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ORIGINAL ARTICLE

Pattern, Treatment and Outcomes of Children with Head Injuries: A 3 Year experience from a Tertiary Childcare Hospital of South Punjab, Pakistan

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ABSTRACT

Objective: To determine pattern, treatment and outcomes of children with head injury.
Study Design: A retrospective study.
Place and Duration of the Study: Department of Pediatric Neurosurgery, The Children's Hospital and Institute of Child Health, Multan Pakistan from January 2019 to December 2021.
Material and Methods: A total of 1285 children of both genders aged up to 12 years with head injury were included. Patients were initially presented in emergency department while initial assessment along with physical examination was performed in emergency department among all children. Relevant radiological investigations were performed in all cases as per supervision of the senior consultant surgeon on duty. Demographic data along with pattern, treatment and outcome of children with head injury was noted.
Results: In a total of 1285 children, 822 (64.0%) were male and 463 (36.0%) female. Mean age at the time of presentation was 4.7±2.5 years. Area of residence was urban in 1051 (81.8%) children while 234 (18.2%) belonged to rural areas of residence. Most common reason behind head injury was fall shown in 757 (58.9%) children whereas road-traffic accidents accounted for 414 (32.2%) children. Diffuse axonal injury was the most common head injury noted in 778 (60.5%) followed by linear fractures 152 (11.8%). Crainiotomy and bone elevation were performed in 54 (4.2%) and 117 (9.1%) children respectively while remaining 1114 (86.7%) children were treated conservatively. Mortality was noted in 25 (1.9%) children.
Conclusion: Falls followed by road-traffic accidents were the most common mode of head injury among children. Diffuse axonal injury accounted for nearly 2/3rd of all head injury cases. Large majority of the children were treated conservatively while overall outcomes were good among children with head injury.
Keywords: Head injury, mortality, fall, road-traffic accident, fracture.

INTRODUCTION

Head injuries are considered to be a frequent cause of morbidity and mortality among pediatric age groups.[1] It is estimated that nearly half of Pakistan's population is aged below 20 years while there is no centralized registry about the exact burden of head injuries among children in Pakistan.[2] Data from developed countries has shown that head injuries are the single most frequent cause behind mortality and permanent disability among children.[3] Severe head injuries account for majority of the cases with poor outcomes but mild to moderate had injuries can still cause unfavorable outcomes.[4,5]

Literature highlights fall to be the main cause behind children presenting to emergency units with head injuries whereas falls account for nearly 6% of all pediatric age group mortality.[6-8] Overall, falls are the 4th most common types of trauma related death after road-traffic accidents, fire related incidents and drowning.[9] A recent study from Karachi analyzing 152 children with head injury found that parietal fractures were the most common types observed in 63.1% children. Overall, 73% children had satisfactory recovery while mortality was reported in 10.5% children.[10]

Not much data about the presentation, treatment and outcome is known from South Punjab Region of Pakistan, The Children's Hospital and Institute of Child Health, Multan is one of the leading tertiary care hospitals of the region. In this study, we aimed to determine pattern, treatment and outcomes of children presenting to emergency department with head injury. The findings of this three year study were thought to highlight the most common trends of pediatric head injury in our region which can further assist us arranging required resources and modalities to improve outcomes related to pediatric head injury cases.

MATERIAL AND METHODS

This retrospective study was conducted at Department of Pediatric Neurosurgery, The Children's Hospital and Institute of Child Health, Multan Pakistan from January 2019 to December 2021. Being a retrospective study, institutional ethical committee's approval was not required as per local protocols. Obtainment of verbal or written consent was also not possible at the time of data recording.

A total of 1285 children of both genders aged up to 12 years with head injury were included. All patients with multiple or complex fractures were excluded. Children having associated abdominal injuries requiring surgical interventions were also excluded. Patients were initially presented in emergency department while initial assessment along with physical examination was performed in emergency department among all children. Relevant radiological investigations were performed in all cases as per supervision of the senior consultant surgeon on duty. Standard treatment protocols as per "National Institute of Clinical Excellence (NICE)" were followed in triage, evaluation and timely management of head injuries in all children.[9] The Glasgow Coma Score (GCS) was adopted to grade severity of head injury where GCS between 14 to 15 was labeled as mild head injury, GCS between 9 to 13 as moderate whereas scores between 3 to 8 were labeled as severe head injury. A special proforma was made for recording of all study data.

For data analysis, "Statistical Package for Social Sciences (SPSS)" version 26.0 was adopted. Qualitative data was shown as frequencies/percentages while numerical variables were shown and mean±standard deviation (SD).

RESULTS

In a total of 1285 children, 822 (64.0%) were male and 463 (36.0%) female. Mean age at the time of presentation was 4.7±2.5 years. Area of residence was urban in 1051 (81.8%) children while 234 (18.2%) belonged to rural areas of residence. Most common reason behind head injury was fall shown in 757 (58.9%) children whereas road-traffic accidents accounted for 414 (32.2%) children. Table-1 is showing baseline characteristics of all children.

Table-1: Characteristics of Children at the Time of Presentation with Head Injuries (n=1285)

Baseline Characteristics		Number (%)
Gender	Male	822 (64.0%)
	Female	463 (36.0%)
Age Groups (years)	<1	77 (6.0%)
	1-5	741 (57.7%)
	6-10	453 (35.3%)
	11-12	11 (0.9%)
Residential Status	Rural	234 (18.2%)
	Urban	1051 (81.8%)
Mode of Injury	Fall	757 (58.9%)
	Road-Traffic Accidents	414 (32.2%)
	Sports Injuries	61 (4.7%)
	Blunt Injury	25 (1.9%)
	Violence or Abuse	16 (1.2%)
	Others	12 (0.9%)

Diffuse axonal injury was the most common head injury noted in 778 (60.5%) followed by linear fractures 152 (11.8%). Table-2 is showing details of pattern of head injuries in children.

Table-2: Pattern of Head Injuries in Children (n=1285)

Diagnosis	Number (%)
Diffuse Axonal Injury	778 (60.5%)
Linear Fracture	152 (11.8%)
Depressed Fracture	89 (6.9%)
Contusions	54 (4.2%)
Extra Dural Hematoma	118 (9.2%)
Subdural Hematoma	79 (6.1%)
Intracerebral Hemorrhage	15 (1.2%)

Mild head injury was observed in 890 (69.2%) children, moderate head injury in 301 (23.4%) while remaining 94 (7.3%) children had severe injury. Crainiotomy and bone elevation were performed in 54 (4.2%) and 117 (9.1%) children respectively while remaining 1114 (86.7%) children were treated conservatively. Mortality was noted in 25 (1.9%) children within 5 days following treatment while 23 of these children had severe head injury.

DISCUSSION

Traumatic head injury is described as "physical force, resulting in total or partial functional disability or psychosocial impairment, with an associated altered state of consciousness".[11] The head injury is known to the cause of physical, emotional, cognitive as well as behavioral abnormalities. Pediatric head injury is also cause of economical and emotional distress on the affected families. Data from United States has shown that around 3/4th of all injury deaths among children are due to head injuries.[12] Global data about child injuries has represented that around 98% of all child injury related deaths occur in developing countries.[13]

The present study is the largest study from South Punjab, Pakistan analyzing 1285 cases of pediatric head injury cases. We noted that 64.0% of children were male. A local study from Sahiwal reported 60.1% of children with head injuries to be male which is in agreement to the present findings.[14] A study from Karachi also showed that 59.8% children with head injuries were male.[10] A study from Egypt also found that 59.0% of children with head injury were male.[11] The male predominance in the present study could be because of more adventurous behaviors of male children while male children are also thought to be more aggressive when compared to females.

In this study, mean age at the time of presentation was 4.7±2.5 years while most of the children (57.7%) were aged between 1 to 5 years. A study from Egypt showed that 47% of children with head injury were aged between 2 to 5 years which shows that age group beyond infancy period up to 5 years is the most affected age group regarding head injury among pediatric population.[11] Our findings are in contrast to Asif M et al where 56.7% of children with head injury were between 6 to 15 years of age.[14]

We found that 81.8% children belong to urban areas of residence. Majority of the children reported in the present study with head injury hailing from urban areas could be due to the reason that as our setting is situated in an urban area where people from the nearly locations approach more often immediately after the occurrence of the head injury while people from the peripheral or rural areas could be seeking rural healthcare settings as those could have been approached easily after the head injuries seeking immediate attention for possible treatment. A study from Egypt also reported 68% of children with head injuries to be from urban areas.[11]

In the present study, fall was the most common mode of head injury (58.9%) while road-traffic accidents accounted for 32.2% head injury cases in children. Local and regional data in the past have shown fall to be the commonest mode behind head injury[14,15] while international literature portrays fall and road traffic accidents to account for nearly 3/4th of all head injury pediatric cases.[16,17] Local data from Sahiwal also showed that 63.3% of patients with head trauma were due to fall.[14]

In the present study, mortality was reported in 1.9% pediatric head injury cases which shows that overall mortality was low while majority of the deaths occurred in children with severe head injury. A local study from Rawalpindi revealed mortality among children with head injury to be 1.1% which is slightly less than what was observed in our study.[18] Data from Karachi reported much higher rates of mortality (10.5%) among children with head injury in comparison to what we found.[10]

Our study had some limitations. Retrospective study design of the present study imposed some limitations. We only reported short-term outcomes and were unable to gather follow up data of the children with head injury. We were unable to mention radiological and laboratory parameters of the children included in this study.

CONCLUSION

Falls followed by road-traffic accidents were the most common mode of head injury among children. Diffuse axonal injury accounted for nearly 2/3rd of all head injury cases. Large majority of the children were treated conservatively while overall outcomes were good among children with head injury.

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