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PATTERN OF CHILD INJURIES AND ITS ECONOMIC IMPACT IN BANGALORE: A CROSS-SECTIONAL STUDY

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ABSTRACT

Introduction: Injury, poisoning and other consequences of external cause has accounted to 12.5% of total deaths among children aged 5-14years in India. Very few studies have been conducted about economic impact of child injuries in India. This study focussed on pattern of child injuries and its economic impact in an urban community, Bangalore.

Methodology: Cross sectional study was conducted covering 797 children by house-house survey. Pre-tested, semi-structured questionnaire was used. Among injured further details was obtained.

Results: Injury prevalence among children aged 0-18years was 62.7/1000 children (95% CI 45.6-79.9); 64% were moderately injured. Median [IQR] age of injured was 9[5-12.25] years and males (60%) had higher injuries. Home was the common place and falls being common external cause. Majority of it occurred while playing(60%). Common time of injury was 2PM and lower limb being the common site. 20% experienced some kind of disability even after 30 days following injury; walking with a limp (10%) being the common disability type. Average cost per injury was Rs 2601 (minimum to maximum was Rs 100- Rs18650)

Conclusions: Prevalence of child injuries 62.7/1000 (95%CI 45.6-79.9). Majority of child injuries occurred at home and falls being common external cause. In child injuries direct cost was higher than the indirect cost.

Keywords: child injuries, falls, cost, disability

INTRODUCTION

Children are the wealth of tomorrow's nation. Every child is at risk of getting exposed to injuries and every parent tries maximum to safeguard their children from injuries.[1]While the epidemiological transition is taking place; the morbidity and mortality pattern among children are also changing[2]. As a result of it injuries have become one of the leading causes of childhood morbidity and mortality thereby it becoming a public health problem globally. Globalization, urbanization and motorization have also resulted in rise in child injuries burden.[3]

Globally, injury and violence was the major killer of children aged less than 18 years, resulting for yearly 950000 deaths (2004). Among them 90% were unintentional injuries. Road traffic injuries (RTI) were the leading cause of death.[3] India's population in 2013 was 1252139596; among which under 18 years accounted to 34.7%.[4] Injury, poisoning and certain other consequences of external cause accounted to 12.5% of total deaths among Indian children aged 5-14years.[5] According to National Crime Records Bureau (NCRB) report(2009) there were 23016 deaths (<14years) following injuries in India.[6] In 2014, there were 20768 and 32308 accidental deaths reported among <14years and 14-18years respectively. Total number of suicides reported in 2014 were 1720 and 9230 among <14 years and 14-18years respectively. Students accounted for 6.1% of total suicidal victims in India

in 2014, examination failure and illness being the main reasons.[7]

Children are vulnerable to injuries especially in India due to rapid change in lifestyle and increased motorization. Their soft tissues are more vulnerable to the impact of injury when compared to adults. Children's impulsiveness, experimentive attitude, lack of knowledge on judgement of distance and low levels of concentration also makes them vulnerable.[8]

Injuries being a major reason for childhood mortality, morbidity currently is a major cause for disability. It's also a major concern to the parents since it results in financial and emotional burden on them.[9]

Children being playful most of the time do face injuries almost every day. But not all these injuries affect the child's physical or mental health. Many studies have been conducted to assess the risk factors of child injuries but very few studies are available on the disability and economic expenditure following child injuries. So the present study focussed to describe the pattern of child injuries among children aged 0-18 years in Bangalore, India and additionally also made an assessment of economic impact of these injuries on their families.

MATERIAL AND METHODS

The original study conducted focused on the pattern of injuries and its socio economic impact on the injured and their family in a community. Only a part of the data i.e on child injuries has been discussed here. Study area was the urban field practice area which included two (Bruhat Bengaluru Mahanagara Palike) BBMP wards. By applying multi stage sampling technique 20 census enumeration blocks (CEB) were selected and data was collected in these CEBs. The complete details of the study methodology have been described elsewhere.[10] Study population included all children ≤18 year's age residing at ward number 17 & 36, Bangalore. Study was conducted during June 2012-March 2013. Inclusion criteria consisted of all children ≤18 years of age who were residing in that area from the past 6 months and those who met with injury where the term "injury" had been described.[11] Further the injuries were classified as mild injuries (defined as any injury resulting in partial/complete incapacitation of the injured lasting for <48 hours in the past 3 months); moderate injuries (defined as any injury resulting in partial/complete incapacitation of the injured lasting from 3rd -13 days in the past 12 months) and severe injuries (defined as any injury resulting in partial/complete incapacitation of the injured lasting ≥14 days or resulting in permanent disability/coma/death in the past 12 months). Recall period of 12 months was used during data collection. Parents or guardians refusing to give informed consent and those who were not willing to participate for their own reasons were excluded. Information relating to moderate & severe injuries among children was collected in each of the households after obtaining informed consent from the parents or guardians. Demographic details, injury details like place of injury, type, time, site followed by post injury details and expenditure incurred were collected

Statistical analysis

Qualitative variables were expressed in frequency and percentages. Quantitative data were summarized through descriptive measures such as median with inter quartile range (IQR). Prevalence with 95% confidence interval was also calculated. Chi square test was employed for evaluating statistical significance.

Ethical clearance was obtained from the institutional Ethical Committee. During the survey, informed consent was taken from the parents or guardians of children.

RESULTS

Information was collected from 797 children aged ≤18 years. Among them the median [IQR] age of study population was 10 [5-14] years and 53.5% were males. According to modified Kuppuswamy's classification[12] of socioeconomic status 37.5% belonged to upper middle followed by 27.1% belonged to lower middle status, while 82.4% of them are Hindu. (Table 1)

Details of Injury

Out of 797 children studied 50 (6.27%) of them met with moderate to severe injuries in the past one year, which included one death. Prevalence of injuries among children aged 0-18 years was 62.7/1000 population (95% CI 45.6 -79.9). Among the injured 32 (64%) were moderately injured (χ^2=3.92, df=1, P=0.048). Average number of injuries per person was one.

Among the injured 17(34%) and 16 (32%) belonged to the age group of 5-9 years & 10-14 years respectively (χ^2 =17.6, df=4, P=0.001) indicating that majority of injuries occurred in school going children from 5-14 years. Their median [IQR] age was 9[5-12.25] years. Among injured 30 (60%) were males (χ^2 =2, df=1, P=0.157, not statistically significant) and 23 (46%) belonged to lower middle socioeconomic status[12] which was statistically significant (χ^2=13.2, df=3, P=0.004). Among the injured 39 (78%) belonged to Hindu religion followed by Muslims and Christians (χ^2 =44.9, df=2, P =<0.01) which was statistically significant. (Table 1)

Table 1: Prevalence of child injuries according to various socio-demographic characteristics

Variables	Population at risk (n)	Number injured*	Prevalence per 1000 population (95% CI)	P value
Age (years)				
less than 1	25	1	40 (26.1-53.9)	0.001
1-4	162	9	55.5 (39.3-71.7)	
5-9	204	17	83.3 (63.8-102.9)	
10-14	229	16	69.9 (51.8-87.9)	
15-18	177	7	39.5 (25.7-53.3)	
Gender				
Male	426	30	70.4 (52.3 -88.5)	0.157
Female	371	20	53.9 (37.9-69.9)	
Socio-economic status				
Upper	92	6	65.2 (47.7-82.7)	0.004
Upper middle	299	12	40.1 (26.2-54.0)	
Lower middle	216	23	106.5 (84.6-128.3)	
Upper lower	182	9	49.5 (34.1-64.8)	
Lower	8	0	0	
Religion				
Hindu	657	39	59.4 (42.6-76.1)	<0.01
Muslim	95	6	63.2 (45.9-80.4)	
Christian	45	5	111.1 (88.8-133.4)	
Total (N)	797	50	62.7 (45.6 -79.9)	

CI- confidence interval; *Number injured during 12 months of recall period;

Table 2: Distribution of injuries among children aged 0-18 years by various characteristics

Characteristics	Freq(n=50)*(%)
Place of injury	
Home	19(38)
Street/highway	17(34)
School	7(14)
Residential institution	1(2)
Sports/athletic area	2(4)
Industrial/construction	1(2)
Others (farm, commercial area, country side)	3(6)
External cause	
Fall	33(66)
Road traffic injuries	6(12)
Animal related	5(10)
Fall of object	2(4)
Domestic accidents	1(2)
Physical assault	1(2)
Suicide	1(2)
Burn	1(2)
Activity at the time of injury	
Leisure/play	30(60)
Travelling	15(30)
Domestic activity	2(4)
Unspecified activities (hanging around, doing nothing)	2(4)
Unknown	1(2)
Physical nature	
Fracture	8(16)
Sprain/strain	4(8)
Dislocation	1(2)
Cuts/open wound	33(66)
Bites	3(6)
Burns	1(2)

*Number of injuries during past 12 months of recall period

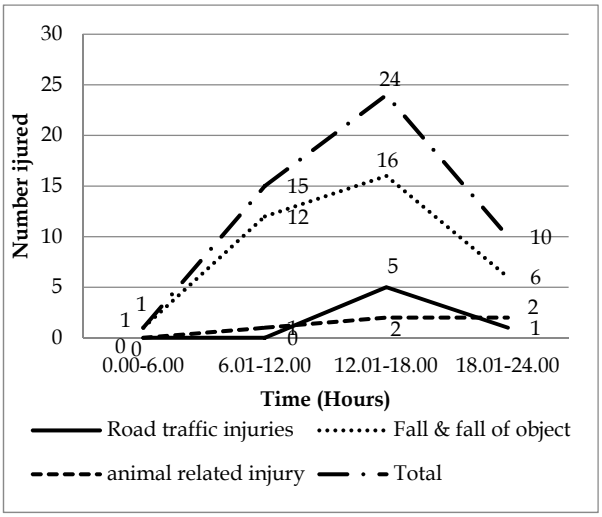

Figure 1: Line diagram indicating time of injury

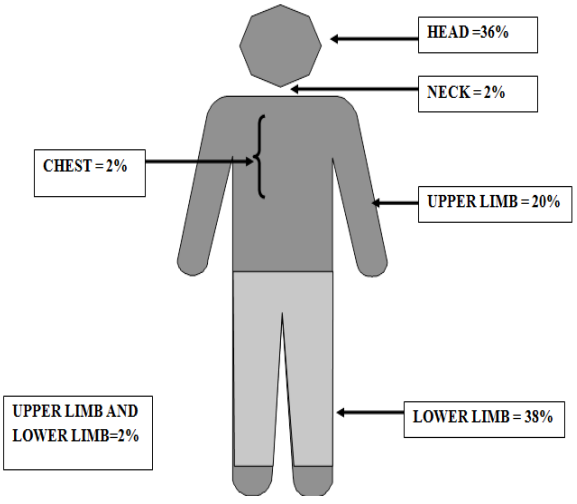

Figure 2: Anatomical location of injuries

Table 3: Post injury details as experienced by children aged 0-18years

Details	Freq(n=50)(%)
Immediate care received	
No care	4(8)
First aid	12(24)
Professional help	34(68)
Injury outcome within 30 days	
Death	1(2)
Disabled	9(18)
Returned to normal	40(80)
Injury leading to impairment/activity limitation/ participation restriction after 30 days of injury	
Yes	10(20)
No	39(78)
Not applicable (in death case)	1(2)

Table 4: Physical nature of disability causing impairment among children aged 0-18 years (n=50)

Physical nature of disability causing impairment	Freq (%)
No disability	39 (78)
Not applicable in case of death	1 (2)
Unable to use hand or arm	3 (6)
Difficulty to use hand or arm	2 (4)
Walk with a limp	5 (10)

Table 5: Details of injury expenditure among children aged 0-18 years

Cost	Average cost per injury(Rs)	Min-Max cost(Rs)
Direct cost		
A)Direct medical cost	1395	60-8200
B)Direct non medical cost	709	0-5600
Total direct cost(A+B)	2104	100-10000
Indirect cost		
Total indirect cost	497	0-10000
Total cost(direct+indirect)	2601	100-18650

One US dollar = Rs 54.65 (2012-2013)

Pattern of Injuries

Most common place of childhood injuries was home (38%) followed by street (34%). Falls (66%) was the most common external cause of injury. Majority (60%) of it occurred while playing and 66% of them had cuts or open wounds while 16% experienced fracture. (Table 2)

Majority of injuries occurred around 14 hours (2PM). Falls and fall of objects occurred during day time (6 AM - 6 PM). Animal related injury was commonly seen from 12 PM -12 AM. RTIs was commonly seen from 12-18 hours (Figure 1)

Most common injury site was lower limbs (38%) followed by head (36%). (Figure 2)

Post injury details

Immediately following injury 68% of them sought for professional help. 80% of them returned to normal within a month while 20% experienced some kind of impairment /activity limitation/participation restriction even after 30 days following injury which included one death due to suicide. (Table 3)

Among the 10 children who were disabled the most common type of disability was limping 5(10%) followed by inability to use hand/arm 3(6%) (Table 4)

Expenditure incurred following an injury

The average direct cost per injury was Rs 2104. Direct cost included medical cost (included hospital charges+ drugs+ dressing+ rehabilitation devices+ etc) and non medical cost (included travel+ legal+ funeral+ loan + property sold). Average indirect cost per injury (calculated by wages lost by caregiver) was Rs 497. So total average cost per injury was Rs 2601. The minimal and maximum cost per injury was Rs100 - Rs18650 (Table 5)

DISCUSSION

Globally, more children over 9 years of age die from injuries than from any other cause.[11] Even in our study the median (IQR) age of injured children was 9 (5-12.25) years.

A community-based cross-sectional survey conducted at Egypt in 2011 among children aged 0–18 years showed that falls (25%) was the most common cause of injury; which was also observed in our study. Injury incidence among males was high and high among children aged 2-6years. Commonly observed physical nature of injuries was wounds (30.6%) followed by fractures (28.7%). Most common place of injury was the home and its immediate surroundings which were also observed in our study.[14]

Another community-based survey conducted at Aligarh in 2006-07 among children aged 0–15 years showed that the age group of 6-15 years suffered more than under-5 year children. Injury prevalence rate was 11% while in our study it was 6.27%. This difference can be attributed to difference in the recall period of 6 months and one year; also the age group of 0-15 years & 0-18 years and consideration of moderate to severe injuries only in our study. Under-5 children were more prone to falls (32.4%). Most common site of injury were head and neck followed by lower limbs while in our study lower limbs was the most common site followed by head and neck. Home was the common place of injury; similar results were observed even in our study.

Minor injuries (i.e disability lasting <30 days)[9] was seen in 89.8% of the children while in our study it was 80%.

Majority of the time falls results in small cut/bruise. But sometimes it can be more dangerous. Around the world yearly at least 47,000 children and teenagers die because of a fall. Some may land up with fracturing their bones. In some countries half of the child injuries admitted in emergency clinics is due to falling.[13] Even in our study falls was the commonest child injury. History of falling from cot, bicycle, and first floor, from terrace, falling while climbing stairs and while playing was noted.

Not many studies have been conducted to study the economic impact of childhood injuries in a community. However Global Childhood Unintentional Injury Surveillance (GCUIS) study was conducted among the injured children seen at emergency department in selected urban settings in 4 cities of developing countries by means of a pilot injury surveillance system to determine the frequency and nature of childhood injuries in 2007. In this study 65% of the injured children admitted were males, most of it happening between 6AM-12PM. Falls (56%) followed by RTIs (22%) were common type, 63% of it occurring while playing which was also seen in our study. Among injured 76% relied on government welfare or out-of-pocket payments for health-care expenses and only 1% had private insurance. Even in our study only 2% was covered by health insurance and rest was through savings and loan.

In our study average cost per injury was Rs 2601. Here the direct cost (Rs 2104) was higher than the indirect cost (Rs 497). Unlike in injuries seen in over all age distribution[10] among the child injuries the direct cost is more than the indirect cost since majority of children will not be working for earning money and in our study majority of the caregivers were mothers who were homemakers. Hence the indirect cost is less compared to direct cost.

Limitations of our study - Certain amount of information bias could have occurred while collecting details of number of days being injured, expenditures met by the family following an injury, time of injury. Efforts to reduce such information bias were done by cross checking the medical bills, medical records and discharge summaries. To curtail recall bias a local event calendar was used. (Example – did any of your child met with any kind of injury in the past one year i.e from previous Diwali festival to this year Diwali). Multi stage sampling methodology was employed and all the children who met the eligibility criteria were included in the study. So there was no coverage error in our study.

CONCLUSION

To conclude the prevalence of child injuries was 62.7/1000 population (95% CI 45.6 -79.9) among children aged 0-18 years; 36% of them being severely injured. The median (IQR) age of injured children was 9 (5-12.25) years and was common among males. Home was the common place and 60% of it occurred while playing. Falls was the common external cause. Majority of them occurred at afternoon around 2PM. Lower limbs was the common injury site. 20% experienced some amount of disability even after 30 days following injury and limping was the most common disability type seen. An average cost per injury was Rs 2601, direct cost being higher than indirect cost.

RECOMMENDATIONS

In general there is a need to conduct more community based studies to assess the economic impact of child injuries. Based on the observations from our study we would like to recommend child friendly homes since home was the most common place and falls being common injury type; by keeping the floors dry and avoid scattering objects on floor so that the child doesn't trip over. Avoid sharp edged furniture and instruments at home; if necessary redesign nursery furniture and other instruments. Fix windows and balconies with safety mesh to prevent falls. Establish playgrounds with appropriate surface material and equipments; so that children can play safely there.

Provide health education to parents and teachers about child injury prevention and utilisation of first aid box at the time of needy. Educate the school children about the traffic rules. Compulsory utilisation of helmets for both pillion and rider, compulsory utilisation of seatbelts in four wheelers shall help to reduce the burden and impact of road traffic injuries among children.

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