

Accidental Injury in Children and its Clinical Pattern at Tertiary Neurological Center in Kathmandu

Sharad Hari Gajuryal¹, Pranaya Shrestha², Nicolla Newall³, Matrika Singh¹, Manish Bikram Shah⁴, Basant Pant²

¹Department of Public Health, Annapurna Neurological Institute and Allied Sciences, Maitighar, Kathmandu, Nepal

²Department of Neurosurgery, Annapurna Neurological Institute and Allied Sciences, Maitighar, Kathmandu, Nepal

³School of Medicine and Dentistry, University of Aberdeen, United Kingdom

⁴Department of Orthopedics, Annapurna Neurological Institute and Allied Sciences, Maitighar, Kathmandu, Nepal

CORRESPONDENCE

Dr. Sharad Hari Gajuryal
Department of Public Health
Annapurna Neurological Institute & Allied
Sciences, Maitighar, Kathmandu, Nepal
Email: sharad2005@hotmail.com
ORCID ID : <https://orcid.org/0000-0002-0038-9955>

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ABSTRACT

Introduction: Accidental injury in children is a significant cause of morbidity and mortality worldwide. The burden of child injuries in Nepal is not well understood due to lack of research into its epidemiology. This study aims to identify the prevalence of accidental injury as well as its clinical pattern in a tertiary Neurological Center in Nepal.

Methods: A retrospective cross sectional study of pediatric patients presenting to Annapurna Neurological Institute with history of accidental injury between the period of 1 year. Data was collected using self-designed Performa which included socio-demographic profile, mode of injury, type of injury, place of injury and outcome.

Results : Out of total 232 patients, 130 patients (56.03%) had history of Road Traffic Accident whereas 102 patients (43.97%) had history of fall injury. Head injury was the major cause of road traffic accident and fall. Majority of patients had accidental injury at home (41%), most of the injury occurs at morning. Mainly, injury occur by falling from window and terrace (49%) and majority of RTA occurred among pedestrians. Less than half patients are admitted to the ward and total of (6.4%) patient died after having accidental injuries during hospitalization.

Conclusion: Pediatric accidental injury should be recognized as an important public health issue in Nepal. The high incidence of pediatric injury as a result of RTA and falls indicate the need for the identification of specific risk factors to reduce these injuries and implementation of stricter traffic rules and regulations and public education programs. A comprehensive injury registry in our set up seems to be important for formulating policies to reduce pediatric trauma burden.

Key Words : Accident; Accidental injury; Falls; Road traffic accidents.

INTRODUCTION

According to World Health Organization, falling is a natural part of a child's development as they begin to walk, climb, run, jump, and explore their surroundings.¹ Previously, infectious diseases have accounted for the majority of childhood morbidity in low to middle-income countries (LMICs).^{2,3} However in recent years this trend has shifted to accidental injury, which is now the leading cause of mortality in pediatric patients in LMIC.⁴ Children under the age of 18 account for nearly a quarter of all unintentional injury deaths (0.8 million), mostly in low and middle-income nations.⁵ In 2013, it was estimated that accidental injuries killed 324,000 infants and toddlers

less than 5 years worldwide.⁶ Around 1979, injuries were the main cause of death in Argentina, Costa Rica, and Uruguay; second in Trinidad; third in Paraguay and Venezuela; fourth in Colombia and Mexico; and fifth in Ecuador.⁷ Most of these minor injuries do not required hospital admission, although it creates the majority of the functional and financial burden of unintentional injury in health care.⁸ More than half of the male children's suffer from home injuries where about 64% of the injuries occurred at home, According to the Iran's Health Ministry.⁹ There are more than 95 hospitals in Nepal, along with 205 primary healthcare facilities,

thousands of primary healthcare posts, and 8 tertiary care facilities.³ However, Non-fatal injuries is referred as the “tip of the injury iceberg” for every child who suffers and dies.¹⁰ The most frequent reasons for an increase in traffic accidents are more vehicles, drinking while driving, inadequate infrastructure, distracted driving, ignorance, and child restraints (WHO).¹¹ Although Nepal has a large number of health facilities, due to the lack of incentives for qualified professionals to work in these low-resource environments, these facilities frequently lack the equipment and staff necessary to deliver adequate care.³ The burden of these kinds of accidental injuries in Nepal is not well understood due to lack of research in its epidemiology. This study aims to analyze all injuries from Road traffic accident (RTA) & fall injuries among children and adolescents under 15 years old of age to determine the prevalence of the various types of childhood injuries presenting to Annapurna Neurological Institute & Allied Sciences. The results from this study will help in guiding the implementation of appropriate interventions to reduce the incidence of unintentional injury in the pediatric population.

METHODS

A retrospective cross-sectional study was conducted between October 2018 to September 2019 among all pediatric patients who presented to ANIAS with a history of accidental injury. A total of 232 patients with history of accidental injury arriving at hospital were taken. All cases of accidental injury in patients <15 years were included other than patients with history of injury due domestic violence and other natural causes of disaster. Ethical approval was obtained from the Institutional Review Committee for this study. Sources of data included referral letters and imaging reports from primary hospitals, emergency department records, inpatient notes, discharge summaries, and clinic follow-up notes. Data were recorded and analysed on a Microsoft Excel spreadsheet. Demographics of patient history, mechanism of injury, Glasgow Coma Scale (GCS) on arrival, time of injury, site of injury, primary care history pattern of injury, length of stay and functional outcomes were recorded.

RESULTS

Figure 1 shows the geographical distribution of different province (the territory occupied by one of the constituent administrative districts of a nation) of the patients with accidents injuries arriving at Hospital for treatment. Most of patients were from province 3, mainly from Kathmandu Valley (43.96%) followed by province 1(15.9%) and other province. Most of the patients from the outer province were referred from higher center.

As we can see after province 3, there is higher numbers of injury occurred in province 1. Table 1 shows the distribution of RTA and fall injury patients less than 15 years of age. Out of total 232 patients, 130 patients (56.03%) had history of Road Traffic Accident whereas 102 patients (43.97%) had history of fall injury.

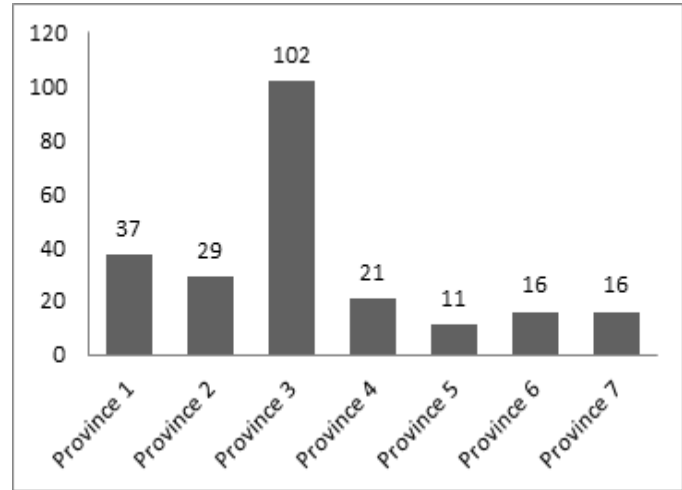


Figure 1: Province wise distribution of accidental injuries(n=232)

In both modes of injury the number of cases of RTA and fall injuries seems high in male groups. The most vulnerable group of age for encountering the road traffic accident were the age group of 10-15 years (36.9%) and for fall injury the vulnerable age group were (31.3%). Talking about the RTA, the major injury caused by RTA was head injury (26.1%) followed by fracture (24.6%), laceration (20%), Soft tissue injury (18.4%) and (10.7%) of multiple site injury.

Moving towards fall injury, 1/4th percentage of the patient has suffered from the head injury where soft tissue injury (21.5%) was the second highest contributor for the injury followed by laceration (20.5%), fracture (18.6%) and lastly multiple site injury (13.7%). Table 2 shows the distribution of the accidental injuries according to the site of injury and time of injury. Majority of patients had accidental injury at home (41%) followed by street (32%), school (15%) and playground (12%) whereas most of the accidental injury occurred in morning time (35%) followed by evening time (32%) and the results shows that the lesser amount of the accidents was occurred during the time of night (17%) and at afternoon (16%). The vulnerable site for the injury was at home and the most vulnerable time was in the morning time.

Table 3 shows the various modes of injury for RTA and fall injury among total respondents. Majority of patients had fall from window and terrace (25.4%) and (23.5%)

Table 1 : Distribution of Patients of RTA and Fall injury (n=232)

Characteristics		Mode of Injury		
		RTA n=130 (56.03%)	Fall Injury n=102 (43.07%)	Total N=232
Gender	Male	88(67.6%)	65(63.7%)	153 (65.9%)
	Female	42(32.3%)	37(26.2%)	79 (34.0%)
Age	<1 years	9(6.9%)	29(28.4%)	38(16.3%)
	1-5 years	32(24.6%)	32(31.3%)	64(27.5%)
	6-10 years	41(31.5%)	30(29.4%)	71(30.6%)
	10-15 years	48(36.9%)	11(10.7%)	59(25.4%)
In-jury-Type	Head Injury	34(26.1)	26(25.4%)	60(25.8%)
	Fracture	32(24.6%)	19(18.6%)	51(21.9%)
	Soft Tissue Injury	24(18.4%)	22(21.5%)	46(19.8%)
	Laceration/abrasion	26(20%)	21(20.5%)	47(20.2%)
	Multiple site Injury	14(10.7%)	14(13.7%)	28(12.0%)

Table 2 : Distribution of injury according to site & time

Site of Injury	Frequency (%)
Home	95(41%)
Playground	28(12%)
Street	74(32%)
School	35(15%)
Time of Injury	
Morning	81(35%)
Afternoon	37(16%)
Evening	74(32%)
Night	39(17%)

respectively. The tendency of falling from the guardians hands seems to be lower than other fall injury factors and majority of RTA injury was occurred among the pedestrians (89.2%) followed by two whellers involving in the accidents and pillion rider.

Table 4 shows that about 21.5 percent of patients arriving to hospital with accidental injury were discharge from emergency after conservative management where less than half patients are admitted to the ward and total of (6.4%) patient died after having accidental injuries during hospitalization.

Table 3 : Distribution according to Mode of Injury

Fall Injury (n=102)	Frequency (%)
Stairs	21(20.5%)
Terrace	24(23.5%)
Bed	8(7.8%)
Chair	5(4.9%)
Window	26(25.4%)
Guardians Hand	3(2.9%)
Tree	5(4.9%)
Self-fall	10(9.8%)
RTA (n=130)	
Two Wheeler	23(22.5%)
Pillion Rider	16(15.6%)
Pedestrian	91(89.2%)

Table 4 : Outcome of the children from Accidental Injuries

Outcome	Frequency (%)
Discharge from ED	50(21.5)
Admitted to Ward	88(37.9)
Admitted to ICU	56(24.1)
LAMA*	23(9.9) (*Left Against Medical Advice)
Death	15(6.4)

DISCUSSION

Accidents involving children are a major public health concern, accounting for a significant proportion of preventable death, serious injury, and long-term disability. The findings shed light on the impact of childhood injuries on specific health facilities. In our study, the mode of injury related to fall was (43.07%) which seems lesser as compared to the study conducted at South Delhi (59.5%)⁵ and RTA was 130 (56.03%) of occurrence which is higher in percentage as compare to the study done at Urban Delhi (18.9%)¹² where the numbers of RTA among male children was (67.6%) and the vulnerable group for RTA was 10-15 years (36.9%). An epidemiological study shows that girls suffered significantly more injuries than boys, both in terms of total and average number of injuries which signify the opposite findings as compare to our present study.⁵ The major injury caused by the RTA was head injury (26.1%). Lacks of pedestrian's road (89.2%) are the major cause of RTA where 22.5 percent of accidents are occurred by two wheelers and 15.6 percent by pillion riders.

Moving towards the fall injury, 63.7% of the male and 26.2% of female comfort to take place during fall where

the age range from 1 to 5 years (31.3%) compares to the study performed at Iran 25% of the injury happens under four years of age⁹ which is because the toddlers of this age starts to crawl and walk which has high risk of facing accidents. WHO report on child injury reveals that falls are a common cause of non-fatal injury among children, according to data from Latin American countries and Pakistan.¹ The type of injury occurred during fall are head injury (25.4%) where soft tissue injury (21.5%) and laceration/abrasion (20.5%) are in similar amount. Fractures are also seen (18.6%) which is similar to the study reviewed at United State where 14% of the child suffered from fractures.⁸ The fall injuries occur mostly at terrace, stairs, and windows. The lack of safety measures in apartments is a plausible factor for this mechanism of injury. Many of the apartments in Nepal have low balconies and windows without barriers. As a result, unsupervised children climb over the balconies and fall multiple stories. Despite a large number of paediatric head injuries and recommendations to the government for the implementation of safety barriers, no preventative measures have yet been instituted to curtail this problem. This result is in keeping with studies from other developed and developing countries including Asia, South America and Africa.¹³ For instance, a hospital-based study in Kumasi, Ghana discovered that falls (27.2%) and road accidents to pedestrians (40% of total injuries) were the two leading causes of child injuries.¹⁴

Among 232 total patients about half of the common site of injury was at home (41%) where the study done at Urban Delhi, China and another epidemiological study ranges from (40-55%)^{5,6,12} thirty-two percent of the child, less than 15 years old have injury at street, school (15%) and playground (12%). A result from unintentional child injury surveillance in developing countries shows that 80% of the injury were caused at streets and road where 64% of the fall injury occurred at home.¹⁵ Similarly the injury occurred mostly at morning time (35%) and at evening (32%). Out of the injured respondents, the respondents who are admitted to hospital ward were less than half (37.9%) followed by having admission to ICU (24.1%), discharge from emergency unit (21.5%) as compared to the study at Delhi two-third of the children were taken to the emergency¹² and in relation to the data from the Global Childhood Unintentional Injury Surveillance study, which was carried out in four cities where nearly 50% of children under the age of 12 who had sustained an unintentional injury serious enough to warrant presentation to an emergency department had been left with a disability¹ and some respondents who left against medical advice (LAMA) were (9.9%). In our study, the percentage of the death of injured patients less than 15 years old were 6.4% where a cohort study

reveals that 24% of child die due to the head injury after admitting to the hospital before the age of 7 years old.¹⁶

In this context of injuries occurring high loss of children causing life-threatening conditions and disability wherever possible, nations should develop and promote locally produced, affordable, and effective fall prevention measures for children, such as window guards, roof railings, and stair gates. In particular when combined with other interventions, parental supervision is a crucial component of prevention. In order to reduce the long-term effects of falls and prevent long-term disability, acute care and rehabilitation should be made available and designed appropriately for children.

The strength of the study is that it is a hospital based study in a tertiary neurological center in Kathmandu which is dedicated for major injury cases with a good practice of digitalized medical record for data retrieval. A major limitation of this study is that this study has been conducted in single center, thus the result of this study may not be generalized.

CONCLUSION

Road traffic accidents and fall injury are a major source of public health concern especially in children. Factors predisposing to pediatric injury have rarely been investigated and currently there are no injury prevention programs for pediatric population. The epidemiological parameters shown in this study could be useful tool to identify burden and research priorities for specific type of injuries.

REFERENCES

1. Naz F, Qamarunnisa S, Shinwari ZK, Azhar A, Irtifaq Ali S. Phytochemical investigations of *Tamarix indica* willd. and *Tamarix passernioides* del. ex desv. leaves from Pakistan. *Pakistan J Bot.* 2013;45(5):1503–7.
2. Sharma M, Lahoti B, Khandelwal G, Mathur R, Sharma S, Laddha A. Epidemiological trends of pediatric trauma: A single-center study of 791 patients. *J Indian Assoc Pediatr Surg.* 2011;16(3):88–92.
3. Gupta S, Gupta SK, Devkota S, Ranjit A, Swaroop M, Kushner AL, et al. Fall Injuries in Nepal: A Countrywide Population-based Survey. *Ann Glob Heal [Internet].* 2015;81(4):487–94. Available from: <http://dx.doi.org/10.1016/j.aogh.2015.07.004>.
4. Nagele P, Hüpfel M, Kroesen G. Epidemiology and outcome of pediatric trauma treated by an emergency-physician-staffed advanced life-support unit. *Wien Klin Wochenschr.* 2004;116(11):398–403.

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5. Bhuvanewari N, Prasuna JG, Goel MK, Rasania SK. An epidemiological study on home injuries among children of 0-14 years in South Delhi. *Indian J Public Health*. 2018;62(1):4-9.
 6. Lili X, Jian H, Liping L, Zhiyu L, Hua W. Epidemiology of injury-related death in children under 5 years of age in Hunan province, China, 2009-2014. *PLoS One*. 2017;12(1):2009-14.
 7. Bangdiwala SI, Anzola-perez E, Romer CC, Schmidt B, Valdez-lazo F, Toro J, et al. The incidence of injuries in young people: I methodology and results of a collaborative study in Brazil, Chile, Cuba and Venezuela. *Int J Epidemiol*. 1990;19(1):115-24.
 8. Hashikawa AN, Newton MF, Cunningham RM, Stevens MW. Unintentional injuries in child care centers in the United States: A systematic review. *J Child Heal Care*. 2015;19(1):93-105.
 9. Rezapur-Shahkolai F, Afshari M, Moghimbeigi A, Hazavehei SMM. Home-related injuries among under-five-year children and mothers' care regarding injury prevention in rural areas. *Int J Inj Contr Saf Promot*. 2017;24(3):354-62.
 10. Howe LD, Huttly SRA, Abramsky T. Risk factors for injuries in young children in four developing countries: The Young Lives Study. *Trop Med Int Heal*. 2006;11(10):1557-66.
 11. Bagale A. Journal of Community & Public Knowledge Regarding Road Traffic Accidents among Adolescents of a. 2022;8(9).
 12. Parmeswaran G, Kalaivani M, Gupta S, Goswami A, Nongkynrih B. Unintentional childhood injuries in urban Delhi: A community-based study. *Indian J Community Med*. 2017;42(1):8-12.
 13. Hyder AA, Sugerman D, Ameratunga S, Callaghan JA. Falls among children in the developing world: A gap in child health burden estimations? *Acta Paediatr Int J Paediatr*. 2007;96(10):1394-8.
 14. Bartlett SN. The problem of children's injuries in low-income countries : A review Review article The problem of children ' s injuries in low-income countries : a. 2015;(April 2002).
 15. Hyder AA, Sugerman DE, Puvanachandra P, Razzak J, El-sayed H, Isaza A. Global childhood unintentional injury surveillance in four cities in developing countries : a pilot study. 2009;(June 2008):345-52.
 16. Whitnall L, Mcmillan TM, Murray GD, Teasdale GM. Disability in young people and adults after head injury: 5-7 year follow up of a prospective cohort study. 2006;5-7.