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Trends of Patients Admitted to Pediatric Surgery Department Due to Unintentional Trauma at A Tertiary Care Hospital, Karachi

Sadia Abdul Qayyum, Hina Yousuf, Syed Mukkaram Ali, Lubna Faisal, Fatima Rehman

ABSTRACT:

Objective: To determine the frequency and factors associated with unintentional trauma and its management in children under 14 years of age.

Study Design and Setting: This study is retrospective, descriptive and was conducted at the Pediatric Surgery Department and Emergency Room at Liaquat National Hospital and Medical College, Karachi.

Methodology: Total duration of the study was from 1st January 2020 to 31st December 2020 and all the unintentional trauma cases in children below 14 years of age were included. Details of history, examination, and any procedure done were recorded through a predesigned proforma in regard to their age, gender, day of presentation and, factors related to trauma like the anatomical site, place, mode and type of injury along with their treatment outcomes. Descriptive statistics were run using SPSS version 26.

Results: Out of 103 children, (66%) were males in the age group of 2-4 years. The surge of injuries was on weekdays (71.8%). Domestic injuries were 68.9% which is significantly higher. The most affected region was the head/ neck (28.2%) with lacerations (40.0%) and bruises (90.0%). Amongst the management outcomes, the invasive procedures were frequent (48.5 %) for laceration (48.0%).

Conclusion: Amongst the (6.4%) of unintentional trauma cases, the majority of these injuries were blunt trauma in children under four years of age on the head/ neck region. We conclude that the majority of these pediatric injuries were moderate in nature and required invasive treatment strategies but these injuries are preventable.

Keywords: Injury, Intentional injuries, Mode of injury, Pediatric trauma, Un-intentional injuries

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Sadia Abdul Qayyum
Assistant Professor Department of Forensic Medicine
Liaquat National Hospital and Medical College, Karachi
Email: sadia.abdul@lnh.edu.pk

Hina Yousuf
Assistant Professor Department of Pediatric Surgery
Liaquat National Hospital and Medical College, Karachi
Email: h.yousuf@lnh.edu.pk

Syed Mukkaram Ali
Professor Department of Forensic Medicine
Liaquat National Hospital and Medical College, Karachi
Email: Mukkaram.ali@lnh.edu.pk

Lubna Faisal
Assistant Professor Department of Anatomy
Liaquat National Hospital and Medical College, Karachi
Email: Drlubna.faisal@lnh.edu.pk

Fatima Rehman
Assistant Professor Department of Anatomy
Liaquat National Hospital and Medical College, Karachi
Email: Fatima.rehman@lnh.edu.pk

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INTRODUCTION:

Trauma incorporates 12% of the entire disease burden with the increasing mortality percentage around the globe.[1] Injury is the bodily defacement that occurs as a result when a body is instantaneously put through towards an intolerable amount of vitality.[2] Children are susceptible to injuries of different types. Medico-legally injury is divided into two types; intentional and unintentional injuries which are established on the basis of intention. Unintentional injuries include road traffic accidents, falls, burns, poisoning, drowning, occupational injuries, sports injuries, falls of objects, and injuries in disaster situations whereas intentional ones include suicide, assault, child maltreatment, homicides, bias-related violence, and firearms.[3] Pediatric injuries are observed to be avoidable, the emphasis should be on the recognition of factors which include age, gender, family practices, and circumstances. Age and gender are the most paramount aspect of modifying the patterns of injuries like children under the 5 years age group are more susceptible to injuries related to the head due to their start of wandering abilities. Unintentional injuries can also cause disability, which can have an impact on the lives of children. In the 0-14 year age group, the leading cause of mortal or severe traumatic injuries

is unintentional injury.[4] Simple or grievous nature of the injury can have an impact on the emotional aspect as well as the financial aspects of families.

The circumstances in Pakistan are substandard resulting in an escalating number of pediatric trauma victims due to road traffic accidents and with increasing ferocity also there is lack of timely services of appropriate pre-hospital and hospital-based medical awareness. The initial help to the trauma victims is usually provided by relatives or people at the scene of the accident. It demands the capacity to acquire care, swift and secure movement of patients.[5] Exigency awareness depends on the identification of grievous injury or illness and prompt action by the paramedics who should be competent in handling emergency and intensive care of children with vital trauma. This can be accomplished by regular training and advanced skills of resuscitation by all health care professionals which may have a great effect on pediatric trauma outcomes. The trauma teams which comprise surgical subspecialties especially pediatric surgery, neurosurgery, orthopedic surgery, and cardiothoracic surgery, etc. should always be accessible for gravely injured children with a maximal reaction time from the first contact of 30 min to circumvent mortality and severe morbidity.[6] Neonatal, infant, and under-five mortality rates in 2019 were 40, 54, and 65 per 1000 live births, which gives Pakistan the world's highest neonatal mortality rate, the 11th highest infant, and 20th highest under-five mortality rates.[7]

The frequency and pattern of pediatric trauma-associated cases in the population may vary from one country to another based on different variables. As in National health survey, Pakistan has a significant result of estimated injury rate which is 35.2 per 1000 children under 15 years of age.[8] Trauma is perhaps an extreme bodily offense caused by an extrinsic source like fall, accident, misadventure from knife or firearm, etc. that requires emergency intervention to impede loss of entity or limb or substantial, irreversible physical impairment. It does not include heart attacks, strokes, chronic contagious or infectious diseases, or mentalillness not caused by an acute bodily injury. For the potential pediatric-specific trauma triage criteria, the connection linking type and mode of injury and outcome in injured children needs to be determined. Therefore, this study is set out to report the frequency, management, and associated factors with un-intentional trauma in the pediatric age group.

METHODOLOGY:

This retrospective study was conducted between 1st January 2020 to 31st December 2020 at the Pediatric Surgery outpatient and emergency department of Liaquat National Hospital and Medical College, Karachi after obtaining approval from the institutional review committee via letter (Ref: App# 0630-2021 LNH-ERC). Inclusion criteria was all cases with a history and examination of unintentional trauma in children under 14 years of age. Exclusion criteria was patients who were declared dead on arrival in emergency room (ER) as their detailed history and examination were not found, intentional trauma (homicide , suicide, drowning, sexual assault or abuse) cases were excluded from the study.

A detailed evaluation of patient medical files was done through a pre-designed proforma which included their age, gender, day of presentation, anatomical site, injury type, mechanism, place, and management of the injury. All cases included in this study were tabulated in Microsoft Excel 2013 and analysed using SPSS version 26. Categorical measurements of the obtained data were stated in numbers (n) and percentages (%). Inferential statistics were explored using Chi-square/Fisher exact test. The p-value of <0.05 was considered statistically significant.

Patient privacy and confidentiality were maintained by using distinctive prefixes and password-protected data entry software with minimal users.

RESULT:

During the course of the study period, overall 1606 children were admitted through ED and OPD of pediatric surgery out of which 103 (6.4%) children were identified as being exposed to unintentional trauma. Most children presenting with injuries were Male 68 (66%) and they outnumbered females 35 (33.9%) having mean age 4.0 ± 3.1 years. We found major injuries occurring in the age group of 2-4 years 44 (42.7%), Males 31 (30.0%), and females 12 (11.26%). The least common age group for both genders were 10-14 years with males around 5 (5.8%) and females 3 (3.0%) respectively. The notable spikes in un-intentional injury volume were found mostly on weekdays 74 (71.8 %). Injuries which were frequently sustained were domestic in nature 72 (69.9%). The maximum duration of hospital stay was 17 days having a mean [SD] 2.7 [2.8] mainly in penetrating firearm injury. (Table 1).

Our study depicts the comparison between anatomical site factors and the type of injury seen on it. The most affected site of the body was head/ neck 29 (28.2%) with laceration 10 (40.0%) the leading mode of injury observed closely followed by the region of abdomen 25 (24.3%) in which stricture 14 (100%) due to caustic ingestion was the chief type of injury noted and the least affected area was pelvis/ perineum 5 (4.9%). (Table 2).

The frequent mode of unintentional childhood injuries was from asphyxia 12 (50.0%) and blunt objects 12 (38.7%) followed by chemical burns 7 (50.0%) seen in 2-4 years age group and the least reported cases was observed in 10-14 years age 9 (8.7%). The overall burden of the route of pediatric trauma admission was from accident and emergency department (ER) 55 (53.4 %) with the dominant mode of injury by asphyxia 22 (91.7%). These patients were triage as level 1: injured children with airway, breathing, or circulation (ABCs) disarrangement and Glasgow Coma

Scale (GCS) <8 (1.9%), Level 2: Children with steady ABCs, long bone injuries, dislocations, stable abdominothoracic injuries, and head injury with GCS 9-12 (6.8 %), Level 3: Hemodynamically steady patient with minor trauma (44.7%) with the recurrent mode of injury seen was asphyxia 22 (91.7%) and fall from height 14 (100%) respectively. The tally of outpatient department (OPD) admission were 48 (46.6%) these were by blunt objects 21 (67.7%) (Table 3).

Amongst the traumatized children who were admitted they were managed successfully through invasive treatment modalities 50 (48.5%) with the highest indication 18 (36.0%) in 2-4 year age group. Laceration 24 (48.0%) was the leading type of injury in which invasive methods were used. The frequency of minimally invasive procedures was 39 (37.9%) primarily in the age group of 2-4 years 20 (51.3%) being employed in foreign body ingestion cases 24 (61.5%) and post chemical burn stricture formation 14 (35.9%) while 5.8 % were those children who left against the medical advice (LAMA) (Table 4)

Table 1: Distribution of characteristics of pediatric trauma (n=103)

Characteristics	Total (%)
Gender distribution	
Male	68 (66%)
Female	35 (33.9%)
Age distribution (years)	
0-1	24 (23.3%)
2-4	44 (42.7%)
5-9	26 (25.2%)
10-14	9 (8.7 %)
Days of Injury	
Week days	74 (71.8%)
Weekend	29 (28.1%)
Place of Injury	
Highway (RTA)	3 (2.9 %)
Home	72 (69.9%)
Hospital (Injection trauma)	4 (3.9%)
Play area	24 (23.3 %)
Length of hospital stay (Days)	
Minimum duration	1 (0.97%)
Maximum duration	17 (16.5%)

DISCUSSION:

Injury is the leading cause of demise and infirmity in children throughout the globe. More than a million children less than 14 years of age expire each year from unintentional injuries globally.[9]

Our study highlights the burden of unintentional pediatric trauma cases admitted before, during, and after the lockdown of the COVID-19 pandemic period at a tertiary care hospital located in the center of the busy and crowded metropolitan city of Pakistan. The Pediatric surgery department managed 103 (6.4%) unintentional trauma cases, which were triaged, observed, managed, and are encompassed in this study.

The majority of children were males (66 %) as compared to females (33.9 %) with a ratio of 1.9:1. This is in agreement with many studies in which male children are more exposed than females.[10] Guardians are more apprehensive about girls playing outside that's why they are not bared to likely risk factors and habitat fitting for trauma such as playing on roads, rooftops, on trees, or near construction sites, etc. Predominance was noted amongst the age group (pre-school) between 2-4 years (42.7%) mostly in males (45.5%). After the age of one, children walk, which allows them to discover the world around them, play outside, and more easily escape the supervision of their parents.[11] We also found out the percentage of injuries that had taken place during the weekends (28.1 %) in relation to weekdays (71.8 %) which is in accordant with an analysis study done in Morocco.[12] In opposition to this a study conducted in Karachi mentions weekends bearing more reported cases.[13] Domestic injuries (69.9%) were observed to be in majority, which is similar to a compelling study conducted in Nepal and Saudi Arabia.[14,

Table 2: Pediatric trauma distribution on anatomical site and type of injury (n=103)

Variable Site	Type of Injury									
	Abscess	Bruise	FB	Fracture	Incised wound	Laceration	Stricture	Penetrating	Total	p-value
Abdomen	1 7.1%	1 10.0%	8 33.3%	0 0.0%	0 0.0%	0 0.0%	14 100.0%	1 20.0%	25 24.3%	0.000
Head/ Neck	6 42.9%	9 90.0%	3 12.5%	1 12.5%	0 0.0%	10 40.0%	0 0.0%	0 0.0%	29 28.2%	
Limbs	6 42.9%	0 0.0%	0 0.0%	2 25.0%	3 100%	7 28.0%	0 0.0%	3 60.0%	21 20.4%	
Pelvis/ Perineum	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	5 20.0%	0 0.0%	0 0.0%	5 4.9%	
Thorax	1 7.1%	0 0.0%	13 54.2%	5 62.5%	0 0.0%	3 12.0%	0 0.0%	1 20.0%	23 22.3%	

Chi-square/ Fisher's Exact Test applied,*p-value < 0.05 considered significant

[15] This is noteworthy in the preschool group who pass a considerable amount of their time at home.

With regard to anatomical site, preponderance was of head/neck trauma (28.2%) resulting in lacerations (40.0%) and bruises (90.0%). Our findings corroborate with a report from Germany,[16] which showed head injuries to be the most commonly injured body area, followed by Abdomen (24.3%). This may be due to the fact that children have unrestrained attitudes and recently started to walk resulting in compression, crushing, or deceleration forces being exerted on the head and abdominal cavity. Lacerations and bruises are repeatedly seen in children because fringed bony prominence hit against resistant targets namely floors, stairs, or furniture proceeding towards the common display of this type of injuries on the chin, cheek, nose, occipital region, head, and forehead.[17] Foreign body ingestion (coin, battery, peanuts, buttons, needles, magnets, etc.) and stricture formation was the leading type of injury found in the abdomen.[18, 19] Young children are clearly eccentric of blunt objects of diverse shapes, sizes, and colorful liquids of variegated smell, and one of the ways they inspect new target is to put them in their oral cavity to savor and feel them. The type of injury

Table 3: Comparison of pediatric trauma age group and place of admission with mode of injury (n=103)

Variable	Mode of injury								
	Asphyxia	Blunt object	Chemical burn	Fall	RTA	Sharp object	Others	Total	p-value
Age Group									
0-1 (years)	7 29.2%	9 29.0%	2 14.3%	1 7.1%	1 12.5%	2 25.0%	2 50.0%	24 23.3%	0.647
2-4 (years)	12 50.0%	12 38.7%	7 50.0%	6 42.9%	3 37.5%	3 37.5%	1 25.0%	44 42.7%	
5-9 (years)	4 16.7%	8 25.8%	5 35.7%	5 35.7%	2 25.0%	2 25.0%	0 0.0%	26 25.2%	
10-14 (years)	1 4.2%	2 6.5%	0 0.0%	2 14.3%	2 25.0%	1 12.5%	1 25.0%	9 8.7%	
Place									
OPD	2 8.3%	21 67.7%	13 92.9%	0 0.0%	4 50.0%	6 75.0%	2 50.0%	48 46.6%	0.000
ER	22 91.7%	10 32.3%	1 7.1%	14 100%	4 50.0%	2 25.0%	2 50.0%	55 53.4%	

Chi-square/ Fisher's Exact Test applied,*p-value < 0.05 considered significant

Table 4: Comparison of pediatric trauma age group and type of injury with the outcome. (n=103)

Variable	Outcome					
	Conservative	Invasive	Minimal Invasive	LAMA	Total	p-value
Age Group (years)						
0-1	1 (12.5%)	12 (24.0%)	9 (23.1%)	2 (33.3%)	24 (23.3%)	0.515
2-4	4 (50.0%)	18 (36.0%)	20 (51.3%)	2 (33.3%)	44 (42.7%)	
5-9	1 (12.5%)	14 (28.0%)	9 (23.1%)	2 (33.3%)	26 (25.2%)	
10-14	2 (25.0%)	6 (12.0%)	1 (2.6%)	0 (0.0%)	9 (8.7%)	
Type of Injury						
Abscess	0 (0.0%)	14 (28.0%)	0 (0.0%)	0 (0.0%)	14 (13.6%)	0.000
Bruise	4 (50.0%)	2 (4.0%)	0 (0.0%)	4 (66.7%)	10 (9.7%)	
Foreign body	0 (0.0%)	0 (0.0%)	24 (61.5%)	0 (0.0%)	24 (23.3%)	
Fracture	3 (37.5%)	4 (8.0%)	0 (0.0%)	1 (16.7%)	8 (7.8%)	
Incised wound	0 (0.0%)	2 (4.0%)	1 (2.6%)	0 (0.0%)	3 (2.9%)	
Laceration	0 (0.0%)	24 (48.0%)	0 (0.0%)	1 (16.7%)	25 (24.3%)	
Stricture	0 (0.0%)	0 (0.0%)	14 (35.9%)	0 (0.0%)	14 (13.6%)	
Penetrating wound	1 (12.5%)	4 (8.0%)	0 (0.0%)	0 (0.0%)	5 (4.9%)	

Chi-square/ Fisher's Exact Test applied,*p-value < 0.05 considered significant

is the anticipated injuries established on whether they occur as a consequence of a blunt trauma e.g., fall, vehicle collision, and blunt-edged objects, or sharp trauma e.g., firearms, stabbing, and incised wounds. Mode or mechanism of injury cites the method by which destruction to skin, muscles, organs, and bones takes place.[20]

Following the comparison of pediatric age group and mode of injury, we found a significant injury burden was by asphyxia (50.0%) and blunt objects (38.7%) respectively, which was mainly seen in 2-4 years age group, [21] these children are choked by edibles or any small blunt object while in motion or talking relatively resembles the situation of café coronary in the older age group. Youngsters are known for their bodily venture, this may either derange their attentiveness and causes a surge both in the respiratory process and drop causing the food or object into the region of respiratory passages or can result in close or open injury proceeding to concussion, contusion, abrasion or lacerations, etc. Regarding pediatric emergency admissions and mode of injury, a considerable proportion of these admissions was by asphyxia (91.7%) in which young children aspirate foreign objects accidentally and fall from height (100%) similar findings are from a study in Oman.[22] Blunt object trauma (67.7%) was the chief mode of injury admission from the outpatient department (46.6%), interestingly none of the local studies have commented on this. In contrast to this, a study from the US commented on the burden of outpatient cases which encompassed (51%) of traumatic brain injuries.[23]

For all the affected children that were admitted the management was mainly through invasive treatment 50 (48.5 %) frequently between the age group of 2-4 years, which was carried out to a large extent for laceration 24 (48.0%) on head /face. Similar findings are seen from a study in Morocco, [24] where surgery was performed in the majority of traumatized children. The minimally invasive treatment 39 (37.8 %) was done chiefly in foreign body ingestion/ aspiration and post-chemical burn stricture formation cases in which bronchoscopy, esophagoscopy, esophageal dilation, etc were done. [25]

Limitations include, firstly our study retrospectively evaluated the unintentional trauma cases we relied on the available data from the medical files in which factors like patients' socioeconomic status, delay in pursuing and accessing medical attentiveness, gaps in identifying the trauma, and education of the guardians were not available. In this regard, more supplementary studies are required to additionally distinguish these factors.

CONCLUSION:

It was revealed that most of the affected age group were children under four years with the head/ neck being the major affected anatomical site, mode of injury was blunt trauma with laceration being the leading type of injury for which the outcome was invasive treatment modalities. In this regard, parents must take precautions and a preventive approach particularly when children begin to walk or wander. We observed that the majority of pediatric injuries were moderate in nature and preventable hence policy should be embraced by caregivers on the basis of these trends.

Authors Contribution:
Sadia Abdul Qayyum: Conceived the study, Manuscript writing, Design of study, Literature review
Hina Yousuf: Supervised the work and final review
Syed Mukkaram Ali: Study design & Methodology writing
Lubna Faisal: Statistical Analysis and Results
Fatima Rehman: Clinical work and data collection

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