



## Brief Report

# Pediatric craniomaxillofacial injuries after road traffic crashes: characteristics of injuries and protective equipment use<sup>☆,☆☆</sup>



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## ABSTRACT

**Objective:** A cross-sectional study to determine the pattern of craniomaxillofacial (CMF) injuries among children involved in road traffic crashes was performed. The association of protective equipment use with the CMF injuries was evaluated.

**Methods:** Retrospective records of children treated in the University Malaya Medical Centre, Kuala Lumpur, Malaysia, after road traffic crashes between January 1, 2008 and December 31, 2012 were reviewed, and, after that, telephone interviews were made.

**Results:** Seventy-one children were included in this study. Fifty-two (73.6%) were involved in a motorcycle injury and 19 (23.4%) in a car crash. Their mean age was 6.02 years; SD, 3.46 (range between 0 to 13 years old). More male children were observed (52.1%) compared with females (47.9%). Thirty-nine point four percent of the children sustained CMF injuries, 33.8% body injuries, and 23.9% had both CMF and other body parts injuries. The highest injury severity score was 26, whereas the lowest was 0. Many children did not use protective equipment during traveling, 44.2% of children among motorcycle pillion riders, and 78.9% among car passengers. The association between helmet use and CMF injuries was shown to be statistically significant ( $P < .001$ ).

**Conclusion:** Craniomaxillofacial injuries could be prevented with the use of motorcycle helmet and seat belt.

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## 1. Introduction

Road traffic injuries accounted for 12% of death among children aged younger than 14 years with a mortality rate of 7.4 per 100000 children in Southeast Asia [1]. In Malaysia, young motorcycle riders aged 15 to 18 years were reported to be the highest group of children involved in fatal road traffic injuries, whereas child pillion riders were ranked as the third leading group, and this involved children aged between 1 and 14 years [2]. Children riding on a motorcycle without wearing helmet are likely to sustain moderate-to-severe head injury [3,4]. Similarly, children who traveled without proper car restraint system and placed on the front seats are also prone to moderate-to-severe injury [4].

A *craniomaxillofacial* (CMF) injury is defined as any injury involving the head and/or the face.

The objectives of this study were as follows:

1. to determine the sociodemographic of the children and parents involved in road traffic crashes (RTC),
2. to determine the crash characteristics of the RTC,

3. to determine the pattern and severity of CMF injuries after RTC among children who traveled as car or motorcycle passengers, and
4. to determine the association between use or nonuse of protective apparatus and CMF injuries among car or motorcycle child passenger.

## 2. Material and method

Ethics approval was obtained from the Research and Ethics Committee, Faculty of Medicine, University Malaya, and Faculty of Dentistry, University Malaya (MEC ref. no.:896.122 and DF OS1205/0018[P]).

### 2.1. Study design

The design of this study is a cross-sectional study. It comprised 2 stages as follows:

1. Retrospective record review and
2. Telephone interview of the parents of the injured children.

#### 2.1.1. Retrospective record review

Medical records of pediatric passengers of private vehicles who were involved in RTC and treated in the Emergency Department, University of Malaya Medical Centre, were obtained. The patients' registration

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numbers were manually obtained from the Registry of the Emergency Department, and this was matched with the data from the University Malaya Medical Centre Patients' Record Department.

The selection of subjects was based on the following inclusion and exclusion criteria:

**Inclusion criteria:**

- Children who traveled as a car or motorcycle passenger and
- Parents of the injured children agreed to participate in the study and could communicate in Malay or English language.

**Exclusion criteria:**

- Children who traveled in vehicles other than cars or motorcycles,
- Children who traveled as driver of the vehicle,
- Fatal RTC, and
- Patients who were discharged from the hospital care before a definitive diagnosis could be made.

Data related to demographic data, brief information on injury mechanism, and other characteristics were obtained from the medical record.

The diagnosis of injuries were identified, and severity of associated injury was assessed using the Abbreviated Injury Scale (AIS) 2005 (updated 2008) [5].

The severity is coded as 0 (no injury), 1 (minor), 2 (moderate), 3 (serious), 4 (severe), 5 (critical), or 6 (non-survivable injury). In this study, AIS greater than or equal to 3 indicated severe injury.

From the AIS, the injury severity score (ISS) was calculated. It is the sum of the square of the 3 highest AIS scores from 3 different body regions with the highest AIS.

### 2.1.2. Telephone interview

Parents who agreed to be interviewed were included in the study. The interview took approximately 30 minutes to complete. The variables included in the interview were as follows:

1. sociodemographic data of both children and parents,
2. crash particulars, and
3. protective equipment.

### 2.2. Statistical analysis

Data entry and data analysis were performed using the Statistical Programme for Social Science Software (version 12.0; SPSS Inc, Chicago, IL). The variables of interest were shown as frequency, percentage, mean, SD, median, and interquartile range (IQR) where appropriate.

The association between demographic, crash, and protective equipment and CMF were assessed using Pearson  $\chi^2$  test. Fisher exact test was used in situations where the expected cell frequency was less than 5. The level of significance was set at 0.05.

### 3. Result

In total, there were 212 child passengers documented to be involved in RTC from January 1, 2008 to December 31, 2012. Eighty-seven were passengers of larger vehicles, so they were excluded from this study. One hundred twenty-five children were passengers of motorcycles and cars. Of the 125 children, 54 parents did not respond to our telephone calls. Seventy-one parents were able to be contacted and agreed to participate in this study.

#### 3.1. Sociodemographic characteristic of the children and their parents

The children were between 0 and 13 years old (mean age, 6.02 years; SD, 3.46). Malays made up the largest ethnic group (69.0%). More male children (52.1%) were involved compared with females.

Most of the parents interviewed were the father of the child ( $n = 63$ , 88.7%). More than half of the parents were between the ages of 30 and 40 years. All parents had at least primary school education, with more than half had secondary education background. Only 15.5% of parents attended tertiary education, they were in the 30 to 50 years age group. The socioeconomic status of the parents was consistent with the type of vehicles drove.

Majority with tertiary education traveled in a car ( $n = 10$  [90.9%]) before the RTC. Only 1 rode a motorcycle. Eighty-five point seven percent of parents with primary and 86.5% with secondary education were on their motorcycles before the RTC.

#### 3.2. Characteristics of the RTC

Table 1 shows the crash characteristics. These involved 52 motorcycle pillions and 19 car passengers. Twenty-nine point six percent of the RTC, which involved 10 motorcycles and 11 cars occurred on a highway. Eighty percent of the crash was self-reported to travel below 80 km/h before the RTC. Eight children were found to be traveling on a motorcycle between 81 and 110 km/h before the RTC.

Most vehicles that were involved in the injuries hit or were hit by a moving partner (50.7%). Approximately half of the crashes were single-vehicle crash (ie, skid and crash with objects).

##### 3.2.1. Protective equipment

Table 2 shows the characteristics and usage of the protective equipment. Among 52 children who rode on the motorcycles with their parents, 38 (73.1%) were seated on the rear. Children who sat in front, sat in between the motorcycle basket and the rider. Altogether, 29 children (55.8%) wore a helmet, and 21 of them (72.4%) sat on the rear. Among all the helmets, approximately a third ( $n = 10$ , 34.5%) were reported to be standard helmets (approved by the Standards and Industrial Research Institute of Malaysia [SIRIM]).

**Table 1**  
Characteristics of the RTC

Characteristics		Vehicles			
		Car (n = 19), n (%)		Motorcycle (n = 52), n (%)	
		Highway	Other roads	Highway	Other roads
Precrash speed	0-80 km/h (n = 57)	5 (8.8)	8 (14.0)	7 (12.3)	37 (64.9)
	81-110 km/h (n = 14)	6 (42.9)	0 (0.0)	3 (21.4)	5 (35.7)
Time of injury	12:00-5:59 AM (n = 6)	0 (0.0)	1 (16.7)	3 (5.0)	2 (33.3)
	6:00-11:59 AM (n = 18)	2 (11.1)	2 (11.1)	2 (11.1)	12 (66.7)
	12:00-5:59 PM (n = 10)	4 (40.0)	2 (20.0)	0 (0.0)	4 (40.0)
	6:00-11:59 PM (n = 37)	5 (13.5)	3 (8.1)	5 (13.5)	24 (64.9)
Crash partners	Objects (n = 17)	5 (29.4)	3 (17.6)	2 (11.7)	7 (41.2)
	Colliding partners (n = 36)	5 (13.9)	5 (13.9)	5 (13.9)	21 (58.3)
	Single vehicle (n = 18)	1 (5.6)	0 (0.0)	3 (16.7)	14 (77.8)

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