

# Head Injury in Children, An Epidemiological Study of 417 Cases.

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Head injury is the most frequent type of emergency coming to paediatric or neurosurgical centres. A prospective study of 417 cases presenting to our department was carried out on a structured proforma. There were 298(71.46%) males and 119(28.53%) females with a ratio 2.5:1. About half 210(50.53%) were below 5 years of age. Cases coming from urban area 252(60.43%) were of more than rural 165(34.56%) area. Out of 417 children 304(72.90%) belonged to low socioeconomic group. Fall from height was the common mechanism of injury. 224(53.71%), followed by road traffic accident (pedestrian and passenger injury) 167(40.05%) and 26(6.22%) were cases from other causes. Amongst 210 cases of 0-5 years of age, fall was the commonest 168(80%) cause. Road traffic accident was the commonest mechanism of injury among 176 cases of 5-10 years of age range and 31 cases of 10-12 years of age. Amongst 176 cases of 5-10 years of age, road traffic accidents (RTA) was commonest 114(64.72%) cause and out of 31 cases of 10-12 years of age, RTA was again the commonest 19(61.29%) cause. The correlation of mechanism of injury with sex and preventive measures have also been discussed.

**Key words:** Head injury, children, epidemiology, prevention.

Head injury is the most frequent injury brought to the paediatric surgical or neurosurgical units. Although most of these injuries are preventable, but large numbers of children are effected. These injuries are usually the result of fall from height or bicycle, road traffic accidents, agriculture trauma and gun shot injuries<sup>1</sup>. Fall from the height is the major cause of head injury leading to admission in infants and children of preschool age group whereas traffic related and road side accidents are more likely to be the cause of head injury for those aged 10 years onward<sup>2</sup>. Overall 85% of head injuries sustained in childhood are mild and not life threatening<sup>3,4</sup>.

The Paediatric Surgical Unit of Nishtar Hospital, Multan receives the cases of head injuries both from the urban as well as rural areas of Southern Punjab. The aims and objective of this study was to know about the epidemiological aspect of this disease with reference to the parent's education and socioeconomic status both of urban and rural areas. It would be possible to lay out some of the preventive measures, which could definitely help in bringing down the incidence of this preventable national problem.

during this one year period. In addition to routine patient's biodata, proforma recorded the education of the parents, total numbers of their children, socioeconomic background, type of house and single or joint family system. It also recorded the mechanism and type of injury taking place in rural or urban areas. Out of 417 cases 252(60.43%) were of minor injuries i.e., lacerations, cuts and abrasion that were sent home after necessary treatment. Rest of 165 (39.56%) were admitted and treated accordingly.

## Observations and results

### Sex Distribution:

Like most of the illnesses again male preponderance was seen in this study. There were 298(71.46%) male and 119(28.53%) female children. The male to female ratio is 2.5:1, which reflects the greater susceptibility of male children to trauma. Male to female ratio is 1.3:1 in <5 years of age and 5.3:1 >5 years of age. Although the male predominance is high through all age groups but it is very high in school going and elder children (Fig. 1).

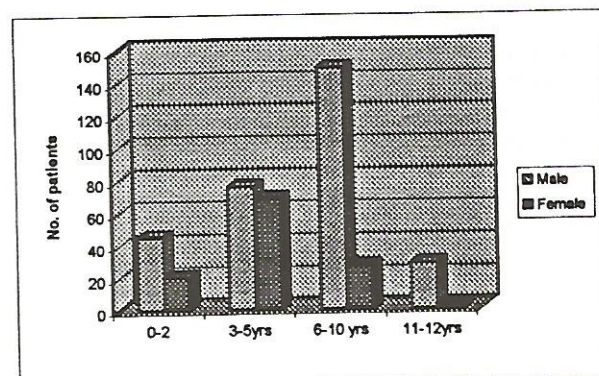


Fig.1 Age and sex incidence

## Patients and Methods

A prospective study was carried out in the Department of Paediatric Surgery, Nishtar Hospital, Multan from June 1996 to May 1997. A structured proforma was completed at the time of presentation of all cases of head injuries coming to the department. The purpose of study was to understand the mechanism and type of injury in relation to the age and sex of the children. It also reflects the comparative causes for head injuries in cities and villages with reference to the parent's education, socioeconomic status, their number of children and design of houses. Preventive measures have also been suggested. A total of 417 cases were brought with the diagnosis of head injury

**Age distribution**

Age range was from 2 months to 12 years with a median age of 6.2 years. About half 210(50.35%) of the children were below 5 years of age followed by 176(42.20%) of 5-10 years of age and 31(7.43%) of 10-12 years of age. Out of 207 children in age group of >5 years, 177(85.50%) were males and 30(14.49%) were females (Fig. 1).

**Parent's educational and socioeconomic status:**

The biodata revealed that 252(60.43%) cases were brought from the urban area of Multan and nearby cities whereas 165(39.56%) cases were brought from the rural area. Out of urban children, 180(28.57%) were living in multistory houses with joint family system. Out of 417 fathers, 125(29.97%) were educated with a maximum level of intermediate. Out of 417 mothers, 2 had died while 42(10.12%) were educated, highest education being matric. Both parents of only 28(6.71%) children were educated. Primary pass was taken as educated. Only 6(1.44%) mothers were working women. Fathers of almost all children belonged to manual workers, lower class officials and labourers. Out of 417 children 304(72.90%) belonged to poor socioeconomic group.

Total number of children of these parents were 1861. There were 923(49.59%) males and 938(50.41%) females. The number ranged from 1-13 children/family with average number of 4.5 children/family.

**Mechanism of head injury:**

Fall from height was the commonest 224(53.71%) cause of head injury followed by road traffic accidents (both as pedestrian and passenger injury) 167(40.05%), agricultural trauma including animal assault and machinery injury 16(3.83%) and other injuries like firearm, homicidal, drowning etc., 10(2.39%). Amongst 210 cases of 0-5 years of age, fall was the commonest 168(80%) type of injury. Amongst 176 cases of 5-10 years of age, road traffic accidents were commonest 114(64.72%) type of injury. Amongst 31 cases of 10-12 years of age group road traffic accident and vehicle injury was again the commonest 19(61.29%) type of injury (Fig. 2.)

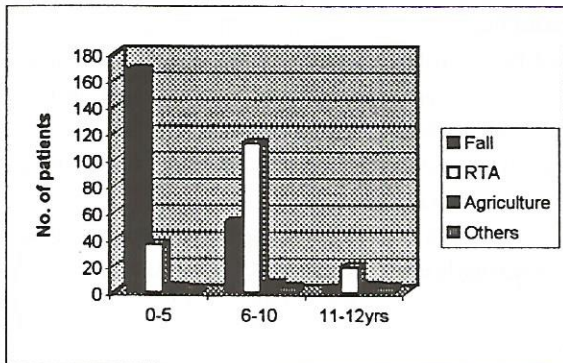


Fig.2 Age and mechanism of injury.

Road traffic accidents has been the commonest 140(46.97%) type of injury in males out of total 298 cases

of head injury while in females, fall from height has been the commonest 86(72.26%) type of injury out of total 119 cases (Table 1).

Table 1. Sex and mechanism of head injury

Sex	Fall	RTA	Agriculture	Other
Male	138 (61.60%)	140 (83.83%)	12 (75%)	8 (80%)
Female	86 (38.39%)	21 (16.16%)	4 (25%)	2 (20%)

**Discussion**

Even though head injury in children is a major health problem being faced by the world but the epidemiological data in this field is very limited. Therefore, U.S. national academy of science has labelled the trauma as "neglected disease of modern society"<sup>5</sup>. An attempt has been made to discuss the epidemiology of the disease in detail so that some practical suggestions could be made for the prevention of this disease.

Exact incidence of the disease is not known in our country due to lack of proper documentation. According to Kraus, in a population based study, incidence of brain injury in children younger than 12 years of age is 185 per 100,000 per year<sup>4</sup>. The cases of head injury admitted for suspected brain injury comes to be 5.5% of the total admission in our department. Almost half 210(50.35%) of the victims were <5 years of age. Out of these 210, there were 168(75%) falls, which mostly took place from roof, wall, bed, lap of mothers etc. It means that these accidents mainly took place at home as concluded by Hsiang et al<sup>2</sup> that >6 years of age 40% of head injury took place at home. In the school going age group of 5-10 years, 176(42.20%) were affected and RTA was the commonest 114(64.77%) mode of injury. Children are active in this age and are more prone to RTA because of increasing number of vehicles especially motor bikes, bicycles and cars during school and office hours. Moreover, untrained and young drivers without proper license add to the severity of the problem. In the third group of 10-12 years of age, 31(7.43%) were affected and out of these 19(61.29%) had the RTA. Our result is supported by Hsiang et al<sup>2</sup> who summarized that traffic related or bicycle related accidents are more likely the cause of head injury in those aged 11-15 years. There is male preponderance in the study, which closely resembles to that of Luerssen et al<sup>6</sup>. The male to female ratio <5 is 1.3:1 which shows that both the sex stand equal chance of getting injured. This M:F ratio rises to 5:1 in school going children which shows that males are more active, inquisitive and bicycle riders, all of this exposes them to trauma. Moreover, the ratio of school going children again favours the male dominance in our society. In the age group of >10 years, number of female children was only 3(9.67%) out of 31 which indicates the restriction of female adolescents to house in our society.

The urban 252(60.43%) to rural 165(39.56%) ratio was 1.5:1 which shows that children in cities are more

prone to accidents due to congested population. Although 180(71.42%) children from urban areas were living in single story and as single family and 72(28.75%) were living in multistory buildings with joint family system. The educational status of the parents was not worth mentioning. Out of 417 fathers, 292(70%) were uneducated and out of 415 mothers, 393(94.6%) were uneducated which makes a literacy rate of about 20% which is much less than our national literacy rate of 36%<sup>7</sup>. It means that illiteracy is again a cause for poor supervision of children. Economics always plays a pivotal role in development of young generations. Parents of 304(72.90%) children had an earning of less than Rs.3000 per month in this expensive era. The increasing number of children in a family also exposes them to trauma, which is also supported by this study, because average number of children is 4.5 per family. Therefore parents cannot give proper attention to all children.

The severity and mechanism of injury seem to be linked as are the mechanism of injury and age, as discussed earlier. More than half 224 (53.71%) had falls from roof, wall, beds, lap of mother and trees etc. The practice of kite flying on roofs especially without side barriers is an important cause of fall in our society. Fall has been described as the most common mechanism of head injury in many studies<sup>8,9,10</sup> like that of our study. Road traffic accidents on roads, highways and streets involving motor vehicles, motorcycle and bicycle etc. both as pedestrian and passenger RTA started as a health hazard to mankind with invention of first true automobile by N.T. Cugnut in 1769<sup>11,12</sup>. The problem of RTA has been fairly well documented in developed countries as mentioned by Ghulam et al<sup>13</sup> but there is lack of such data in our country especially in children. R.T.A has been second common 167(40.05%) cause of head injury in our study, which resembles with the study of Hsiang et al<sup>2</sup>. This alarming increase in RTA is probably because of increasing number of vehicle s, broken roads, poor sense of road safety (both for drivers and pedestrian) and illiteracy. Head injury resulting from agriculture trauma, animal assault, machinery injury etc is also not an uncommon 16(3.83%) cause in our study. It is because of the child labour in our country, which exposes these children to such injuries.

### Preventive Measures

Many accidental head injuries in children are preventable. Measures at personal and mass levels can help to reduce the incidence of this problem.

**A. Personal Level:** Since most of the head injuries in children under 5 years of age take place within the house.

Young children should not be left alone on height especially roof, stairs, beds and walkers etc. Vigilance regarding open windows and stairways and side barriers on roofs should be observed.

### B. Mass Level

1. An educational plan to increase the literacy rate should be started. The implementation of family planing programme in order to reduce the number of children should be stressed.
2. The condition of roads and vehicles should be improved. Proper use of occupant restrains in motor vehicle should be encouraged. Wearing of helmets for motor cycle riders should be observed strictly. No child under 18 should be allowed to drive a motor vehicle.
3. The child labour should be a crime in order to prevent the accidents. The ratio of school going children should be increased and education regarding traffic and road safety should be imparted to children in schools and on print and electronic media.

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