

DOI: <http://doi.org/10.4038/sljfmsl.v9i2.7812>

## A RETROSPECTIVE ANALYSIS OF FACIAL INJURIES IN VICTIMS OF ROAD TRAFFIC FATALITIES

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### ABSTRACT

Facial injuries play a significant role when it comes to medico-legal interpretation, category of hurt, cause of death and for compensation purposes. Road traffic accidents had been identified as a major contributor towards facial injuries. The main objectives were to identify the different facial injuries such as abrasions, contusions, lacerations and fractures, injury pattern, the distribution and to correlate the facial injuries with vulnerable road users.

A pre-prepared questionnaire was used to extract information from the autopsy reports of road traffic accidents involving 59 victims covering a period from 2005 to 2014. Majority of the victims were males (79.7%) and belonging to the age group of 21-30 (22%) and 41-50 (22%). The vulnerable road users were mostly pedestrians (39%), followed by motorcycle riders (28.8%). Only few (6.8%) of the victims had teeth injuries. Most of the victims had injuries on the right forehead (44%) and right peri-orbital area (37.3%). The commonest type of facial injuries were abrasions which were 44 (grazed abrasions 30.5% and other types of abrasions 44.1%) followed by lacerations 38 (64.4%). The most common injuries on the right forehead were abrasions (20.3%) and lacerations (16.9%) while on the right peri-orbital area it was contusions (18.6%). Majority of the victims were pedestrians and motor cycle riders. Most of the injuries were observed on the right forehead and right peri-orbital region and the commonest facial injury type was abrasions. A specific type of injury pattern was not identified to retrospectively suggest the involvement of a pedestrian or others.

**Key words:** facial injuries; regional injuries; road traffic injuries; victims



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## INTRODUCTION

The interpretation of facial injuries following road traffic injuries will greatly enhance the work of a forensic pathologist. The literature review reveals majority of the studies were done in clinical patients with the view of giving a better management with multidisciplinary teams. However, research studies done in forensic context especially with the deceased are scarce<sup>1,2,4,6</sup>. This study attempts to explore the different injuries on the face in victims of road traffic fatalities and to identify any correlation between the injuries and the type of road user. Furthermore, an attempt is made to identify any causal links between injuries and the mechanisms of causation. Though evidence was not available regarding the exact human and environmental factors which could have contributed to the collision, a sincere attempt was made to look for factors which could have contributed or modified the injury pattern. The value of facial injuries in forensic practice can be further explained by mandatory keeping a profile of face with or without injuries corroborating the facial injuries with the given history and in certain instances the pathologist may be requested to give an opinion regarding the circumstances with no available history. It should be borne in mind that the overall interpretation of injuries involves the whole-body examination and final opinions are made after carefully interpreting the external and internal injuries in the whole body regions. This study is again an attempt to see whether the pattern of facial injuries give a reflection or a cue regarding other bodily injuries.

Facial injuries play a significant role when it comes to injury interpretation, category of hurt, cause of death and for compensation purposes. Road traffic accidents had been identified as a major contributor towards facial injuries<sup>1,2</sup>. In the day to day practice of a Judicial Medical Officer (JMO), one has to deal with autopsies, scene visits and clinical cases involving road traffic injuries. Most often the first anatomical region which

attracts attention is the face. Therefore, interpretation of facial injuries deserves a special expertise to corroborate with the available history. At the time of pre-autopsy briefing, most often the history regarding the circumstance, type of incident, type of vehicle and involvement of the vulnerable road user is provided by the attending police officer and eye witnesses. It is only a matter of analyzing the injury pattern and confirming whether the injury pattern is compatible with the given history. However, there are situations when autopsies and scene visits are performed without any valid information. Sometimes, bodies are brought with no available personal information (unknown bodies) where the performing pathologist may need to conclude with the available injuries. At times he may need to request a special order from a magistrate if the injuries are suspicious.

Careful interpretation of facial injuries and previous familiarization of facial injuries following road traffic injuries will help a forensic pathologist to make correct judgments regarding the mechanism of causation of those injuries. A study of this nature which carefully analyzes facial injuries following road traffic fatalities involving different types of vulnerable road users will give some insight regarding the interpretation of facial injuries. Though the sample size is minimum and limited to a particular anatomical region, still there may be observations which could be utilized in the day to day work and for future research purposes.

The available literature regarding facial injuries reveal that road traffic accidents has been one of the major contributors for it and the injuries involve both soft tissues and bones<sup>3,4</sup>. Some studies reveal it was characteristic of the involvement of frontal bone followed by nasal bone or the nasal bone was most often the site of fracture<sup>5</sup>. In contradiction, some other studies reveal that mandible followed by maxillary bone involvement<sup>1</sup>.

However, there were no studies which were elaborating on all types of facial injuries, injury pattern and different mechanisms of causation for forensic purposes. A study of this nature which was done on the decedents following road traffic accidents with an extensive analysis of facial injuries with an intention to mainly to identify the possible mechanisms of causation may pave way for future projects.

## OBJECTIVES

With regard to fatal road traffic accidents to identify the types, injury pattern and distribution of facial injuries

## STUDY DESIGN SETTING AND METHODS

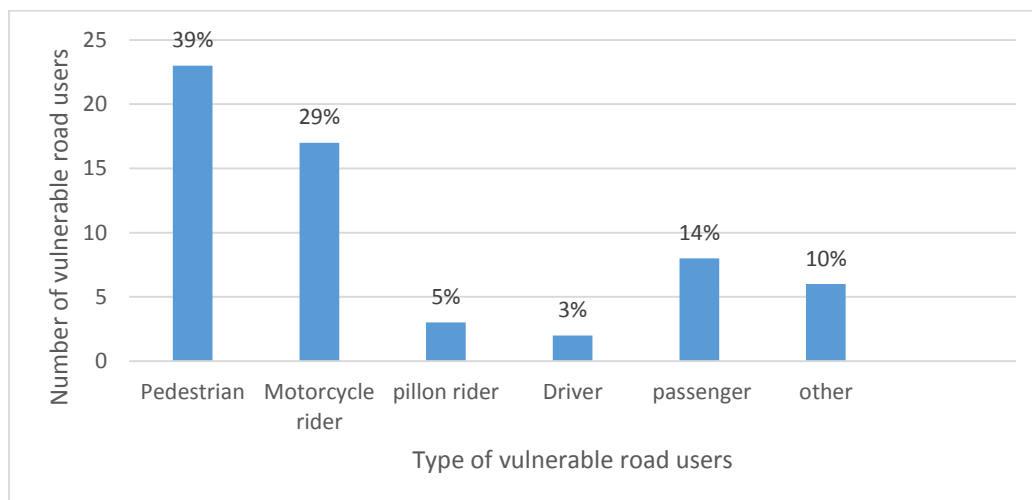
Information regarding gender, age and facial injuries (pattern, type and distribution) was extracted from autopsy reports of persons who met with road traffic accidents during the period from 2005 to 2014. Data were analyzed using SPSS version 20.

## RESULTS

Fifty nine cases were identified. Majority were male (80%). Twenty two percent (22%) were in the age groups 21-30 and 41-50 (Table 1)

**Table 1: Age distribution**

Years	Frequency	%
<10	1	2
11-20	-	-
21 - 30	13	22
31 - 40	6	10
41 - 50	13	22
51 - 60	12	20
61- 70	8	14
>71	6	10
Total	59	100



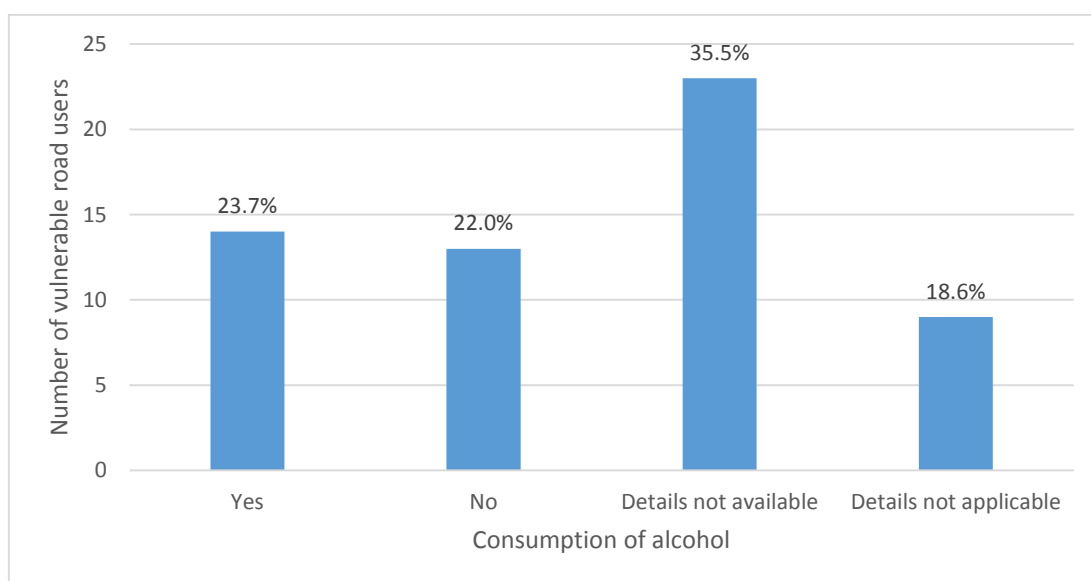
**Figure 1: Types of vulnerable road users**

Majority were pedestrians (39%), followed by motorcyclists (29%).

**Table 2: Circumstances of impact among pedestrians**

Circumstance	Number
Standing by the road	3 (13%)
Crossing (on zebra crossing)	6 (26%)
Crossing (not on a zebra crossing)	9 (39%)
Walking on the right side of the road	3 (13%)
Walking on the left side of the road	1 (4%)
Details not available	1 (4%)
Total	23 (100%)

Majority of pedestrians sustained impacts while crossing the road (not on a zebra crossing).



**Figure 2: Consumption of alcohol**

Blood alcohol concentration revealed that 24% were under the influence of alcohol.

**Table 3: Time of incident**

Time	Number
0000 - 0600	8 (14%)
0601 - 1200	16 (27%)
1201 - 1800	15 (25%)
1801 - 2359	20 (34%)
Total	59 (100%)

Majority of incidents occurred at night (1801 to 2359).

**Table 4: Facial injuries**

Type	Number
Grazed abrasions	18 (31%)
Other abrasions	26 (44%)
Lacerations	38 (64%)
Contusions	19 (32%)
Fractures	17 (29%)
Others	02 (3%)

The commonest type of facial injuries were abrasions followed by lacerations, contusions and fractures.

**Table 5: Injuries on right side of forehead**

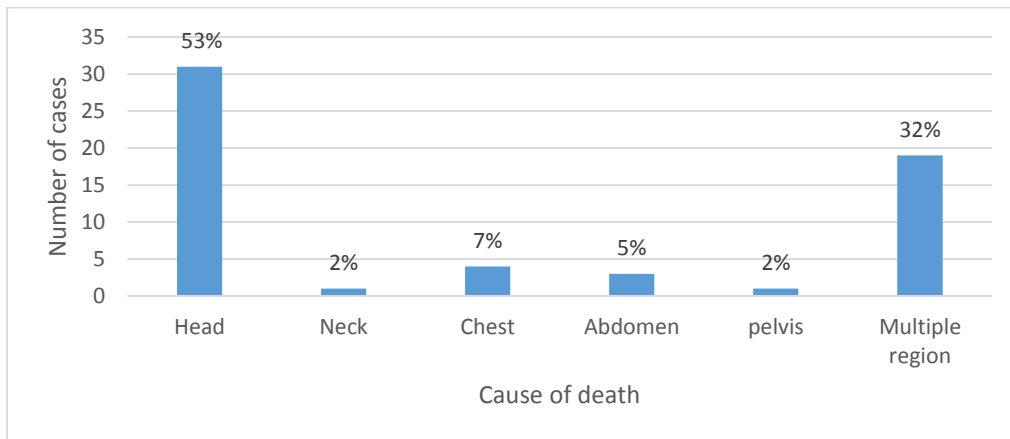
Type	Number
Fractures only	03 (5%)
Abrasions only	12 (20%)
Lacerations only	10 (17%)
Contusions only	01 (2%)
Multiple minor injuries	00 (0%)
No injuries	33 (56%)
Total	59 (100%)

The commonest injuries on right side of forehead were abrasions and lacerations.

**Table 6: Injuries on right peri-orbital area**

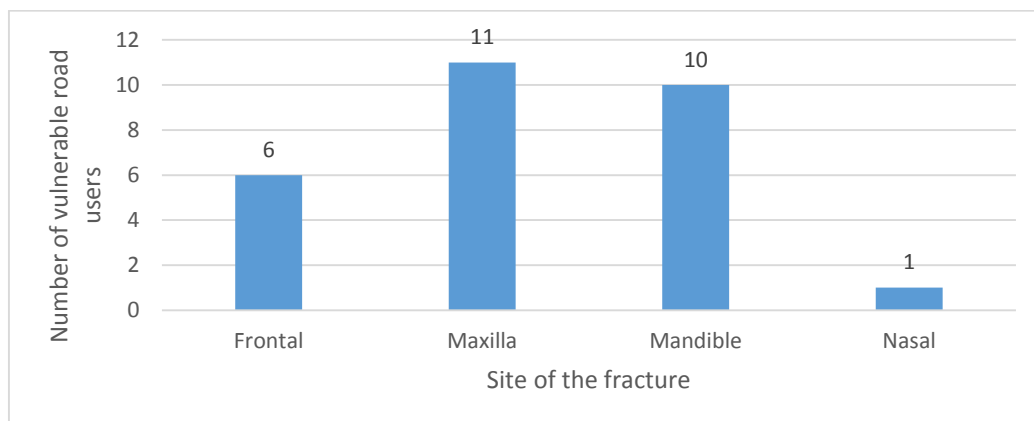
Type	Number
Fractures only	0 (0%)
Abrasions only	4 (7%)
Lacerations only	6 (10%)
Contusion only	11 (19%)
Multiple minor injuries	1 (2%)
No injuries	37 (63%)
Total	59 (100%)

The commonest injury on right peri-orbital area were contusions



**Figure 3: Cause of death**

The cause of death in a majority was head injury, followed by injury to multiple regions. There were no deaths related to facial injuries alone (Figure 4)



**Figure 4: Site of fracture**

The majority of fractures were in the maxilla followed by mandible and frontal bone.

**Table 7: Anatomical site involved**

Site	Number
Forehead	49 (83%)
Nose	11(18.6%)
Orbital area	43 (72.9%)
Cheeks	31(52.5%)
Chin	26 (44.1%)
Ears	9 (15.3%)
Lips	13 (22%)
Philtrum	1 (1.7%)

**Table 8: Side of face involved**

Right side of face	Middle of face	Left side of face
49.7%	21.9%	28.4%

The forehead is the most commonly involved area followed by orbital area, cheeks, chin, lips and nose with most of the injuries on right side (Tables 8, 9).

## DISCUSSION

The study revealed that majority of the victims were in the age ranges of 21 to 30 and 41 to 60 years with a male predominance. This observation reconfirms the findings expressed at other studies.<sup>4,5,7</sup> The involvement of young adults, especially males could be due to the adventurous nature/life style and trying out new things, therefore increasing their vulnerability.<sup>1,6</sup> However other studies have shown that injuries are commoner in the aged due to impairment in vision and hearing and diminished reflexes.<sup>8,12</sup> The pedestrians were the mostly affected due to road traffic injuries. They were followed by motor cyclists and passengers from different vehicles.<sup>3,9,10,13</sup>

The pedestrians were mostly involved while using the zebra lines or crossing the road at

a non-identified place. The accidents have a preference during night hours. This susceptibility of victims could be explained by the presence of minimal protection during the time of collision. Most of the victims were under the influence of alcohol and there were a sizable number of individuals where the alcohol results were not available. In some individuals who belongs to the category of passengers, the available results were not included in the study. Alcohol consumption is a known contributory factor towards the involvement in a road traffic accidents.<sup>14</sup> Though in Sri Lanka strict laws regarding drink driving are prevailing, still alcohol is detected in many victims. The main reason for lack of alcohol results could be due to the reason that majority of the victims are pedestrians and alcohol analysis may not have been requested.

The analysis of the distribution of the facial injuries reveal, most of the injuries had a preference over the right forehead and right peri-orbital region followed by right cheek and the injuries were common on right side of the face in comparison to left side. The commonest type of injury in the face was abrasions which included grazed and other types of abrasions. The severest type of injury was the fractures which were found in maxillae, mandible, frontal and nasal bones.<sup>6,11,16</sup> In selected cases there were fractures to the teeth as well. Almost all the injuries including contusions and lacerations were caused by blunt force trauma. When considering the face as a whole and different anatomical regions, the distribution reveals the forehead is the area that has been most commonly involved in victims followed by the orbital area. Also most of the injuries were on right side (49.7%) compared to mid face and left side. According to the injury pattern and the distribution of injuries it was not possible to identify the involved road user (considering a hypothetical situation where there is no available history). However, a plausible opinion can be given about the mechanism of causation after observing facial injuries.

The presence of facial injuries more on the right side with the involvement of right forehead, right peri- orbital and right cheek may be most likely due to victims coming into contact with the road surface following a right sided fall. This observation is further supported by the presence of abrasions and other injuries following blunt force trauma since the severity was less and in most instances the death was not due to the facial injuries alone. This finding may exempt other types of impacts such as primary and secondary impacts following a collision of a vehicle to a minimum. Anyhow facial injuries alone will not allow a Forensic Pathologist to come to definite conclusions without considering other regional injuries. One must admit that the careful study of facial injuries including the pattern and distribution may strengthen the interpretation of other regional injuries. The cause of death in majority were due to head injuries followed by multiple trauma in different regions.<sup>6,8,15</sup> Importantly there were no deaths related to facial injuries alone.

A study of this nature regarding facial injuries following road traffic injuries is very valuable. Since it will strengthen the early observations during routine autopsies, scene visits and examination of clinical patients where the given history is doubtful. The population with the advent of better communication and internet facilities is more knowledgeable about the different ways of seeking compensation. Therefore, it is imperative for a forensic practitioner to be more knowledgeable and practical with regard to different types of facial injuries. This study could be used as a prelude to confirm the similar findings in a larger population. In addition, the clinical patients who are admitted to tertiary care hospitals with facial injuries following road traffic injuries can also be included in a larger research study. Further the facial injuries can be co-related with other regional injuries for better interpretation.

## CONCLUSIONS

Majority of victims were pedestrians and motorcyclists. Most injuries were on the right side of the forehead and right peri-orbital region with the commonest injury type being abrasions. Facial injuries alone did not contribute to death. There was no significant injury pattern suggestive of the involvement of a pedestrian or other types of road users. However, the facial injuries were highly suggestive of road traffic injuries. The injury pattern and distribution did not contradict the given history in any instance.

## LIMITATIONS

This study involved a selected group of victims following road traffic fatalities. A larger sample size from different provinces would have enabled generalization of results.

The paucity of information regarding human and environmental factors and confirmatory evidence such as CCTV footage were a drawback. The comparison of facial injuries with other regional injuries would have further strengthened the study.

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