

Original Research Article

A clinical study on types of ocular injuries following road traffic accidents in a tertiary health care hospital in Chennai, Tamil Nadu

Melvin Frederick, Vinisha Kumaresan*, P. Anuradha

Department of Ophthalmology, Saveetha Medical College and Hospital, Chennai, Tamil Nadu, India

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*Correspondence:

Dr. Vinisha Kumaresan,

E-mail: vinisha3004@gmail.com

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ABSTRACT

Background: Ocular injuries are one of the major causes of preventable blindness, most common cause being road traffic accidents (RTA). More than 90% of eye injuries can be prevented by simple measures. The main aim of this study is to find out the type of ocular injuries following RTA, and to find out the association between the type of injury and the vehicle they rode during the RTA.

Methods: This cross-sectional study was conducted at Saveetha medical college and hospital, Chennai. It comprised of 160 patients who presented to the department of ophthalmology and emergency with ocular injuries following RTA. A detailed trauma history from the patient was taken and examination was done to assess the type, location, and the severity of the ocular injury. Analysis was done using SPSS software.

Results: Among the 160 patients, periorbital ecchymosis was the most common type of ocular injury (27.5%). Males were more affected (85%), 2-wheeler accidents being the most common one (85%), with most of the injuries with unilateral eye involvement (87.5%).

Conclusions: Most of the ocular injuries following RTA were injuries in and around the eyelid, which can be easily prevented by simple measures like wearing helmet, maintaining the speed limit and observation of traffic rules.

Keywords: Ocular injuries, Trauma, RTA, Vehicle, Helmets

INTRODUCTION

Ocular injuries are one of the major causes of preventable blindness in developing countries.¹ A study on mid face fractures revealed that RTA was the most common causative factor (64%). These fractures were complicated by blindness.² More than 55 million eye injuries occur worldwide every year, out of which 2.3 million people are affected bilaterally and 19 million people are affected unilaterally, this makes ocular trauma the leading cause of preventable unilateral blindness.^{1,2}

The eye occupies 0.1% of the total body surface area, but their injuries lead to loss of vision, which is an important sense.³ Strong bony orbital walls, eyelids covering the eyeball, eyeballs remaining in a cushion of fat, backward displacement of the eyeball in fractures are all protective mechanisms, still ocular injuries are common.¹ Incidence

of RTA is on rise, causing severe ocular morbidity. Decrease or loss of vision, either unilateral/ bilateral, can lead to economic burden to the victims and the society, due to time lost from work, delayed hospital stays, prolonged follow up and visual rehabilitation. Ocular trauma is associated with great deal of emotional stress.¹

Ocular injuries due to RTA may involve the eyelids, orbital wall, lacrimal apparatus, conjunctiva, cornea, sclera, extra-ocular muscles, vitreous haemorrhage, retinal detachment, and even ruptured globe. Previous studies on ocular trauma in RTA revealed that males are more affected than females. Trauma can occur at any age, but the incidence was higher in patients younger than 33 years. Head on collision was the most common mode of accident. Pieces of glass from the windshield or the frame of the spectacles caused perforating injury. Steering wheel and dashboard caused direct blunt trauma.⁴

More than 90% of eye injuries can be prevented by simple measures.³ The use of ocular protective devices in India is very low.¹ Preventive measures such as helmet, seat belt, clear road signs, and markings with fluorescent markings can be useful in darkness to prevent RTA.⁵ Epidemiology of ocular trauma has clearly been studied in developing countries but their data in developing countries are limited.³ This study was aimed at finding the types of ocular injuries following RTA.

METHODS

Study type

Study type was cross-sectional study.

Study place

Study conducted at the Saveetha medical college and hospital, Thandalam, Chennai.

Study period

The study conducted from February 2021 to August 2021.

Selection criteria

Ocular trauma cases following RTA, irrespective of the age group and gender, presenting to the ophthalmology OPD and emergency OPD of Saveetha medical college and hospital, Chennai were included in the study.

Ocular trauma due to any other aetiology and patients who were terminally ill, unconscious, and not co-operative was excluded from the study.

Sampling method

Convenience sampling method used for the study.

Sample size

The 160 patients were selected for the study.

Procedure

After obtaining informed consent from patients, detailed trauma history obtained from the patient and if necessary, from relatives. History of pre-existing medical conditions and ocular traumas were recorded. History taking and examination which included demographic variables, type of vehicle, mode of accident, presenting complaint after injury and what type of injury were documented. The data collected was tabulated and analysed using SPSS software.

Ethical approval

This study approved by ethics committee of Saveetha medical college and hospital. As this study was a cross-

sectional study, no participants' private data such as name, telephone no. and address involved. Only demographic information and types of ocular injuries in RTA patients who presented to department of ophthalmology and emergency were noted and analysed in the study.

RESULTS

Among the 160 cases 48.8% (n=78) of ocular injuries following RTA occurred in the age group 18-29 years, 51.2% (n=82) occurred in the age group 30-50 years (Table 1). Among the 160 cases, 85% (n=136) were males and 15% (n=24) were females. 87.5% (n=140) patients were involved in injuries of a single eye while 12.5% (n=20) had bilateral involvement (Table 2). On assessing the vehicle driven during the road traffic accident, 85% (n=136) patients had driven 2-wheeler, 11.3% (n=18) had driven 4-wheeler, 3.8% (n=6) had driven 3-wheeler (Table 3). Among the 160 patients, 27.5% (n=44) had periorbital ecchymosis, 25.6% (n=41) suffered from subconjunctival haemorrhage, 13.1% (n=21) from lid laceration, 12.5% (n=20) from orbital fracture, 5.6% (n=9) from corneal perforation, 5.0% (n=8) from hyphema, 3.8% (n=6) from corneal abrasion, 2.5% (n=4) from lens dislocation, 1.3% (n=2) from vitreous haemorrhage, and 1.3% (n=2) from intraocular foreign body (Table 4).

Table 1: Age group of patients with ocular injuries due to RTA.

| Age (Years) | Frequency | Percentage (%) |
|-------------|-----------|----------------|
| 18-29 | 78 | 48.8 |
| 30-50 | 82 | 51.2 |
| Total | 160 | 100 |

Table 2: Distribution of gender among patients with ocular injuries due to RTA.

| Gender | Frequency | Percentage (%) |
|--------|-----------|----------------|
| Male | 136 | 85 |
| Female | 24 | 15 |
| Total | 160 | 100 |

Table 3: Eye involvement in ocular injuries following RTA.

| Eye involvement | Frequency | Percentage (%) |
|-----------------|-----------|----------------|
| Unilateral | 140 | 87.5 |
| Bilateral | 20 | 12.5 |
| Total | 160 | 100 |

Table 4: Type of vehicle driven during the RTA.

| Type of vehicle | Frequency | Percentage (%) |
|-----------------|-----------|----------------|
| 2-wheeler | 136 | 85 |
| 3-wheeler | 6 | 3.8 |
| 4-wheeler | 18 | 11.3 |
| Total | 160 | 100 |

Association was established and the significance was found out by chi-square test. Among the 140 unilateral injuries, 87.85% (n=123) were males and 12.14% (n=17) were females. Among the 20 bilateral injuries 65% (n=13) were males and 35% (n=7) were females (Table 5). There was no association between the type of vehicle driven and the eye involvement. Out of the 140 unilateral injuries, 86.42% (n=121) were due to 2-wheeler, 2.85% (n=4) due to 3-wheeler, 10.71% (n=15) due to 4-wheeler. Out of the 20 bilateral injuries, 75% (n=15) were due to 2-wheeler, 10% (n=2) due to 3-wheeler, 15% (n=3) due to 4-wheeler (Table 8).

Table 5: Types of ocular injuries following RTA.

| Type of injury | N | Percentage (%) |
|-----------------------------|-----|----------------|
| Periorbital ecchymosis | 44 | 27.5 |
| Orbital fracture | 20 | 12.5 |
| Lid laceration | 21 | 13.1 |
| Subconjunctival haemorrhage | 41 | 25.6 |
| Corneal perforation | 9 | 5.6 |
| Corneal abrasion | 6 | 3.8 |
| Hyphema | 8 | 5 |
| Traumatic cataract | 3 | 1.9 |
| Lens dislocation | 4 | 2.5 |
| Vitreous hemorrhage | 2 | 1.3 |
| Intraocular foreign body | 2 | 1.3 |
| Total | 160 | 100 |

There is a common misconception that injuries occur more to males in RTA when compared to females, in this study there is no association between gender and type of injury. Among 136 males, periorbital ecchymosis was seen in 27.94% (n=38), orbital fracture in 11.76% (n=16), lid laceration in 11.76% (n=16), subconjunctival hemorrhage in 25% (n=34), corneal perforation in 6.61% (n=9), corneal abrasion in 3.67% (n=5), hyphema in 5.14% (n=7), traumatic cataract in 2.2% (n=3), lens dislocation in 2.9% (n=4), vitreous hemorrhage in 1.47% (n=2), intraocular

foreign body in 1.47% (n=2). Among the 24 females, periorbital ecchymosis was seen in 25% (n=6), orbital fractures in 16.66% (n=4), lid laceration in 20.83% (n=5), subconjunctival hemorrhage in 29.16% (n=7), corneal abrasion in 4.16% (n=1), hyphema in 4.16% (n=1) patients (Table 7).

There was no association between the type of injury and eye involvement as well. Among 140 unilateral eye injuries, periorbital ecchymosis was seen in 23.3%, orbital fractures in 11.42% (n=16), lid laceration in 13.57% (n=19), subconjunctival hemorrhage in 26.42% (n=37), corneal perforation in 6.42% (n=9), corneal abrasion in 4.28% (n=6), hyphema in 5.71% (n=8), traumatic cataract in 2.14% (n=3), lens dislocation in 2.14% (n=3), vitreous hemorrhage in 1.42% (n=2), intraocular foreign body in 1.42% (n=2). Among the 20 bilateral injuries, periorbital ecchymosis was seen in 45% (n=9), orbital fracture in 20% (n=4), lid laceration in 10% (n=2), subconjunctival hemorrhage in 20% (n=4), lens dislocation in 5% (n=1) patients (Table 9).

There was no association between the type of vehicle driven and the type of ocular injury. Among the 136 people who rode the 2-wheeler, periorbital ecchymosis was seen in 27.94% (n=38), Orbital fracture in 13.23% (n=18), lid laceration in 11.02% (n=15), subconjunctival hemorrhage in 25% (n=34), corneal perforation in 6.61% (n=9), corneal abrasion in 3.67% (n=5), hyphema in 5.14% (n=7), traumatic cataract in 2.2% (n=3), lens dislocation in 2.2% (n=3), vitreous hemorrhage in 1.47% (n=2), intraocular foreign body in 1.47% (n=2). Among the 6 patients who rode the 3-wheeler, orbital fracture was seen in 16.66%, lid laceration in 33.33% (n=2), subconjunctival hemorrhage in 16.66% (n=1), hyphema in 16.66% (n=1), lens dislocation in 16.66% (n=1) patients. Among the 18 people who drove the 4-wheeler, periorbital ecchymosis was seen in 33.33% (n=6), orbital fracture in 5.55% (n=1), lid laceration in 22.22% (n=4), subconjunctival hemorrhage in 33.33% (n=6), corneal abrasion in 5.55% (n=1) of patients (Table 10).

Table 6: Association between gender and eye involvement in ocular injuries following RTA.

| Eye involvement gender wise | Unilateral | Percentage (%) | Bilateral | Percentage (%) | Total (p= 0.007) | Percentage (%) |
|-----------------------------|------------|----------------|-----------|----------------|------------------|----------------|
| Male | 123 | 87.85 | 13 | 65 | 136 | 85 |
| Female | 17 | 12.14 | 7 | 25 | 24 | 15 |
| Total | 140 | 100 | 20 | 100 | 160 | 100 |

Table 7: Association between gender and type of ocular injury.

| Type of injury | Male | Percentage (%) | Female | Percentage (%) | Total (p=0.859) | Percentage (%) |
|----------------------------|------|----------------|--------|----------------|-----------------|----------------|
| Periorbital ecchymosis | 38 | 27.94 | 6 | 25 | 44 | 27.5 |
| Orbital fracture | 16 | 11.76 | 4 | 16.66 | 20 | 12.5 |
| Lid laceration | 16 | 11.76 | 5 | 20.83 | 21 | 13.12 |
| Subconjunctival hemorrhage | 34 | 25 | 7 | 29.16 | 41 | 25.62 |

Continued.

| Type of injury | Male | Percentage (%) | Female | Percentage (%) | Total (p=0.859) | Percentage (%) |
|--------------------------|------|----------------|--------|----------------|-----------------|----------------|
| Corneal perforation | 9 | 6.61 | 0 | 0 | 9 | 5.62 |
| Corneal abrasion | 5 | 3.67 | 1 | 4.16 | 6 | 3.75 |
| Hyphema | 7 | 5.14 | 1 | 4.16 | 8 | 5 |
| Traumatic cataract | 3 | 2.2 | 0 | 0 | 3 | 1.87 |
| Lens dislocation | 4 | 2.9 | 0 | 0 | 4 | 2.5 |
| Vitreous hemorrhage | 2 | 1.47 | 0 | 0 | 2 | 1.25 |
| Intraocular foreign body | 2 | 1.47 | 0 | 0 | 2 | 1.25 |
| Total | 136 | 100 | 24 | 100 | 160 | 100 |

Table 8: Association between the type of vehicle driven and eye involvement in ocular injuries following RTA.

| Type of vehicle | Unilateral | Percentage (%) | Bilateral | Percentage (%) | Total (p=0.230) | Percentage (%) |
|-----------------|------------|----------------|-----------|----------------|-----------------|----------------|
| 2-wheeler | 121 | 86.42 | 15 | 75 | 136 | 85 |
| 3-wheeler | 4 | 2.85 | 2 | 10 | 6 | 3.75 |
| 4-wheeler | 15 | 10.71 | 3 | 15 | 18 | 11.25 |
| Total | 140 | 100 | 20 | 100 | 160 | 100 |

Table 9: Association between the type of eye injury and the eye involvement.

| Type of injury | Unilateral | Percentage (%) | Bilateral | Percentage (%) | Total (p=0.543) | Percentage (%) |
|-----------------------------|------------|----------------|-----------|----------------|-----------------|----------------|
| Periorbital ecchymosis | 35 | 23.33 | 9 | 45 | 44 | 27.5 |
| Orbital fracture | 16 | 11.42 | 4 | 20 | 20 | 12.5 |
| Lid laceration | 19 | 13.57 | 2 | 10 | 21 | 13.12 |
| Subconjunctival haemorrhage | 37 | 26.42 | 4 | 20 | 41 | 25.62 |
| Corneal perforation | 9 | 6.42 | 0 | 0 | 9 | 5.62 |
| Corneal abrasion | 6 | 4.28 | 0 | 0 | 6 | 3.75 |
| Hyphema | 8 | 5.71 | 0 | 0 | 8 | 5 |
| Traumatic cataract | 3 | 2.14 | 0 | 0 | 3 | 1.87 |
| Lens dislocation | 3 | 2.14 | 1 | 5 | 4 | 2.5 |
| Vitreous haemorrhage | 2 | 1.42 | 0 | 0 | 2 | 1.25 |
| Intraocular foreign body | 2 | 1.42 | 0 | 0 | 2 | 1.25 |
| Total | 140 | 100 | 20 | 100 | 160 | 100 |

Table 10: Association between the type of vehicle driven and type of ocular injury.

| Type of injury | 2-wheeler | Percent (%) | 3-wheeler | Percent (%) | 4-wheeler | Percent (%) | Total (p=0.543) | Percent (%) |
|----------------------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------------|-------------|
| Periorbital ecchymosis | 38 | 27.94 | 0 | 0 | 6 | 33.33 | 44 | 27.5 |
| Orbital fracture | 18 | 13.23 | 1 | 16.66 | 1 | 5.55 | 20 | 12.5 |
| Lid laceration | 15 | 11.02 | 2 | 33.33 | 4 | 22.22 | 21 | 13.12 |
| Subconjunctival hemorrhage | 34 | 25 | 1 | 16.66 | 6 | 33.33 | 41 | 25.62 |
| Corneal perforation | 9 | 6.61 | 0 | 0 | 0 | 0 | 9 | 5.62 |
| Corneal abrasion | 5 | 3.67 | 0 | 0 | 1 | 5.55 | 6 | 3.75 |
| Hyphema | 7 | 5.14 | 1 | 16.66 | 0 | 0 | 8 | 5 |
| Traumatic cataract | 3 | 2.2 | 0 | 0 | 0 | 0 | 3 | 1.87 |
| Lens dislocation | 3 | 2.2 | 1 | 16.66 | 0 | 0 | 4 | 2.5 |
| Vitreous hemorrhage | 2 | 1.47 | 0 | 0 | 0 | 0 | 2 | 1.25 |
| Intraocular foreign body | 2 | 1.47 | 0 | 0 | 0 | 0 | 2 | 1.25 |
| Total | 136 | 100 | 6 | 100 | 18 | 100 | 160 | 100 |

DISCUSSION

This study on ocular injuries following RTA who presented to the department of ophthalmology and emergency demonstrates a wide spectrum of ocular injuries. The sample size was 160 and was selected based on convenience sampling. Like various previous researches, we found out that men are more susceptible to ocular injuries than women. This could be due to their lifestyle, occupation and being more active, community-dwelling, in comparison with women.⁶⁻¹⁰ In present study, patients in the age group 18-29 accounted for 48.8% of cases and in the study conducted by Sree et al patients less than 33 years accounted for 45.13%.¹ Most of the previous studies have shown that people belonging to the age group of 20-30 years have the highest prevalence of ocular injury.^{9,10} But in our study people in the age group of 30-50 had highest prevalence (51.2%) of ocular injury and also in the study conducted by Sree et al patients above 33 years accounted for 82%.¹ In the present study among the 160 cases, periorbital ecchymosis was seen in 27.5% of patients while in the study conducted by Sree et al periorbital ecchymosis was seen in 64.58% of patients.¹ In present study, orbital fractures were seen in 12.5% of patients while in the study conducted by Sree et al orbital fractures were seen in 22.22% of patients.¹ In the present study lid laceration was seen in 13.1% of cases while in the study conducted by Sree et al lid laceration was seen in 65.88% of cases.¹ In the present study, corneal abrasion was seen in 3.8% of patients while in the study conducted by Qayum et al corneal abrasion was seen in 17.3% of patients.² In the present study subconjunctival hemorrhage was seen in 25.6% of patients while in the study conducted by Sree et al subconjunctival hemorrhage was seen in 58.33% of patients.¹ In the present study corneal perforation was seen in 5.6% of cases while in the study conducted by Sree et al corneal perforation was seen in 4.86% of patients.¹ In the present study hyphema was seen in 5% of the cases while in the study conducted by Shtewi et al hyphema was seen in 50% of cases.⁴ In the present study traumatic cataract was seen in 1.9% of patients while in the study conducted by Shtewi et al occurred in 31.9% of cases.⁴ In the present study Lens dislocation was seen in 2.5% of cases while in the study conducted by Shtewi et al occurred in 7.6% of patients.⁴ In the present study vitreous hemorrhage was seen in 1.3% of cases while in the study conducted by Shtewi et al occurred in 23.6% of cases.⁴ In the present study Intraocular foreign body was seen in 1.3% of cases while in the study conducted by Sree et al it occurred in 0.69% of cases.¹

Chi square tests were done and there were no association between gender and the eye involvement, gender or the type of injury, eye involvement and the type of injury in this study. Periorbital ecchymosis was the most common type of ocular injury following RTA, males were more affected than females. Unilateral eye involvement was the most common presentation. Two-wheeler accidents caused the most ocular injuries in this study.

Limitations

This study has a small sample size. A larger patient population could not be evaluated due to lack of time.

CONCLUSION

Injuries to the globe were relatively common than the injuries in and around the lid. Injuries involving the lid resulted only in cosmetic disfigurement but there was poor visual prognosis when the globe is involved. Many of these injuries can be prevented by preventive measures like wearing helmets while riding 2-wheeler, avoiding driving when under the influence of alcohol or drugs. Safety precautions like maintaining the speed limit and observation of traffic rules must be followed. Eye protective goggles can also be worn.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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