PREVALENCE OF CHILD INJURY AND ASSOCIATED FACTORS AMONG PEDIATRIC PATIENTS PRESENTING TO JIMMA UNIVERSITY MEDICAL CENTER, SOUTHWEST ETHIOPIA

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ABSTRACT

Background: Injury is one of the most important preventable cause of death and disability in children beyond the first few months of life. Hazardous living conditions, lack of safe play space, absence of child care options, responsibility beyond age and vulnerability to injury put children at high risk in developing countries. Even though child injury is becoming major public problem it receives little attention and availability of data addressing this problem is extremely limited in developing countries. Therefore, there is urgent need for more researches which contribute to effective analysis of this problem and creating awareness in Ethiopia. This research will reveal the magnitude of child injury and associated risk factors contributing to develop practical and well targeted preventive measures and to develop well organized approach to child injury to reduce disability and death. It can be base for further research.

Objectives: To assess the prevalence and associated risk factors of child injury among pediatric patients presenting to JUMC, 2017.

Methods: Facility based cross sectional study was conducted. All pediatric patients under the age of 14 years was included in the study. The data was collected by structured questionnaire and guide was used to collect data. Bivariate logistic regression was used to identify candidate variables and multivariable logistic regression was employed to identify independent predictors of injury and to control confounders. For multivariable logistic regression adjusted odds ratio with its 95% C.I was calculated and confidence interval was used to declare its significance.

Result A total of 451 children under the age of 14 seen at JUMC OPD were included in the study of which 54.5 %(n=246) were males and 45.5 %(n=205) were females. 222(49.5%) were under 5. 72.3 %(n=326) of the participants were from rural area. The overall prevalence of child injury was 26.4%. Unintentional injury account for 95.7 %(n=114). Falls were the commonest (37%, N= 44). The commonest organ system injured was musculoskeletal system, representing 35.3 %(n=42). The multivariate logistic regression model concluded that sex being male, low maternal education, care giver are predictors of increased prevalence of child injury

Conclusion This study found out that significant number of children are involved in child injury. Majority of the injuries were unintentional injuries. Falling accident was the leading mechanism of trauma followed by burns and RTAs. From body system injuries, musculoskeletal system was the leading body system injured followed by head and soft tissue injuries.

Acknowledgement

My deepest gratitude goes to my advisors, Dr. Gersam Abera and Mr. Mamo Nigatu for the guidance in analysis and development of this research paper. I also want to acknowledge the researchers who have led the base for my study on which I based almost all of my references.

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Abbreviations and Acronyms

JUMC- Jimma University Medical Center

OPD Outpatient department

RTA Road traffic accident

TAH -Tikur Anbessa Hospital

WHO- Word Health organization

OECD- Organization for Economic Cooperation and Development

GDP – Gross Development Production

WHO – World Health Organization

UNICEF – United Nation Children's Fund

UNC – United Nation Convention

PICU – Pediatric Intensive Care Unit

PTS – Pediatric Trauma Score

EMSC – Emergency Medical Service for Children

CNS – Central Nervous System

SIRS – Systemic Inflammatory Response Syndrome

Chapter One: Introduction

1.1 Background

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 the result of a lack of one or more vital elements, such as oxygen". [1] The term 'accident' implies a random event beyond control. This may lead to thinking of injuries as inevitable which may in part be responsible for the lack of global effort in injury prevention. [2]
Injuries are most commonly categorized with reference to the presumed underlying intent: unintentional or intentional. Unintentional injuries are injuries that occur as a result of accident. These can be due to road traffic accidents, falls, drowning, burns, and poisonings. Intentional injuries are due to use of physical force against a child that either results in or has a high likelihood of resulting in harm to the child's health, survival, development or dignity. Injuries considered to be intentional include physical, sexual and psychological violence, harmful traditional practices, and deliberate neglect. [2]

Children are not just small adults. Their physical and cognitive abilities, degrees of dependence, activities and risky behaviors all change substantially as they grow older. As children develop, their curiosity and wish to experiment are not always matched by their capacity to understand or respond to danger. At about 3 months of age children will start to wriggle and roll, at about 6 months they start to sit up alone, and start crawling at around 9 months. When they can they try to reach for objects and put them in their mouth despite of nature of the objects. At 18 months they are mobile and exploring the world. Child development and behavior is therefore highly associated with particular injuries. [3] [4]

Children judgement in differentiating what is harmful and beneficial is poor. This put them in need of continues supervision by caregivers. Lack of appropriate supervision on top of their curiosity, the way they explore the environment, impulsive behavior and disobedience predispose them to injury. Research in developed countries has also identified many environmental and social risk factors for child injuries. These are hazardous living condition, heavy trafficking, lack of safe play space, absence of child care options poverty; single-parent

family; large family size; poor maternal, education; lack of awareness of risks among care givers. [2]

Pediatric trauma, particularly in the younger age groups, is considered to differ from adult trauma in the patterns of injury sustained, physiology, the number of trauma cases, the frequency of surgical procedures performed and recovery from injury. Physicians who treat injured children must be familiar with important distinctions and management of specific injuries. As a child grow older the trauma characteristics is more or less similar to that of adults. [4]

There is trimodal pattern of death in trauma which is modified for children, the first group of injured children dies within seconds or minutes, because of injuries to the nervous system and the major vasculature. Survival can only be improved in this group through pre-event prevention efforts, such as education, social awareness, and behavior modification. A second peak occurs from minutes to hours after the injury and is due to mass lesions in the central nervous system (CNS) (usually subdural and epidural hematomas), solid organ injury in abdomen, or collection of fluid in the pleural and pericardial space. These injuries require early identification these problems and aggressive management. These can be addressed by systemic delivery of emergency medical services (EMSC) for children to avoid preventable death in children. A third mortality peak occurs days to weeks after the initial injury and is the result of complications of injury, such as sepsis and systemic inflammatory response syndrome (SIRS), leading to multiple organ failure syndrome. This late peak in trauma related mortality is less frequent. These can be reduce by good follow-up and early management of complications. [4]

The pediatric trauma score (PTS) was developed to reflect the children's vulnerability to traumatic injury and also predicting mortality. Mortality is estimated to be 9% with a PTS > 8, and 100% with a PTS $\leq$ 0. The minimal score is -6 and the maximum score is +12. [5]

Pediatric Trauma Score (PTS)	+2	+1	-1
Weight	> 20 kg (44 lbs.)	10-20 kg (22-44 lbs.)	< 10 kg (22 lbs.)
Airway	Patent	Maintainable	Unmaintainable
Systolic B/P	> 90 mm Hg	50-90 mm Hg	< 50 mm Hg
CNS	Awake	+ LOC	Unresponsive
Fractures	None	Closed or suspected	Multiple closed or open
Wounds	None	Minor	Major, penetrating or burns

The body regions most frequently injured in major childhood trauma are the lower extremities, head and neck, and abdomen. In minor childhood injury, soft tissue and upper extremity injuries predominate. Motor vehicle versus pedestrian trauma results in the Waddell triad of injuries to the head, torso, and lower extremity Motor vehicle accidents may cause head, face, and neck injuries in unrestrained passengers. Cervical spine injuries, bowel disruption or hematoma, and Chance fractures occur in restrained passengers. Bicycle trauma results in head injury in the unhelmeted riders. It can also cause upper extremity, chest and upper abdominal injuries, as result of contact with the handlebar. In recent years, many studies are being conducted and much effort has been devoted to overcome challenge in pediatric trauma with the hope that better results will be seen in future. Both historical studies and contemporary investigations indicate that children survive more frequently and recover more fully in hospitals that specialize in pediatric trauma than in other hospitals. [3] [4]

1.2 Statement of the Problem

Child injuries are a growing global public health problem which require a due attention. The incidence of serious traumatic injury is approximately 420/100,000. [5] Trauma represents about 10% of pediatric hospitalizations, 15% of pediatric intensive care unit (PICU) admissions, 25% of pediatric emergency department visits, and 50% or more of pediatric ambulance runs. [6]. Moreover, it also represents nearly 20% of hospitalizations for serious injury among all age groups combined. Although the hospital-based fatality rate is 2.4/100,000, the population-based mortality rate is 11.8/100,000, indicating that 78% of lethally injured children die before hospital admission and demonstrating the need for effective injury prevention and prehospital care. [3]

Injury is one of the leading cause of death throughout the world, responsible for about 950 000 deaths under the age of 18 years each year. Overall, more than 95% of all injury deaths in children occur in low-income and middle-income countries. In developed countries there is a significant decrement in child death attributed to injury over the last 50 years, but still is one of the leading cause of death accounting for about 40% showing significance of the problem. [7]

Additionally, 10 to 30 million children sustain nonfatal injuries every year, of which many of them are left with a temporary or permanent disability. These disabilities may be physical, mental or psychological. These children can be disabled for short term (less than 6 weeks), long term (6 weeks or more). In study which was done in four countries (Egypt, Columbia, Pakistan and Bangladesh), nearly 50% of children under the age of 12 years who had suffered an unintentional injury severe enough to present to an emergency department were left with some form of disabilities. RTAs were responsible for 20% of long term or permanent disabilities and 43% short term disabilities. Falls were responsible for 9% of long term or permanent disabilities and 39% of short term disabilities. Drowning was responsible for 15% of long term or permanent disabilities and 20% of short term disabilities. [2]

Preventable injuries pose significant financial, emotional, and social cost on the injured children, their families and the country as a whole. In addition to direct costs for care, there is the additional loss of future productivity of the child and the parent who must provide care for the injured child. For the year 2000, these costs were estimated to be $130 billion in total costs, with

nearly $25 billion due to direct medical costs. [3] According to WHO estimates, the financial burden of road traffic injuries (including treatment costs and lost income) is currently equivalent to 1% of GDP in low income countries, and is expected to rise in coming years. In Africa, the total economic burden from road traffic crashes was recently estimated at $3.7 billion per year. [8]

Despite the rising proportion of child deaths attributable to injuries, child injury death rates have been falling since the 1970s because of a coordinated program of prevention measures including legislative measures, public education, environmental modification, and improvements in accident and emergency services in developed countries [9]. The World Health Organization, the United Nations Children's Fund and many partners have worked hard to bring child injury to a priority for the global public health. [2]

In 2005, WHO and UNICEF called for global effort to prevent child injury. [8] This was followed in 2006 by WHO's ten-year plan of action on child injury. This joint WHO/UNICEF World report on child injury prevention brought knowledge about the various types of child injuries and how to prevent them. At the same time, it recognized that there are major gaps in knowledge. It is intended to help transfer this knowledge into practice, so that what has proven effective in decreasing the burden of child injuries in some countries can be adapted and implemented in other countries [2]

Multi-disciplinary strategy, like education, environmental modification and legislation have been used for prevention of injuries and shows good result in reducing injury mortality in many high-income countries. For instance, the number of road traffic deaths has been reduced in many countries by measures like reducing speeding, deter drink-driving and encourage the use of child car seat restraints. Child deaths due to fires and burns have been reduced by the increased use of smoke alarms, changes to the regulations governing the use of high fire risk materials for children's nightwear and by controlling the temperature of hot water in the home. Drownings have been reduced by fencing pools, installing covers on wells, and teaching older children to swim. Child abuse and neglect can be minimized by home visitation and parent training programs. [10]

Initiation of a new understanding of respect for children and their rights, from birth up to the age of 18 years by the UNC on the Right of a child and the UN resolution in 2000 to reduce the

nearly 11 million deaths among the under-fives by two thirds by 2015 (Millennium Development Goal 4) also contributed developing policies and strategies to reduce child injury. [10] [11]

The prevention of child and adolescent injury demands the involvement of many sectors in a collaborative effort at both the national and local level. These sectors are ministries of education and health, transportation, housing and urban development sectors, NGOs and social workers. The special responsibility of parents for ensuring the safety of their children should also be recognized. [8]

The burden of disease attributable to child injury in developing countries, is increasing in both absolute and relative terms, as infectious diseases decrease. The lack of awareness of the problem, in addition to the particular circumstances that these countries face, has meant that proven measures have not been implemented to the same extent as they have in high-income countries. [12]. Some promising efforts are being made in several low- and middle-income countries, in terms of injury prevention, but much more still needs to be done. Many of the interventions currently used in high-income countries have yet to be tested in low- and middle-income settings, and some measures have yet to be fully developed and evaluated [2]

Ethiopia has faced economic, social and political challenges, due to years of civil war. This has led to the existence of urban/rural disparities between regions, in particular with regard to the availability of resources and infrastructure. The problems are reflected in the failure or ineffective functioning of social services such as health and education. Violation of right of children, poverty, unsafe environment all set good environment for child injury. Recently progresses are being made in collaboration with different NGOs to tackle child injuries due to violation, and also in reducing RTA. [13] [14]

In addition to political and socioeconomic factors, there is a significant gap in knowledge about magnitude and severity of child injury in Ethiopia, as availability and quality of data are limited. This study will show us the magnitude of the problem and its associated risk factors which will enable policy makers and other stakeholders to establish and implement well targeted prevention program.

Chapter Two: Literature Review

2.1 Prevalence of Child injury

Child injury is one of the leading cause of death, hospitalization and disability across the world. About 10 to 30 million children sustain non-fatal injuries each year. [2] Children who die due to injuries or violence are estimated to be 950,000 each year of child 90% of them are unintentional. Study conducted in many countries have shown relative significance of nonfatal injury and how it differs from fatal injury. [7] Injury is usually graphically represented as a pyramid, with the smallest group, that of death, at the top, hospitalized injury in the middle and the largest group, non-hospitalized injury, at the bottom. [15]

Worldwide, RTA and drowning are the most common causes of injury deaths among children, followed by burns and falls. Violence and abuse also take a significant contribution. [10] RTAs are the leading cause of death among 15–19-year-olds and the second leading cause among 5 – 14-year-olds. In 2004, road traffic injuries accounted for approximately 262,000 child deaths among children and youth aged 0–19 years – almost 30% of all injury deaths among children. Data shows that globally, the road traffic death rate among children is 10.7 per 100,000. [7]

In most countries, falls are the most common type of childhood injury seen in emergency departments, accounting between 25% and 52%. Nearly 47,000 children die due to falls every year, but hundreds of thousands more sustain less serious injuries from a fall. In Africa, the median incidence of falls among children and youth aged less than 22 years was 41 per 100 000 population. [16]

In developing countries the incidence is increasing, partly due to rapid growth of motorized transportation and expansion of industries without adequate safety precautions. More than 95% of injury deaths among children occur in low-income and middle-income countries. [2] The Review on injury in sub-Saharan Africa, injuries rank third behind diarrhea and malaria with incidence of 40,000 and 100 deaths per 100,000 population per year. Incidences are higher in males than in females, and the most common cause is fall, followed by road traffic injury, assault, burn and poisoning. [17]

In study done in four developing countries (Vietnam, Ethiopia, Peru, India), overall injury prevalence ranged from 9% in Vietnam, 12.5% in Ethiopia, 16.5 in Peru and 19.5% in India. The

most frequent type of injury was serious falls (5.6–12.3%). Few children in any country had fracture (0.4–2.1%), while prevalence of burns was between 2.1% and 8.3%. Between 0.6% and 2.5% of children were reported to have sustained a near fatal injury. In each country, males and females had very similar levels of each injury type. [12]

In hospital based cross sectional study done in Tikur Anbessa Teaching hospital, of the 380 children included in the study, there were 286(75.3%) males and 94 (24.7%) females a ratio of 3:1. Unintentional injuries were 88.2% (N=335) and child maltreatment accounted 10.8% (N=41). Falls the common pattern of injuries accounting for 52.9% (N=201), followed by road traffic injuries 22.1% (N=84). Majority of the injury had occurred at home and home areas (53.7%) (N=206). Head and neck (including the spinal cord) and extremities injuries accounted 36.1 %(N=137) and 36.1 %(N=137), respectively. Isolated fractures were seen in 42.1% of the cases. Majority of the cases (43.9%) had arrived to TAH after 24 hours the injury. 48.9% were admitted. Immediate death after arrival had occurred in 1.8 % of the participants. In the multivariate analysis, age of the study participants and nature of injury were strong predictors of the severity of injury. [18]

Another cross sectional study conducted on patterns of childhood injury among 452 children aged 0-14 in JUMC in 2006 showed that traumatic injuries other than car accidents were accounted for 82.23%, burn 15%, poisoning 1.3% and car accidents 1.3%. Burn was common among children aged 5 – 9 years. 62.2% of the accidents occurred at home, followed by school 14.8%, high way 16%, and 6.2% in sport fields. There was statistically significant association between age and type of accident and nature of injury [19]

2.2 Risk Factors Associated with Child Injury

Researches done in developed countries have identified many environmental and social risk factors for child injuries. The few studies exploring child injury risk factors in developing countries have also found supporting evidence. These factors commonly mentioned are male sex, large family size, low maternal education, child's main caregiver not being the mother, maternal illiteracy, care of the child by older siblings, 'pre-existing impairments' in the child and maternal depression. Injuries also appear to be both more prevalent and more severe in rural areas,

perhaps because of the hazards of agricultural machinery, exposed bodies of water, and lack of safe play space. [20]

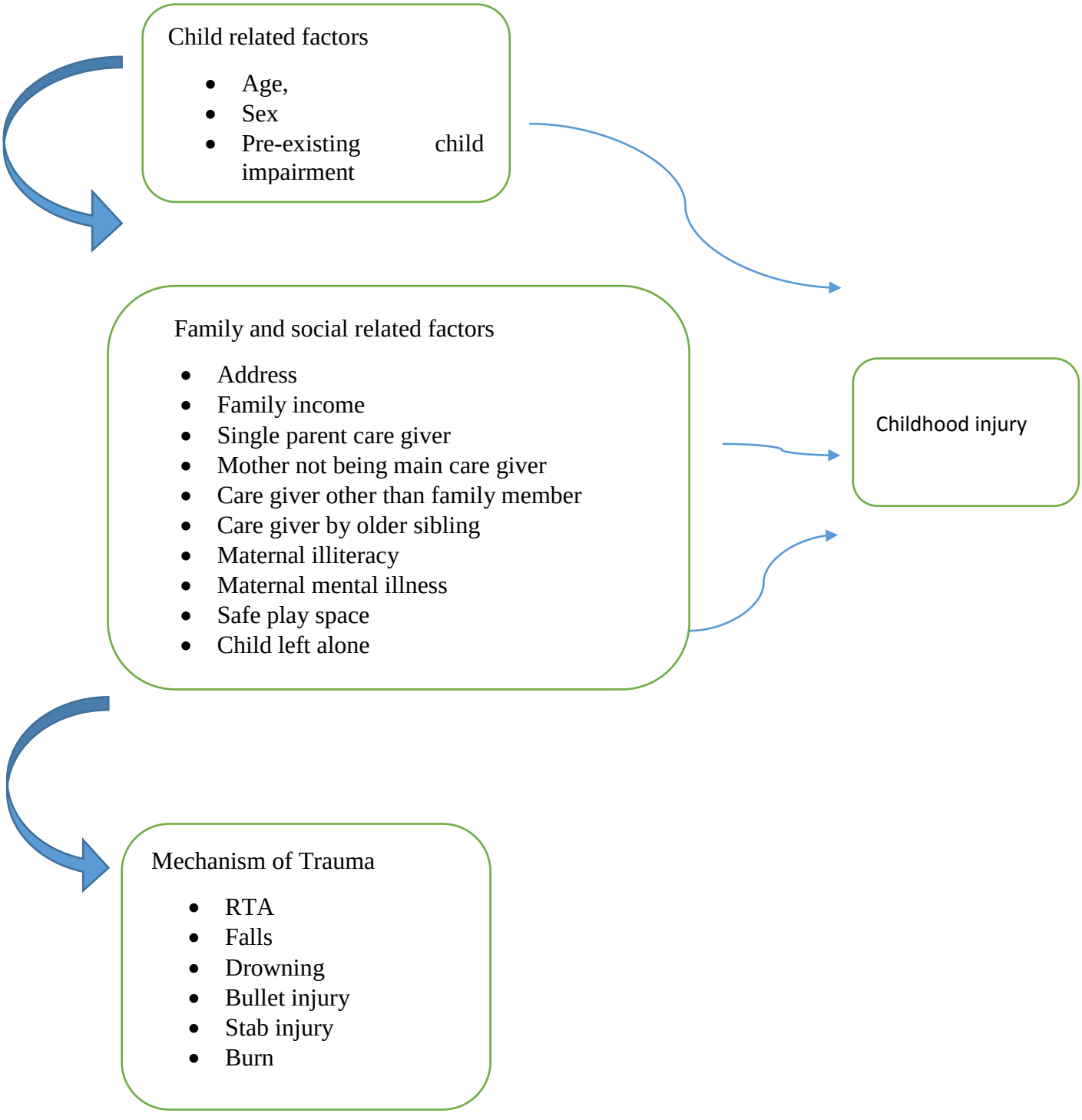
A number of factors contribute to children's susceptibility to injury. Especially in young children curiosity and the drive to explore and experiment are not matched by the capacity to understand or to respond to the danger. So constant supervision is required in potentially dangerous environment. Such supervision could be difficult for a care giver who does not have awareness, overburdened, have other responsibility or mentally ill. As a result many children are left unattended or given to older siblings who are not old enough to look after them. [2]

Worldwide, boys are affected more than girls in almost all studies. This could be attributed to behavioral difference, but could also be due to greater freedom given to boys than girls. Globally, boys between 5-14 years are more than twice to be drowned as compared to girls, more than twice to sustain injury due to fall and 80% more chance to die in RTA. Global figures also indicate that girls are more likely to die due to burns than boys. This could be due to the extra time girls are supposed to be indoor and also have a responsibility to cook. [2] In study done at Tikur Anbessa Specialized Hospital boys were 3 times more likely than girls to encounter both intentional and unintentional injuries. [18]

Socioeconomic factor was the main determinant associated with child injury. For example, in high-income countries, about 5% - 10% of children suffering road traffic injuries are pedestrians, while in low-income and middle-income countries the proportion ranges from 30% to 40%. [6] Child pedestrian injury is highest in Africa and Asia where it is usual for people to walk along roads. Child occupant death is also major concern in high income countries. Such injury can account up to 50% childhood traffic death. As motorization increases childhood occupant's death is also on increase in low and middle income country. [2] However, if there is adult supervision, the probability of a child sustaining road traffic injury is significantly reduced. A study in Malaysian found that the risk of injury was reduced by 57% among children supervised by their parents [21]. Another study, in Canada, showed that lack of parental supervision increased the risk of injury to child pedestrians and cyclists by a factor of 2.6. [22] Studies that was conducted to examine the risk of child pedestrian injury in association with specific supervision practices showed a strong positive association between pedestrian injury and a lack of supervision both after school and on the journey to school. [23]

In research done in four developing countries (Ethiopia, Vietnam, Peru and India), children who were attended by caregivers with mental disorder were consistently at greater risk of injury. Long-term health problems of the child were associated with burns in Vietnam; falls in India, Ethiopia and Peru. Care giver other than family member was another associated factor with injuries in Vietnam, India and Peru. Leaving the child alone or with other children under-5 was associated with falls in Peru and any injury in Vietnam. This was not a statistically significant risk factor in Ethiopia or India. [12]

Conceptual Framework



Chapter Three; Objectives

3.1 General objective

To assess prevalence of child injury and associated risk factors among pediatric patient presenting to JUSH from August, 2017 to January, 2018.

3.2 Specific objectives

To assess prevalence of child injury factors among pediatric patient presenting to JUSH from August, 2017 to January, 2018.

To assess risk factors associated with child injury factors among pediatric patient presenting to JUSH from August, 2017 to January, 2018.

Chapter Four: Methods and Materials

4.1 Study period and Setting

The study was conducted from August 1, 2017 to January 31, 2018, in JUMC, which is located in Oromia region, southwestern Ethiopia about 341km from the capital city. JUMC is the only teaching hospital in southwest Ethiopia with a catchment population of about 15 million who are from three regions, namely SNNP, Gambella and Oromia. Majority of the patients come from the later region mainly the three zones i.e. Jimma zone as a whole, Illu Ababor zone and parts of zones of Wollega. Recently, new and 600 bedded hospital with a better infrastructure is constructed and functional for the last one and half year.

4.2 Study design

Facility based cross sectional study design was used.

4.3 Population

4.3.1 Source population

All pediatric patients presenting to JUMC outpatient department.

4.3.2 Study population

Selected pediatric patients presented to JUMC OPD during the study period was incorporated into the study.

4.4 Inclusion and Exclusion Criteria

4.4.1 Inclusion Criteria

Selected pediatric patients aged 0-14 years who presented to JUMC from August, 2017 to January, 2018.

4.4.2 Exclusion Criteria

- Patients who did not give consent
- Patients whose injury condition was unknown

4.5 Sampling size determination and sampling techniques

4.5.1 Sampling Size determination

Sample size was calculated by considering single population proportion formula by considering 12% proportion of childhood injury from the study done in four developing countries including Ethiopia. [12] 3% margin of error and 95% CI.

$$n = \frac{(Z\alpha/2)^2 p(1-P)}{d^2}$$

Where Z = 1.96 at 95% CI, P = proportion of pediatric injury, d= margin of error,

Then, n = $\frac{(1.96)^2 0.12(0.88)}{0.03^2}$ = 450.74 = 451

4.5.2 Sampling Technique

Convenient sampling method was used to incorporate all study population of interest during the study period

4.6 Data collection materials and Procedures

4.6.1 Data collection Materials

A structured questionnaire that include variables on socio-demographic characteristics, mechanism of trauma and presumed risk factors for pediatric injury

4.6.2 Data Collection Procedures

Data was collected by trained surgical residents from secondary source which was the patients' card, care givers and patients themselves while they were in the facility

4.7 Study Variables

4.7.1 Independent Variables

Child Related Factors

Age,

Sex

Preexisting child illness

Family and social related factors

Address

Child residence

Family income

Single parent care giver

Mother not being main care giver

Care giver other than family member

Care giver by older sibling

Maternal illiteracy

Maternal mental illness

Child left alone

Safe play space

Engagement in family responsibility

Mechanism of Injuries

RTA

Falls

Drowning

Bullet injury

Stab injury

Sharp instrument

Stick/stone

Burn

4.7.1 Dependent Variables

Child injury

4.8 Data processing and analysis plan

Data was cleared, checked for completeness and entered to SPSS version 23 to derive descriptive statistics and frequency distributions. The association between prevalence and risk factors was tested with bivariate and then multivariate analysis using logistic regression. Categorical data

was be expressed in terms of proportions. The level of significance was set at a probability of 0.05. The result was reported in sentences, shown in tables, charts and graphs and discussed with the literatures from different similar research.

4.9 Data Quality Control

The data collectors were trained by the principal investigator for three hours before the survey so as to ensure consistency and reduce intra and inter observation. Close follow-up and supervision was taken by the principal investigator throughout data collection. Collected data was checked for completeness.

4.10 Ethical Consideration

Ethical approval and clearance for the study was obtained from IRB of Jimma University. The importance of the study was properly be explained to the patients or attendants and Consent was taken. Results of the study will be disclosed to concerned bodies and researchers who want to do further research in related areas.

4.11 Plan for Dissemination of Findings

The finding of this study will be disseminated to JUSH, Department of surgery, Oromia Health Bureau, Federal Minister of Health. The finding will also be presented on annual postgraduate research conference, different seminars and workshops, if opportunity is found. Attempts will be made to publish the finding on peer review journals.

Chapter Five:

Results

Sociodemographic Status

A total of 451 children under the age of 14 seen at Jimma University Medical Center Outpatient Department were included in the study conducted from August, 2017 to January, 2018, of which 54.5 %(n=246) were males and 45.5 %(n=205) were females. From age distribution of the participants, 49.5 %(n=222) were under 5 years of age, 37.9 %(n=171) were 6-10 years and 12.9 %(n=58) were age 11-14years, with the mean age of 6.1year. 72.3(n=326) of the participants were from rural area and 27.3% (n=125).

Table 1 Sociodemographic Characteristics of Child injury presenting to JUMC, August, 2017 – January, 2018.

Variable	Values	Frequency	Percentage
Sex	Male	246	54.5%
	Female	205	45.5%
Age	<5	222	49.2%
	5-10	171	37.9%
	11-14	58	12.9%
Address	Urban	125	27.7%
	Rural	326	72.3%

Prevalence of Child Injury

The overall prevalence of child injury was 26.4%, (35.4%) in males and 15.6% in females.

Majority of the injuries were 95.8% (n=114) were unintentional injuries, the rest, 4.2% (n=5) were intentional injuries.

Table 2 Distribution of Sociodemographic Characteristics and Child injury presenting to JUMC, August, 2017 – January, 2018

Sociodemographic characteristics		Injured	Non injured
Age	<5	28(12.6%)	194(87.4%)
	6-11	63(36.8%)	108(63.2%)
	11-14	28(48.3%)	30(51.7%)
Sex	Male	87(35.4%)	159(64.6%)
	Female	32(15.6%)	173(84.4%)
Address	Rural	26(20.8%)	99(79.2%)
	Urban	93(28.5%)	233(71.5%)

Mechanism of Trauma

Concerning the mechanism of trauma; falls were the commonest (37%, N= 44) followed by burn (26.1%, N= 31). RTA, sharp instruments and animal kick represent 23.5 %(N=28), (11.8%, N=14) and (1.7%, N=2) respectively. Among them. Falls and RTA were commonest in age group of 6-10, with a value of 65.9 %(n=29) and 64.3 %(n=18) respectively. Burn was the commonest mechanism of injury in children <5 years of age, 45.2 %(n=14)

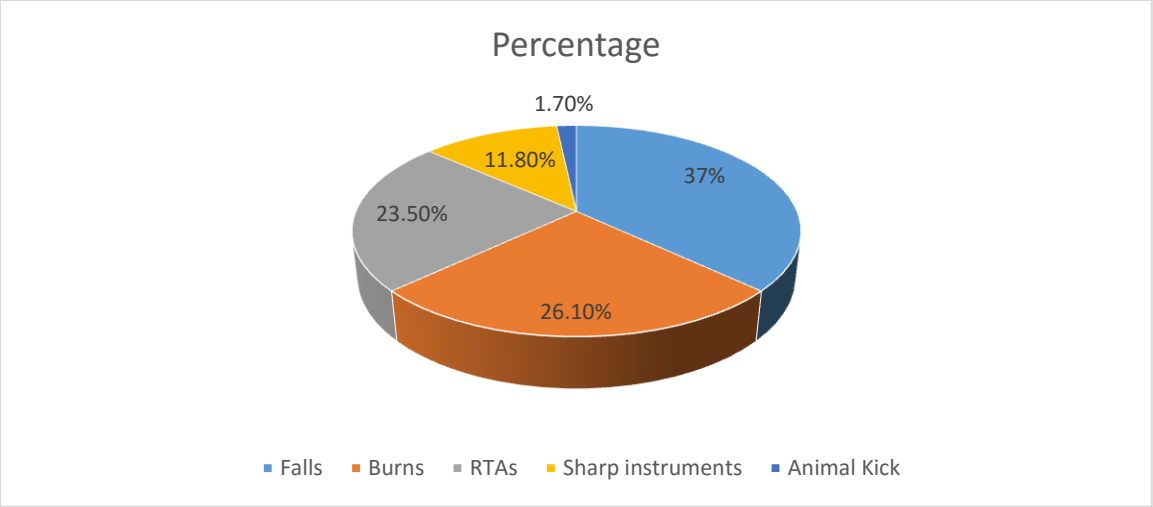


Fig. 1 Mechanism of child injury in patients presenting to JUMC, August, 2017 – January, 2018

Body System Injured

According to system involved in the trauma; 35.3%(n=42) were musculoskeletal injuries, 18.5%(n=22) head injury, 5.9%(n=7)abdominal injury, 1.7%(n=2) chest injury, 24.4%(n=29) soft tissue injury and 12.6% (n=15) of patients had multiple system injuries.

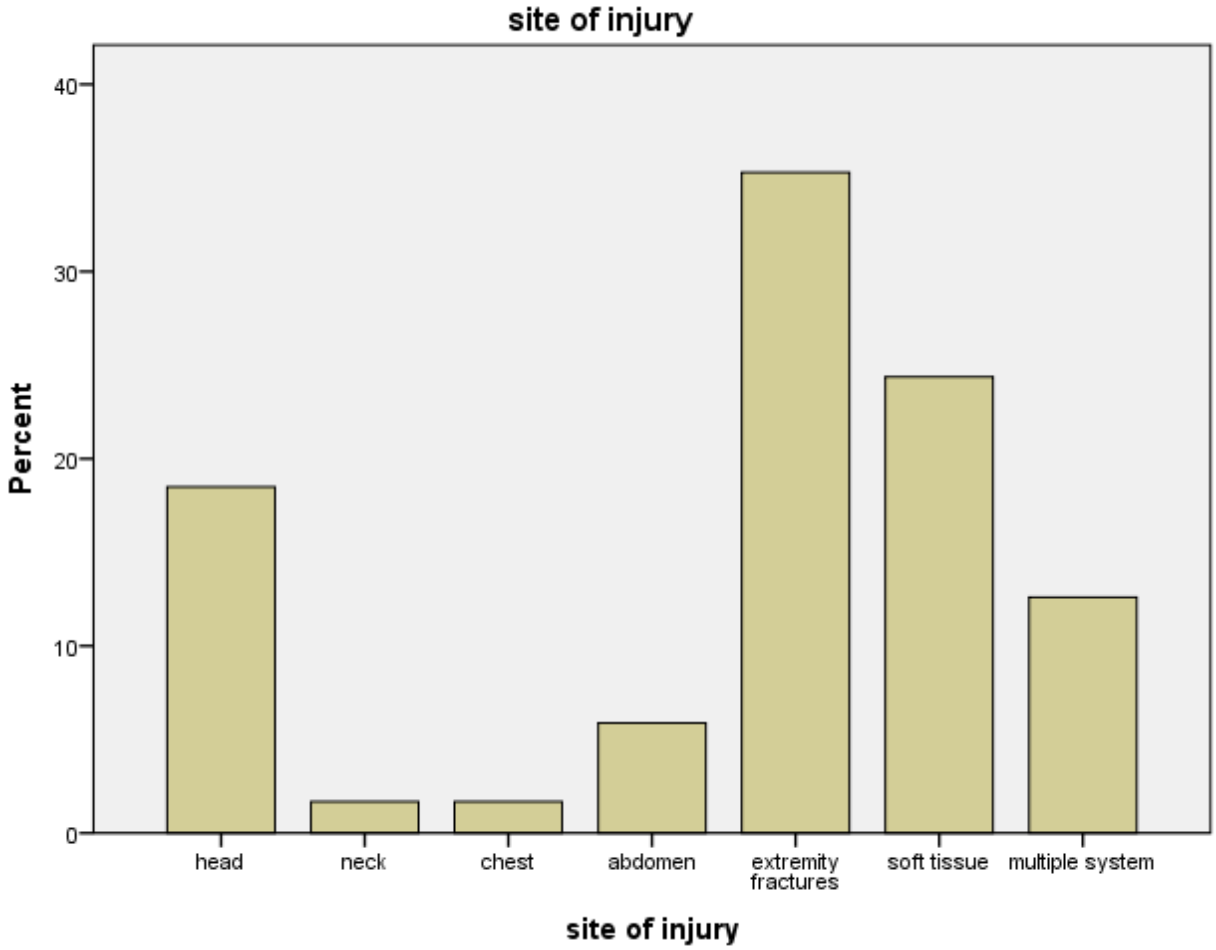


Fig. 2 Body system injured in child injury in pediatric patients presenting to JUMC, August, 2017 – January, 2018.

Factors Associated with child injury

Bivariate Analysis

P-value of <0.25 taken for the variables to be taken as a criteria for level of significance to appear in the multivariate analysis to include enough variables for the analysis. From the bivariate analysis, of the socio-demographic variables both age and sex (male) showed significant effect on increased prevalence of child injury. (P value<0.001). Address (rural) also has significant association with increased prevalence of child injury. (P=0.097)

From maternal education, mother being illiterate and 1-6th grade showed significant effect on prevalence of child injury (P value <0.009). Increased prevalence of child injury was also observed in all types of care giver and when the child is left alone. (P value <0.001)

Single parent care giver showed significant effect on increased prevalence of child injury. (Pvalue=0.071). Residence of a child like living with parents, relatives or non-relatives are significantly associated with increased prevalence of child injury. (P value <0.025)

Engagement in work or responsibility is significantly associated with increased risk of child injury. (Pvalue<0.001).

Maternal mental illness, number of sibling, family income, preexisting child impairment and play space didn't show significant effect on prevalence of child injury.

Multivariate Analysis Results

Table: 3 Multivariate analysis of factors affecting outcome of TBI patients with binary logistic regression model, JUMC, August, 2017-January, 2018

Variable	Category	Outcome		COR	P value	AOR	95%CI for AOR	
		Injured	Non injured					
Age	<5	28	194	1.00	0.303	1.00	NI	NI
	5-10	63	108	4.042	0.413	1.412	0.618	3.228
	11-14	28	30	6.467	0.750	0.87	0.257	2.666
Sex	Male	87	159	2.96	0.000	3.09	1.742	5.475
	Female	32	173	0.338	NI	NI	NI	NI
Address	Urban	26	99	1.00	NI	NI	NI	NI
	Rural	93	233	1.52	0.597	0.774	0.299	2.002
Single parent care giver	Yes	18	29	1.81	0.418	0.657	0.237	1.819
	No	101	303	1.00	NI	1.00	NI	NI
Maternal education	Illiterate	92	182	1.00	0.058	NI	NI	NI
	Read and write only	4	62	0.151	0.007	0.196	0.060	0.0635
	1-6th grade	9	46	0.457	0.768	1.164	0.423	3.204
	7-12th grade	8	28	0.667	0.379	1.836	0.475	7.104
	>12th grade	6	14	1.00	0.346	0.494	0.114	2.138
Care giver	Mother	12	226	1.00	0.000	1.00	NI	NI
	Father	2	5	7.533	0.032	9.217	1.215	69.937
	Older sibling <18	21	41	9.646	0.000	13.774	5.579	34.006
	Relatives	8	8	18.833	0.000	18.158	4.730	69.699
	Left alone	69	46	28.250	0.000	19.875	7.814	50.56
	Non relatives	7	6	21.972	0.000	21.427	4.215	108.92

Child home	With parents	110	326	1.00	0.868	1.00	NI	NI
	With relatives	7	5	4.149	0.618	1.474	0.32	6.793
	With non-relatives	2	1	5.927	0.912	0.863	0.064	11.716
Early Responsibility	Yes	69	64	5.779	0.11	2.028	0.853	4.825
	No	50	268	1.00	NI	1.00	NI	NI

The multivariate logistic regression model with the backward LR (likelihood ratio) method concluded that sex being male, low maternal education, care giver are predictors of increased prevalence of child injury.

Boys are 3 times more likely to encounter child injury when compared to girls. This was statistically significant. (P value <0.0001)

From educational status of a mother, mothers who can read and write 80.4% less likely to be associated with increased prevalence of child injury when compared to those who are illiterate. This was statistically significant. P value<0.001).

From the care givers, increased prevalence of child injury was observed when care giver is not mother. Children are 9 times more likely to get injured when they are look after by fathers; 13X by older sibling, 18X by relatives other than parents, 20X when left alone and 21X by non-relatives. This was statistically significant (P value <0.001)

Chapter Six

Discussion

Child injury is still one of major health burden worldwide. Unintentional injury accounted for 95.8 %(n=114). This is comparable research done at TASH which accounted for 88.2%. [18] Worldwide unintentional injury account for >90% of child injury worldwide. [7]

The overall prevalence of trauma in this study was 26.4% (n=119). Falls were the commonest mechanism of trauma accounting for 37 %(n=44), followed by burns and RTA which accounted for 26.1% and 23.5% respectively. This comparable with researches from many country which shows that falls are the most common type of mechanism of injury ranging from 25% to 52%. It is also comparable with research done in four developing countries (Ethiopia, Peru, Vietnam, India), prevalence of child injury ranged from 9-19.9%. It was 12.5% in Ethiopia. Falls were most common in all countries (5.6-12.3%) followed by Burns (2.1-12.3%). [12]. In hospital based study in TASH, falls were most common mechanism of injury which accounted for 52.9 %(n=201), followed by RTA which was 22.1 %(n=84) of mechanism of trauma [18]

From body system injuries musculoskeletal injuries were the most common system to be injured, accounting for 35.3 %(n=42) followed by soft tissue injuries and head injuries, which represent 24.4% (n=29) and 18.5% (n=22) respectively. This is supported study done in THAT in which head and neck (including the spinal cord) and extremities accounted for 72.2% of the injuries

Worldwide boys are affected more than girls. This study also showed that boys were 3 x more likely to be involved in child injury than girls, similar results was demonstrated in study done in Tikur Anbessa Teaching Hospital, boys were 3 times more likely than girls to be affected in both intentional and unintentional injuries. [18] This is also comparable to world reports on child injury prevention indicated that boys were twice more likely to be drowned than girls, more than twice to sustain falling injury and 80% to be involved in car accidents [2]

Care givers other than mother was associated with increased prevalence of child injury. Children are 9 times more likely to get injured when they were looked after by fathers; 13 times by older sibling less than 18 years of age, 18 times by relatives other than parents, 20 times when left

alone and 21 times by non-relatives. Supporting results were observed in study done Malaysian found that the risk of injury was reduced by 57% among children supervised by their parents [21]. Another study, in Canada, showed that lack of parental supervision increased the risk of injury to child pedestrians and cyclists by a factor of 2.6. [22] Studies that was conducted to examine the risk of child pedestrian injury in association with specific supervision practices showed a strong positive association between pedestrian injury and a lack of supervision both after school and on the journey to school. [23]

Chapter Seven

7 Conclusion and Recommendation

7.1 Conclusion

This study found out that significant number of children are involved in child injury. Similar to worldwide data, majority of the injuries were unintentional injuries. Falling accident was the leading mechanism of trauma followed by burns and RTAs. From body system injuries, musculoskeletal system was the leading body system injured followed by head and soft tissue injuries.

7.2 Recommendation

This research in general showed the magnitude of child injury and associated factors in Jimma University Medical Center. Child injury is found to be prevalent in this population. Thus strategies need to be formulated to reduce the risk and prevent of childhood injuries. Public awareness especially on home safety measures to control of hazardous situations at community level. Education should be given to families regarding impact of care giver in preventing child injury. Government policies should work toward increasing women education. Social workers and other concerned body should focus on how to prevent involvement of children in works and family responsibilities at early age. Efforts to tackle pedestrian safety should focus on both in urban and rural areas. Furthermore, researchers and health care providers should work to uncover the burden of hypertension overall

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ANNEX II QUESTIONAIRRES

Jimma University

A prospective study on pattern of trauma, determinants and outcome in pediatric age group in JUSH.

Direction of the interviewer

- ✓ Explain the purpose of this study to the interviewer and obtain verbal consent.
- ✓ Give assurance

1. Socio Demographic Data

1.1 Age …… sex…….. Card number _____

1.2 Woreda_____ Kebele_____

2. Mechanism of trauma and Clinical presentation

2.1 Time of presentation_____ Duration after trauma_____

2.2 Mechanism of trauma

☐ RTA ☐ Stab ☐ Bullet ☐falling from Height or falling down accident ☐stick/stone ☐ sharp instrument ☐ burn ☐others (specify) _____

2.3Site of injury

☐Head ☐Neck ☐Chest ☐Abdomen ☐Extremity fracture☐Soft tissue ☐multiple system

2.4 Intent of the injury.☐ Unintentional☐ intentional ☐ undetermined

2.7. If bullet specify type of the gun ☐.pistol ☐other heavy fire arm ☐Blast effect

2.7.1 If pistol, Distance of the shot**,** ☐< 3 m ☐ 3- 7 m ☐>7 m

3. Information on family and social history

3.1 Family annual income ☐<10,000 birr ☐ 10,000-50,000birr ☐ >50,000birr

3.2 Are both parents alive?

☐Yes ☐No

3.3 If no, which parent is dead?

☐Father ☐Mother ☐Both

3.4 Number of siblings

☐1-5 ☐5-10 ☐above 10

3.5 Educational status of the mother

☐Illiterate ☐Read and write only ☐Grade 1-6 ☐Grade 7-12 ☐E. >12 grade

3.6 Care giver at time of injury ☐Mother☐Father ☐older sibling, age ___ ☐grandparent ☐ nanny ☐others specify_____

3.7 History of maternal mental illness ☐yes ☐no

3.8 Preexisting child impairment

☐Yes ☐no

3.9 If yes specify….

3.10 Where does the child live?

☐With parents ☐with relatives ☐with people other than relative ☐lives on street others specify…….

3.11. Is the child left alone at time of injury?

☐Yes ☐no

3.12 Is there safe play space? ☐ Yes ☐ No

3.13 Is the child engaged in any agricultural or other family responsibility?

☐Yes ☐No

Data Collected by ……..
Signature……..date……

Data Checked by……..signature
…….date……