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## Research Article

### EPIDEMIOLOGY OF PEDIATRIC ORTHOPAEDIC INJURIES PRESENTING IN A TERTIARY CARE HOSPITAL IN NORTHERN INDIA

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#### ABSTRACT

**Background:** Road traffic accidents have become a leading cause of morbidity, mortality and disability in our country. The causes of injury in paediatric age group has also seen a major shift towards road traffic accidents. This has led to an increase in high velocity trauma in children and is responsible for a change in the injury patterns in this age group. This study is an effort to recognize the incidences and injury patterns of orthopaedic injuries in children with non-fatal injuries.

**Aims:** To describe the incidence and injury pattern of orthopaedic injuries in pediatric patients.

**Materials and Methods:** 353 patients under the age of 18 years were included in our study over a period of one year. Age and Sex distribution, duration since injury at presentation, Mode of injury, Region of injury, type of fractures and need for surgical intervention were studied.

**Results:** Most patients were in the adolescent age group and presented after 24 hours of injury. Most common mode of injury was road traffic accident. The highest affected region of injury was thigh with 29.8% patients having femoral shaft fractures. Closed fractures were seen in 248 patients and open fractures were seen in 105 patients. Physeal injury was seen in 46 patients.

**Conclusion:** Measures to prevent road traffic injuries in children need to be emphasized on as it has become a major cause of injury and disability in the young age groups of our population.

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#### INTRODUCTION

The World Health Organization (WHO) estimated that, in 2002, around 875 000 children under the age of 18 years died as the result of an injury, although recent community-based studies conducted by UNICEF suggests that this number could be much higher. This places injuries among the leading causes of death in children who survive beyond their first birthday ([http://apps.who.int/iris/bitstream/10665/43279/1/9241593415\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/43279/1/9241593415_eng.pdf) 2005). Around one-third of all girls and boys suffer at least one fracture before the age of (Cooper C., 2004) Around 18% of children below the age of 9 years have a history of a fracture (William Spady, 2004). During the period of motor development, children explore their surroundings. This makes them prone to injuries in their homes, schools, playgrounds and other outdoor environment. Road traffic accidents have become a leading cause of morbidity, mortality and disability in our country. The causes of injury in paediatric age group has also seen a major shift towards road traffic accidents. This has led to an increase in high velocity trauma in children and is responsible for a change in the injury patterns in this age group. This study is an effort to recognize the incidences and injury

patterns of orthopaedic injuries in children with non-fatal injuries.

#### MATERIALS AND METHODS

The study was conducted in a tertiary care hospital in Lucknow, India. Medical records of all patients admitted in the department of orthopaedic surgery over one year period, from October 2016 to September 2017, were analysed. A total of 3978 patients were admitted in the department in the above time period. Among these, 353 patients were included in our study according to inclusion criteria. Only patients who required hospitalization were included in the study. All patients with traumatic injuries in the age group <18 years admitted in the department of orthopaedic surgery, of either sex were included in the study. Patients with pathological fractures and patients who received treatment on outpatient basis were not included in the study. The following patient characteristics were studied: Sex distribution, Age distribution, duration since injury at presentation, Mode of injury, Region of injury, type of fractures, Treatment modality: operative / conservative. The mode of injury was recorded under the categories of road traffic accidents, ground-level fall, fall from a height, being crushed under a weight, railway accidents and other

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mechanisms. The Gustillo- Anderson grading of all open fractures were recorded. Radiographs were analysed to document the anatomical region of injury and physeal injuries were recorded. Fractures involving 8 anatomical regions, namely arm, forearm, hand, thigh, leg, foot, spine and pelvis were recorded. Patients who had fractures involving more than one body region, were documented as patients with multiple fractures.

**Statistical Analysis:** The data summaries were presented as absolute and relative frequencies for quantitative measures, and are presented as means, frequencies (%), and standard deviations. Statistical analysis was performed using the chi square test on SPSS ver 18 for Windows. P-values < 0.05 were considered significant.

## OBSERVATION AND RESULTS

We enrolled 353 patients in the study according to our inclusion criteria, of which 251 (71.1%) were males and 102 (28.9%) were females. 41 patients were less than 6 years of age (11.6%), 122 patients were in the age range of 6-12 years (34.6%) and 190 patients were above 12 years of age (53.8%). Most patients were in the adolescent age group. 38 patients presented to the hospital within 6 hours of injury, 126 patients presented between 6-24 hours, and 189 (53.5%) patients presented after 24 hours. Most of the patients came after 24 hours of injury. The most common mode of injury was road traffic accident (table 1). 287 (81.3%) patients had a single fracture and 66 (18.7%) had multiple fractures. The most affected region of injury was thigh with 29.8% patients having femoral shaft fractures (table 2). Closed fractures were seen in 248 (64.6%) patients and open fractures were seen in 105 (33.4%) patients. Gustillo Anderson grade 3c injuries were seen in 41 (11.6%) patients. Physeal injury was seen in 46 (13%) patients. A majority of 283 (80.2%) patients needed operative management. 61 (17.3%) patients could be managed by conservative means. 9 patients left hospital without definitive management.

**Table 1**

Variable	Category	No.	%	Chi sq	p-value
Mode of Injury	Fall of Weight	17	4.8	425.34	<0.0001
	FFH	86	24.4		
	Machine	27	7.6		
	RTA	162	45.9		
	Slip on Ground	40	11.3		
	Train	12	3.4		
	Others	9	2.5		
Total		353	100.0		

**Table 2**

Variable	Type	No.	%	
Region of body injured	arm	97	23.3	
	foot	31	7.5	
	forearm	46	11.1	
	hand	13	3.1	
	leg	78	18.8	
	pelvis	12	2.9	
	spine	15	3.6	
	thigh	124	29.8	
	Total		416	100.0

## DISCUSSION

Injuries account for about 12% of the disease burden worldwide and place a disproportionate burden on countries with limited resources (Molcho, Michal, 2015). During the course of development, children learn motor skills as per their age. They tend to explore their surroundings and in the process are exposed to various risks of injury in their homes, schools and outdoor environment. Previous studies have shown that male children show risk taking behavior and are more prone to injuries than their female counterparts. In our study also we have found that male children have a higher incidence of fractures requiring admission. India is a country which has seen a rapid increase in motor vehicles on our roads. Increase in motor vehicles have led to an increase in road traffic accidents. A mismatched growth in the infrastructure, poor road discipline, underage driving and high risk behavior are common cause of accidents. Road traffic accidents have now become the leading cause of fractures in children. Bangdiwala *et al* in 1990 published their study where they found falls as the most common cause of fractures in young patients less than 20 years of age in Brazil, Chile, Cuba and Venezuela (I Bangdiwala, 1990). Vijay Kumar Kundal *et al* in their study published in 2017 found that road traffic accidents are the most common cause of injuries in pediatric age group (Kundal, Vijay, 2017). There is a shift from low velocity injury to high velocity trauma in pediatric patients. This has also resulted in an increase in the incidence of open fractures. Louise Rennie *et al* reported 0.7% open fractures in their study (Tandon, T, 2007). Tandon *et al* reported 2.8% open fractures. The incidence of open fractures ranged from 1.5 to 2.6% in other studies (Hanlon CR, 1954 and Cheng JC, 1993 and Worlock P, 1986). In our study 35.4% patients had open fractures. Physeal injuries are a major cause of growth disturbance leading to long term morbidity, deformities and disability. Tandon *et al* reported physeal injuries in 17.4% of their patients (Tandon, T, 2007). Incidences of physeal injuries ranged from 15 to 28% in other studies (Wong PC, 1965 and Compere EL, 1935). In our study 13% of patients had physeal injury. Multiple fractures have also become common occurrence. Tandon *et al* in 2007 reported multiple fractures in 2% of their pediatric patients ((Tandon, T, 2007)). In our study 18.7% of patients had multiple fractures. The present study may not truly represent the extent of this problem in a developing country. Not all patients presenting to our emergencies are admitted due to overcrowding. Also a vast population is catered to by quacks. Such patients only report to hospitals late with complications.

However, what needs to be understood is that injuries in children is a major health concern. Preschool children need constant supervision in their homes as well as outdoors. School age children are frequently injured in the playground or on the roads on their way to and from schools. Road discipline needs to be an important part of school curriculum as every individual will have access to motor vehicles. Education and awareness at this age will hold the key to preventing a large proportion of these injuries in the society.

## CONCLUSION

Measures to prevent road traffic injuries in children need to be emphasized on as it has become a major cause of injury and disability in the young age groups of our population.

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