

ORIGINAL ARTICLE

CHILD INJURY ADMISSIONS TO A HOSPITAL IN ETHIOPIA

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ABSTRACT

Background: Childhood is a period characterized by increased physical activity. This, coupled with wrong judgment of dangerous and risky situations, leads to increased chances of injury, if daily activities and play are not supervised by care givers.

Objective: This study sets out to evaluate the burden of childhood injury and spotlight the common conditions that predispose to it with view to proffering some solutions.

Methods and Materials: A retrospective analysis was carried out in all children with injury admitted from 1 September 2010 to 30 August 2015 in Mekelle Hospital.

Results: In this series, there were 508 childhood injuries and the age distribution was 135(26.6%) between 0-4years, 196 (38.6%) between 5-9 years and 177(34.8%) between 10-14 years. Most, 196 (38.6.0%) childhood injuries occurred in ages between 5-9 years followed by 10-14 years of life accounting for 177(34.8%) of the cases. Boys 348(68.5%) were more predominantly affected than girls 160(31.5%). The causes of injury were fall down accident (30.1%), road traffic accident (24.8%), burn injuries(23.8%), puncture wounds (11.2%) and non-fatal interpersonal violence (8.7%). Fall down and road traffic accidents were the top causes of injury in ages between 5-9 and 10-14 years. Among the injury types, fractures accounted for 30.7%. The overall mortality rate was 4.9%, most of which was due to road traffic crashes and burn injuries.

Conclusion: In this study, the rate of pediatric injury appeared to be low in early childhood, while it showed a significant increase in school ages for all kinds of injury. The evidence indicated that most childhood injuries are preventable and that effective preventive measures can significantly reduce injury related childhood morbidity and mortality.

Key words: Children, Injury type, Outcomes.

INTRODUCTION

An injury is defined as the physical damage that results when a human body is suddenly subjected to energy in amounts that exceed the threshold of physiological tolerance or else the result of a lack of one or more vital elements such as oxygen (1).

There is every indication that childhood injuries, both accidental and intentional are on the increase in Africa including Ethiopia (1-3). Accidents are now the leading causes of morbidity and mortality after the first year of life. African countries including Ethiopia are undergoing social and economic change, such as urbanization and industrialization, which has increased the incidence of intentional and accidental childhood injuries (4-6).

Nowadays, there is epidemiologic transition whereby the old world diseases, mainly infections, are replaced by man-made diseases among them being injuries. (1-3,6,7). In Africa, the scarce available data shows the same trend; trauma is now the commonest reason for emergency vis-

its to various health facilities leading to enormous social and economic impact not only to the victim but also to the family and the community (8, 9). Despite this, the prevention of injuries has not received the attention it deserves, either from the medical workers or also from the community and policy makers, partly because of the scarcity and lack of data on the major causes of injury related accidents. But the incidence of injury in many African countries including Ethiopia is so high that this situation should not be allowed to continue (10). It is thus imperative that doctors and surgeons involved in the management of these patients spearhead the fight against all types of injuries by drawing up strategies for preventive measures and participating in their implementation.

PATIENTS AND MATERIALS

This is a retrospective descriptive study conducted on all children with accidental and intentional injuries admitted to both pediatric and surgical wards in Mekelle Hospital from September 1, 2010 to August 30, 2015. Mekelle Hospital is a regional referral hospital located in Mekelle-

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Tigray Regional state in north Ethiopia at a distance of 783 kilometers from Addis Ababa. It renders curative service in all the major disciplines including the basic minor units. All child victims of injury aged from one month to 14 years were included in the study. The patient demographic variables, the diagnosis, nature and location (site) of injury including conditions during discharge were assessed. Case notes were obtained from patient medical records and operation theatre registers. Adequate medical recording has been maintained in this hospital. Information on age, diagnosis and treatment outcomes was extracted from the admission and discharge registers in the ward and registers from the operating room. All patients were grouped into various age groups based on their specific characteristics. Data was filled in a pre-prepared protocol sheet. Descriptive analysis was carried out using computer statistical software and results displayed using numbers, percentages and tables. The difference in proportions was examined using statistical tests and significance was set at $p < 0.05$.

RESULTS

A total of 2336 cases of pediatric surgical lesions were admitted, out of which 508 were cases of childhood injuries accounting for 21.7%. The age ranged from one month to 14 years of life. The age distribution of the victim children was as follows: 0-4 years 135 (26.6%), 5-9 years 196 (38.6%) and 10-14 years 177(34.8%), (Table1). Most, 196 (38.0%), of childhood injuries occurred in ages between 5-9 years followed by 10-14 years of life accounting for 177(34.8%) of the total cases (Table 1). Males 348 (68.5%) were more predominantly affected than females 160 (31.5%) giving a male to female ratio of (M: F) of 2.2:1 (Table 2). The median and mean ages were 7 and 8.1 years respectively.

Table 1: The causes of childhood trauma seen across the different age groups, Mekelle, Ethiopia,(2010-2015).

Causes of injury	Age in years			Total (%)
	0-4	5-9	10-14	
Falls	26	72	55	153(30.1%)
RTA	9	63	54	126(24.8%)
Burns	64	28	29	121(23.8)
Puncture/laceration	36	21	0	57(11.2%)
Interpersonal violence	0	9	35	44(8.7%)
Bull gore injury	0	2	2	4(0.8%)
Blast injury	0	1	2	3(0.6%)
Total	135(26.6%)	196 (38.6%)	177(34.8%)	508(100%)

RTA: Road traffic accident.

Table 2: Socio- demographic distribution of children with trauma, Mekelle-Ethiopia, (2010-2015).

Characteristic	Number of patients	Percentage (%)
Age groups (in year)		
0-4 years	135	26.6
5-9 years	196	38.6
10-14 years	177	34.8
Sex		
Male	348	68.5
Female	160	31.5
Place of residence		
Urban	339	66.7
Rural	169	33.3

In this study, the causes of childhood injury were falls 153(30.1%), road traffic accidents 126(24.8%), burn injuries 121(23.8%), puncture (laceration) wounds 57 (11.2%) and non-fatal interpersonal violence (assault) 44 (8.7%) (Table 1). In this series, the result showed a high rate of unintentional 464(91.3%) and minority were intentional 44(8.7%) injuries which were the reason for their admissions

Falling down and road traffic accidents were the leading causes of injury related morbidity in ages between 5-9 and 10-14 years of life accounting for 72(14.8%), and 55 (10.8%) for falling down and 63(12.4 %) and 54(10.6%) for RTA respectively (Table 1). Burn injury was the third overall cause of childhood trauma contributing to 121 (18.4%) mostly in ages between 0-5 years contributing to 64(12.6%) in this study. The difference across the age groups was statistically significant ($p < 0.05$). Scalds 65 (53.7%) and flame 56(46.3%) were the frequent etiologies of burn injuries. Meanwhile, scalds 43(35.5%) in the younger and flame 35(28.9%) among older children were the common causes of burn injury, ($p < 0.001$). The total body surface area (TBSA) burnt was between 1- 10% in 70(57.8%) of the patients. The remaining 41 and 10 children had TBSA of 11-20% and TBSA greater than 20% of burn injuries respectively.

Cases of burn in this study may not reflect the actual magnitude of the affected children, because full record information was not available, because the hospital provides no facility for burn care. Tongue puncture/ laceration 57(11.1%) and non-fatal interpersonal violence 44(8.7%) were the other observed childhood injuries in this series.

Non-fatal interpersonal violence was commonly seen in age groups between 10-14 years of life which accounted for 35 (6.9%), ($p < 0.001$) as shown in Table 1.

Among the injury types, fracture alone was seen in 156 (30.7%) of the study subjects, soft tissue injuries in 129 (25.4%) followed by burns 121(23.8%). Puncture wounds and head and neck injuries with intracranial hemorrhage related to trauma accounted for 57(11.2%) and 23(4.5%) respectively, moreover, internal organ injuries including bowel and solid organs were encountered in 11(2.2%) of the cases. Traumatic amputations 8(1.6%), injury dislocations 7(1.4%) and blast trauma 3(0.6%) were also other observed childhood injuries in this series (Table 3).

In this study, the major body part involved in child victim of trauma were extremities 164(32.3%), head, ears, eye, nose and throat (H.E.E.N.T) 158(31.1%) and integumentary (skin) 140(27.6%). Multiple injuries were observed in 27(5.3%) of the cases (Table 4). Among the study subjects, the majority 339(66.7%) were urban dwellers (Table 2). Most injuries had occurred at home, home surroundings 303(59.6%), highway 126(24.8%), around play areas 48(9.4%) and at school 31(6.1%).

Table 3: Types of childhood injuries in Mekelle-Ethiopia, (2010-15).

Types of injury	Number of patients	Percentage (%)
Fracture/dislocation	156	30.7
Soft tissue injuries	129	25.4
Burn injuries	121	23.8
Tongue puncture /lacerations	57	11.2
Head /neck injuries	23	4.5
Abdominal trauma	11	2.2
Traumatic amputations	8	1.6
Blast injuries	3	0.4
Total	508	100

Table-4: Major body parts involved among children admitted for trauma in Mekelle Hospital, Ethiopia, (2010-2015).

Body part involved	Number of Patients	Percentage
H.E.E.N.T	158	31.1%
Thorax	5	0.1%
Abdomen	12	2.4%
Genitourinary	2	0.4%
Integumentary (skin)	140	27.6%
Locomotor(limbs)	164	32.3%
Poly trauma	27	5.3%
Total	508	100%

H.E.E.N.T: head, ears, eye, nose and throat.

In all the study children hospitalized due to accident, the condition at discharge was recorded and analyzed. With regard to injury related treatment outcomes, over 427 (84.1%) of the cases showed complete recovery with minor sequelae, while 56(11.0%) had major injury related defects in six months of minimum treatment follow-ups (Table 5), based on the criteria shown in Table 6.

The overall mortality rate of surgically treated children who were victims of injury was 4.9% (25/508) in which eleven deaths were due to road traffic crashes which gives a higher mortality rate for road traffic related admissions in trauma (Table 5).

Table- 5: Causes and treatment outcomes in childhood injury in Mekelle- Ethiopia, (2010-2015).

Types of injury	Cured	Minor sequelae	Major sequelae	Same	Died	Total
Unintentional injuries 464(91.3%)						
Falls	41	96	12	0	4	153
RTA	38	64	11	0	13	126
Burns	33	58	24	0	6	121
Puncture/laceration	44	13	0	0	0	57
Bull gore injuries	0	4	0	0	0	4
Blast injuries	0	1	0	0	2	3
Intentional injuries 44(8.7%)						
Interpersonal assault	9	25	9	0	0	43
Stab injury	0	1	0	0	0	1
	165	262	56	0	25	508
Total	32.5%	51.6%	11.0%	0	4.9%	100%

Table 6: Descriptions for the determination of residual impairment, Mekelle-Ethiopia, (2010-2015).

Sequelae	Descriptions
Cured	No apparent disability
Minor sequelae	Transient defects Minor defects without effect on stature or body functions
Major sequelae	Permanent disability Contractures /amputations Joint stiffness Major deformity with functional impairments Motor deficits (neural, visual, hearing and speech)

DISCUSSION

Childhood injuries are now becoming one of the leading causes of morbidity and mortality after the first year of life (11). This study revealed that childhood trauma accounted for a significant number of ward admissions. Considering that only cases judged to be beyond the capability of the first aiders actually come to higher level health facility, this indicates that the incidence of severe childhood injury is likely to be much higher in the population (11-13). In this report, the majority of the victim children were boys (68.5%), which is comparable to studies done in Jimma (Berhanu,1998), Dare es Salam (2002), TAH by Teklewold (1973) and to an earlier study in Northwest Nigeria in 2004 (7,10-12). The explanation for male preponderance might be that male children are prone to accidents because they are most often out of their houses, although this view may demand a detailed large scale prospective analysis.

In this series, the rate of accident appeared to be low in early childhood except in burns, while it showed a significant increase in school age, i.e. age groups between 5 - 9 years which accounted for 38.6% of the total cases. A similar trend has been reported in an earlier study in Nigeria (2009) with 34.5% in their series (10). Another similar study in TAH by Teklewold (1973) has revealed that over half of the accidents occurred in ages between 5 -9 years (6), a finding similar to this report. This is understandable because in this age group children have a high level of curiosity and zeal to explore their surrounding without appropriate awareness of danger (1, 2). In this study, 91.3% of the cases had unintentional injuries and 8.7 % intentional injuries. Intentional injury is defined as violence classified as interpersonal assault, including violence against intimate partners, collective violence (war), and self-directed violence (suicide). However, a significant percentage of cases were categorized under accidental causes, details of which were not

available, has left the proportion of unintentional injuries relatively higher than the intentional traumas, though the gap between the two should have become narrower.

In this study, the most frequent mechanism of injury was fall down and road traffic accidents, accounting for 30.1% and 24.8% respectively, which is in agreement with a study done by Teklewold (1973) (6), and to studies in other areas of Ethiopia and other African countries (7-12). Mechanical injuries comprising of fall down and road traffic accidents were the major causes of unintentional injuries which accounted for 54.9% of the total cases. An earlier similar study had reported similar findings which was 69.0% in their study (10). In this series, fall down accident was the leading cause of childhood injury which was observed in 30.0% of the total victim children indicating a similar observation with the study done in Jimma in 2006 (13). Unlike in this study, the magnitude of car accident accounted for 1.3% in Jimma, most likely due to less congestion of vehicles in that area (13).

Overall, road traffic accident ranked as a second most common cause of injury, frequently observed in ages between 5-9 and 10-14 years of life which is comparable with an earlier study in Nigeria in 2009 (10). Another previous study on childhood trauma in Jimma (1998), and in Tanzania (2002) indicated that road traffic accident was the leading cause of childhood injury in age category similar with this series (11,12). A few differences in the ranking of the other causes of injury in children were partly due to variations existing in places within the same country (8, 11).

Among the injury types, fracture alone was the most notable type of injury encountered in 30.1% of the total cases. Teklewold had reported that fractures accounted for 30.0% (6) in their cases which is consistent with this series. In this series, the major anatomic parts involved were extremities (limbs) and H.E.E.N.T (head and neck) accounting for 32.3% and 31.1% respectively followed by the integumentary (skin) 27.6% of the study subjects.

Of the affected children 5.3% had multiple injuries, strong predictors of fatality. Burn with 23.8% was the other cause of childhood injury, which was frequently observed in ages between 0-4 years accounting for 12.6% of the cases. In the majority burns, scald 65 (53.7%) and flame 56 (46.3%) were the causes of burn injury. In children who were victims of burn injury, the TBSA burnt was between 1-10 % in 70 (57.8%) of the patients, which contributed to lower rate of fatality. The remaining 41 cases had TBSA of 11-20 % and 10 cases had > 20 % of burn injury.

With regard to treatment outcomes, description of cure, minor and major sequelae was undertaken. Based on those criteria, about 85.1% of the treated cases showed complete recovery with minor sequelae, while 11.0% had major injury related defects in agreement with studies done in Jimma (2006) where 83.2% of their cases showed complete recovery with minor sequelae, whereas 16.8% had major injury related residual impairments (13). An earlier study done in Nigeria (2009) reported that 60.2%, 36.6% and 3.2% of the injured children had minor, moderate and severe injury scoring respectively (10). Another study in Jimma (1998) by Birhanu et al, revealed that the majority of their injured children had complete recovery with minor sequelae while a minority had major injury related defects (11), depicting a comparable treatment outcome to this series.

In this study, the overall mortality rate was 4.9%, most of which was due to road traffic crashes, burn injuries and fall down accidents. However, the deaths reported in this series may not show the overall magnitude of trauma related fatality, since the majority of severe injuries die on their way to a health facility (14,15). An earlier similar study by Teklewold F. had reported a 9.3% fatality in accident related childhood admissions, slightly higher compared to this audit (6).

In conclusion, this study has depicted that the rate of pediatric injury appeared to be low in early childhood, while it showed a significant increase in school ages for all kinds of injury. Fall down and road traffic accidents were the principal mechanisms of injury. Evidence indicates that most childhood injuries are preventable through education of parents on safety within the home and adaptation of houses to suit the activities of children being reared within. This will go a long way towards reducing the incidence and severity of childhood trauma. Meanwhile, a further prospective study is recommended to look into the specific causes of childhood injuries because institutional based clinical audits may underestimate the magnitude and the frequency of injury in children.

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