



Original Article

Etiology, Risk Factors, and Patterns of Ocular Injuries Following Road Traffic Accidents in a Tribal Region of Central India: A Hospital-Based Observational Study

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ABSTRACT

Background: Ocular trauma resulting from road traffic accidents (RTAs) is an important cause of visual morbidity and preventable blindness, particularly among young adults. Limited epidemiological data are available from tribal regions of Central India. This study aimed to evaluate the etiological factors, risk determinants, and injury patterns associated with ocular trauma due to RTAs in Bastar district of Chhattisgarh. **Methods:** A hospital-based descriptive observational study was conducted in the Department of Ophthalmology, Government Medical College, Jagdalpur, from January 2021 to June 2022. A total of 150 patients presenting with ocular injuries following RTAs were included. Detailed history regarding age, gender, type of vehicle, alcohol consumption, helmet and seat-belt use, and ocular examination findings were recorded. Data were analyzed using descriptive statistics. **Results:** Most patients belonged to the 21–40-year age group (64%) with a mean age of 31.8 years. Males constituted 82.7% of cases. Two-wheeler accidents accounted for 91.3% of ocular injuries. Alcohol consumption before the accident was reported in 70% of patients. Among two-wheeler riders, 84.7% were not wearing helmets, while 55.6% of four-wheeler occupants were not using seat belts. Closed globe injuries constituted 97.3% of cases. Most injuries involved the eyelids and conjunctiva. Complications were uncommon, with 91.3% of patients showing no major complications. **Conclusion:** Young males riding two-wheelers represent the highest-risk group for ocular trauma in Bastar. Alcohol consumption and non-compliance with safety measures are major modifiable risk factors. Strict enforcement of road safety regulations and public awareness programs are essential to reduce ocular morbidity.

Keywords: Ocular trauma, road traffic accidents, risk factors, alcohol consumption, helmet use, Bastar, Chhattisgarh.

INTRODUCTION

Ocular injury is a major cause of preventable blindness & visual impairment in India. It is the cause of blindness in more than half a million people worldwide and it is often the leading cause of unilateral loss of vision, particularly in developing countries.[1] Serious mechanical eye injuries are not uncommon.[2] It was estimated that the incidence of blindness due to eye injuries was 9/1,00,000 people in developed countries and 75/1,00,000 in developing countries.[3] According to the data from the ophthalmic literature and WHO's Blindness Data Bank, about 55 million eye injuries occurred that restricted activities more than one day each year, and 7,50,000 cases required hospitalization each year, which included 2,00,000 open globe injuries; in addition, approximately 1.6 million blindness resulted from trauma, and there were 2.3 million people with bilateral low vision in these causes, and almost 19 million with unilateral blindness or low vision.[4] In India the major contributors of eye injury are RTA (34%), sports (29%) and occupations (21%).[5,6] The role of ocular injuries

due to head trauma in the causation of blindness and overall prognosis of patients has become a subject of immense importance with RTAs being the most common risk factor.[7] Head injuries are frequently associated with ophthalmic manifestations and consequent visual morbidity.[8] Out of which RTA account for considerable amount of cases.[9] The major risk factors for eye injuries include age, sex, socioeconomic status, lifestyle, and the site where the injuries occur, awareness about road safety norms.[10] The population increase results in increase in number of vehicles on the road leads to more RTA. Any type of injuries in RTA are mostly due to not following safety rules which include without helmet, without seat belt, with alcohol consumption and not obey driving rules. [11,12]

METHODOLOGY

A hospital-based descriptive observational study was conducted in the Department of Ophthalmology, Government Medical College and Maharani Hospital, Jagdalpur, Chhattisgarh, over a period of 18 months from January 2021 to June 2022.

Study Population

The study included 150 consecutive patients presenting with ocular injuries following road traffic accidents. Patients of all age groups and both sexes were enrolled after obtaining informed consent.

Data Collection

A detailed history was obtained regarding:

- Age and sex
- Type of vehicle involved
- Alcohol consumption before the accident
- Helmet use among two-wheeler riders
- Seat-belt use among four-wheeler occupants
- Time and mechanism of injury

All patients underwent comprehensive ophthalmic evaluation including:

- Visual acuity assessment
- Diffuse light examination
- Slit-lamp biomicroscopy
- Fundus examination
- Ancillary investigations whenever required

Ocular injuries were classified according to the Birmingham Eye Trauma Terminology (BETT) system into open globe and closed globe injuries.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using descriptive statistical methods. Results were expressed as frequencies, percentages, and proportions.

RESULTS

A total of 150 patients with ocular injuries due to road traffic accidents were included.

Table 1. Demographic Characteristics of Study Population

Variable	Frequency	Percentage (%)
Age 21–40 years	96	64.0
Other age groups	54	36.0

Variable	Frequency	Percentage (%)
Male	124	82.7
Female	26	17.3
Total	150	100

The majority of patients belonged to the economically productive age group of 21–40 years (64%). Males constituted 82.7% of all cases.

Table 2. Vehicle Involvement and Safety Measures

Table 2A

Variable	Frequency	Percentage (%)
Two-wheeler	137	91.3
Four-wheeler	9	6.0
Pedestrian	4	2.7

Table 2 B

Variable	Frequency	Percentage (%)
Alcohol Consumption	105	70.0
No Alcohol Consumption	45	30.0

Table 2 C

Variable	Frequency	Percentage (%)
Helmet Used (n=137)	21	15.3
Helmet Not Used (n=137)	116	84.7

Two-wheelers were involved in 91.3% of accidents. Alcohol consumption was reported by 70% of patients. Among two-wheeler riders, only 15.3% were wearing helmets.

Table 3. Nature of Ocular Injuries and Complications

Variable	Frequency	Percentage (%)
Closed Globe Injury	146	97.3
Open Globe Injury	4	2.7
Scar Formation	9	6.0
Corneal Opacity	3	2.0
No Complication	137	91.3

Closed globe injuries predominated (97.3%). Most patients recovered without major complications.

DISCUSSION

The present study evaluated the etiological profile and risk factors associated with ocular injuries due to RTAs in Bastar district. The findings demonstrate that young adult males are the most vulnerable population. Nearly two-thirds of patients belonged to the 21–40-year age group. Similar observations have been reported by Sujatha et al. (2021) ^[13] who documented maximum involvement among young adults. This age group is economically active, travels more frequently, and often engages in high-speed driving, increasing the risk of accidents. Male predominance (82.7%) observed in the study is comparable to findings reported by Jitendra Kumar et al., (2017) ^[14] (77.60%), Surbhi Gupta et al (2018) ^[15] (88%). The greater exposure of males to vehicular travel and occupational mobility may explain this trend. Two-wheeler accidents accounted for more than 90% of cases. This finding is particularly important because motorcycles are the most common mode of transportation in Bastar. Similar studies by Maurya RP et al., (2021) ^[16], Shilpi Dubey et al., (2019) ^[17] have reported two-wheelers as the predominant vehicle associated with ocular trauma. Alcohol consumption emerged as a major risk factor. Seventy percent of injured patients had consumed alcohol before the accident. Comparable observations were reported by RTA. Han et al., (2011) ^[18] emphasizing the strong association between alcohol use and ocular trauma. Alcohol impairs judgment, reduces reaction time, and increases the severity of accidents. A particularly alarming finding was the poor compliance with safety measures. Only 15.3% of two-wheeler riders were wearing helmets. Similarly, more than half of four-wheeler occupants were not using seat belts. The protective role of helmets in reducing head, facial, and ocular injuries is well established. Non-compliance with these safety measures significantly increases the risk of severe ocular trauma. Closed globe injuries constituted 97.3% of cases. This finding is consistent with most published literature where blunt trauma remains the predominant mechanism in RTAs. The low incidence of open globe injuries may reflect early medical attention and improved road safety awareness. The majority of patients did not develop significant complications. Scar formation and corneal opacity were the most commonly observed sequelae. Permanent visual loss was uncommon but remains a major concern because even a small number of severe injuries can result in lifelong disability. The findings highlight the urgent need for public health interventions targeting young two-wheeler riders, particularly in tribal and rural populations. Enforcement of helmet laws, strict measures against drunk driving, road safety education, and strengthening emergency ophthalmic services may substantially reduce ocular morbidity.

CONCLUSION

Ocular injuries due to road traffic accidents remain a significant cause of visual morbidity in Bastar district. Young males involved in two-wheeler accidents constitute the most vulnerable group. Alcohol consumption, non-use of helmets, and poor adherence to safety regulations were identified as major modifiable risk factors. Closed globe injuries were the predominant pattern of trauma. Strengthening road safety enforcement, promoting helmet use, reducing alcohol-impaired driving, and increasing public awareness are essential measures for preventing ocular trauma and preserving vision in this tribal region.

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