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Original Research Article

A qualitative study to assess dynamics of major injuries in children and adolescents of a rural area of Delhi

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ABSTRACT

Background: Childhood injury constitutes a grave public health problem. Most of the unintentional injuries and their consequences are preventable. Present study highlights the dynamics related to major injuries in children.
Methods: This is part of a prospective research conducted over 16 months, on 397 children and adolescents of rural Delhi. Present report includes those with major injuries. Data was collected by in-depth interview of subjects with major injuries, and their guardians.
Results: Five major injuries occurred during study period. Thus incidence of major injuries was 1.26/100 children/year and proportion of major injuries out of total injury events was 2.89%. There was no fatality or disability. Socio-demographic risk score was high for 4 out of the 5 children. All subjects were adolescents, of whom 3 were boys and 2 girls. All injuries were of locomotor system, with two cases having multiple glass-cut injuries in addition. All injury events had occurred when subjects were away from home, of which three occurred on road, due to unclean surroundings in one case and two by motor vehicle accidents due to inexperienced drivers, of less than legal age for driving, and on alcohol. Treatment was taken from secondary care hospitals by all injured subjects. Mean cost of treatment was Rs.5,009/-, with total out-of-pocket expenditure being Rs.7,212/- (mean=Rs.2,404/-). Mean time to recovery was a little over 1 month (32 days).
Conclusions: All the major injuries that occurred in the study population could have been prevented by taking responsibility at various levels.

Key words: Major injury, Qualitative study, Childhood injury

INTRODUCTION

Childhood injury constitutes a grave public health problem in terms of suffering of the child in the immediate injury period as well as sustaining serious residual consequences that might leave the child incapacitated for life. Injuries constitute a large proportion of global burden of childhood death, particularly for older children in whom it accounts for almost half of the deaths.[1] Many more children suffer from the consequences of non-fatal injuries and subsequent life-long disabilities, leading to high loss of disability adjusted life years (DALYs).[2,3] Major injuries are the ones which result in these unfavourable consequences. In addition, treatment expenses for injuries especially in case of major injuries, cause strain on the family budget, particularly so in poor families. Most of the unintentional injuries and their consequences are preventable. Detailed assessment of the various related aspects is essential to design preventive measures. The present study was conducted to assess the dynamics related to major injuries for the purpose of risk assessment of host and environmental factors, and study the occurrence and management of major injuries.

METHODS

Present qualitative study is a part of a prospective research study on childhood injuries, conducted over 16 months from September 2017 to December 2018, on 397 children and adolescents, in two villages of North West Delhi, out of which one village is the rural field practice area of Maulana Azad Medical College in New Delhi.

Subject inclusion criteria were individuals in the age group 0-19 years and belonging to families having at least one adolescent and two younger siblings. The first household to be visited was selected by lottery method starting at the center of each village and subsequently subjects meeting eligibility criteria in consecutive families were selected.

Out of all the injuries that occurred during the total study period, the injury events that resulted in major injuries in the subjects have been analysed here. For the purpose of this research, major injury was defined as any injury to internal organs; any injury associated with systemic symptoms like loss of consciousness, difficulty in breathing, severe acute pain in abdomen; any injury resulting in impaired vision or hearing; any fracture, dislocation or sprain; any cut needing stitches, cuts ≥5 cm in length or ≥5 cuts in number at a time; burn of size ≥5 cm in length or diameter. Data was collected from the subjects and their guardians by in-depth interview and review of medical records. Activity and location of the subject, along with environmental condition at the time of the event was assessed to identify possible preventive factors. Post-event management of injuries was studied in detail. Exact cost of treatment at private hospital was noted. Government expense for management of cases treated at government hospital was calculated from the prescribed amount by Delhi Government for Rate Contract of Central Procurement Agency for medicines and reimbursement rates for investigations and procedures, under Delhi Government Employee's Health Scheme.

Data analysis was done by both quantitative and qualitative methods. Quantitative method included cost calculation for the injuries and socio-demographic risk assessment of host factors as present during the pre-event period. Risk of subjects was scored as 1 for raised risk and 0 for lower risk, according to the socio-demographic variables that were found to be associated with significantly raised Relative Risk for injuries by bivariate analysis earlier in the main study. The factors found to be significantly associated with injuries are detailed below. Maximum attainable risk score was 8, with higher score associated with higher risk. Subject: male subject (risk score 1). Mother of subject: uneducated (risk score 1) and working (risk score 1), in age group 18-34 years (risk score 1), spending 5 or more hours outside home (risk score 1). Family: nuclear family (risk score 1). Head of the family: in 25-39 year age group (risk score 1) and working (risk score 1). Qualitative data was presented in textual formal as description of injury occurrence and detailed case study of the injuries that included probable associated factors, description of the injuries and their management.

RESULTS

During the entire study period there were five cases of major injuries. No injury to internal organs or with systemic symptoms was reported. Fortunately for the families, there was no fatality or disability during the study period and no Disability Adjusted Life Years were lost. Of the total 397 population, five subjects suffered from major injuries thus making incidence of major injuries to be 1.26 per 100 children per year. Expressed as proportion of total injuries, out of the 173 injury events that occurred during the study period, five events resulted in major injuries in the subjects, proportion of major injuries thus was 2.89% of the total injury events. Socio-demographic risk score for the subjects, using Haddon Matrix for risk assessment of host factors during the pre-event period for major injuries, high risk scores were found for majority of these children. Barring one subject who had a risk score of 1 (12.5% of the maximum possible risk) all the other four subjects had socio-demographic risk scores above 60%, which indicates high risk (Table 1).

Table 1: Socio-demographic risk score of subjects with major injuries: Pre-event factors.

Case no.	Subject		Mother				Head of family		Type of family	Risk score N (%)
	Age (yrs)	Sex	Age	Education	Working/ not working	Time spent outside home	Age	Working/ not working		
1	17	F	40	Educated	Not Working	At Home	42	Working	Joint	1 (12.5)
2	12	F	37	Illiterate	Working	8 Hour	46	Self-Employed	Nuclear	5 (62.5)
3	16	M	34	Illiterate	Not Working	At Home	35	Working	Nuclear	6 (75.0)
4	14	M	32	Illiterate	Not Working	At Home	33	Working	Joint	5 (62.5)
5	17	M	42	Illiterate	Working	6 Hour	45	Working	Nuclear	6 (75.0)

Table 2: Description of major injuries: event-time factors.

Case no.	Age (yr)	Sex	Time of day	Time of year	Type of injury	Place of occurrence
1	17	F	Afternoon	October	Elbow Dislocation, multiple cuts	Driving two-wheeler on road
2	12	F	Afternoon	September	Elbow Fracture	Walking on road
3	16	M	Afternoon	November	Shoulder Sprain	Playing in school
4	14	M	Morning	September	Shoulder Fracture	Playing in school
5	17	M	Afternoon	December	Wrist sprain, multiple cuts	Passenger in car with drunk driver

All the majorly injured subjects were adolescents, of whom three were boys and two were girls. All the injury events had occurred when the subjects were away from home, three happening on road during travel and two while playing in school. All the injuries except one had occurred in the afternoon and all events had occurred in the post-monsoon and winter months i.e., September to December. All the injuries were of the locomotor system, with two cases having multiple glass cut injuries in addition (Table 2).

Table 3 shows treatment was taken from secondary care hospitals by all the injured subjects, with three subjects attending private hospital and two subjects attending government hospital. Total cost of treatment of all major injuries was Rs.25,046/-, ranging from Rs.683/- to 17,151/- and with mean cost of Rs.5,009/-. Total out-of-pocket expenditure of families on account of major injuries was Rs.7,212/- (mean=Rs.2,404/-), while total expenses to the Government was Rs.17,834/- (mean=Rs. 8,917/-). Total time to recovery was 162 days, ranging from 2 weeks (14 days) to 2 months (60 days), with mean time to recovery being a little over 1 month (32 days).

Table 4 summarizes the five cases and shows their case studies. It may be seen that out of the five cases of major injuries, one subject was injured due to unclean surroundings (case 2). Two cases were caused by motor vehicle accidents due to inexperienced drivers who were of less than legal age for driving (cases 1 & 5), of which in one case the driver had taken alcohol (case 5). Two subjects were injured while playing in school (cases 3 & 4).

Table 3: Management of major injuries: post-event factors.

Case no.	Place of treatment	Type of treatment	Cost of treatment (Rs.)	Time to recovery
1	Private Hospital	Crepe Bandage	1,450	2 weeks
2	Government Hospital	Surgery	17,151	2 months
3	Private Hospital	Crepe Bandage	1,000	2 weeks
4	Private Hospital	Plaster	4,762	2 months
5	Government Hospital	Medicine and dressing	683	2 weeks
Total			25,046	162 days
Mean			5,009	32 days

DISCUSSION

Burden of injuries is presently rising at an alarming rate. All age groups are at risk of sustaining injuries. However, population in extremes of age that is children and elderly, are more vulnerable to injuries and are also at much higher risk of its consequences. Main contributor to disability and death are the major injuries sustained. The leading causes of fatal injury seen among the children include road traffic injuries, drowning, burns and firearm injuries.[4] But fortunately, severe or major injuries have been reported by researchers to be low. Majority of the injuries have been reported to be either mild or moderate and majority do not cause any disability.[5,6] Disability and death due to injuries have also been reported to be low.[7-11] In the present study, 2.89% of the total injury events resulted in major injury to the subjects. No injury to internal organs or with systemic symptoms was reported, no fatality or disability had occurred, and no Disability Adjusted Life Years were lost.

Dynamics of major injuries have not been studied earlier by researchers. The present study adds to the existing evidence regarding major injuries in the various dimensions in the Haddon Matrix viz. pre-event host risk factors; event time host behaviour and environmental condition; and post-event injury management aspects. Pre-event socio-demographic risk factors were high for four out of the five subjects. Event time host factors included high-risk behaviour of the subjects. Event time environmental factors showed climatic condition i.e., fog

leading to low visibility in one case, which is a natural hazard. However, unclean community surroundings i.e., presence of wet cow dung on road on which the subject slipped and fell, was the environmental factor responsible for the injury event in one case, which could have been prevented with minimum organized efforts of the community. Post-event management was good and all the subjects with major injuries were taken to secondary care hospitals for treatment and compliance to treatment was also good in all the subjects.

Table 4: Case studies of major injuries.

Cases	Description
Case 1	A 17-year-old girl was driving a two-wheeler though she was of less than legal age for driving. She lost her balance and fell, due to which she suffered multiple grazing abrasions on left side of face with bleeding, sharp cut on left upper eyebrow, dislocation of left elbow. Treatment included stitches for the sharp cut, Tetanus Toxoid injection, antibiotic medication and local dressing. Time to recovery was 2 weeks. Total expenditure was Rs.1,450/-
Case 2	A 12-year-old girl while walking on the street close to her house in the evening slipped on wet cow dung and fell down. She had fracture of both bones of right arm radius and ulna. Initially she was put on conservative management and closed reduction was done and above elbow plaster cast was applied. On follow-up after one month, non-union was detected and surgery was done-open reduction of fracture dislocation and internal fixation with nails and plate. She was discharged on tenth day after surgery. Subsequently, physiotherapy was continued for 3 weeks. Time to recovery was 2 months. Total expenditure was Rs.17,151/-
Case 3	A 16-year-old boy fell down while playing in school. He sustained soft tissue injury/muscle sprain of right shoulder. He was treated conservatively with local crepe bandage, local analgesic ointment, hot fomentation followed by mobility exercises. Time to recovery was 2 weeks. Total expenditure was Rs.1,000/-
Case 4	A 14-year-old boy fell down while playing basketball in the school ground. He had hairline epiphyseal fracture near head of left humerus. He was treated conservatively with fiberglass cast applied on the affected part, which was removed after 4 weeks. Subsequently, mobility exercises were continued for 1 month. Time to recovery was 2 months. Total expenditure was Rs.4,762/-
Case 5	A 17-year-old boy was riding in a car driven by his friend who had taken alcohol and was also of less than legal age for driving. With lack of visibility due to fog the car collided with a tree and the windscreen shattered. He suffered multiple injuries multiple abrasions on face, sharp cut on right upper eyelid, sprain of the right wrist, abrasions on chest and both arms. The sharp cut was stitched and dressing was done for all wounds. He was given T.T injection, antibiotic medication and ointment. Time to recovery was 2 weeks. Total expenditure was Rs.683/-

Limitations

One major limitation of this study is that it is based on interview of the subjects with major injuries and/or their guardians. Thus, the data presented here is as reported by the respondent, which may not be sufficient to assess the real-life scenario. But it is seen that sensitive information was also divulged by the respondents e.g., driver being below the legal age and also driving in an inebriated condition. Hence, it may be assumed that the information obtained is correct and implies that there is immense scope in taking minor actions to prevent major injuries.

CONCLUSION

In-depth analysis of injury dynamics of major injuries revealed that, all the major injuries that occurred in subjects of the present study could have been prevented by taking responsibility at various levels viz. community by keeping surroundings clean, parents by preventing under-age children from driving and preventing them from driving after taking alcohol, and school staff being more vigilant on students while they were playing. Individuals should also be more careful while performing any activity, in these cases walking, playing or driving.

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