

# Epidemiological Analysis of Forearm Fractures in Kashmiri Children

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**Abstract:** ***Background:** The objective of this study was to do an epidemiological analysis of forearm fractures in children in Kashmir region who were treated at the hospital for Bone and Joint Surgery Srinagar for two years. **Method:** this was a retrospective study done over a two year period which includes 600 children with forearm fractures who were treated at Bone and Joint Surgery Hospital Srinagar Kashmir. Each case was studied with respect to age, sex, trauma side, fracture type, associated injuries and the mechanism leading to trauma. **Results:** Among all fractures analyzed during this interval of time, the most common was forearm fractures which accounted for 35.53%, elbow fractures constitute 31.51% of all fractures, which was second only to forearm fractures and femur fractures constituted the third (26%). Rest of the fractures (8%) constituted fractures of leg bone, clavicle, proximal humerus and others. Average age was 7 years. Most of the children were of age group 7 to 11 years. Among all elbow fractures males constituted 72% of all fractures and female children were 28% with male to female ratio of 2: 1. The spring is the period of the greatest incidence of fractures (38%), during the remaining seasons fractures in children include: 37% - summer, 14% - autumn, 11% - winter.. Left side dominated among all fracture types and constituted 70% of all fractures. Most common mechanism of trauma was due to fall in recreational accidents (61.16%).*

**Keywords:** forearm, Children, Fracture,, Kashmir, Injury, Retrospective.

## 1. Introduction

Pediatric Fractures of upper limb constitute a large burden of fractures to be treated in trauma hospitals. Most of these fractures are treated in emergency department at the time of admission. Because children tend to fall with their outstretched arms, fractures of the upper extremity constitute 65 to 75% of all fractures. The most common area of the upper extremity injured is distal forearm<sup>1, 2</sup>, and about 8 to 10% of upper extremity fractures involve the elbow. Distal humerus accounts for around 85% of fractures around elbow. Supracondylar fractures constitute the majority of fractures, reported to occur in 55-75% of patients with elbow fractures. Lateral condyle fractures are second followed by medial epicondylar fractures. Fractures of radial head and neck, olecranon, T condylar types are less common. Many authors have reported peak age of distal humerus fractures between 5 and 10 years of age<sup>3</sup>. These elbow fractures are more common in boys. Distal humeral physeal injuries as opposed to most parts of the body, where they occur around puberty, have peak age of 4 to 5 years in girls and 5 to 8 years in boys. In the literature, studies focusing on the epidemiological aspect of forearm fractures in children are rare. In Kashmir Valley, there has been no study about the epidemiology of elbow fractures in children, thus the aim of our study was to determine the epidemiological profile of fractures of the elbow in children at Bone and Joint Hospital Srinagar which is the main orthopedic centre in the valley

## 2. Patients and methods

This work represents a retrospective study conducted for a period of 2 years from 1st June 2014 to may 31, 2016. Data was collected from hospital inpatient records. 600 cases of children with elbow trauma were managed in the Bone and joint Hospital Srinagar, Kashmir for whom full documentation of trauma mechanism and other parameters for study were available. For each case, the following parameters were studied to know the frequency, age, sex, circumstances of occurrence, the mechanism, the side sustained, the anatomical lesion, and associated lesions. All

those patients about whom some data pertaining to above mentioned parameters were missing, were excluded from our study. We then compared our results with literature data.

## 3. Results of the study

**Epidemiology The frequency:** In a period of 2 years we identified 600 cases of forearm fractures with an annual incidence of 300. During this time period, 1795 fractures in children were recorded. Fractures of the distal forearm constitute the most (35.53% of cases) and the elbow (31.51% of cases) come in second place as shown in Table 1. Most of these cases are reported between April to September (65%) as compared to Oct – March( 35%). In Kashmir Valley, children don't participate in recreational activities in winters and mostly stay indoor accounting for low incidence during winters

**The Age:** The average age of children was 7 years, ranging from 9 months to 15years. A peak incidence was noted in the age group of 6 to 11 years.

**The Sex:** Male predominance was noted with 401 cases compared to 199 cases of female children with a sex ratio of 2: 1. **The circumstances of occurrence:** The occurrence circumstances of the elbow fracture are most frequent in recreational accidents with 65% of cases. This is followed by domestic accidents with 15% of cases and sports accidents with 11.2% of cases as shown in Table 2.

**The mechanism:** Fall during recreational activity and domestic fall was the most common mechanism with 85.49% of cases. Sports injury constitutes 10.17% injury while road traffic accidents were responsible in 4.34% of patients as shown in Table 3. **Clinical and biological aspects:** Injury sustained side. Left sided fractures occurred in 69% of cases and the right elbow in 31% cases. Fractures occurred on the left side in 76% of cases when the dominant limb was right side as shown in Table 4.

Anatomical location are shown in table 5

Associated injuries: Associated injuries accounted for 4 % of cases.

**Table 1:** Distribution of fractures recorded during the study period.

Fracture site	Number	Percentage
Femur	470	26.20
Forearm	631	35.15
Elbow	564	31.42
Leg	61	3.40
Foot	35	1.94
Others	34	1.90
Total	1795	100

**Table 2:** Distribution of patients according to the circumstances of occurrence

Mode of injury	Number	Percentage
Recreational activity	367	61.16
Domestic accident	109	18.17
Fall from height	37	6.16
Road accident	26	4.34
Sports	61	10.17
Total	600	100

**Table 3:** Distribution of patients by mechanism of injury

Mechanism	Number	Percentage
Fall on ground	547	91.16
Direct blow	33	5.50
Twisting injury	20	3.34
Total	600	100

**Table 4:** location of the fracture relative to the dominant member

Dominant member	Location of lesion		Total
	R	L	
Right	158	313	471
Left	31	98	129
Total	189 (31.5%)	411 (68.5 %)	600 (100%)

**Table 5:** Anatomical location of fractures

Anatomical location of fracture	N Boys	N girls	total
Base of proximal ulna	35	15	50
Proximal epiphyses of radius	24	9	33
Shaft of ulna	13	5	18
Both bones of forearm	128	88	216
Distal epiphyses of radius and ulna	65	26	91
Distal radius	22	10	32
Distal 1/3 <sup>rd</sup> of radius and ulna	114	46	160
Total	401 (66.84%)	199 (33.16%)	600 (100%)

Of all the 600 cases of forearm fractures, as examined separately, we found left sided predominance by 68.50 % as compared to right (31.5%). Boys constituted 66.84% of all patients.

#### 4. Discussion

Fractures of the forearm are the most frequent fracture in children. Elbow fractures come on second number. They mostly concern boys with a peak incidence between 4 and 6 years. Other researchers have similar values<sup>4</sup>. The incidence of the forearm fractures goes up over the age of 2 years,

which is associated with the increasing physical activity and the peak of the forearm fractures coincides with the period of maturation. The results show an increasing trend of the forearm fractures in the study age group<sup>5, 6, 7, 8-13</sup>. The largest number of fractures occurred in the spring (38%). The most common mechanism of fracture was a fall on ground.

Climate has its own effect altering the incidence of such fractures. Majority of forearm fractures occur during spring and summer while the incidence is lowest in winters.

The predominance of males were reported by many authors with figures ranging between 60 and 70 percent<sup>14</sup>. In our study we found that dominance with a higher no. of boys with 66.84% of all patient. In our study the mean age was 7 years with a peak incidence between 6 to 11 years which is consistent with the study done by Ryan LM et al<sup>15</sup>

The epidemiology of fractures in children and adolescents for many years has been the subject of numerous studies and discussions. In the light of the published data, there are no clearly documented reasons or etiopathogenetic links to the bone fragility in the first two decades of life, as some fractures in children and adolescents result from many coexisting factors such as age, race, biogeographic conditions, sex (predominance of boys), some physiological and environmental factors, lifestyle or even familial and genetic factors. A clear cause of fractures in low-energy trauma has not yet been established<sup>16, 17, 18</sup>.

The left predominance was reported by most authors<sup>19, 20</sup>. In accordance with multiple investigators, we found that lesion was most often on the non-dominant side of the limb. This can be explained by an attempt to amortizing the fall by non dominant side. In our study, 5% had another associated fracture and it was most often around the elbow.

#### 5. Conclusion

Fractures of the forearm are most common fractures in children in our context which occurs mostly in boys usually on non dominant side. The peak incidence between 6 and 11 years. Fractures around elbow are second common fracture in children. Both these occur during spring and summer as a result of fall during recreational activities.

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