

Ocular injuries in two-wheeler-associated road traffic accidents

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ABSTRACT

BACKGROUND: The objective of this study was to evaluate the role of helmets in providing protection against ocular trauma during road traffic accidents.

MATERIAL AND METHODS: We conducted a retrospective comparative observational study on ocular trauma due to road traffic accidents. We collected data from 100 patients. Patients in Group A had 50 cases of road traffic accidents while using helmets, and patients in Group B had 50 cases of road traffic accidents without helmets. The demographics, ocular parameters, type of injury, and severity of injury were compared between the two groups.

RESULTS: Among the 100 patients evaluated, 30% had subconjunctival haemorrhage (SCH), among which 90% were not using helmets. Similarly, 21% presented with ecchymosis; among them, 95% were riding without a helmet. 18% presented with a cut lacerated wound, all of whom were not using a helmet. There were 13% of patients with lid tears, and all did not use a helmet. 23% had abrasions: in this subgroup, 82.6% didn't use helmets ($p = 0.000$). 2% of patients suffered globe rupture, and neither wore a helmet.

CONCLUSION: Road traffic accidents, especially while riding a two-wheeler, are a significant and growing cause of blindness. Helmets and visors are paramount to avoid substantial visual loss in road traffic accidents.

KEY WORDS: helmet; road traffic accident; ocular injuries

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INTRODUCTION

Road traffic accidents have been reported to have high rates of mortality and morbidity. Two-wheeler accidents are a significant cause of ocular trauma. They are more prevalent in developing than developed countries [1].

Motorcycle crash victims tend to have a higher incidence of head injuries along with higher chances of ocular injuries [2].

Ocular trauma is known to cause significant ocular morbidity and blindness [3]. The incidence of ocular trauma is approximately 55 million cases per year across the globe [3]. Among the causes of ocular injuries are road traffic accidents. They are

one of the leading causes and are now becoming one of the top 10 public health problems [4].

Facial injuries are common in patients riding two-wheelers, especially those who do not wear helmets. According to our literature search, few studies have assessed ocular injuries in patients riding two-wheelers, comparing helmet users to non-users [5].

Road traffic accidents can present with various ocular injuries involving vital structures including but not limited to the eyelids, lacrimal canaliculi, orbit, conjunctival, cornea, sclera retina, and optic nerve [6]. Many patients presenting with ocular trauma tend to sustain injury to the ante-

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rior segment — these structures are exposed and thus more vulnerable to injury. This tends to impact not only the vision but also the cosmesis, which has a significant social and economic impact on the victim.

Motorcycle falls can have a devastating effect on the body in general and the eye in particular [7]. Using simple protective equipment such as helmets and visors can prevent many of these life and sight-threatening events.

Helmets help by absorbing a large amount of the impact force, thus reducing the effect on the head or the globe. Helmets have a thick plastic foam inside the hard outer shell, which helps cushion the blow [8].

Another important fact that needs to be emphasised is the use of visors along with helmets. Visors tend to protect the eye from penetrating injuries.

The importance of using protective equipment while riding has been repeatedly emphasised. There have been multiple incidences of sight-threatening and life-threatening injuries that have been reported. These reports date back to the 16th century, when King Henry II of France reportedly had an injury with a lance due to an improperly fitted visor. He had a foreign body in the eye, leading to orbital cellulitis [9].

Although extensive literature is available regarding the advantages of using helmets to prevent life-threatening injuries, there is little data available regarding the advantages of helmet use in preventing ocular injuries.

In this study, we study the types of ocular injuries following a road traffic accident and compare the severity of the injuries among patients using helmets and those without.

MATERIALS AND METHODS

A retrospective study was conducted on all patients with road traffic accident (RTA) who had attended the ophthalmology department of a tertiary care centre in south India for over 1 year. The inclusion and exclusion criteria for the study were as follows:

Inclusion criteria:

- patients In the age group between 18–60 years;
- history of ocular injury sustained following a road traffic accident while riding a 2-wheeler.

Exclusion criteria:

- trauma due to causes other than RTA;

- RTA while riding any vehicle apart from a two-wheeler.

One hundred patients were included in the study. The cases were divided into groups based on the history of the usage of helmets. Each group had 50 consecutive. A detailed history regarding the mechanism, time, and type of injury was noted. History of helmet usage and consumption of intoxicating substances was also enquired about. Each patient underwent a detailed ophthalmic evaluation, including visual acuity evaluation, anterior segment evaluation, and dilated fundus evaluation whenever possible. Since the data was extracted from the medical records, and many of the patients were also admitted with other injuries, fundus evaluation was not possible. Hence, it was not included in the statistical analysis. Patients also underwent various radiological investigations as and when necessary.

Statistical analysis was done using SPSS v. 20. Descriptive statistics were analysed in absolute and relative frequency and mean and standard deviation.

The inferential statistics used were the independent t-test, paired t-test, and chi-square test with a 95% confidence interval. The Fischer exact test was used for categorical variables.

RESULTS

The male-to-female ratio of the 100 patients was comparable. Drivers constituted 84% of the patients, while pillion riders constituted 16% of the patients. Seventy-eight percent of the patients were males, while 22% of the patients were females. 50% of the males wore a helmet, while 54.5% of the females wore a helmet. However, this was not statistically significant.

As seen in Table 1, a patient's propensity to get any injury around the eye or involving the eye increases when a helmet is not used. Globe ruptures were seen in two patients who did not use a helmet, though this was not statistically significant. Abrasions around the eye and subconjunctival haemorrhages were also seen in those who did not use a helmet.

28.6% of the patients who did not wear a helmet had a vision of less than counting fingers (CF) 3 m ($p = 0.001$).

Whether the patient was the driver or the pillion rider, the proportion of various traumas was not statistically significant.

Injury	Percentage among helmet users (%)	Percentage among non-users (%)	p-value
SCH	3.9	22.4	0.006
Cut lacerated wound	0	36.7	0.000
Lid tear	0	26.5	0.000
Chemosis	0	28.6	0.000
Abrasions	7.8	38.8	0.000
Traumatic mydriasis	0	6.1	0.073
Globe rupture	0	4.1	0.145

SCH — sub conjunctival haemorrhage

Best corrected visual acuity	> 6/60	> cf2m	> PL +ve	PI -ve
Helmet user	100%	0	0	0
Non user	71.4%	14.3%	10.1%	4.1%

DISCUSSION

Two-wheelers are an economical mode of transport and are extremely popular in developing countries like India [10].

Due to a lack of lane segregation for bicycle riders, two-wheelers, and four-wheelers, there tend to be more road traffic accidents. This also makes 2-wheelers more prone to accidents.

The average age of patients was 34 ± 6 years, which mainly includes the working-class population. Such statistics further highlight the importance of avoiding such events, as these working-class populations are primarily responsible for the country's overall development. Strict rules imposed by the government for the usage of helmets are an important step towards protecting the same working-class population.

A report in 2008 by the National Crime Bureau found that 123,552 deaths had occurred due to 2-wheeler accidents [11].

In our study, we found that males were more commonly affected during road traffic accidents than women. Similar results were obtained by Kamath et al. in 2007 [12]. This could be due to the increased usage of vehicles amongst men as compared to women.

A study conducted by the National Trauma Databank found that helmets significantly reduced the risk of hospital mortality and morbidity following a two-wheeler accident. Our study found similar results wherein ocular morbidity frequency was significantly higher in patients riding a 2-wheeler without a helmet [13].

Amit Gupta et al.'s study found that head and facial injuries occurred more frequently in riders not using helmets. This emphasizes our findings that ocular injuries were more common in riders not using helmets [14]. In our literature search, no articles describing ocular injuries in this setting were found. However, sports and warfare were.

Among the patients wearing helmets, some patients suffered from severe injuries despite wearing a helmet. An important reason for this is the quality and type of helmets used and whether visors were used. Zamani-Alavijeh et al., in their study, found a similar result wherein not only using helmets but also properly strapping the helmets and using visors proved to be more effective in protecting against severe injuries [15].

A recent case report from a tertiary care center in South India reported a case of a large intraocular foreign body measuring around 14mm on the medial aspect of the eye. This patient also did not use a helmet [16].

A Bangalore Road Safety and Injury and Prevention Programme study found that < 10% of pillion riders tend to use helmets [17].

Our study analysed the importance of using helmets among drivers and shows that it is equally important for pillion riders to use helmets. This was demonstrated in a study conducted by Siddiqui et al., where 66.7% of unhelmeted pillion riders suffered from severe head and neck injuries [18].

As suggested by the government of India and the state governments, a Bureau of Indian

Standards (BIS) certified helmet should be used to prevent injuries. As is seen in our sample, minor ocular injuries occurred even in patients who used a helmet.

CONCLUSION

Helmets are an essential tool for protecting riders from ocular trauma. We would also like to emphasize the importance of helmets for both the driver and the pillion rider. It is also important to make sure that helmets and visors are strapped in properly. Like the government is already doing, further stricter rules need to be put in place, not only on the road but also in workplaces and sports arenas.

Conflicts of interest

Authors declare no conflicts of interest.

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