 1st February, 2014. A total of 37 patients under the age of 12 years, presented with head injuries to the emergency department, were included in the study. A self-designed questionnaire was filled for these children after getting the oral consent from their parents. The questionnaire comprised a complete detail on the causes of head injury, clinical presentation on reaching the hospital, X-rays and Computed Tomography (CT) scans of the children and their reports. SPSS version 20 was utilized as an analytical tool. The mean age of patients was 6.93 years  $\pm$  3.02. Out of these 37 patients, 54.1% were males and 45.9% were females. Road traffic accidents accounted for most of cases (48.6%) with marked peak observed in boys as compared to the girls. Majority had a good Glasgow Coma Scale (GCS) score (43.2%) whereas a depressed fracture was found to be the dominant feature (21.6%) on X-rays. Additionally, 29.7% of children had intracranial hemorrhage while 32.4% also acquired other injuries. In total 29.7% were offered surgical intervention with majority (83.8%) landing in neurosurgical ward. As head injury in childhood is an important issue, keeping in view the lack of research in this field we need to properly highlight the burden of such injuries in childhood so that all the concerned governing authorities should take every possible step in preventing as well as managing this devastating health concern.

## Keywords

Trauma, unconscious, fracture, hemorrhage

## Introduction

Every day, all over the world, the lives of more than 2000 families are affected by the loss of a child to an accidental injury.<sup>1</sup> Once children reach the age of five years, accidental injuries are the biggest threat to their survival but this has been neglected for many years (Peden; 2008). Trauma is the reason for 40-60% of emergency callouts concerning children (Zimmer; 2009). Many accidents result in head injury, which is the principal cause of admission of children to hospitals after trauma (Rickham; 1961). As for adults early recognition of findings indicating a need for an intervention are decisive for the prognosis (Zimmer; 2009). Although head injury is a common occurrence in childhood, most of the brain injury that occurs are mild and uncomplicated (Leuerssen; 1994). The management of these children aims at providing the optimum conditions for the recovery of normal neurological function and, if secondary complications develop, to ensure that they are recognized and treated early (Jennet; 1972). In addition, studies stress the concept that in pediatric head injury, adequate resuscitation is probably the single most critical factor for optimal survival (Pigula; 1993).

Even though head injury in children is a major health problem facing our nation today (Vernon; 1991), it is not studied extensively in children under the age of 12 yrs. Basic scientists have contributed to this body of knowledge by demonstrating some unique characteristics of the immature CNS and how it responds to injury (Vernon; 1991). In parallel with other studies, we therefore focused on the epidemiology, causes and the morphological and radiographic findings and their outcomes on the injured children.

## Materials and Methods

A cross-sectional study was conducted on 37 children, admitted to the Neuro-surgery department at Jinnah Postgraduate Medical Centre in a two month duration presented with head injury from 1st December, 2013 till 1st Feb, 2014. The age ranged from 1 to 12 years.

A questionnaire was designed to chronologically account the cases of primary head injuries from the initial diagnosis to its management. The questionnaire involves the history of injury, presentation, course of diagnosis and treatment strategies. All the children were graded according to their Glasgow Coma Scale (GCS) score. A score of 15-13 is interpreted as good if, a score of 12-9 is moderate and a score  $<8$  or  $=8$  is severe. The initial diagnosis was reviewed through CT scan and an X-ray was also

done in some cases to evaluate skull fractures and other injuries to the body.

Inclusion criteria consists of children with a proper vaccination status as given in EPI (Extended Program of Immunization) and having no history of chronic disability. Exclusion criteria consists of children with a history of birth trauma or repeated admission to the hospital with various complaints.

The Ethical Review Board reviewed the protocol of the research and the researcher filled the questionnaires, with accordance to the informed consent of the parents. The records were kept confidential.

Statistical Package of Social Sciences version 20 (SPSS 20) was used as a tool for the analysis of the collected data and to compute the results.

## Result

The mean age of the participants was 6.93 years  $\pm$  3.02 as shown in Table 1; all were admitted to the Neurosurgery department. Out of 37 patients, 54.1% were boys while 45.9% were girls. A total of 48.6% of patients had a Road Traffic Accident (RTA) and 45.9% had a fall from a certain height (not documented), as shown in table 2. The majority of the RTAs took place due to riding a motor cycle (21.6%) and the least was by car (2.7%). The risk of RTA was found to be more prevalent in boys (32.4%) whereas risk of FFH (fall from height) was more in girls (27.02%).

A total of 62.2% of the children were found unconscious when presented to the emergency room. Some patients also reported vomiting (37.8%), irritability (8.1%) and headache (2.7%). Among these patients, 43.2% had a good GCS score, 21.6% had a moderate score and 35.1% had a severe GCS score.

Almost 35% of the admissions had an X-ray of the skull, 5.4% cases of which showed fracture of the parietal bone and 2.7% cases showed fracture of temporal and frontal bone each. Additionally, 21.6% had a depressed fracture while 10.8% had a comminuted fracture.

The CT scan findings of the brain showed intracranial hemorrhage in 29.7% (10.8% extradural and subdural each, 5.4% intracerebral and 2.7% interventricular), brain edema in 21.6%, non-hemorrhage

contusion in 10.8% and diffuse axonal injury in 8.1% cases, as shown in Figure 1.

A surgical intervention was done in 29.7% of the cases immediately while other injuries were reported in 32.4% of the

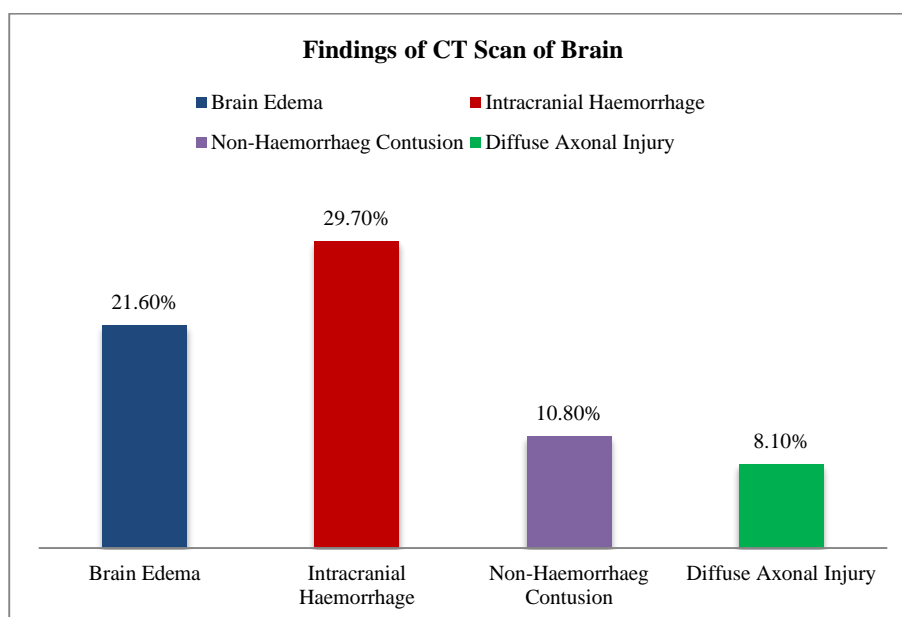
cases. Overall, 13.5% were sent to the Intensive Care Unit (ICU) and 83.8% were admitted to the neurosurgery ward.

**Table 1**  
**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
Age	37	2	12	6.93	3.028
Valid N (listwise)	37				

**Table 2**  
**Type of Injury**

	Frequency	Percent	Valid Percent	Cumulative Percent
Road Traffic Accident	18	48.6	48.6	48.6
Penetrating Injury	1	2.7	2.7	51.4
Fall from height	17	45.9	45.9	97.3
Fall of object on head	1	2.7	2.7	100.0
Total	37	100.0	100.0	



**Figure 1**

**Discussion**

This study discusses the different aspects of head injury concerning children under the age of 12 years as this age group shows higher vulnerability. A Nigerian research conducted from 1992 to 1995 clearly highlighted the fact that trauma is an important factor in childhood morbidity and mortality with road traffic injuries taking the lead (Adesunkanmi; 1998). Head injuries in children are an important issue particularly in our society and it requires serious measures in this regard. In developing countries such as Pakistan, people do not often have high quality emergency services available. About 62.2% of the patients are unconscious at the time of presentation to the ER whereas 50% of the children who die from head injury are conscious on arrival to the ER (Zimmerman; 1978).

Patients with head trauma may experience one or a combination of primary injuries, such as scalp injury, skull fracture (e.g., basilar skull fracture), concussion, contusion, intracranial and/or subarachnoid hemorrhage, epidural and/or subdural hematoma,

interventricular hemorrhage, diffuse axonal injury, and penetrating injuries (Schutzman) The definition of minor head trauma for children two years of age and older has often been based upon the Glasgow Coma Scale (GCS). Some have defined minor head trauma as a GCS score of 15, whereas others have included children with scores  $\geq 13$ . However, the rate of traumatic brain injury in children with a GCS of 13 is as high as 20 percent, which makes computed tomography (CT) of the head indicated for most children with this degree of altered mental status (Felice; 2013). In our study, the majority of head injuries were as a result of RTA i.e. 48.6% of which 21.6% were acquired as a result of a motor cycle ride. This is similar to a study performed in Tanzania, which demonstrated 58.8% of cases culminating in different types of injuries as a result of a motorcycle accident (Chalya; 2012). A higher ratio of RTA well establishes the fact that the safety measures while traveling are easily neglected in this part of world which surely results in greater damage in the shape of head injuries in our country. The risk of RTA in our study demonstrates it to be higher in boys than girls similar to results shared by a study which

demonstrated the RTA ratio to be 2.1:1 in males and females (Chalya; 2012), whereas the second common reason remained to be from a fall from a certain height (undocumented) being common in females.

CT scanning shows that the major forms of head trauma were intracranial hemorrhage, brain edema and non-hemorrhagic contusions while the common findings on X-Ray were fractures of cranial bones with the majority being depressed fractures. In this study, brain edema was found to be the second most common finding on CT scan estimating about 21.6% of the total subjects. These results are comparable to a study reporting that general cerebral swelling as the most common CT finding in 100 pediatric patients with acute head injury (Zimmerman; 1978). This contrasts another study where traumatic subarachnoid hemorrhage was noted to be in 41% of cases on admission CT scans (Sarvadei; 2002). A fall is the most common cause of injury for children sustaining minor head trauma, followed by motor vehicle crashes, pedestrian and bicycle accidents, projectiles, assaults, sports-related trauma, and abuse. Brain injuries can lead to widespread deficits in a range of functions from language to motor skills and cognition (Felice; 2013). These effects may be longer-lasting, especially in young children who suffer traumatic blows to the head (Felice; 2013). Children with brain injuries continue to have problems with cognition for a decade after their trauma (Anderson; 2004).

#### Conclusion

In order to comprehensively address these disparities and appropriately handle this global health burden, we have to effectively evaluate all the rules concerning the driving and improve the emergency facilities in Pakistan. A systematic approach should be designed to manage the injuries and to prevent their complications. It can all be benefited by public education and the health system betterment, combined with legislative support.

#### Conflict of Interest

There is no conflict of interest among the authors.

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