DOI:http://doi.org/10.4038/sljfmsl.v13i1.7898

RESEARCH PAPER

Profile of children presenting for clinical forensic examination to the Teaching Hospital complex, Peradeniya, Sri Lanka

Siddique MS*, Vadysinghe AN, Wickramasinghe WMLN
Department of Forensic Medicine, Faculty of Medicine, University of Peradeniya, Sri Lanka

ABSTRACT

Introduction: Children are more susceptible to injuries due to their inability to protect themselves. Our study aims to determine the socio-demographic profile, causative factors, intent, and severity of injuries in children presenting to the Teaching Hospital Complex Peradeniya for clinical forensic examination (CFE).

Methodology: This is a cross-sectional descriptive study. Children who presented for clinical forensic examination for a period of one year (from September 2017 up to September 2018) to Teaching Hospital Complex, Peradeniya, Sri Lanka, were included. Data was collected using a questionnaire at the time of clinical forensic examination where the Medico-legal examination form (MLEF) was also completed. Written informed consent was obtained from both the patient and guardian for routine medico-legal procedures and for inclusion in the study.

Results: Two hundred and forty-two children were recruited. One hundred and fifty-seven (65%) were male. The majority (43%) were between 16-18 years of age. Most of the injuries were due to road traffic accidents (RTA) (61%) followed by assault (18%), sexual abuse (12%), and accidental falls (5%). 'Other' types of injury or presentations were seen in 9 (4%) which was due to poisoning, drowning, air gun injury or burns. Males were predominantly affected except in the category of sexual abuse. Twice the number of males sustained injuries due to RTA compared to females, while three times the number of males was affected by assaults compared to females. The main category of hurt was non-grievous (62%). In this cohort, 31% had intentional trauma with a male predominance.

Conclusion: In children presenting to the Teaching Hospital Complex Peradeniya for clinical forensic examination (CFE), road traffic accidents are the main cause for injuries. Males are more vulnerable to injuries in general, while females are more vulnerable to sexual abuse.

Keywords: Child sexual abuse, Road traffic accidents, Trauma, Violence

Corresponding Author: Siddique MS
sadsid71@gmail.com
https://orcid.org/0000-0003-2909-2482

ARTICLE HISTORY
Received: 26.08.2021 **Received in revised form:** 22.09.2022
Accepted: 08.03.2022 **Available online:** 13.06.2022

INTRODUCTION

Injury is a leading cause of death and disability worldwide burdening countries especially with limited resources[1]. Those who survive may be disabled, temporarily or permanently having a profound effect on the individual, family, society, and the country[2]. Children are more susceptible to injuries due to their inability to protect themselves. They depend on caregivers for food, shelter, safety, education, health, and for other needs. Therefore, their protection is the responsibility of the family and society as a whole[1-3].

Children may be subjected to intentional or non-intentional injuries[3]. Children cannot protect themselves from intentional injuries and they do not possess communication skills to express their feelings and experiences or resist abuse in comparison to adults. Therefore, caregivers may not identify abuse, which leads to further victimization of the children[4]. Studies show that children who behave aggressively with their peers have been victims of intentional violence in the past[5,6].

The cost of injuries to society is very high. Such costs may be direct or indirect. Direct costs come from the use of goods, child protection, and health services. Indirect costs are incurred by the caregivers in following up, spending their time and income[5]. A healthy, strong, younger generation is the strength of a nation. Therefore, injuries to children adversely affect not only the victims but their families, friends and communities as a whole[7].

It has been reported by Manas K Akmatov in 2011, that children from a low socio-economic class are at a higher risk of experiencing intentional injuries[8]. Literature reveals that such injuries are often associated with socio-demographic factors such as culture, habit, and living conditions[9,10].

Currently, Sri Lanka has a population of 21 million. There is rapid growth of the population of children with the growth of the country's population. Approximately 31% of the total population is children[11]. In Sri Lanka a child is legally defined as a person less than 18 years of age, irrespective of maturity and the level of education.

Literature revealed a study conducted in the Western province, Sri Lanka to determine the cause of injuries in children. This showed that 71% of children admitted to hospital are referred for Clinical Forensic Examination (CFE). Of these, 55% were victims of RTA, 17% victims of intentional trauma, 12% were victims of sexual abuse, and 16% were victims of other types of trauma[12].

Sri Lanka is a country that provides a large labor force to foreign countries. Females leave their families to go abroad for employment. A study conducted by Siriwardhana et al in 2015, on labor migration and its impact on families, revealed that it contributes to child injury[13]. Furthermore, a study conducted in 2011 by Miller revealed that the abuse of coastline male children in Sri Lanka is aggravated as a result of tourism[14].

OBJECTIVES

With regard to children, presenting to the Teaching Hospital Complex Peradeniya (Dental hospital, Pediatric hospital, Professorial unit) following trauma of medico-legal significance to;

- describe medico-legally significant issues
- determine the socio-demographic profile of the victim, causative factors, intent, and severity of injuries.

METHODOLOGY

A cross-sectional descriptive study was conducted on children (individuals less than 18 years) presenting to the Teaching Hospital Complex, Peradeniya (Dental hospital, Pediatric hospital, Professorial unit) for clinical forensic examination for a period of one year. Data were collected prospectively and documented at the time of clinical forensic examination by the Judicial Medical Officer.

Written informed consent was obtained from both the patient and guardian for routine medico-legal procedures and for being included in the study. The children whose guardians refused to consent and children with cognitive impairment were excluded from the study. Mentally challenged children were excluded as their capacity to comprehend the gravity of giving consent is particularly challenging and requires psychiatric opinion.

Information was gathered by taking a detailed history from both the patient and guardian during the routine clinical forensic examination. Police records were accessed in cases of RTA, physical or sexual child abuse. Information regarding socio-demographic profile, causes for injury, whether intentional or non-intentional, and category of hurt were collected.

Confidentiality was ensured by coding the patients. Confidentiality of data was ensured by a way of storing completed questionnaires in a secure place and by securing electronic data by a password.
Ethical approval was granted by the Ethics Review Committee, University of Peradeniya, Sri Lanka.

RESULTS

A. Socio-demographic profile

Out of 242 children, 157 (65%) were male. According to the age distribution 103 (43%) were between 16-18 years, 72 (30%) were between 11-15 years, 30 (12%) children between 6-10 years and 37 (15%)

were 1- 5 years. Table 01 summarizes the distribution of gender across different age groups, which shows that males are predominantly affected in all age groups.

Table 01: Gender and age distribution

	Male	Female	Total
	n (%)	n (%)	
1-5 years	21 (9%)	16 (7%)	37
6-10 years	17 (7%)	13 (5%)	30
11-15 years	46 (19%)	26 (11%)	72
16-18 years	73 (30%)	30 (12%)	103
Total	157	85	

B. Type of trauma

Most of the injuries were due to road traffic accidents 148 (61%), followed by assault 44 (18%), sexual abuse 29 (12%), and accidental falls 12 (5%). Nine children (4%) had sustained injuries or had conditions due to poisoning, drowning, air gun injury, and burns which were categorized under other types of injuries. A significant association was found between the gender and type of trauma **(Table 02)**. Males were predominantly affected when considering all types of injuries, except in sexual abuse. In road traffic accidents males were affected twice as often as females. In assaults males were affected three times more than females. The number of affected children was increasing gradually as they aged, except in falls and 'other' types of injuries in which the incidence declined with age **(Table 02)**.

Table 02: Age and Gender distribution with Type of Trauma

	Assault	Sexual abuse	Falls	RTA	Others	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	
Gender						
Male	33(14%)	11(5%)	7(3%)	100(41%)	6(3%)	157
Female	11(5%)	18(7%)	5(0.2%)	48(20%)	3(1%)	85
Age						
1-5 years	4(2%)		5(2%)	25(10%)	3(1%)	37
6-10 years	6(2%)	2(1%)	1(0.4%)	20(8%)	1(0.4%)	30
11-15 years	14(6%)	13(5%)	3(1%)	40(17%)	2(1%)	72
16-18 years	20(8%)	14(6%)	3(1%)	63(26%)	3(1%)	103

C. Severity of trauma

Injuries were classified according to the Penal Code of Sri Lanka[15]. Accordingly increasing severity was classified as 'Non-grievous', 'Grievous', 'Endangering life' and 'Fatal in ordinary cause of nature'. Non grievous injuries are predominant 150 (62%), when compared to grievous injuries 57 (24%). Four cases (2%) had injuries which could be classified as endangering life and 2 (1%) were fatal in ordinary cause of nature. Further analysis of category of hurt with gender showed that out of 150 cases presenting with non-grievous injuries, 66% were male. Similarly, the majority of grievous injuries were reported in males (75%), highlighting the possibility of males being subjected to severe trauma than females. Injuries that are endangering life and fatal in ordinary cause of nature were reported equally among both males and females **(Table 03)**. However, these types of injuries were reported in small numbers making it difficult to draw up any conclusions regarding the association between gender and category of hurt.

Table 03: Category of hurt and gender

	Male	Female	Total
	n (%)	n (%)	
Non grievous	99 (41%)	51 (21%)	150
Grievous	43 (18%)	14 (6%)	57
Endangering life	2 (1%)	2 (1%)	4
Fatal in Ordinary cause of nature	1 (0.4%)	1 (0.4%)	2
Other	12 (5%)	17 (7%)	29
Total	157	85	

D. Manner of the incident

Out of 242 victims, 168 (69%) had unintentional trauma and only 74 (31%) had intentional trauma. Table 04 represents the association between manner of injury with age and gender. Accordingly, more males (19%) had sustained intentional trauma. Incidence of unintentional trauma was high in 1-5 years age group compared to 6-10 years age group.

Table 04: Age and gender distribution with manner of the injury

	Intentional		Unintentional		Total
	n	(%)	n	(%)	
Gender					
Male	46	(19%)	111	(46%)	157
Female	28	(12%)	57	(24%)	85
Age					
1-5 years	3	(1%)	34	(14%)	37
6-10 years	10	(4%)	20	(8%)	30
11-15 years	28	(12%)	44	(18%)	72
16-18 years	33	(14%)	70	(29%)	103

DISCUSSION

In medico-legal practice application of medical knowledge to an injured individual is the main contribution to ensuring justice. In order to do so, judicial medical experts should identify the main causes for injuries, mechanism of infliction, risk factors, category of hurt, and the magnitude of the problem. In this research, we attempted to identify the medico legally significant factors among children who presented with injuries.

The number of affected children progressively increased from infancy to adolescence. This is confirmed by 103 out of 242 cases being in the 16-18 age group followed by 72 in the 11-15 age group. Further, we noticed that older children had sustained all types of injuries. This pattern is consistent with previous national and international studies where they have found that older children are more prone to injuries than younger children[16,17]. They are more vulnerable to injuries as they represent an active age group that engages in sports, recreational activities, confrontations, and riding or driving motor vehicles.[18]

Road traffic accidents were identified as the main cause for injuries. Nearly 148 (61 %) have met with accidents, where 100 were males and rest were females. RTAs have become a major problem worldwide[19]. Developed countries have safe roads, technically certified vehicles, and road rules to which majority of the citizens adhere[19]. In comparison, Sri Lanka despite good road rules has poor roads and vehicles. However, it is noted that people do not abide by the law[12,20]. In addition, there can be other reasons that increase the risk of RTA such as poor maintenance of roads, crowded roads, absence of footpaths, and inexperience of drivers and pedestrians.

Majority who met with RTA were in the 16-18 year age group. According to previous studies, most of them were riders or drivers. The main vehicles were motorcycles and three wheelers.[12,20] Studies have also identified that younger age groups (1-10 years) who met with RTA were pedestrians or passengers in vehicles. Often, it was revealed that they had not followed the traffic rules or the alleged drivers had not followed rules.[20,21] Females were injured while travelling in motorcycles as pillion riders while, males were injured as the rider of motor cycles.[21]

Eighteen percent of the victims had been assaulted, 12% were victims of sexual abuse, 5% were victims of a fall, and 4% were the result of 'other' causes such as poisoning, burns, drowning, or gunshot injuries. The incidence of accidental falls and 'other' injuries decreased with age. Conversely assault, sexual abuse, and road traffic accidents increased with age.

Assaults accounted for 44% of injuries. All were intentional, majority were male, and there was a gradual rise with age. Most injuries were due to violence. This reflects the younger generations trend

for violence which is consistent with previous studies.[22]

Child sexual abuse is a serious issue in the health sector as well as in the legal system of the country[23]. Our results showed that the incidence of sexual abuse was increasing with age. Sexual abuse victims were identified mainly in two age groups; 11-15 years and 16-18 years. Eleven males and 18 females were affected. Main underlying causes were teenage love affairs and eloping with the partners. This has become a major problem in our society[24] that needs to be studied further. The literature revealed that most perpetrators are well known to the victim, and are older (more than 18 years)[24,25]. Often they are married or having multiple sexual partners. Most of the perpetrators have faced sexual harassment in their childhood as well[23]. According to previous studies done in Sri Lanka, many victims were school-aged, younger than their assailants and shared risk factors such as being from a single parent family, parents who have gone abroad to work as house maids, working parents, peers having love affairs, and communication accessibility. In addition, all these activities have taken place in a pre-planned manner[24,25].

Young children are more prone to injuries due to falls[9]. The majority occurred in their own house or in preschools and schools while playing and were non-intentional injuries. There were 12 cases of accidental falls, and the 1-5 year age group was mainly affected. Incidence of falls gradually decreased with age.

The 'other' category of injury included burns, poisoning, drowning, and air gun injuries. However, only a few patients with these injuries were reported for CFE due to various reasons. Globally, burn injuries cause high morbidity and mortality in all age groups[26]. Children can have long term physical, psychological, economical, and social effects on them and their families due to burns[27,28]. Although a considerable number of burn patients are admitted and treated, most of these cases are not reported for medico legal examinations[28]. Drowning is the third leading cause of death from unintentional injuries with highest rates among children and has been a controversial subject medico-legally[29]. Hence, all cases of burn injuries and drowning may not be referred for forensic examination and can be the reason for this low incidence.

According to the severity of the injury, the majority (62%) were non grievous and only 24% were grievous injuries. Injuries that are endangering life and fatal in ordinary cause of nature were reported less.

Most of the injuries were non-intentional (69.4%). Among the injuries reported among younger children majority were non- intentional. However, the incidence of intentional injuries was gradually increasing with age. This also can be attributable to the increasing incidence of violence seen among adolescents[22.]

CONCLUSION

Road traffic accidents are the main cause for injuries in children. Males are more vulnerable to injuries in general, while females are more vulnerable to sexual abuse.

RECOMMENDATIONS

As older children are more vulnerable to RTA and sexual assaults, parents/guardians must be vigilant. Teachers and other school staff should pay attention to preventing non-intentional injuries. As there is increased risk of violence among older children/ adolescents, they should be educated on the importance of abiding the law.

LIMITATIONS

This study sample is of children who have sustained injuries and who were medico legally examined. Children who refused admission and those who sought alternate therapies are not included in the study. In addition, mentally challenged children were also excluded from the study.

ACKNOWLEDGEMENTS

To Dr. S. Tennakoon, Senior Lecturer, Department of Community Medicine, University of Peradeniya for his valuable support in the statistical analysis of this research and Miss. F. Mizha for the assistance in preparing the manuscript.

CONFLICTS OF INTEREST

There are no conflicts of interest.

DISCLOSURE

ANV is an editorial board member of Sri Lanka Journal of Forensic Medicine, Science & Law. Therefore he did not participate in anyway in the publication / decision making process of this submission, as per journal policy.

ETHICAL ISSUES

None

AUTHOR CONTRIBUTIONS

MSS: writing project proposal, data collection, writing project report and manuscript; **ANV:** supervision of the process and editing the manuscript; **WMLNW:** finalizing the manuscript.

REFERENCES

1. de Sousa Petersburgo D, Keyes CE, Wright DW, Click LA, MacLeod J, Sasser SM. The epidemiology of childhood injury in Maputo, Mozambique. *International Journal of Emergency Medicine*. 2010 Sep;3(3): 157-63. https://doi.org/10.1007/s12245-010-0182-z.
2. Hong J, Lee B, Ha EH, Park H. Parental socioeconomic status and unintentional injury deaths in early childhood: Consideration of injury mechanisms, age at death, and gender. *Accident Analysis & Prevention*. 2010 Jan 1;42(1): 313-319. http://doi.org/10.1016/j.aap.2009.08.010.
3. Mutto M, Lawoko S, Nansamba C, Ovuga E, Svanstrom L. Unintentional childhood injury patterns, odds, and outcomes in Kampala City: An analysis of surveillance data from the National Pediatric Emergency Unit. *Journal of Injury & Violence*. 2011 Jan;3(1): 13–18. https://doi.org/10.5249/jivr.v3i1.56.
4. Norman RE, Byambaa M, De R, Butchart A, Scott J, Vos T. The long-term health consequences of child physical abuse, emotional abuse, and neglect: a systematic review and meta-analysis. *PLoS Medicine*. 2012;9(11): e1001349. https://doi.org/10.1371/journal.pmed.1001349.
5. Pathirana BDD. The Cost of Violence on Children. *Sri Lanka Journal of the Humanities*. 2011;37(1-2): 119–133. https://doi.org/10.4038/sljh.v37i1-2.7207
6. Afifi TO, MacMillan HL, Boyle M, Taillieu T, Cheung K, Sareen J. Child abuse and mental disorders in Canada. *Canadian Medical Association Journal*. 2014 Jun 10;186(9): E324-32. https://doi.org/10.1503/cmaj.131792.
7. Fergusson DM, McLeod GF, Horwood LJ. Childhood sexual abuse and adult developmental outcomes: Findings from a 30-year longitudinal study in New Zealand. *Child Abuse & Neglect*. 2013 Sep 1;37(9): 664-74. https://doi.org/10.1016/j.chiabu.2013.03.013.
8. Akmatov MK. Child abuse in 28 developing and transitional countries—results from the Multiple Indicator Cluster Surveys. *International Journal of Epidemiology*. 2011 Feb 1;40(1): 219-27. http://doi.org/10.1093/ije/dyq168.
9. Jacobi G, Dettmeyer R, Banaschak S, Brosig B, Herrmann B. Child abuse and neglect: diagnosis and management. *Deutsches Arzteblatt International*. 2010 Apr;107(13): 231. https://doi.org/10.3238/arztebl.2010.0231.
10. Chandran A, Hyder AA, Peek-Asa C. The global burden of unintentional injuries and an agenda for progress. *Epidemiologic Reviews*. 2010 Apr 1;32(1): 110-20. https://doi.org/10.1093/epirev/mxq009.
11. Department of Census and Statistics. *Census of population and housing Sri Lanka 2012*. Available from: http://www.statistics.gov.lk/ [Accessed 10th December 2019].
12. Kitulwatte IDG, Edirisinghe PAS, Appuhamy P. Analysis of child victims of trauma or violence reported for medico-legal examination in three tertiary care hospitals in Sri Lanka. *The Medico-Legal Journal of Sri Lanka*. 2013;1(2): 29-36. http://doi.org/10.4038/mljsl.v1i2.7291
13. Siriwardhana C, Wickramage K, Jayaweera K, et al. Impact of economic labour migration: a qualitative exploration of left-behind family member perspectives in Sri Lanka. *Journal of Immigrant and Minority Health*. 2015 Jun;17(3): 885-94. https://doi.org/10.1007/s10903-013-9951-0.
14. Miller J. Beach boys or sexually exploited children? Competing narratives of sex tourism and their impact on young men in Sri Lanka's informal tourist economy. *Crime, Law and Social Change*. 2011 Dec;56(5): 485-508. https://doi.org/10.1007/s10611-011-9330-5.
15. Penal code. Available from: https://www.lawnet.gov.lk/penal-code-2/ [Accessed 25th Aug 2021]
16. Jiang X, Zhang Y, Wang Y, Wang B, Xu Y, Shang L. An analysis of 6215 hospitalized unintentional injuries among children aged 0–14 in northwest China. *Accident Analysis & Prevention*. 2010 Jan 1;42(1): 320-6. http://doi.org/10.1016/j.aap.2009.08.012.
17. Monuteaux MC, Lee L, Fleegler E. Children injured by violence in the United States: Emergency department utilization, 2000–2008. *Academic Emergency Medicine*. 2012 May;19(5): 535-40. https://doi.org/10.1111/j.1553-2712.2012.01341.x.
18. Sidebotham P, Fraser J, Fleming P, Ward-Platt M, Hain R. Patterns of child death in England and Wales. *The Lancet*. 2014 Sep 6;384(9946): 904-14. https://doi.org/10.1016/S0140-6736(13)61090-9.
19. Fraga A, Fraga GP, Stanley C, Costantini TW, Coimbra R. Children at danger: injury fatalities among children in San Diego County. *European Journal of Epidemiology*. 2010 Mar;25(3): 211-7. https://doi.org/10.1007/s10654-009-9420-1
20. Devasurendra K, Perera L, Bandara S. An insight to motorized two and three wheel crashes in developing countries: A case study in Sri Lanka. *Journal of Transportation Safety & Security*. 2017 Mar 30;9(sup1): 204-15. https://doi.org/10.1080/19439962.2016.1236052.
21. Sadeghi-Bazargani H, Ayubi E, Azami-Aghdash S, et al. Epidemiological patterns of road traffic crashes during the last two decades in Iran: a review of the literature from 1996 to 2014. *Archives of Trauma Research*. 2016 Sep;5(3): e32985. https://doi.org/10.5812/atr.32985.
22. Sigel EJ, Mattson SA, Mercado MC. Increased violence involvement and other behavioral and mental health factors among youth with firearm access. *Journal of Adolescent Health*. 2019 Jul 1;65(1): 63-71. https://doi.org/10.1016/j.jadohealth.2019.01.028.

23. Bebbington P, Jonas S, Kuipers E, et al. Childhood sexual abuse and psychosis: data from a cross-sectional national psychiatric survey in England. *The British Journal of Psychiatry*. 2011 Jul;199(1): 29-37. https://doi.org/10.1192/bjp.bp.110.083642
24. Sathiadas MG, Mayoorathy S, Varuni K, Ranganathan SS. Child abuse in northern Sri Lanka. *The Indian Journal of Pediatrics*. 2017 Feb;84(2): 128-33. http://doi.org/10.1007/s12098-016-2193-0.
25. Vidanapathirana M. Child sexual abuse; a medico-legal analysis. *International Journal of Medical Toxicology and Forensic Medicine*. 2014 Jan 1;4(3): 91-7. http://doi.org/10.22037/ijmtfm.v4i3(Summer).5885.
26. Mani KK, Demado A, Manaf RA, Yellappan K. Preventing fire and burn among children in Malaysia: a research driven education initiative. *Journal of Injury and Violence Research*. 2019 Aug;11(4 Suppl 2). https://doi.org/10.5249/jivr.v11i2.1317.
27. Mitchell M, Kistamgari S, Chounthirath T, McKenzie LB, Smith GA. Children younger than 18 years treated for nonfatal burns in US emergency departments. *Clinical Pediatrics*. 2020 Jan;59(1): 34-44. https://doi.org/10.1177/0009922819884568.
28. Mashreky SR, Rahman A, Svanström L, Khan TF, Rahman F. Burn mortality in Bangladesh: findings of national health and injury survey. *Injury*. 2011 May 1;42(5): 507-10. https://doi.org/10.1016/j.injury.2009.11.020.
29. Armstrong EJ, Erskine KL. Investigation of drowning deaths: a practical review. *Academic Forensic Pathology*. 2018 Mar;8(1): 8-43. https://doi.org/10.23907/2018.002.