Original Article

Unintentional, paediatric domestic injury in a semi rural area of Karachi

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Abstract

Objective: To identify the characteristics of unintentional domestic injury in children living in a semi-rural area of Karachi.

Methods: This retrospective descriptive study was carried out at a private hospital located at the northern outskirts of Karachi, Pakistan, from January 2005 to January 2007. We enrolled 271 out-patient children of either gender with a positive injury history. A questionnaire inquiring socio-demographic characteristics, timing of injury, monthly variation, injury pattern and factors was filled out. Descriptive analysis and Chi-square test were applied to find out the statistically significant differences.

Results: Among the 271 patients, the male-to-female ratio was 1.2:1. Fall from height 145 (54%) or at the same level 52 (19%) was the commonest form of domestic unintentional injury across all ages. Children younger than 2 years of age, 140 (52%), were more prone to injuries, with 49 (51%) having fallen from the lap. Cuts with sharp domestic utensils were noted in 19 (6%), while 15 (6%) had burns. Submersion in underwater tank was noted in 20 (7%) cases and poisoning in 7 (3%). Majority of the injured children were from the low socio-economic stratum and more injuries, 194 (72%), were reported during the summer months.

Conclusion: Male children are more prone to suffer unintentional domestic injuries especially during summer vacations. Fall was the commonest pattern noted.

Keywords: Paediatric injuries, Domestic, Unintentional, Karachi, Pakistan. (JPMA 62: 638; 2012)

Introduction

Although paediatric infectious diseases are the leading cause of paediatric morbidity and mortality in developing countries, still paediatric injury-related deaths and deformities, either intentional or unintentional, are escalating and positioning to be the leading cause of morbidity or mortality.[1] The past prediction that injury burden will exceed infectious diseases nearly comes true in most parts of world, both in children and adults.[2] In the developed world, injury fatality is four times more than any other paediatric disease. In US, most children aged 1-4 years die annually from unintentional injuries as compared to all other childhood diseases combined.[3] In Hong Kong, 76% of unintentional injuries were noticed in 1996 between 1-14 years of age.[4]

Unintentional injuries account for 90% of all injury-related deaths and disability. Though paediatric injuries are a

major health problem in low-income countries (LIC), our knowledge about its epidemiology and risk factors is still inadequate.[5] In 1990 the injuries in LIC accounted for 13% of all Disability-Adjusted Life Years (DALYs). It is expected that by 2020, the figure will increase to 22%.[6] This is just the tip of the iceberg. This actually accounts for millions of unintentional injuries each year in LICs.[5]

Factors contributing to these unintentional domestic injuries are challenging living conditions, lack of available space and family members, child behaviour, parental perceptions of injury risk, and safety measures. Maternal stress and education are the other indirect factors of paediatric unintentional domestic injuries.

Drowning, fires, and burns are the leading causes of death in pre-school children while falls and poisonings are quite common in young children.[7] Most unintentional injuries to children occur under 5 years of age, in and around their homes.[8]

It was estimated that annually 6.16 million unintentional injuries occur in Pakistan in children above 5 years.[9] Unintentional, domestic and environmental injuries contribute to 47,000 deaths per year, and most of these injuries are preventable.[10]

Multiple studies have been conducted in this region, but most of them focussed on adult injuries. Identifying the characteristics for common domestic unintentional paediatric injuries is most needed at this stage. This leads to effective planning for preventive strategies. Few studies focussed on paediatric injuries, especially on road traffic and other environmental injuries, and their characteristics.[11] In the absence of prior knowledge about the basic epidemiology of injury pattern and causative factors, the effective and accurate preventive measures cannot be taken. In this study, we tried to mark out the characteristics which included distributions, types, causes and circumstances of domestic unintentional injury in a semi-rural area of Karachi.

Patients and Methods

This study was carried out at a private hospital located at the northern outskirts of Karachi, Pakistan, from January 2005 to January 2007. The study population resided in a semi-rural setting with a dense population of one million. There were few, if any satisfactory civil amenties.[12] Approximately 11,000 patients visited the hospital annually. Target population of children aged up to 14 years of either gender, were included in this descriptive study. Children with history of physical and/or sexual abuse, occupational, industrial or road traffic injuries were excluded from the study, as these injuries were either intentional or not within the child's residential premises. Injury was defined for referencing as "the physical damage that result when a human body is suddenly subjected to energy in amounts that exceed the threshold of physiological tolerance."[7] Children with history of injury and/or any other illness were all approached. After institutional permission, parents and patients were explained the procedure and formal consent was taken. Of 301 out-patients' children with a positive domestic unintentional injury history, 271 parents consented to enroll in the study. Our response rate was 90%. Parents were asked if there had been any unintentional paediatrics injury in the preceding 12 months before the study period. Injury is an event that would leave its impact on social and emotional memories of the family, while the recall period was initially 48 months, it was pre-tested and later reduced to 12 months for data validity.

An interview-based, pre-tested questionnaire was used as a tool for data collection. Age, socio-economic status, monthly family income, family size, number of siblings in the family and house structure were noted. Mother's status, working or housewife, in a nuclear or joint family system was also noted. Pattern of injuries such as fall, burn, cuts, drowning/submersion, poisoning, ingestion, animal/insect bite etc. were inquired. The timing of injury, monthly variation and factors leading to injury were also noted. All variables had categories assigned as answering options. There were no open-ended question. The primary investigator and trained researchers were involved in data-collection for uniformity of data for all paediatric clinics at the hospital.

WHO defines, 'Fall' as descending from a height, with respect to a lap or structured body i.e. furniture, ceiling etc. Injury occurring while simple walking or running was considered as slipping. Burn is taken as any injury related to stove/matches fire, scalded wound by hot water or chemicals etc or with firearms.[13]

After compilation, data was double-entered, checked and cleaned. A descriptive analysis and Chi-square test was applied to test the statistical significance of all categorical variables (risk factors, not the types of injury) using the SPSS version 16.0. Level of significance was set at 0.05 with 95% CI.

Results

Among the 271 patients, the male-to-female ratio was 1.2:1. Data evidence showed that age was an important contributor to injury. Those younger than 2 years of age were more prone to injuries, as 140 (52%) cases were found, while 98 (36%) children were in the 3-10 age group (Table).

Assessing the effect of gender, we noted no gender difference in children less than 2 years of age. However, from age 3-10 years, we found marked male predominance, 71 males as compared to 27 females. In those over 10 years, there was a reverse shift of gender differences, 24 females against 9 males. Majority of these injuries were

Table: Baseline characteristics of study participants.

Characteristics(unit)	N	Percentage
Age (years)		
Younger than 1 year	25	9.2
1-2 years	115	42.4
3-5 years	49	18.1
5-10 years	49	18.1
11-14 years	33	12.2
Gender		
Male	147	54.2
Female	124	45.8
Number of siblings		
1-2	41	15.1
2-4	61	22.5
5-6	146	53.9
>6	23	8.5
Economic status		
Low economic class	171	63.1
Middle economic class	100	36.9
House structure		
Kacha (mudded built)	55	20.3
Pacca (brick built)	216	79.7
Mother working status		
Housewife	145	53.5
Working mother	126	46.5
Other caretakers in family		
<5 members	125	46.1
>5 members	146	53.9
Family structure		
Nuclear	133	49.1
Joint	138	50.9

from low socio-economic stratum; 91 (53%) of the less privileged children were less than 2 years of age (X2 = 15.662, p = 0.004).

Regarding the pattern of injury, there were 145 (54%) with fall from height, 52 (19%) children fell at the same level or slipped while walking/running, 15 (6%) reported burn injuries, unintentional cuts with sharp domestic utensils were noted in 19 (6%), submersion history was given by 20 (7%) parents, poisoning was noted in 7(3%) cases, firearms and cracker injuries were noted in 3 (1%) children, Insect/animal bites were reported by 11 (4%) cases. Children had fallen from bed, stairs, chairs, furniture, roof and even from the mother's laps.

We found 145 (54%) injured children whose mothers were housewives; while there were 126 (46%) injured children with working mothers. There was a reverse drift when we analysed the injury according to economic background. As we found, 171 (63%) poor families, in which 139(81%) mothers stayed at home, but still their children had some sort of injuries. While in 100 economically satisfied families, 94 (94%) mothers had to go out to earn and upgrade the economic status of their family, paying the price of putting their children at risk to injury. (X2 = 1.43, p = 0.0001). In injuries related to fall from

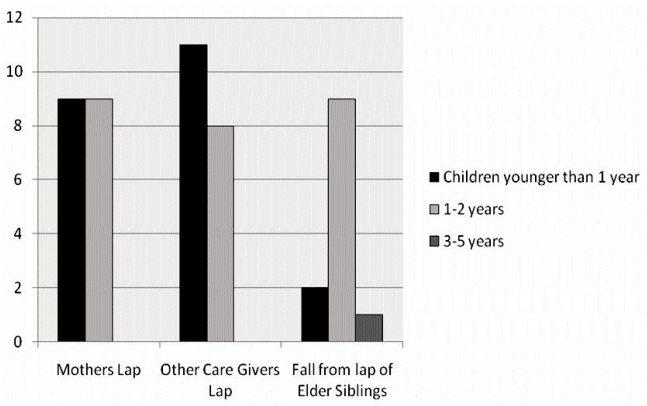

Figure: Comparison of falling from laps.

height, we found 65 (45%) children of working mothers as compared to 80 (55%) children whose mothers stayed at home (X2 = 14.3, p = 0.073). For other injury patterns, we found working mothers in 6 out of 9 cases of burns, and 8 out of 11 for cuts. No difference in cases of submersion was observed. While correlating the age of the children with the working status of mothers, it was noted that 86 (68%) mothers had to go out to earn despite having a child aged younger than 5 years. In 126 children of working mothers, 66 (54%) had domestic injury and were cared for by other family members. Working mothers preferred to live in the joint family system, as indicated by 66 (53%) cases, 88 (52%) nuclear families belonged to the poor class, while 55 (55%) joint families had satisfactory economic status.

Number of siblings in the family also contributed to the injury risk. The age of siblings in the family was inversely proportional; while the number of children was directly proportional to injury incidence. In age younger than 5, we found 101 (37%) children had larger number of siblings (X2 = 16.88, p = 0.001)

Seasonal variation had a profound effect on the incidence of domestic injuries across all age groups. We found that children were more injury-prone during the summer months. During the hot summers of April to August, 194 (72%) children had injured themselves, followed by summer vacation of June and July, with 90 (46%) cases. All 20 submersion incidences were noted during the summer months in the underground water tanks. Seventeen out of 19 children had a history of cut by sharp utensils during the summer months. Similarities were noted for ingestion and animal bites. The spectrum of injury altered during the winter season. Female children were wounded with fire and burn exposure, while drowning events decreased substantially. The timing of injury was found to be another important factor; 149 (55%) were injured during the afternoons.

We found 145 (54%) children of all ages involved in some sort of injury with fall from elevation. Falling from the lap in children younger than 2 years of age was the single most common form of domestic unintentional fall-related injury (Figure). Out of 94 fall-from-height cases under 2 years, 49 (51%) had fallen from the lap. These falls were more from the laps of care-givers other than the mothers (65%). In the same age group, 45 (31%) had fallen from beds and cots which was another source of injury. Having more elder siblings had a detrimental effect on fall, as 90 (62%) who had fallen from elevation were found in families with large family size. Though not significant, it was inverse in case of working mothers ($X2 = 0.075$, $p = 0.785$). In children ever 3 years of age, fall-related injuries with bicycle, stairs and roof ranked in the declining order. Fall from stairs were common for all ages.

Fall from the same level or slip while walking, running or playing was another important cause of domestic injury in children. For all ages, we found 52(19%) patients. Thirty eight (73%) cases were below 2 years of age. Thus, injuries induced by fall form height or at the level/slip counted to 197 (73%) and was the commonest type of domestic unintentional domestic injury in the study children. Children living in concrete houses and who were younger than 5 years suffered most of the injuries ($X2 = 18.609$, $p = 0.0001$). Fortyfour cases with fall at the same level/slip were reported from concrete houses with smooth flooring, as compared to just 8 in Kacha/mud houses. Other patterns of paediatric injury did not give significant numbers to be analysed.

Discussion

Paediatric injury is an unrecognised public health problem of today's world for both the developed and under developed countries.[14] There are several factors that had a direct or indirect effect on paediatric injury. These include age, gender, socio-economic status, geography, child behaviour, domestic environment, maternal education, family structure, siblings and the number of family members.[15] Data proves that home is the primary place for injuries, especially in children younger than two years of age.[16]

Age and gender related behaviour directs our children towards specific injury patterns.[9] Children under two years of either gender generally have the same gross motor and other milestones. They are involved in similar acts of play and approach, and, thus, were prone to similar set of injuries. Children less than 2 years are early-walkers, unaware of the danger, trying to seek answers to curios thoughts, hence putting themselves at risk. They are more prone to fall (either from height or at level) and ingestion-related injuries.[17] In this age group, literature does not support any gender differences dictating the injury pattern. As children moved up the ladder of developmental milestones, they needed separation and monitoring timeout, especially male children.[18] Their observatory activity, learning skills, thought process and their fine skills matures and they start visualising the world from their own outlook, with more experience and skill. These learning abilities are personal, environmental and gender-dependent. Toddlers experience injuries like fall from the bed, tricycle and stairs etc.[19]

Apart from other injury patterns, the most striking was fall (from height or at the level). It frequently results in visits to the emergency department involving children up to 5 years of age.[20] These injuries often involve falls from stairs or furniture.[13,14] Besides, 94% of all paediatric falls occur at or around the child's home.[16] Even within fall, the patterns can be further sub-divided. Across the globe, fall from the lap in children under 2 years is a common cause related to unintentional domestic injury.[17,21,22] Infants under 6 months are small enough to roll and fall from bed, unlikely to jumble and can be more secure within the lap with less chance of fall or being dropped.[22] In contrast to children under 2 years of age who are bed and/or lap bounded, infants are prone to fall more. As experienced by different authors,[17] we also witnessed 22% of children with similar findings. Interestingly, most children had fallen from mothers' or the care-givers' lap. On the contrary, Bombaci et al.[23] and Oral R,[20] found fewer such cases. We found more cases, probably due to the study location, which was a vicinity with large family population. In our study population, most of the families did not have separate paediatric beds; infants usually shared the same bed with parents, devoid of safety railings, resulting in injuries. Luckily, fall during this period were less dicey. Still, proper bed configuration, supportive railings and other protective measures should reduce these numbers. This study does not differentiate the incidence of fall during early and late infancy.

In Southeast Asian countries like, Pakistan, India and Bangladesh, the traditional child holding or carrying style is with one hand, aided with arm and shoulder support, while mothers are busy with domestic work or serving others family members. Elder siblings and other care-givers also follow the same posture. This traditional style of holding children is risky, exhaustive and tricky to balance for both the child and the care-giver. The ideas of kangaroo style of holding and/or back bags, as practiced by Africans and by women of Far East Asia, are ideal form of holding and nursing the children, resulting in both free hands. The incidence of paediatric fall under 2 years from adult arm or mother lap of Africa and Far East Asia needs to be studied to observe the effectiveness of their child-holding practice.

The comparison between these two groups with/without intervention is another vacant area for extensive studies.

Late infancy is still a time when toddlers support, as they are learning to run, jolt and jump simultaneously. Extra curious and active, they climb up the furniture, chairs, bed, railing, and stairs etc. The incidence of fall (either from height or at the level), while running and walking, from stairs was infrequently noticed as compared to other studies.[16] This effect might be evident from the study population belonging to the less-privileged families, with limited available spaces and furniture in the house, and thus, had little chance of tripling while playing and running. As in this study, fall from stairs was the third commonest cause of fall in children.[17,24] The reasons of fall in the house are multi-factorial. It is not just the age or gender. Housing, spacing, flooring, type and size of furniture, family members, working mothers and time spent by children within the house, all influence on the incidence and pattern of domestic unintentional injury.

In the Western world, there is an increased trend of mothers to go out to earn in order to financially support the family. In the US, the number of working mothers rose from 46.8% to 62.3% between 1980 and 1996[12] and their children are either nursed/cared for by babysitters, single parents or supervised in daycare centres for large portions of the day. These working mothers may have less time to provide adequate supervision to their children and may lead to higher injury rates. There is a strong correlation between injury rates and maternal employment and is likely to be mediated by the quality of the care and the system that influence it. In Karachi, only 3% of women are employed outside their home.[25] The educational status of mother's working group, working hours, occupation and age are few other factors leading to injuries. On the contrary, literature also demonstrates that children of working mothers have lower injury rates.[26] Children in our study were either looked after by their elder siblings, grandparents or other close relatives within the child's own house. In the US, 31% of grandparents reported the responsibility for their grandchildren.[26] In Pakistan no such data is available to quantify these values.

Household/family size in Pakistan is 6.8 people per family. This includes members of all age groups.[26] In our study, the number of siblings/family members was directly proportional, while the age was inversely proportional to injury incidences, conflicting with Bombachi et al.[23] Number of children and their age lead to their curiosity and involvement in adventurous and injury-prone activities, especially if they were not supervised by either elder sibling or adult family members.[27] On the other hand, the presence of younger sibling is associated with a lower probability of injury, while the presence of older siblings increases accident rates.

Literature from the Western world shows that children of small family size or with single care-giver are more prone to injuries; even the severity of injury increases.[28] The situation demands higher level of responsibility in order to minimise the injuries both in small and large-size families.

As supported by literature and our data, during the long, warm afternoon nap-hour of Karachi, especially during the months of summer vacations, children stay indoors frequently unattended and numerous injuries result.[27]

Children in concrete houses are more prone to injury. This is evident from present and other literature that injury related to fall is among the commonest domestic injuries, because of their smooth and slippery floor, marbles, stairs and ceilings etc. These children are prone to fall or slip while running, playing or walking, while mud house are deficient in such potentially injury-prone resources. Children is such a house have limited space available and are forced to spend most of their time playing out of their house. They had injuries there, but those were not included in the study as they were not domestic (in-house injury) in nature. We did not compare the socio-economic background of the concrete house families. In the study area, such house had multiple floors, each divided into further components with multiple families living within a small landscape.

In terms of limitations, the study only included patients presenting to emergency or walk-in clinic from a small hospital with history of domestic and unintentional injuries. These results cannot be generalised to cover the entire population. There was also recall biases as it was a retrospective descriptive study. Risk factors were statistically assessed in general and not pertinent to specific type of injury. Risk factors were also not compared.

However, on the basis of this study, we can aim for more elaborate studies and work towards general public awareness and policies for the prevention of this avoidable aspect of childhood mortality, morbidity, and limit disability for life. Primordial preventive measures, including counselling through media, parents and children education of safe home environment, will reduce the incidence. Primary healthcare providers are an excellent source of data-collection for minor domestic injuries and they can also help in primary and secondary preventions.

Conclusion

Male children are more prone to unintentional domestic injuries, especially during the summer vacations. Fall was the commonest pattern noted. The study of

paediatric injuries and its prevention helps in realising that significant reduction in morbidity and mortality can only be achieved through awareness of its epidemiology and identification of risk factors. Modern injury prevention and control is modulated by 4-Es of injury prevention: 'Engineering, Enforcement, Education, and Economics.' Preventive measures aimed at continuous awareness by media, as well as parents and children education regarding safe home environment might reduce the frequency.

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