

## Ocular Morbidity in Road Traffic Accidents at Tertiary Level Centre in India

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### ABSTRACT

**Purpose:** (i) To study the incidence of ocular injuries in vehicular accidents. (ii) To determine the pattern of clinical presentation of ocular injuries due to vehicular accidents. (iii) Effective management and final visual prognosis in vehicular ocular injuries.

**Methods:** All patients with history of ocular injuries following road traffic accidents presenting to the casualty and outpatient Eye opd from Jan 2018 to Dec 2018 were included in this study. Ocular injuries other than RTA were excluded.

**Results:** Incidence of ocular injuries due to RTA was 90.4/1000 RTA, M:F ratio 2.4:1, sub conjunctival hemorrhage (51), ecchymosis (47), Lid lacerations (24), conjunctival tear (6), conjunctival chemosis (18), conjunctival foreign body (8), orbital fracture (11) corneal tear (8), corneal foreign body (5), corneal abrasion (3), sclera laceration (2), hyphema (3), sphincter tear (3), Iridodonesis (1), Traumatic mydriasis (5), Iris prolapse (5), traumatic cataract (6), subluxation (2), dislocation (1), Vitreous haemorrhage (2), traumatic optic neuropathy (2), Berlin's oedema (2), pre retinal haemorrhage (1).

**Conclusion:** Ocular injury due to RTA accounted for 90.4/1000 RTA. Injuries involving cornea and sclera had bad prognosis and involving optic nerve had worst prognosis.

**Keywords:** RTA, Trauma, Ocular injuries, Ocular morbidity

**Abbreviations:** BE: Both Eye; RE: Right Eye; LE: Left Eye; M: Male; F: Female; 2W: 2 Wheeler; 3W: 3 Wheeler; 4W: 4 Wheeler; PD: Pedestrians; #: Fracture; ECH: Ecchymosis; SCH: Sub Conjunctival Hemorrhage; LT: Lid Tear; AB: Abrasion; CT-F: Corneal Tear Full Thickness; CTP: Corneal tear partial thickness; FB: Foreign Body; SL: Scleral Laceration; SPT: Sphincter Tear; TM: Traumatic Mydriasis; IP: Iris Prolapse; B: Berlin's Oedema; VH: Vitreous haemorrhage; TON: Traumatic Optic Neuropathy; PRH: Pre Retinal Haemorrhage; IOP: Intraocular Pressure; CF: Counting Finger; RTA: Road Traffic Accident; PL: Perception of light; PR: Projection of Rays; AC: Anterior chamber

### INTRODUCTION

An injury to the eye or its surrounding tissues is the most common cause for attendance at an eye hospital emergency department. The extent of trauma may range from simple superficial injuries to devastating penetrating injuries of the eyelids, lacrimal system, and the globe [1]. The surgical management of such injuries is directed primarily at the restoration of normal ocular anatomy. The ultimate goal is to prevent secondary complications and maximize the patient's visual prognosis [2].

Eye injuries are a major and under-recognized cause of disabling ocular morbidity that especially affect the young [2]. The public health importance of ocular trauma is undeniable. Injuries generate a significant and often unnecessary toll in terms of medical care, human suffering, long term disability, productivity loss, rehabilitation services and socioeconomic cost.

### Aims and objectives

1. To study the incidence of ocular injuries in vehicular accidents.
2. To determine the pattern of clinical presentation of ocular injuries due to vehicular accidents.
3. Effective management and final visual prognosis in vehicular ocular injuries.

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## MATERIALS & METHODS

After ethics clearance taken from the review board, present study was carried out at Bandikui Dausa, from January 2018 to December 2018 for a period of 1 year.

All patients with history of ocular injuries following road traffic accidents presenting to the casualty and outpatient at eye opd of Bandikui, Dausa were included in this study.

This study, conducted over a period of one year, included 1050 cases of road traffic accident, of which 95 cases presented with ocular injuries. Cases of ocular injury due to causes other than vehicular accidents are excluded in this study. Only patients over the age of 18 years with RTA were selected in this study. Socio-demographic data and details of the patients were obtained.

Information regarding the type of vehicular accident, time and location were noted.

- Signs and symptoms occurring after the injury were recorded.
- Thorough examination using a torch light was done.
- Visual acuity was recorded using Snellen's chart.
- This was followed by examination under slit-lamp for more detailed examination.
- Gonioscopy was performed wherever necessary.
- IOP was recorded with applanation tonometer. In few cases it could not be recorded.
- Direct and indirect ophthalmoscopy was performed wherever required.
- Retinoscopy was performed in cases without media opacities.
- Plain x-ray skull in A-P view, lateral view, Rheese parieto-orbital-oblique view and Water's view were taken whenever necessary.
- B-scan ultrasonography was performed in those cases with media opacities who were suspected of having posterior segment abnormality.
- CT and MRI were done wherever required.
- Depending on the presentation, patients were subjected to detailed examination by ENT surgeon, General surgeon, Maxillo-facial surgeon and General physician.
- Patients were managed mainly at casualty and OPD level, with some patients admitted for further management and specialized care.
- Patients were followed up every week after they were discharged from the hospital and the patients who were treated on OPD basis were also followed up every week.

## RESULTS

Out of 1050 patients of RTA, who presented at CHC Bandikui, Dausa, 95 had ocular injuries. Incidence of ocular injuries is 90.4/1000 RTA (**Table 1**).

**Table 1. Incidence of ocular injuries in RTA.**

RTA	Number of cases	Percentage
Ocular injury	95	9.04
Non ocular injury	955	90.96
RTA patients	1050	100.00

**Table 2** indicates that the majority 39 (41.05%) of ocular injuries occur in the age group of 31-40 years and the least number of cases 10 (10.52%) were seen over the age of 50 years.

**Table 2. Age wise distribution of ocular injuries in RTA.**

Ages	Number of cases	Percentage
20-30 yrs	19	20
31-40	39	41.05
41-50	27	28.42
>50	10	10.52
Total	95	100.00

**Table 3** depicts the prevalence of ocular injuries is more in males 67 (70.53%).

**Table 3. Sex distribution of ocular injuries in RTA.**

Sex	Number of cases	Percentage
Male	67	70.53
Female	28	29.47
Total	95	100.00

**Table 4** shows that most common 53 (55.76%) of ocular injuries in RTA is due to 2 wheelers.

**Table 5** depicts that right eye is most commonly affected i.e. 52 (54.70%) and both eye involvement is least common i.e. 9 (9.47%).

Most common ocular manifestation of RTA is sub conjunctival haemorrhage 51 (53.65%) followed by ecchymosis 47 (49.44%) (**Table 6**).

**Table 4.** Distribution of cases according to the type of vehicle involved.

Vehicle	Number of cases	Percentage
2 wheelers	53	55.76
3 wheelers	07	7.36
4 wheelers	20	21.04
Pedestrians	15	15.78
Total	95	100.00

**Table 5.** Distribution of cases according to eye affected.

Eye	Number of cases	Percentage
Left eye	34	35.77
Right eye	52	54.70
Both eyes	9	9.47
Total	95	100.00

**Table 6.** Clinical manifestation of ocular injuries in RTA.

	Number of cases	Percentage
Orbital fracture	11	11.57
Echymosis	47	49.44
Lid tear	24	25.25
Sub-conjunctival haemorrhage	51	53.65
Conjunctival tear	6	6.31
Conjunctival foreign body	8	8.42
Conjunctival chemosis	18	18.94
Corneal abrasion	3	3.16
Corneal foreign body	5	5.26
Corneal tear-full thickness	5	5.26
Corneal tear – partial thickness	3	3.16
Scleral laceration	2	2.10
Hyphaema	3	3.16
Sphincter tear	3	3.16
Iridodonesis	1	1.05
Traumatic mydriasis	5	5.26
Iris prolapse	5	5.26
Subluxation of lens	2	2.10
Dislocation of lens	1	1.05
Traumatic cataract	6	6.31
Berlin's oedema	2	2.10
Pre-retinal haemorrhage	1	1.05
Vitreous haemorrhage	2	2.10
Traumatic optic neuropathy	2	2.10

**Table 7** shows that a majority of cases 64 (67.39%) had a visual acuity in the range of 6/6-6/12 and only 2 (2.11%) cases had no perception of light after 6 weeks.

**Table 7.** Vision at the time of presentation.

Vision	No. of cases	Percentage
6/6-6/12	64	67.39
6/18-6/36	11	11.58
6/60-CF	16	16.85
PL-PR	02	2.11
NO PL	02	2.11
Total	95	100.00

Improved visual acuity was seen in 89 (93.72%) cases, in the range between 6/6-6/12 at the end of 6 weeks (**Table 8**).

**Table 8.** Vision at the time of discharge.

Vision	No. of cases	Percentage
6/6-6/12	89	93.72
6/18-6/36	04	4.21
6/60-CF	0	0
PL-PR	0	0
NO PL	2	2.11
Total	92	100

## DISCUSSION

This study includes a total number of 1050 RTA patients of which 95 patients had ocular injuries. The incidence of ocular injuries in this study was found to be 90.4/1000 RTA.

In this study patients above the age of 18 years were selected. The majority of ocular injuries occurred in the age group of 31-40 years and least number of cases of RTA were seen in patients over 50 years of age. There was a total of 67 males and 28 females. Male: female ratio was 2.4: 1. Similar male predominance was found in a study from Western Maharashtra by Patil et al. [3].

Out of 95 patients with ocular injuries, most were due to motorized 2 wheelers 53 (55.76%) followed by 4-wheeler 20 (21.04%), pedestrians 15 (15.78%) and 3 wheelers 7 (7.36%).

In the study done by Patil et al [3], majority (35%) were due to motorized 2 wheelers followed by 4-wheeler (25.9%).

A total number of 11 (11.57%) orbital fractures were seen during the period of our study. Of these 4 cases had medial wall fracture, 2 cases had fracture of orbital rim, 3 cases had floor fractures, 1 case had lateral wall fracture and 1 patient had a pure blow out fracture. In a study of orbital fractures in a tertiary health care center by Kamath et al. [4], 22 among 35 patients had infra orbital rim fracture, floor fracture was seen in 10 patients, lateral wall fracture in 4 patients, medial wall fracture in 6 patients, pure blow out fracture in 5 patients and roof fracture in 1 case.

Ecchymosis was one of the most common clinical finding; out of the total number of 95 cases, 47 patients had ecchymosis. 46 patients with ecchymosis were associated with other clinical findings while 1 patient had only ecchymosis. 24 patients had lid tear, most of them being partial thickness lid tear. 4 cases had both upper and lower lid tear. 7 cases had associated fracture orbit. 3 lid tears had no associated ocular injuries, 1 patient had Berlin's oedema and 1 had vitreous haemorrhage. Sub conjunctival haemorrhage was most common clinical finding in our study. 51(53.65%) cases had subconjunctival haemorrhage. They varied from small petechiae to large extravasations. In severe subconjunctival haemorrhage, posterior limit could not be made out. 10 patients did not have any associated clinical findings. Conjunctival tear was seen in 6 (6.31%) patients. Conjunctival tear did not exceed more than 5 mm Conjunctival foreign body was observed in 8 (8.42%) patients and chemosis in 18 (18.94%) patients. Most of the foreign bodies were sand particles and were lodged in bulbar and upper tarsal conjunctiva.

Cornea, 16 (16.83%) patients presented with corneal injuries, 3 (3.16%) patients had corneal abrasion, 5 (5.26%) patients had full thickness corneal tear, 3 (3.16%) patients had partial thickness corneal tear and 5 (5.26%) patients had corneal foreign body. 5 patients with full thickness corneal tear were associated with iris prolapse, out of which 1 patient had posterior dislocation of lens and 1 patient had subluxated lens. Sclera, 2 (2.10%) patients had scleral laceration. None of them were full thickness and were not associated with uveal prolapse. Hyphaema, in our study 3 (3.16%) cases of hyphaema were presented. All the cases of hyphaema involved <1/3<sup>rd</sup> of the anterior chamber. All 3 cases had only marginal increase in intraocular pressure. One patient with hyphaema had associated fracture orbit.

Iris and Pupil, most common findings were traumatic mydriasis 5 (5.26%), 5 (5.26%) cases of Iris prolapse, followed by 3 (3.16%) patients with sphincter tear and 1 (1.05%) with Iridodonesis our study was compared with a study of 205 cases by Canvan and Archer [5], in which 79 cases had Iris and pupillary injuries.

Lens, nine eyes had lenticular involvement. Majority of them 6 (6.31%) had traumatic cataract, 2 (2.10%) had subluxation of lens and 1 (1.05%) had dislocation of lens. 4 (4.21%) patients had early rosette cataract and 2 (2.10%) patients had total cataract. As opposed to 52 eyes out of 212 eyes in a study by Canvan and Archer [5], our study had 3 patients with lenticular damage. Findings were comparable with that of Dabral SM, Mukherjee AK and Saini JS [6] who analyzed 82 patients hospitalized for penetrating eye injuries. Concomitant injuries in the eye were laceration of lid (26), lacrimal canalicular injuries (8), conjunctival tears (38), iris tear (30), ciliary body tear (20), lens (45), posterior segment damage (28), and hyphaema (32). In 12.10% of cases glass caused injury following road traffic accidents.

Posterior segment involvement, out of 95 patients 7 (7.36%) patients had posterior segment involvement.

- 2 (2.10%) patients had vitreous haemorrhage
- 2 (2.10%) patients had traumatic optic neuropathy
- 2 (2.10%) patients had Berlin's oedema
- 1 (1.05%) patient had pre-retinal haemorrhage

Vitreous haemorrhage, two patients had vitreous haemorrhage. 1 patient of vitreous haemorrhage had associated fracture orbit and the other patient had associated ecchymosis and subconjunctival haemorrhage. At the time of presentation both patients had perception of light and improved up to 6/18 and 6/12 respectively after 6 weeks.

Berlin's oedema 2 (2.10%) cases of Berlin's oedema were observed in this study. Both the cases of Berlin's oedema had concomitant orbital fracture. Hermmman [7] found 17 cases of Berlin's oedema in 677 cases.

Pre-retinal haemorrhage, 1(1.05%) patient presented with pre-retinal haemorrhage. The haemorrhage was resolved by 6 weeks with no sequelae.

Traumatic optic neuropathy, patients (2.11%) had traumatic optic neuropathy. Both patients presented with no perception of light, and even after 6 weeks their vision did not improve. Our study was compared with a study of indirect optic nerve injury in two-wheeler riders in North-East India by Bhattacharjee et al. [8] out of 129 consecutive cases of cranio-orbital injury, 35 patients had indirect traumatic optic neuropathy.

Vision, most of the patients with RTA had vision in the range of 6/6-6/12 64 (67.39%) at presentation, and 27 (28.43%) patients had vision in range of 6/18 to counting fingers 1 metre. 2 (2.11%) patients had only perception of light and 2 (2.11%) patients did not have perception of light.

At the end of 6 weeks most of the patients i.e. 89 (93.72%) had good vision in the range of 6/6-6/12 and 2 patients, who previously had no perception of light with traumatic optic neuropathy, showed no improvement in visual outcome.

## CONCLUSION

On conclusion of this study, it was found that ocular injuries due to RTA accounted for 90.4/1000 RTA. Most of the injuries involved the ocular adenexa, which while causing certain degree of cosmetic disfigurement did not lead to any permanent visual sequelae, injuries involving cornea or sclera had bad prognosis and those with optic neuropathy had worst prognosis. The people of most active and productive age groups are involved in RTA, which leads to cosmetic disfigurement and serious economic loss to the community. Males are commonly injured in RTA which is probably related to both exposure and risk taking behaviour. Several human and environmental risk factors were found to be associated with increased risk of RTA e.g. lack of awareness of traffic rules, inadequate enforcement of existing laws, easy accessibility to license and driving under the influence of alcohol. If we control the factors appropriately mortality and morbidity can be prevented.

Recommendations for the prevention of ocular injuries in RTA

1. Passengers sitting in the front seats more commonly sustain ocular trauma.
  - The use of safety seat belts must be made compulsory.
  - All road vehicles must have laminated glass windscreens.
2. The practice of seating younger children on the lap of a parent on one of the front seats should not be allowed.
3. There is an urgent need for education of the public through the use of news media and television programmes.
 

The requirement of wearing seat belts in four wheelers and helmets on two wheelers.

  - Observation of the rules of the road.
  - Punishment for reckless driving and dangerous overtaking.
4. The use of unbreakable plastic spectacles should be encouraged.
5. Road markings, guiding traffic and drivers, need to be re-painted more frequently. Paint should be fluorescent so as to be clearly visible even in darkness.

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