

## Original Research Article

# The prevalence of ocular manifestations in road traffic accidents treated at a rural tertiary care hospital in south india: a cross sectional study

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## ABSTRACT

**Background:** Ocular injuries following road traffic accidents (RTA) is one of the common causes of ophthalmological morbidity and unilateral blindness. The aim of this study was to document the epidemiological pattern of ocular injuries caused by RTA in a cross-sectional population brought to a tertiary care centre in rural southern India.

**Methods:** After receiving institutional ethics committee approval, all patients over the age of 10 years, who came to the emergency department (ED) of this rural tertiary care centre with alleged history of RTA, during the period, July-December 2015 were serially enrolled to participate in the study after obtaining written informed consent. The sample size for 95% confidence level and precision of 5% was calculated to be 191.

**Results:** Out of the 832 cases of RTA presenting to the ED, 191 (23%) had ocular injuries. There were 186 (97.38%) closed globe injuries and 5 (2.6%) open globe injuries. Eight (4.1%) patients with ocular injuries had no perception of light in the affected eye after the accident. The commonest injury was periorbital edema and ecchymosis (68.6%) followed closely by eyebrow laceration (63.9%) and lid laceration (48.2 %). The commonest anterior and posterior segment injuries were traumatic optic neuritis (6.3%) and vitreous or retinal haemorrhage 4 (2.09%) respectively.

**Conclusions:** In this study, the prevalence of ocular involvement in RTA was 23%. Most of the injuries were closed globe injuries and periorbital edema and ecchymosis were the commonest type of injury occurring followed by eyebrow and lid laceration.

**Keywords:** Eye injury, Ocular injury, Road traffic accident (RTA)

## INTRODUCTION

Road traffic accidents (RTA) are events of human tragedy that involve at least one moving vehicle and result in injury or death of one or more individuals. RTAs account for a major proportion of human suffering all over the world and according to the world health organization it is the sixth leading cause of death in India.<sup>1</sup> During the year 2015, the state of Kerala ranked the highest in the country for grievous injury following road traffic accidents, with the total number of persons

grievously injured in 2015 being 29,096 persons.<sup>2</sup> Ocular injuries contribute to a major part of trauma in RTAs and can involve injuries to the eye lids, lachrymal apparatus, orbital wall, periorbital structures and extra-ocular muscles, conjunctiva, cornea, sclera, uveal tissue, vitreous, choroid, optic nerve or can involve the entire globe at times.<sup>3</sup>

Ocular trauma is also regarded as one among the common causes of ophthalmological morbidity and unilateral blindness.<sup>4</sup> These ocular traumata are often

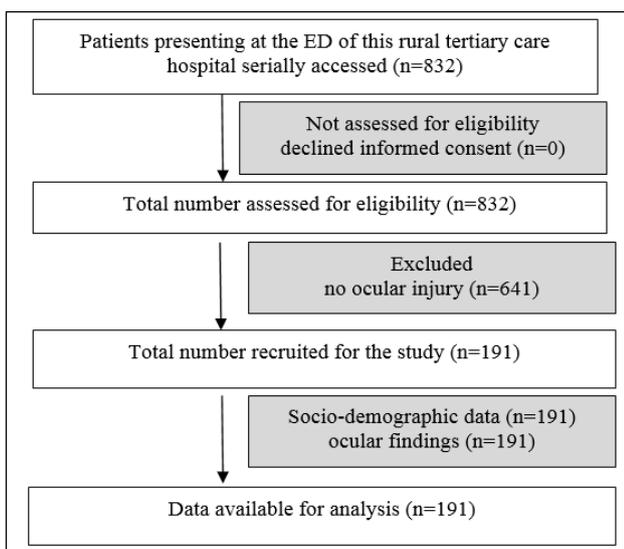
preventable and hence the need to increase public awareness of this public health concern all over the globe. Preventive measures include mandatory use of safety seat belts, laminated glass windscreens for all vehicles, children restrained in car seats on the back seat, education of the public about observation of road safety rules, wearing seat belts and use of unbreakable plastic spectacles. Clear road signs and markings, guiding traffic and drivers using fluorescent clearly visible during darkness are a helpful measure to prevent RTAs.<sup>5</sup>

Kochi, the queen of Arabia, is one of the fast-growing cities of India, also has continually increasing statistics in RTA. In 2015 alone there were 2561 RTAs of which 159 had fatal casualties. In Kochi alone in 2015, 168 people were killed and 2721 injured in road traffic accidents.<sup>2</sup> This cross-sectional study was planned to document the socio-demographic pattern of ocular injuries caused by road traffic accidents in a cross-sectional population brought to a tertiary care hospital in rural South India.

**METHODS**

This hospital-based, observational study was approved by the institutional ethics review board and ethics committee and of this institution in March 2015. All adult patients and children over the age of 10 years, who came to the emergency department of this rural tertiary care centre with alleged history of RTA during the period, July to December 2015 were serially enrolled to participate in the study after obtaining written informed consent.

The sample size was calculated based on the study by Alam J et al, who reported the prevalence of ocular trauma in RTA to be 45%.<sup>4</sup> The sample size for 95% confidence level and precision of 5% was calculated to be 191. The sample size was calculated using master sample size calculation computer software.<sup>6</sup>



**Figure 1: Study flow diagram.**

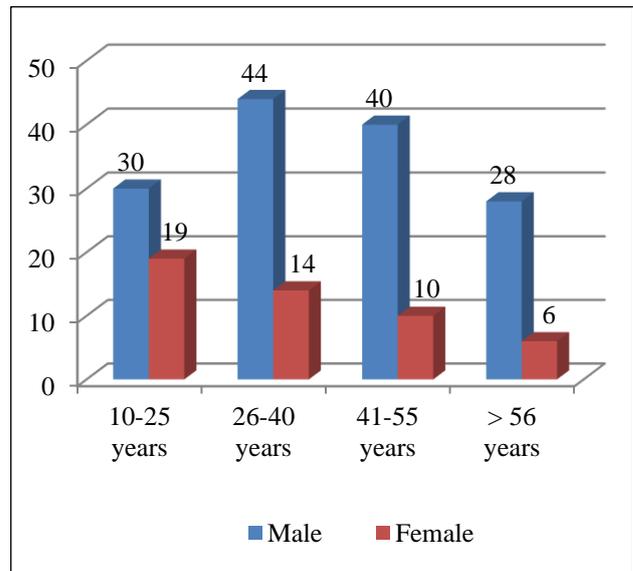
This cross-sectional study included 832 patients who presented at the emergency department of this rural tertiary care hospital with alleged history of RTA during the six-months period from July-December 2015. A structured case study form was used to record the history and findings of the patients.

In all cases with ocular injuries, complete ophthalmological examination was performed in the department of ophthalmology. All data was then entered into the structured case study form and was later collated and analyzed. The study flow diagram is given in Figure 1.

**RESULTS**

Out of the 832 cases of RTA presenting at the emergency department of this institution, 191 (23%) had ocular injuries (Figure 1). Most of the injured persons were in the age group of 26 to 40 years and nearly three quarters of the injured were male. Out of the 832 cases of RTA presenting at the emergency department of this institution, 191 (23%) participants had ocular injuries.

(Figure 2) Among the 191 participants who were injured nearly 75% were males and most of them belonged to the age group 26 to 40 years.



**Figure 2: Age and gender distribution of participants.**

The mode of transport in the case of 143 (74.9 %) participants at the time of the RTA was a two-wheeler, while 36 (18.8%) participants were travelling in four-wheelers and 12 (6.3%) used other modes of transport. Less than a third of those using a two-wheeler were wearing helmets at the time of the RTA.

Among the 143 who were using two-wheelers 102 (71.3%) were not using a helmet when the accident occurred.

The baseline data of the participants is given in Table 1.

**Table 1: Baseline characteristics of participants.**

Baseline data of participants	Number (%)
<b>RTA Patients (n=832)</b>	
With ocular injury	191 (23%)
Without ocular injury	641 (77%)
<b>Age(n=191)</b>	
10-25 years	49 (25.7 %)
26-40 years	58 (30.3 %)
41-55 years	50 (26.2 %)
>55 years	34 (17.8 %)
<b>Gender (n=191)</b>	
Male	142 (74.3%)
Female	49 (25.7%)
<b>Vehicle involved(n=191)</b>	
Two-wheeler	143 (74.9 %)
Car	36 (18.8%)
Other transport modes	12 (6.3%)
<b>Under the influence of alcohol (n=191)</b>	
Alcohol consumed	59 (30.9%)
No alcohol consumed	132 (69.1%)
<b>Two-wheeler accidents (n=143)</b>	
Using helmet	41 (28.7%)
Not using helmet	102 (71.3%)

Types of ocular injuries following RTA are given in Table 2.

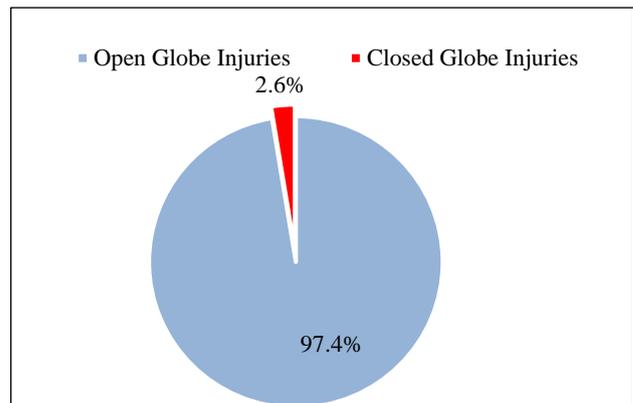
**Table 2: Types of ocular injury following RTAs.**

Type of ocular injury	Number (%)
<b>Anterior segment injuries</b>	
Eye brow laceration	122 (63.9%)
Lid laceration	92 (48.2%)
Periorbital oedema with ecchymosis	131 (68.6%)
Conjunctival tear	3 (1.6%)
Corneal tear	5 (2.6%)
Acute hyphaemia	4 (2.1%)
Traumatic optic neuritis	12 (6.3%)
<b>Posterior segment injuries</b>	
Choroidal tear	3 (1.57%)
Vitreous or retinal haemorrhage	4 (2.09%)
Optic nerve avulsion	1 (0.52%)

All open globe injuries were repaired in our hospital. Eight (4.1%) patients with ocular injuries had no perception of light in the affected eye after the accident.

Periorbital edema with ecchymosis was the commonest type of injury occurring in 131 (68.6%) of the ocular injuries followed closely by eyebrow laceration occurring in 122 (63.9%) and lid laceration in 92 (48.2 %) patients with ocular injuries.

Out of the 191 ocular injuries, 186 (97.38%) were closed globe injuries and 5 (2.6%) were open globe injuries (Figure 3).



**Figure 3: Type of ocular injury.**

Traumatic optic neuritis was the commonest anterior segment injury 12 (6.3%). While vitreous or retinal haemorrhage was the commonest posterior segment injury 4 (2.09%). (Table 2)

Visual acuity (Va) was graded into two categories Va<6/60 and Va>6/60. However, the actual effect of recent trauma causing a reduction in existing visual acuity could not be assessed as the patients also had other

associated causes for reduced vision such as cataract, refractive errors etc. The previous Va was not available for charting a difference.

## DISCUSSION

The emergency medical services of this tertiary care hospital admitted 191 patients with ocular injury following RTA during the short span of six months. This number accounts for 23% of all RTAs with ocular injuries and is on the higher side compared to the study by Alam J et al, where the prevalence of ocular injury was found to be 17%.<sup>4</sup> In a study reported from Libya on 1210 patients of all types of eye injuries 20.5% patients were found to have been caused by road traffic accidents.<sup>5</sup>

Present study showed that ocular injuries were more common in males and there was a male: female ratio of approximately 3:1 while the studies by Puzari et al and Cilino et al had a male female ratio was 4:1.<sup>7,8</sup> Other studies showed a greater percentage of males compared to females.<sup>9,10</sup>

The vehicle used by 85.4% of those who sustained ocular injuries were two-wheelers and 13% were four-wheelers in the study by Kumarasamy et al.<sup>9</sup> These statistics almost correspond to our observation that 74% sustained ocular injuries while travelling in two-wheelers and 18% injuries occurred while travelling in four-wheeled vehicles.

Marudhamuthu et al found that 78% of those with ocular injuries after RTA were under the influence of alcohol, while Swathi et al found that more than half the number of ocular injuries occurred when the individuals were under the influence of alcohol.<sup>10,11</sup> Though consumption of liquor is high in our state we found only 30.9% of those who had ocular injuries were under the influence of alcohol at the time of the RTA.

Marudhamuthu et al found 92% of ocular injuries occurred in two-wheeler drivers who were driving without helmets We also found that the majority of those with ocular injuries who were driving two-wheelers were not wearing helmets (71.3%).<sup>10</sup>

Kumarasamy et al reported that 95.13% of patients had closed globe injury and 4.9 % had open globe injury in his study, while in present study 97.4% had closed globe injuries and 2.6% had open globe injuries.<sup>9</sup> Gahlot et al observed that 32.79% of eye injuries were extra-ocular, 59.02% were closed globe intraocular injuries and 8.19% were open globe intra-ocular injuries.<sup>12</sup> A higher percentage of open globe injuries (13.6%) was reported by Mishra et al from a zonal level military hospital. This may be because this hospital is the largest service hospital in its state, and its eye centre is the only military eye care facility available for the service personnel for ocular trauma.<sup>13</sup>

In the studies by Kumaraswamy et al and Gahlot et al 6.24% and 4.1% of patients did not have any perception of light, while in present study also 4.1% patients with ocular injuries following RTAs had no perception of light after the incident.<sup>9,12</sup>

The most common ocular injury in present study was periorbital oedema with ecchymosis (68.6%). These were also the commonest ocular injuries reported by Alam J et al and Kumarasamy et al in their studies but the commonest ocular injury reported by Muralidhar et al was sub-conjunctival haemorrhage followed by ecchymosis.<sup>3,4,9</sup> Puzari et al also reported subconjunctival haemorrhage as the commonest injury (83.33%) followed by lid oedema and ecchymosis (78.33%).<sup>8</sup> In present study eye brow laceration (63.9%) and lid laceration (48.2%) were next in the list (Table 2).

In the same study by Kumarasamy et al., the author reported hyphaemia in 4.16% patients, however present study showed only 2.1% of hyphaema.<sup>9</sup> Traumatic cataract was observed in 1.38% in the same study but we did not have a single case with traumatic cataract (Table 2).

In the study by Ramachandra et al 31 out of 60 patients had associated head injury along with ocular injury. Every patient with some form ocular injury must be evaluated thoroughly for head injury with special attention to pupillary reactions and visual acuity assessment.<sup>14</sup>

In an article published in the journal Injury the author states that most ocular injuries can be prevented by wearing safety belts and installing high penetration resistant laminated glass windscreens.<sup>15</sup>

## CONCLUSION

Ocular injury was seen to occur more commonly with two-wheeler RTAs. Closed globe injuries were more common but there were some patients with ocular injuries who had no perception of light in the affected eye after the accident.

Increasing public awareness of safety precautions is crucial to prevention of RTAs. Meticulous observation of traffic rules, maintain speed limits, wearing helmets when driving two-wheelers and not driving under the influence of alcohol are some of the measures to minimize RTAs in our country.

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