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Original Article

# Peadiatric Trauma In A Tertiary Care Teaching Hospital

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## Abstract

**Introduction:** Pediatric trauma is a major cause of mortality and disability worldwide and accounts for significant socio economic burden in developing countries.

**Aim:** To assess the various epidemiological parameters that influences the causation of trauma and outcome of trauma in the paediatric age group.

**Methods:** Prospective study of 142 patients of less than 12 years age, was carried out over a period of 3 months (1st July to 30th September), and information regarding the following parameters were assessed: Age group, Sex, mode of trauma, type of injury, place where the trauma occurred and the overall mortality as well as morbidity.

**Results:** Majority of the paediatric trauma cases were seen in the school going age group (6-12 years). In male children RTA was the most common mode of trauma followed by fall from height, and thermal injuries. Roads and streets were found to be the place where maximum trauma occurred followed by Home. Overall mortality was found out to be.

**Conclusions:** Paediatric trauma is a public health issue. By assessing the epidemiology of paediatric trauma, we conclude that majority of paediatric injuries are preventable and paediatric epidemiological trends differ from those in adults. Hence preventive strategies should be adopted in paediatric patients on the basis of these epidemiological trends.

**Keywords:** Fall injury, Pediatric trauma, Road traffic accident

## INTRODUCTION

Paediatric trauma is defined as any physiological damage to the body of children resulting from abrupt exposure to forces or the lack of warmth or oxygen[1].It is a common cause of morbidity and mortality[2]. National Crime Records Bureau (NCRB) report reveals that there were 22,776 deaths (<14 years) due to injuries among children[3] which contributes to 15-20% of total trauma deaths. In India accidental fall is more common. The national safety council documents that 10% of the individual who die of accidental death are children below 12 years of age accounting for 46% of all paediatric death which is more than that of cancer, congenital anomalies, etc. It is the leading cause of mortality in children with almost seven children in one lakh of the population being died per year (office of population census and survey, 1991).[4] Head injury is present in majority of cases and accounts for 75% of deaths. Injury mechanisms vary with age. In infants, non-accidental injury (NAI) is most common, whereas for toddlers, falls are the predominant injury mechanism. In older children and adolescents, road traffic accidents (RTAs) and sports injuries are predominant.[5] In children motor vehicle collisions involving car occupants and pedestrian are the common causes of accidental death (20%) and burns (5%) accounting for significant segment of the remaining group. The injuries which cause such major problems are CNS injury, thoracic injury, abdominal trauma, renal injury & pancreatic injury[6].

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Its management has improved considerably over the past 30 years; whilst there will always be some injuries incompatible with life, effective early care can significantly reduce the morbidity and mortality[7]. Infall injuries, potential energy due to height is converted to kinetic energy under the influence of gravity and at impact some of this energy is imparted to the body and this results in injury.[8] Every organ system is involved in the pathophysiological response to burn injury and its magnitude is proportional to the extent of the cutaneous injury plateauing at approximately 60% Body Surface Area burn. Local cutaneous effects are influenced by the temperature of the wounding agent and the duration of contact.[9] Motor vehicle accidents with acceleration/deceleration forces result in a diffuse injury, whereas trauma produced by low velocity focal contact injuries will produce local injury.

Head injuries in young children result in special physiological response due to Structural differences in a thin, flexible and elastic skull capable of undergoing much deformation, open fontanelles and sutures, a large subarachnoid and extracellular space, immature developing brain, more water content of brain, incomplete myelination, low ratio of brain to CSF, low cerebral blood flow and cerebral metabolic rate for oxygen.[10]

Very few studies/data exists about the epidemiology of Paediatric trauma. Detailed assessment of epidemiology of Paediatric trauma cases help in its prevention and intervention at initial level to decrease the disability resulting from Paediatric injuries.

### AIM

To assess the various epidemiological parameters, pattern of trauma and type of injury that influence the causation of trauma as well as the consequent morbidity and mortality among the paediatric population.

## MATERIALS AND METHODS

This was a prospective study conducted at a tertiary care hospital over a period of three months. After getting the approval from the institutional ethical committee the study was commenced. A total of 142 patients (age up to 12 years) with the history of trauma admitted at the casualty ward in the period of (1st July-30th September) were included. Age above 12 years was excluded from this study. Bites, drowning and poisoning cases were excluded from this study. A detailed history taking (from patients/relatives/children) was done and all the patients were assured with regards to their age, sex, mode of trauma and mortality. The children were classified according to age as: Infants (upto1year), toddlers (1-3 years), Pre-school (3-6years) and school going children (6-12 years). Modes of trauma were divided into subgroups: Head injury, abdominal injury, thorax and bony injury. The places of trauma were divided into the following home, road/street, playground, school.

## RESULTS

In the period of two months, 142 paediatric patients have been admitted. School going children were the most commonly injured (58.45%). Males outnumbered females in a ratio of 2.3:1. (Table 1) Children mostly suffered from orthopedic injuries (46.96%). RTA (53.52%), followed by Accidental fall (33.80) and Burns (7.04%) were the most common mode of injury leading to paediatric trauma. (Table 2) In our study we found, Road/street to be the most common place of injury. The most common cause of injury among all traumatized children was Road Traffic Accident. It affected mostly school going children. (Table 3) Most fall injuries occurred at home followed by road/street. In home/playing area, common place of fall was from tree. Out of 76 children involved in RTA, 38.15% were pedestrians, 40.78% were passengers, and 21.05% were pillion riders. Out of total 10 thermal injury patients, 1 was infant, 2 patients belonged to the toddler age group, 3 were preschool & another 4 from school going age group. Thermal injury due to scalds (hot liquids) accounted for 60% and contact burns 40%. (Table 4) Out of the 142 patients admitted, 4 died (2.81%) - 3 Male and 1 female. Among the four deaths reported, 3 were from school going age group and one was infant. The cause for death was RTA with head injury in 2 cases and Major Burns with Sepsis in 2 cases Figures 1-3.

## DISCUSSION

Trauma should be considered as a disease and its accidental connotation to be rooted out. Hence more research on epidemiological factors related to the causing agent, host

**Table 1: Distribution of paediatric trauma cases**

| Sex differentiation | Age (years) | | | | Total (%) |
|---|---|---|---|---|---|
| | 0-1 | 1-3 | 3-6 | 6-12 | |
| Male | 1 | 10 | 27 | 61 | 99 (69.71) |
| Female | 2 | 6 | 13 | 22 | 43 (30.28) |
| Total (*n*=142) | 3 (2.11) | 16 (11.26) | 40 (28.16) | 83 (58.45) | *n*=142 |

**Table 2: Common modes of injury**

| Modes of injury | Number (%) |
|---|---|
| RTA (*n*=76) | |
| Pedestrian | 29 (38.15) |
| Passenger | 31 (40.78) |
| Pillion rider | 16 (21.05) |
| Rider (any vehicle) | 0 |
| Burns (*n*=10) | |
| Scalds | 6 (60.00) |
| Contact burns | 4 (40.00) |

RTA: Road traffic accident

**Table 3: Distribution of paediatric trauma cases according to mode of injury**

| Modes of Injury | Age (years) | | | | Total (%) |
|---|---|---|---|---|---|
| | 0-1 | 1-3 | 3-6 | 6-12 | |
| Accidental fall | 2 | 4 | 14 | 28 | 48 (33.80) |
| RTA* | 2 | 9 | 24 | 41 | 76 (53.52) |
| Thermal injury | 1 | 2 | 3 | 4 | 10 (7.04) |
| Assault | 1 | 0 | 1 | 6 | 8 (5.63) |
| | 6 (4.92) | 15(10.56) | 42 (29.57) | 79 (55.63) | *n*=142 |

RTA: Road traffic accident

**Table 4: Area involvement in RTA&fall injuries**

| Types of injury | Age (years) | | | | Total (%) |
|---|---|---|---|---|---|
| | 0-1 | 1-3 | 3-6 | 6-12 | |
| Orthopedic | 1 | 5 | 8 | 48 | 62 (46.96) |
| Head | 3 | 8 | 12 | 19 | 42 (31.81) |
| Abdomen | 2 | 3 | 4 | 8 | 17 (12.87) |
| Chest | 1 | 1 | 2 | 4 | 8 (6.06) |
| Genital | 0 | 0 | 1 | 2 | 3 (2.27) |

**Figure 1: A case of accidental fall (abdominal injury)**

**Figure 2: A case of road traffic accident**

and environment is required. This study was done for the above purpose. Prevalence of childhood trauma is high. Tandon et al[11] reported a prevalence of 14.2% and another study done at Naraingarh, India,[12] reported a prevalence of 5.5%. Many studies have been done from Bangladesh,[13] Iran,[14] Nigeria,[15] Thailand,[16,17] and Singapore[18,19] and from major Indian cities.[20-23] These studies have found boys to be more commonly injured than girls. Home was found to be the most common place of injury, followed by road/street, with accidental falls being the most common mechanism of paediatric trauma. In our study too boys were more commonly hospitalized than girls, probably boys are given more freedom as well as free hand to work or play outside their homes and boys likes to explore the environment than girls. In our study male to female ratio was 2.3:1 which is similar to 1.5 to 3:1[th]is which reported in above studies.[15,24,25,] School going children were the most common age group found to be affected in our study, which is also similar to that reported in other previous studies.[14,25,23] But in our study majority of injuries occurred at road/street followed by home. Studies from Ethiopia and Nigeria[15,26,27] all found the home environment to be the most common place for a childhood injury to occur. In our study Road Traffic Accidents were the leading cause of trauma in all age groups, followed by fall injuries. In our study most of the victims of RTAs were passengers, followed by pedestrians.[14,28] In our study, a vast majority of burn injuries occurred from hot liquids followed by contact burn.[29,30] In our study, mortality cases admitted in our hospital are from 6-12 years age group. Mortality due to RTA and thermal injuries were of equal incidence in our study.

## CONCLUSION

Differences in injury pattern and mortality exists between different age groups and High risk injury pattern can be identified by this study. This study gives an idea about the epidemiology of paediatric trauma, with 6-12 years age group found to be the most affected as well as the vulnerable with regards to overall mortality. Road/street was the most common place of injury, and RTAs were the most common mechanisms of injuries. We conclude

**Figure 3: A case of thermal injury**

that majority of paediatric injuries are preventable and paediatric epidemiological trends differ from those in adults. This is study is very useful for adopting preventive strategies and directing ongoing care of severely injured children.

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