Original Articles

Epidemiology of childhood trauma at the Lady Ridgeway Children's Hospital, Colombo

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Abstract

Objective To study the pattern of injuries and socio-demographic characteristics of children seeking treatment at the Lady Ridgeway Hospital, Colombo (LRH) following trauma.

Design A descriptive cross-sectional study

Setting Accident service in LRH

Patients All children less than 13 years of age seeking treatment at the LRH accident service on two randomly selected week days and two randomly selected weekend days.

Method Data was collected using an interviewer-administered questionnaire and was processed manually.

Results 171 children with trauma were tabulated according to type of injury, sex, age, presence of past history of trauma, mother's level of education, site of injury, cause, location, mother's employment status, family income etc.

Introduction

With the reduction in incidence of infectious diseases, traumatic injuries are playing an important role in childhood morbidity and mortality.

The annual health bulletin, 1999 ranks accidents as the second leading cause of death in the 5-14 year age group and the third leading cause of death in the 1-4 year age group in 1996[1]. Traumatic injuries include accidental injuries and injuries due to intentional violence.

Accidents occur more frequently in certain age groups, at certain times of the day and week, and in certain localities. Majority of childhood accidents are preventable[2]. These include home accidents, road traffic accidents, sports accidents and injuries caused by animals.

Childhood is an important period for intentional violence. The child can get injured following violence by caretakers, friends and siblings.

Setting

The accident service of the Lady Ridgeway Hospital for Children, Colombo (LRH) is an ideal setting for the study. This is a tertiary care institution receiving a large number of trauma victims daily. Thus, a large number of patients could be covered in a short period of time making the research viable with available resources. Furthermore, being easily accessible to Colombo and its suburbs, a wide spectrum of injuries could be seen making the study more accurate.

Objective

To study the pattern of injuries and socio demographic characteristics of children seeking treatment at LRH following trauma.

Study design

This was a descriptive cross-sectional study. This study design was chosen as it involves fewer resources (manpower, money, material and time) and was suitable to meet the objective.

Method

The study population comprised all children less than 13 years of age seeking treatment at the accident service of LRH irrespective of whether they were having actual injuries or not. As a sub group, all admissions to medical wards of LRH with poisoning was taken.

Children meeting the above selection criteria, presenting to LRH on 2 randomly selected week days and 2 randomly selected weekend days, was taken as the sample population. The 2 week days were 19th and 20th July 2001 whilst the 2 weekend days were 15th and 29th July 2001. The sampling method was convenient sampling.

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The study instrument was an interviewer administered questionnaire consisting of five main parts:

1. General information (socio-demographic characteristics).
2. Type of injury and its cause.
3. Time and location of injury.
4. Site of injury in body.
5. Type of tissue injury.

The interviewers were the 3 authors. They underwent training on how to administer the questionnaire beforehand. Data processing was done manually. Data analysis was done using two methods:

1. Simple descriptive methods using absolute numbers and percentages represented in table form.
2. Statistical tests to check significance of proportions of one sample in selected areas.

This study was informally granted ethical approval by the Department of Community Medicine, Faculty of Medicine, University of Colombo. Permission was granted by the director of LRH to conduct the study. Informed consent was obtained from all parents and guardians of the subjects before administration of the questionnaire.

Definitions of selected variables

- **Age -** age at last birthday.
- **Family income** - average monthly income of all family members, except married children, during the past year.
- **Home accidents** - accidents occurring at apartments, boarding houses, farm houses, residential homes, non institutional places of residence, drive ways to homes, garages, gardens, yards and swimming pools in private houses. Excludes abandoned or derelict houses, homes under construction but not occupied, institutional places of residence[3].
- **Road traffic accidents** - any vehicular accident occurring on public highways[3].
- **Intentionally caused injuries** - injuries caused with deliberate motivation of causing harm to one person by the same or another person excluding poisoning.
- **Sports injuries** - accidents occurring while engaging in physical exercise with a described functional element.
- **Burns** - damage to skin and underlying tissues from dry heat, flames, flashes, friction, chemicals, electricity, radiation and cold[4].
- **Scalds -** damage to skin and underlying tissues from hot liquids or gases[4].
- **Abrasion** - damage to exposed superficial layers of skin[4].
- **Laceration -** Splits in a tissue or organ located on its surface or within it[4].
- **Contusions** - visible extravasations of blood into tissues due to rupture of blood vessels following mechanical trauma[4].
- **Cuts** - gaps in tissue characterized by concave margins, sharply pointed ends and regular walls where the length of the incision is greater than the depth[4].
- **Stabs** - gaps in tissue characterized by concave margins, sharply pointed ends and regular walls where the depth of the incision is greater than the length[4].
- **Fracture** - injuries of bone, cartilage or teeth diagnosed by clinical features and/or radiological findings[4].

Results and analysis

The type of injury is shown in table 1.

Table 1
Type of injury

Type of injury	*Number (%)*
Home accidents	95 (56)
Injuries caused by animals	36 (21)
Road traffic accidents	14 (08)
Intentional violence	08 (05)
Sports injuries	05 (03)
Other	13 (07)
Total	171 (100)

56% injuries were due to home accidents.

The sex distribution of children is shown in table 2.

Table 2
Sex distribution of children

Type of injury	*No. of males* (%)	*No. of females (%)*
Home accidents	48 (50)	47 (64)
Injuries caused by animals	24 (25)	12 (16)
Road traffic accidents	06 (6)	08 (10)
Intentional violence	06 (6)	02 (3)
Sports injuries	05 (5)	00 (0)
Others	08 (8)	05 (7)
Total	97 (100)	74 (100)

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57% were males and 43% were females.

50% males and 64% females presented with home accidents. The female predominance was statistically significant ($p<0.05$).

25% males and 16% females had injuries caused by animals. The male predominance was not statistically significant. ($p>0.05$)

6% males and 10% females were victims of road traffic accidents. The female predominance was not statistically significant. ($p>0.05$)

6% males and 3% females were subjects of intentional violence. The male predominance was not statistically significant. ($p>0.05$)

5% males and 0% females were involved in sports accidents. The male predominance was statistically significant. ($p<0.05$)

The age distribution in victims of trauma is shown in table 3.

Table 3

Age distribution of the children

Age in years	*No. of home accidents (%)*	*No. of injuries caused by animals (%)*	*No. of road traffic accidents (%)*	*No. due to intentional violence (%)*	*No. of sports injuries (%)*	*No. of other injuries (%)*
- 1	14 (15)	01 (3)	00 (0)	01 (12)	00 (0)	00 (0)
- 4	44 (46)	07 (19)	08 (58)	01 (12)	00 (0)	08 (62)
- 9	29 (31)	18 (50)	03 (21)	05 (64)	04 (80)	02 (15)
- 12	08 (8)	10 (28)	03 (21)	01 (12)	01 (20)	03 (23)
Total	95 (100)	36 (100)	14 (100)	08 (100)	05 (100)	13 (100)

46% home accidents occurred in the 1-4 year age group whilst 50 % animal injuries occurred in the 5-9 year age group.

Distribution of children according to past history of trauma is shown in table 4.

Table 4
Distribution of children according to past history of trauma

Past history of trauma	*Number (%)*
Absent	126 (74)
Present	45 (26)
Total	171 (100)

Only 26% of trauma victims had a past history of trauma.

Distribution of children according to their mother's education level is shown in table 5.

In the analysis of mother's level of education no regular relationship was observed in any type of trauma.
The sites of injury in children is shown in table 6.

In home accidents, commonest sites of injury were the head (46%), face (21%), upper limb (18%) and lower limb (7%).

In injuries caused by animals, the commonest sites were lower limbs (41%), upper limbs (31%) and face (22%).

Table 5

Mother's level of education in the various types of injury

Mother's level of education	No. of home accidents (%)	No. of injuries caused by animals (%)	No. of road traffic accidents	No. due to intentional violence (%)	No of sports injuries (%)	No. of other injuries (%)
Not gone to school	03 (3)	02 (6)	02 (14)	02 (25)	00 (0)	00 (0)
- year 5	06 (6)	01 (3)	02 (14)	01 (12.5)	00 (0)	02 (15)
- year 9	15 (16)	05 (14)	03 (22)	02 (25)	01 (20)	04 (31)
- O/L	21 (22)	08 (22)	02 (14)	01 (12.5)	01 (20)	00 (0)
- O/L passed	27 (29)	12 (33)	02 (14)	01 (12.5)	02 (40)	01 (8)
- A/L	08 (8)	00 (0)	00 (0)	00 (0)	00 (0)	00 (0)
- A/L passed	14 (15)	06 (16)	01 (8)	00 (0)	01 (20)	04 (31)
- Higher education	00 (0)	02 (6)	00 (0)	00 (0)	00 (0)	02 (15)
- Not available	01 (1)	00 (0)	02 (14)	01 (12.5)	00 (0)	00 (0)
Total	95 (100)	36 (100)	14 (100)	8 (100)	5 (100)	13 (100)

Table 6

The site of injury in children

Site	*No. of home accidents (%)*	*No. of injuries caused by animals (%)*	*No. of road traffic accidents*	*No. due to intentional violence (%)*	*No of sports injuries (%)*	*No. of other injuries (%)*
Head	44 (46)	01 (3)	05 (36)	05 (64)	03 (60)	04 (31)
Face	20 (21)	08 (22)	01 (7)	01 (12)	01 (20)	04 (31)
Neck	00 (0)	00 (0)	00 (0)	00 (0)	00 (0)	00 (0)
Chest	01 (1)	00 (0)	01 (7)	00 (0)	00 (0)	00 (0)
Abdomen	03 (4)	00 (0)	00 (0)	00 (0)	00 (0)	00 (0)
Pelvis	00 (0)	01 (3)	00 (0)	00 (0)	00 (0)	00 (0)
Perineum	00 (0)	00 (0)	01 (7)	00 (0)	00 (0)	00 (0)
Upper limb	17 (18)	11 (31)	01 (7)	01 (12)	01 (20)	02 (15)
Lower limb	07 (7)	15 (41)	05 (36)	01 (12)	00 (0)	02 (15)
No injury	01 (1)	00 (0)	00 (0)	00 (0)	00 (0)	01 (8)
Not applicable	02 (2)	00 (0)	00 (0)	00 (0)	00 (0)	00 (0)
Total	95 (100)	36 (100)	14 (100)	8 (100)	5 (100)	13 (100)

The causes of home accidents are shown in table 7.

Table 7
Causes of home accidents

Cause of the accident	*Number (%)*
Falls	66 (70)
Falling objects	06 (06)
Collisions	05 (05)
Burns/ scalds	03 (03)
Pricks	02 (02)
Poisoning	02 (02)
Cut	01 (01)
Crushing	01 (01)
Electricity	00 (00)
Other	09 (10)
Total	95 (100)

70% home accident were caused by falls and 10% by 'other' injuries. 4 such injuries were due to deliberate insertion of seeds, buttons and small metal objects into natural orifices like nose and ear. One case needed ENT referral as the object was still inside the ear.

There were 3 cases of burns due to spilling of a tea cup, contact with an incense holder and a fire in the garden respectively.

Of the 2 cases of poisoning, one was due to paracetamol overdose and the other to ingestion of a piece of mosquito coil.

The cause of fall is shown in table 8.

Table 8
Cause of fall

Cause of fall	*Number (%)*
Falling from a height other than a tree	20 (30)
Slipping	18 (27)
Tripping	11 (17)
Falling from a tree	06 (09)
Following collision	05 (08)
Fits	00 (00)
Fainting	00 (00)
Other	06 (09)
Total	66 (100)

30% falls in children were due to falling from a height other than a tree.

The location of home accident is shown in table 9.

Table 9
Location of home accident

Location	*Number (%)*
Inside house	58 (61)
Garden	32 (34)
Bathroom	02 (02)
Kitchen	02 (02)
Other	01 (01)
Total	95 (100)

61% of home accidents occurred in places inside the house other than the kitchen and bathroom. 34% occurred outdoors.

The type of tissue injury in home accident victims is shown in table 10.

Table 10
Type of tissue injury in home accident victims

Type of tissue injury	*Number (%)*
Laceration	23 (24)
Contusion	17 (18)
Abrasion	10 (11)
Swelling	09 (10)
Fracture	08 (08)
Burn	03 (03)
Cuts	01 (01)
Other	03 (03)
No visible injury	21 (22)
Total	95 (100)

24% of home accident victims had sustained lacerations

Employment status of mothers of home accident victims is shown in table 11.

Table 11
Employment status of mothers of home accident victims

Mother's employment status	*Number (%)*
Mother unemployed	80 (84)
Mother employed	15 (16)
Total	95 (100)

84% mothers were unemployed.

The monthly family income of home accident victims is shown in table 12.

Table 12
Monthly family income of home accident victims

Monthly family income in rupees	*Number (%)*
- 2500	05 (05)
- 5000	25 (26)
- 7500	24 (25)
- 10,000	18 (19)
>10,000	11 (12)
Not available	12 (13)
Total	95 (100)

Monthly family income was less than Rs.2500 in only 5% accident victims.

The animal involved in traumatic injuries is shown table 13.

Table 13
Animal involved in traumatic injuries

Animal	*Number (%)*
Dog	29 (80)
Cat	05 (14)
Rat	01 (03)
Bull	01 (03)
Total	36 (100)

80% of victims had been injured by dogs and 14% by cats.

The manner of injury in victims of animal injuries is shown in table 14.

Table 14
The manner of injury in victims of animal injuries

Manner of injury	*Number (%)*
Bites	33 (92)
Scratch	02
Other	01
Total 36 100	36

92 % of injuries had been caused by bites.

Presence or absence of provocation in animal injuries is shown in table 15.

Table 15
Presence or absence of provocation in animal injuries

Presence or absence of provocation	*Number (%)*
Unprovoked	21 (58)
Provoked	15 (42)
Total	36 (100)

58% victims had sustained the in-jury without provocation.

The location of injury is shown in table 16.

Table 16
The location of injury

Location	*Number (%)*
Home garden	14 (39)
Inside house	11 (30)
Road	07 (19)
School garden	02 (06)
Other	02 (06)
Total	36 (100)

39% had sustained injuries in their home garden and 30% inside their houses.

Vehicles involved in road traffic accidents are shown in table 17.

Table 17
Vehicles involved in road traffic accidents

Vehicle involved in road traffic accident	*Number (%)*
Bicycle	06 (43)
Motor cycle	05 (36)
Three wheeler	01 (07)
Others	02 (14)
Total	14 (100)

In 43% of cases, it was the bicycle and in 36% the motor cycle.

The situation of the victim at the time of the road traffic accident is shown in table 18.

Table 18
Situation of victim at time of road traffic accident

Situation of the victim	*Number (%)*
Pedestrian	07 (50)
Pillion rider (bicycle)	04 (29)
Pillion rider (motor cycle)	02 (14)
Other	01 (07)
Total	14 (100)

In 50% of instances, the child had been a pedestrian.

A peculiar pattern of injury was identified in the 4 children who were pillion riders of bicycles. The foot had been caught between the spokes of the front wheel and had got injured.

Distribution of victims of intentional violence according to person causing harm is shown in table 19.

Table 19
Person causing harm in intentional violence

Person causing harm	*Number (%)*
Friend	05 (54)
Sibling	01 (12)
Self	01 (12)
Other	01 (12)
Total	08 (100)

64% of the injuries caused by intentional violence had been caused by a friend.

Discussion

Several research studies have been carried out regarding accidental trauma and home accidents in Sri Lanka[5,6,7]. In a study carried out at the accident service of the National Hospital of Sri Lanka in 1982, 17% of injuries followed intentional violence[5]. However, in our study only 5% of injuries followed intentional violence. This finding may be misleading as injuries caused by intentional violence in children do not always present to hospital.

Home accidents account for 56% injuries in our study. This is considerably higher than the 20% in adults[5]. Road traffic accidents account for 38% injuries in adults[5] compared with 8% children in our study. Injuries caused by animals accounted for 21% in our study but only 0.2% in adults[5]. Sports injuries were found in 3% in our study compared to 7% in adults[5]. The lower incidence of sports injuries in children may be due to several reasons:

- Children not getting involved in sports likely to cause significant injuries.
- Children not complaining about sports injuries to parents.
- Parents not being worried about sports injuries in children and hence not taking the child to hospital.
- Child receiving treatment at a primary health care centre rather than LRH.

There was an overall male predominance in children with traumatic injuries. 74% did not have a past history of trauma.

Home accidents

Home accidents were significantly commoner in girls ($p<0.05$). This agrees with the finding that 57% of home accidents occurred in adult females[5]. However this finding differs from that of a previous study in children where home accidents were found to be commoner among boys[7].

46% home accidents occurred in the 1-4 year age group. This finding is similar to that of a previous hospital-based study[7]. This can be due to several reasons:

- They spend more time at home than older children.
- Their behaviour makes them more susceptible to home accidents.

Falls (70%) were the commonest cause of home accidents. This agrees with the findings of 2 previous hospital-based studies[5,7]. However, in a study involving patients in general practice, cuts due to sharp objects was the commonest cause6. Although in adults, falling at ground level account for the majority[5], in children it was falling from a height other than a tree. Slipping and tripping, which is the commonest cause of falls in adults[5], was important in this study too.

In adults bathroom, toilet and kitchen were the commonest location of home accidents[5]. However, in our study these were not the major locations for home accidents.

The very high percentage of children having unemployed mothers among the home accident victims (84%) suggests that employment of the mother per se does not make the child more susceptible to home accidents.

There was no regular relationship between mothers' level of education and the incidence of home accidents.

The relatively lower incidence of home accident victims among low-income families in our study can be due to different factors.

- Parents pay less attention to minor injuries in their children and hence do not bring them to hospital for treatment.
- They may seek treatment from primary health care centres rather than bringing the child to a tertiary care hospital.

Injuries caused by animals

As boys tend to provoke animals more than girls, they should be more liable to this type of injury but this is not reflected in this study. The 50% incidence in the 4-9 year age group can be attributed to the changes in behaviour during this period. The 41% injuries in lower limbs is expected but the 22% facial injuries are important because

- Risk of rabies is higher in facial injuries.
- This can cause permanent disfigurement of face.

58% injuries by animals were unprovoked. Thus provocation is not a major factor in animal injuries.

69% of the children had sustained injuries in their home garden or inside their own house. Therefore, the pet is often causing the injury.

Road traffic accidents

There was no statistically significant difference between the proportion of boys and girls sustaining road traffic accidents. Injuries caused by the foot being caught in the spokes of the front wheel was an important finding in pillion riders of bicycles.

Intentional violence

64% cases of intentional violence were caused by a friend. Violence by caretaker was not a feature in our study.

Other injuries

Insertion of a foreign object into a natural orifice is an important cause of injuries in children.

Preventive measures

Preventive measures should target home accidents and injuries caused by animals.

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1. Children between 1-4 years should be closely supervised by an adult when climbing heights from where dangerous falls can occur.

2. Small objects, which the children are likely to insert into natural orifices, should be kept out of reach of children.

3. Parents should be advised to seek treatment for minor injuries from primary health care centres.

4. All domestic dogs should be immunized at the correct time as children are often injured by them.

5. Children should be discouraged from provoking stray dogs to prevent injuries from this dangerous source.

6. Parents should be more careful when carrying the child on the bicycle bars.

Limitations of the study

- We had to use the convenient sampling method because of limitation of resources. This is not a very scientific method to carry out sampling.

- The study setting was a tertiary care hospital which receives transfers with more serious injuries as well as direct admissions. This can affect the result by increasing the severity of the spectrum of injuries. Thus, this population may not properly represent the children in Sri Lanka.

- In this study, the time spent by the mother with the child was not measured as a risk factor for childhood trauma.

- We did not assess the relationship between the mother's personality and the Childs proneness to accidents.

- The relationship between the child's personality and the traumatic injuries was not assessed.

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