

# Pattern and Magnitude of Ocular Trauma Sustained in Road Traffic Accidents (A Trauma Centre Study)

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## ABSTRACT

**Purpose:** To find out the pattern and magnitude of ocular trauma in road traffic accidents (RTA).

**Study Design:** Descriptive cross sectional study.

**Place and Duration of Study:** Shaheed Mohtarma Benazir Bhutto Trauma Centre, from September 2021 to December 2021.

**Methodology:** Patients meeting the inclusion criteria had history and detailed examination. Data included age, gender, duration of presentation, eye involved, vehicle and type of eye trauma. Frequencies and percentages were computed for all categorical variables and mean and standard deviation was calculated for age. Effect modifiers like age, gender and vehicle were addressed through stratification. Effect of reporting time of injury, age, gender and type of vehicle involved in the pattern of injury was addressed. Post stratification chi-square was applied. P-value less than or equal to 0.05 was considered as significant.

**Results:** Out of 117 patients, 81.1% were males and 18.9% were females. Average age was  $29.88 \pm 13.9$  years. Maximum number of patients was in the age range of 10 – 20 years (35%). Two wheelers were 65.8%. Sixty five percent reported within 24 hours of accident. Closed globe trauma accounted for 78.6% and contusion was found in 51 patients (43.6%). Among all, 66.7% had 6/6 – 6/9 visual acuity. No significant association of age and gender was found with pattern of ocular trauma. Reporting time and type of wheeler had association with type of ocular trauma and pattern of ocular trauma (p values less than 0.05).

**Conclusion:** Ocular trauma is more common in young males and patients who report early have better visual acuity.

**Key Words:** Open globe trauma, closed globe trauma and road traffic injuries.

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## INTRODUCTION

A sloping increase in the number of vehicles yearly has led to a plethora of road traffic injuries (RTI) reporting to hospitals each day. In the era where speeding has superseded everything, accidents are not unusual which have led to increased morbidity and

mortality. Ocular injuries once described as “neglected disorder” have recently been highlighted as major cause of visual morbidity.<sup>1</sup> Incidence of ocular trauma in the United States is 2.4 million per year.<sup>2</sup> Road traffic accidents are the 8th major cause of all deaths worldwide and around 1.3 million people are killed worldwide due to road traffic accidents (RTA).<sup>3,4</sup> According to WHO (World Health Organization) 80% of these deaths on road occur in the underdeveloped world.<sup>5</sup> In Pakistan ocular trauma accounts for 10.8% of total trauma cases and road traffic injuries (RTI) being one of the major cause.<sup>6</sup> Fifty percent of major accidents and 66% of deaths in major accidents are due to RTA.

Injuries to eye can also occur in occupations like industrial and construction work, children at play, sports injuries, agricultural hazards, chemical burns in factories, assault at home, high speed travel and motor vehicle injuries.<sup>7,8</sup> The job of an ophthalmologist is to identify these injuries at the earliest possible time. Many injuries can be prevented. Use of prophylactic measures like wearing helmets, seat belts and educating general population about the importance of traffic rules can decrease RTI and associated ocular trauma.<sup>9</sup>

Although ocular trauma is frequently studied but this particular research is focused on RTA related ocular injuries. This study was done to identify frequency and pattern of ocular trauma following RTA. The data can be helpful in taking preventive measures against ocular morbidity. Moreover, it will highlight the importance of early referral and timely treatment for visual rehabilitation.

## METHODOLOGY

This descriptive cross sectional study was conducted at Shaheed Mohtarma Benazir Bhutto Trauma Centre, a tertiary care hospital. Approval was sought from ethical review board of Institute and data was collected from 7<sup>th</sup> September 2021 to 31<sup>st</sup> December 2021. Patients, either male or female, 10 to 60 years of age and presented with history of RTA within a week of injury were included. Patients who had ocular trauma due to cause other than RTA, unconsciousness or who refused to participate in the study were excluded. Patients were included using non-probability consecutive sampling. Sample size was calculated using open EPI calculator. Taking prevalence of RTI as 6.6%,<sup>9</sup> confidence interval of 95%, population size as 1000,000 and margin of error 4.5%, sample size was 117. Informed consent was taken from the patients. Brief history and detailed examination was carried out. Ophthalmic examination was done including pupillary reactions, extra ocular movements, slit lamp examination and Fundoscopy. Data including age, gender, duration of presentation, eye involved, type of vehicle and type of eye trauma were noted. Analysis was done using SPSS version 22. Frequencies and percentages were computed for all categorical variables like gender, eye involved, time since RTA and pattern and type of injury. Mean and standard deviation was calculated for age. Effect modifiers like age, gender and vehicle type were addressed through stratification. Post stratification chi-

square test was applied. P-value less than or equal to 0.05 was considered significant.

## RESULTS

One hundred and seventeen patients reported during the 5 months' time. Out of 117 patients 95 (81.1%) were male and 22(18.9%) were female. Male to female ratio was 4:1. Right eye was affected in 63 patients (53.8%), left eye in 42 patients (35.9%) and 12 patients (10.3%) had trauma to both eyes. Pattern of ocular trauma is depicted in table 1. Average age of the patients was  $29.88 \pm 13.9$ . Distribution of the patients according to age range is shown in Table 2 and Figure 1.

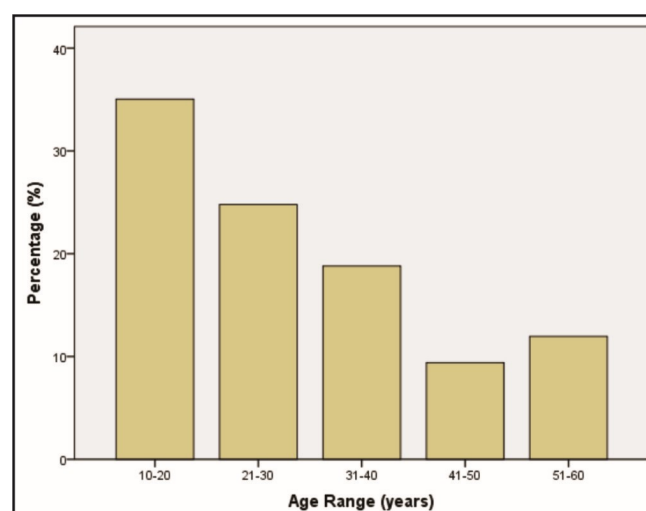


Figure 1: Percentage distribution of age range.

Table 1: Pattern of Ocular trauma.

Type of Injury	Frequency	Percentage (%)
Contusion	51	43.6
Eye brow laceration	10	8.5
Eye wall rupture	6	5.1
Laceration	7	6.0
Lid laceration	35	29.9
Penetrating	3	2.6
Perforating	5	4.3
Total	117	100.0

Table 2: Pattern of trauma with respect to age range.

Age Range (Years)	Type		Total
	Closed Globe	Open Globe	
10 – 20	36 (30.7%)	5 (4.3%)	41 (35.0%)
21 – 30	23 (19.7%)	6 (5.1%)	29 (24.8%)
31 – 40	14 (12%)	8 (6.8%)	22 (18.8%)
41 – 50	8 (6.8%)	3 (2.6%)	11 (9.4%)
51 – 60	11 (9.4)	3 (2.6%)	14 (12%)
Total	92 (78.6%)	25 (21.4%)	117 (100%)

Seventy seven (65.8%) patients were on 2-wheelers, followed by 4-wheeler (n = 13, 11.1%) and 3-wheeler auto rickshaw (n = 6, 5.1%). Maximum number of patients reported within 24 hours of injury (n = 76, 65%) followed by 32 patients (27.4%) who reported within 24 – 48 hours. Only one patient reported after one week of injury.

Closed globe trauma was more common than open globe trauma. Closed globe trauma occurred in 92 patients (78.6%) while open globe trauma accounted for 25 injuries (21.4%). Among the closed globe injuries, contusion (n = 51, 43.6%) was the most common followed by lid laceration (n = 35, 29.9%). Penetrating and perforating injuries were least common (2.6% and 4.3 % respectively). Table 1 shows pattern of ocular injuries reported in our study. Majority of the patients had 6/6-6/9 vision at presentation. Figure 2 shows visual acuity of our patients.

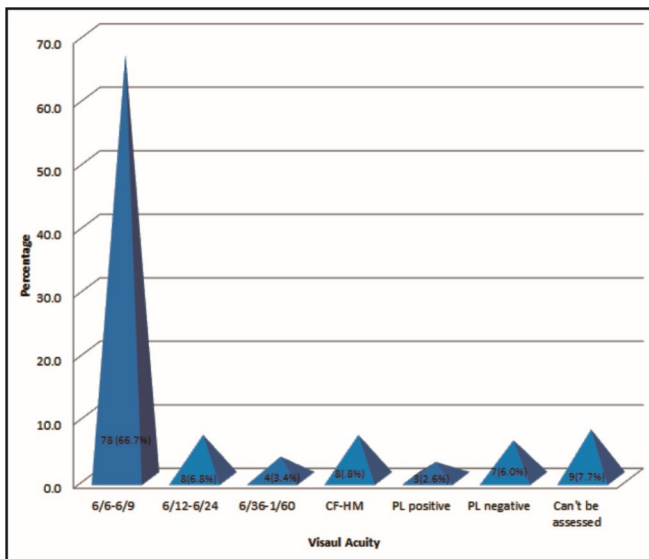


Figure 2: Distribution of visual acuity.

Table 3: Stratification with respect to type and pattern of ocular trauma.

	Type of Trauma	Pattern of Trauma
	p value	p value
Type of wheeler	< 0.016	< 0.01
Time of reporting	< 0.026	< 0.04

Stratification analysis of the patients was performed and no significant association was found between age/gender and pattern of ocular trauma.

However, time of reporting and type of wheeler had association with type of ocular trauma and pattern of ocular trauma as p values were reported to be less than 0.05 (Table 3).

## DISCUSSION

Ocular trauma is classified according to Birmingham Eye Trauma Terminology System (BETTS).<sup>10</sup>

1. Eye Wall: Cornea and Sclera. Technically the eyeball has three coats posterior to the limbus, for clinical and practical purposes violation of only the most external structure is taken into consideration.
2. Closed Globe Injury: An injury penetrating into the cornea; partial thickness corneal wound.
3. Open Globe Injury: A full thickness wound of eyeball.
4. Contusion: There is no (full thickness) wound. The injury is either due to direct energy delivery by the object (e.g. choroidal rupture) or due to changes in the shape of globe (e.g. angle recession).
5. Lamellar laceration: Partial-thickness wound of the eyeball.
6. Rupture: Full-thickness wound of the eye wall, caused by a blunt object.
7. Laceration: full thickness wound of eyeball due to sharp object. The wound occurs at the impact site by an outside mechanism.
8. Penetrating injury: With only entry wound.
9. Perforating injury: Entry and exit wounds.

In this particular study, ocular trauma caused by RTA was more common in the younger age group. This is in accordance with the earlier studies.<sup>11,12</sup> The reason might be the more active nature of young patients that makes them more prone to injuries. This also holds true in RTA. The male to female ratio in our study was 4:1. A recent study reported this ratio in RTA as 6:1.<sup>13</sup> However, our results only included ocular injuries in RTA. In another study from India, males accounted for 77.6% and females 22.4%.<sup>14</sup> In a comparative study done in Rajasthan, India, by Rekhi GS et al, male to female ratio was found to be 2.66:1.<sup>15</sup> Similar results were reported from Libya and Mediterranean region.<sup>16,17</sup>

Ocular injuries are very critical as they might cause irreversible visual loss. Amongst all injuries

caused by RTA, ocular injuries accounts for 7.6%.<sup>18</sup> In our study of 6 months 117 patients reported with ocular trauma due to RTA.

Good visual acuity was recorded in 66.7% patients in our study. Another study reported this ratio to be 75.2% with visual acuity of 6/6-6/9.<sup>14</sup>

Study conducted by Kumarsamay et al, reported that 85.4% of the patients were riding two wheelers like bike or scooter and 13% were riding four wheelers.<sup>19</sup> In our study, 65.8% of the patients were on two wheelers and 11.1% were on four wheelers.

Right eye was more commonly affected in our series which is also reported in another research.<sup>20</sup> Studies have shown that closed globe trauma is more common than open globe trauma.<sup>21</sup> It was also depicted in the current study with closed globe trauma in 78.6% and open globe injuries in 21.37%. In a study done by Smith et al, 68.6% had closed globe and 16.2% had open globe injuries.<sup>22</sup>

In our study contusions comprised of 43.6% and lid laceration were 29.9%. This is in contrast to a previous report with contusion in 22.6% and lid laceration in 5.1%.<sup>23</sup> Puzari reported sub conjunctival hemorrhage as the most common (83.3%) followed by lid edema and ecchymosis (78.3%).<sup>24</sup> Another study reported similar results of sub conjunctival hemorrhage as most common followed by ecchymosis and peri-orbital edema.<sup>1</sup>

It was only a single center study from a trauma center of a tertiary care hospital. Further data from other centers will provide a more diverse picture. However, from the current results it can be seen that young patients need to be more careful. Abiding by the traffic rules and use of protective helmet can definitely lower the percentage of ocular injuries. Delay in reporting to hospital leads to deterioration of injuries. This can be prevented through a planned approach involving all the resources which are available in our country to bring about awareness in masses.

## CONCLUSION

Young persons, males and 2-wheelers are more prone to ocular injuries related with RTA. Education must include traffic rules and safety measures on the roads as a mandatory part of curriculum.

## Ethical Approval

The study was approved by the Institutional review board/Ethical review board (**IRB-1860/DUHS/Approval/2020**).

**Conflict of Interest:** Authors declared no conflict of interest.

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### Authors' Designation and Contribution

Fizza Farooq; Medical Officer: *Concepts, Design, Literature search, Data acquisition, Data analysis, Statistical analysis, Manuscript preparation.*

Muhammad Munir Quraishy; Professor: *Concepts, Design, Literature search, Manuscript editing, Manuscript review.*

Mazhar ul Hassan; Professor: *Manuscript editing, Manuscript review.*

Mehvash Hussain; Assistant Professor: *Manuscript editing, Manuscript review.*

Faiza Mushtaq; VR Fellow: *Data acquisition.*

