

## **Epidemiology of Pediatric Fractures and Dislocations: Analysis of In-Patients**

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**Background and Objective:** Fractures and dislocations in a growing child is a concern to parents and hospitals alike because any mismanagement leaves a lifelong disability. There is limited data on epidemiology of fractures in children in Saudi Arabia.

**Objective:** To determine the prevalence and pattern of pediatric fractures and dislocation.

**Setting:** King Fahd Hospital of the University.

**Design:** Retrospective.

**Method:** All pediatric patients with a skeletal injury admitted to the hospital between 1 January 2004 and 31 December 2009 were included. Data documented included age, sex, type of accident, injury sustained, associated injuries, surgery performed, emergency or elective, type of implant used and any complications.

**Result:** Two hundred fifty-four patients sustained 302 fractures and dislocations. One hundred fifty-nine were boys and 95 were girls. One hundred twenty-four (48.8%) of the injuries were sustained at home and 75 (29.52%) were related to motorized vehicles. Lower extremities were involved in 139 patients, upper extremities in 125 and spinal fractures were seen in 9 patients. Seven patients had dislocations (4 elbows, one hip and 2 ankle joints). One hundred ninety-four (76.4%) had emergency surgery and the rest of the children had elective procedure. Thirty-nine patients (15.35%) had complications; the majority was repeat procedure and 3 patients had superficial infections.

**Conclusion:** Home accidents and trauma are common in this study; lower extremity fractures were seen in more than 50% of the patients. Admissions due to fractures have increased in the last few years. We believe that community education in injury prevention programs will definitely reduce the skeletal injuries in young population.

*Bahrain Med Bull 2012; 34(4):*

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Fractures and dislocations in pediatric age group is a stressful event for the family and the child. Moreover, the resultant morbidity and mortality creates an enormous socio-economic burden on the country<sup>1</sup>. It has been estimated that the lifetime risk of a fracture during childhood is between 27-64%, more in boys than girls<sup>2-5</sup>. In USA, trauma is the leading cause of death after the first year of life, accounting for 50% of mortality<sup>6</sup>. Nearly thirty percent of children sustain at least one fracture before the age of 17 and 9% of all injuries come to the attention of health services<sup>7</sup>.

Road traffic accidents (RTA) are a major cause of pediatric trauma<sup>8-10</sup>. A review of RTA in the Gulf countries revealed, that Saudi Arabia had the highest incidence of pedestrian accidents<sup>11</sup>.

There is very limited data on epidemiology of fractures in the pediatric population from Saudi Arabia. Al-Othman et al reported the first analysis of patients admitted after pediatric trauma from the eastern region followed by other studies which dealt with the injuries related to the specific sites<sup>12-15</sup>.

The aim of this study is to determine the prevalence and pattern of pediatric fractures and dislocation.

## **METHOD**

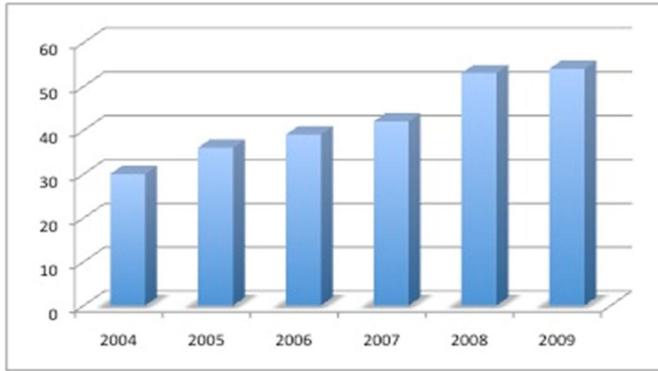
This is retrospective analysis of the prevalence and pattern of pediatric fractures and dislocations in patients  $\geq 12$  years between 1 January 2004 and 31 December 2009. Included patients of pediatric age group, both genders admitted after trauma. The fracture patterns were classified according to the Orthopedic Trauma Association system<sup>15</sup>. Data documented include age, sex, cause of injury, site of injury, treatment and complications.

Management was documented, emergency or elective procedures, conservative or operative treatment. Complications of the treatment were subdivided into repeat surgery, infection, missed injuries and disturbance of fracture union.

The data was entered in the data base and analyzed using SPSS Version 14.

## **RESULT**

Two hundred and fifty-four patients sustained 302 fractures and dislocations. One hundred fifty-nine were boys and 95 were girls. The number of patients increased from 30 in 2004 to 54 in 2009 an increase of 54%, see figure 1. The average age of the patients was  $5.95 \pm 3.03$  years. One hundred and twenty-four (48.8%) injuries were sustained at home and 75 (29.52%) were related to motorized vehicles, see table 1. Lower extremities were involved in 144 patients, upper extremities in 123 and spinal fractures were seen in 9 patients, see table 2. Seven patients had dislocations (4 elbows, one hip and 2 ankle joints). Fifteen children suffered from amputations of the toes due to motorcycle accidents, see figure 2. In 194 (76.4%) emergency surgery was performed and the rest of the children had elective procedure. The majority of fractures and dislocations were treated by conservative methods of closed reduction and Plaster of Paris application/hip spica, see table 3. Thirty-nine (15.35%) patients had complications, the majority was repeat procedure; three patients had superficial infections.



**Figure 1: The Number of Children Admitted between 2004-2009**

**Table 1: Causes of Fractures and Dislocation**

<b>Causes of Injury</b>	<b>Number</b>
Motor Vehicular Accidents	26
Motor Cycles	20
Pedestrians	29
Sports Related	16
Fall from Height	6
Fall at Home	124
Industrial	0
Gun Shot	0
Fire Works	0
Street	11
School	12
Cycle	10

**Table 2: Site of Fractures**

<b>Site of Fracture</b>	<b>Number</b>
Upper Limb	123
Lower Limb	144
Pelvis	4
Spine	9
Amputations	15



**Figure 2: Foot Injury with Partial Amputation Due to Motor Cycle Injury**

**Table 3: Type of Surgical Intervention**

Surgery Performed	Number
K-Wires	52
Plate and Screws	53
External Fixator	6
Closed Reduction and Plaster of Paris	88
Skeletal Traction	10
Cannulated Screws	8
Elastic Nails	11
Hip Spica	26

## DISCUSSION

In this study, fractures and dislocations among pediatric population are increasing; the incidence jumped 54% in 6-year period and the majority of these injuries were sustained at home. Hedstrom et al reported sharp rise of 59% in their study period of 1993-2007; the admission due to fractures increased by 38%, they attributed the changes to outdoor activities<sup>16</sup>. In our study, even though the increase of the injuries was significant, the place where the fractures occurred did not change in the first year compared to the last year; moreover the result was similar to Al-Othman et al study<sup>12</sup>. We studied only the admitted patients; therefore, an increase in the overall injuries could not be assessed.

Valerio et al found that injuries causing fractures were mainly at home and boys had more fractures than girls<sup>17</sup>. The result of our study is similar to Valerio et al that most of the injuries resulting in fractures or dislocations occurred at home; other studies indicated that pediatric injuries were sustained more outside home<sup>4,18,20</sup>. The pattern of injuries in our region appears to have reversed because in 1994 over 60% of the fractures occurred outside homes while in this study 124 (48.8%) of children sustained a fracture due to falls at home. Road traffic accidents have increased due to number of vehicles and drivers in the region. The second major cause of fractures and dislocations were related to motorized vehicles which included road traffic accidents, motorcycle accidents and pedestrian injuries.

It was reported that the ratio of accidents to injuries in Saudi Arabia is 8:6, compared to USA which is 8:1<sup>20</sup>. The startling difference in the incidence of accidents due to all terrain vehicles (ATV) and motor cycle accidents has increased as observed in this study. In the previous study, there were no amputations reported compared to 5.9% of multi-digit amputation in this study. Motor cycle and ATV accidents, are leisure related injuries and occur mostly during the weekends and during school vacations, where children ride the vehicles unsupervised with no protective gears, and most of times with no shoes and their feet get entangled in the wheels, see figures 2 and 3.

Several studies have reported that the upper limb is the most common site of fractures particularly radius and ulna<sup>4,17,18</sup>. In our study we found that lower limb fractures were the commonest compared to other studies; this could be due to inclusion of admitted patients only. It is possible that many patients with upper limb fractures were treated without the need for admission.

The majority of fractures in children are treated conservatively, but recently the trend is towards operative interventions. In our patients, closed reduction and Plaster of Paris applied in 29% (conservative treatment), followed by plate, screw and k-wire fixation. Complication rate was 15.3%.

The study is limited by the inclusion of admitted patients only and being limited to one center rather than multicenter study, which could reflect the true prevalence nationwide.

## CONCLUSION

**We have found that fractures and dislocations are on the rise in the pediatric population. The majority of the injuries have happened at home. The community should be regularly reminded to prevent injuries in children at home. Children should be taught at schools the causes, prevention of injuries and safety at home, playground and the roadside. It is up to clinicians and educationists to devise strategies by way of prospective studies in prevention, limiting injuries.**

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**Author contribution:** All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes

**Potential conflicts of interest:** None

**Competing interest:** None    **Sponsorship:** None

**Submission date:** 30 September 2012    **Acceptance date:** 20 October 2012.

**Ethical approval:** Research and Ethical committee of the University of Dammam.

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