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Original Research Article

Epidemiological and Clinical Profile of Ocular Trauma in a Tertiary Care Hospital of Gujarat, India

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Conflict of interest: Nil

Abstract

Introduction: Raising awareness about potential risk factors can play a significant role in preventing ocular injuries. This study aims to evaluate the epidemiological profile of ocular injuries and visual prognosis among patients admitted to a tertiary care hospital of Gujarat.

Materials & Methods: This hospital-based prospective observational study was conducted in tertiary care hospital, Gujarat over period of two years. Patients with ocular injuries attending the Casualty and the Ophthalmology department were included in the study. Details such as demographic profile, time, nature and cause of injury, visual acuity, and ocular findings were noted. A comprehensive ophthalmic examination was performed.

Results: The mean age of the patients was 31.23 ± 10.65 years. Half of the patients (53.7%) had poly trauma. Only 17.5% of patients reported to the hospital within the first hour. The most common types of injuries observed were lid laceration (66.3%). The majority of patients had a history of road traffic accidents (35.0%) followed by sports-related injuries (20.0%) and occupational injuries (17.5%). Approximately 96.3% of patients underwent primary repair, while only 3.7% underwent evisceration. Initially, about 70.0% of patients experienced blindness, but after 6 weeks of treatment, this decreased to 53.2 %.

Conclusion: Our study highlights that young adult males are more susceptible to ocular injuries, with road traffic accidents and sports injuries being the main causes. It is crucial to implement stricter safety protocols in the workplace and increasing awareness about traffic rules.

Keywords: Occupational injuries, Ocular injury, Prevention, Road traffic accidents, Visual acuity.

Introduction

Ocular trauma, a significant concern in the field of ophthalmology, accounts for 10-15% of ophthalmological conditions and is a leading cause of visual morbidity and blindness. [1,2] Globally, ocular trauma has resulted in 1.6 million cases of blindness, 2.3 million cases of bilateral visual impairment, and 19 million cases of unilateral vision loss. [3,4] In India, the reported incidence of ocular trauma ranges from 1% to 5%. [5,6] While ocular trauma leads to approximately 5% of ophthalmic hospitalizations in developed countries, the figure is higher in developing countries. [7]

Trauma can cause a range of ocular injuries, varying in severity from superficial conditions like subconjunctival hemorrhage to more serious ones such as globe rupture or retinal detachment. Globe injuries are classified as either open or closed. The delicate nature of ocular tissues makes eye injuries particularly impactful, often resulting in permanent blindness. [8]

It's worth highlighting that about 90% of ocular injuries are preventable [4]. Factors like climate, geography, population, lifestyle, culture, and socioeconomic conditions can influence the nature and cause of trauma. [9,10] Ocular injuries not only affect patients' quality of life but also bring about physical, socioeconomic, and psychological stress, often necessitating frequent hospital visits. [11]

The causes of ocular trauma can differ significantly worldwide and even within the same country,

influenced by factors such as occupations, traffic, and environmental conditions.[11] Raising awareness and implementing preventive measures are crucial to mitigate the financial costs and burden on healthcare systems associated with ocular trauma. Increasing public awareness about potential risk factors and agents can play a significant role in preventing many injuries. [12,13] Based on this background, we conducted a study to evaluate the epidemiological profile of ocular injuries among patients admitted to a tertiary care hospital of Gujarat.

Materials & Methods

This hospital-based prospective observational study was conducted in Ophthalmology, Community Medicine and Emergency department of tertiary care hospital, Gujarat from January 2021 to December 2022 after getting approval from institutional ethics committee.

Inclusion Criteria

We included patients with ocular injuries, aged between 1-80 years, who reported to the emergency and ophthalmology department in our study.

Exclusion Criteria

- Patients with old ocular trauma (>1 month),
- surgically treated elsewhere
- those having preexisting vision-threatening ocular diseases like glaucoma, age-related macular degeneration, etc.,
- injury in blind or atrophic eye
- who denied for consent.

Methods

Data was collected in predesigned proforma after obtaining informed consent from each study participant. All study subjects underwent detailed history and ocular & systemic examination. A detailed history regarding demographic information, date, time, place, nature, circumstances and mode of injury, characteristics of traumatic agent and condition of the victim at the time of injury and use of protective measures were noted.

We collected data using a pre-designed form after obtaining informed consent from each study participant. All study subjects underwent a detailed history and ocular & systemic examination. We recorded socio demographic information, date, time, place, nature, circumstances, and mode of injury, as well as details about the traumatic agent and the condition of the victim at the time of injury. We also noted whether protective measures were used at the time of injury

All patients underwent a comprehensive ocular examination, including assessments of visual acuity, diffuse torch light, slit lamp examination, intraocular pressure measurement, and direct and or indirect ophthalmoscopy. We also utilized additional investigations like OCT, X-ray orbit, ultrasonography (USG B Scan), computed tomography (CT) scan, and Magnetic resonance investigation (MRI) when necessary. The patients were followed up at one week, three weeks, and six weeks to evaluate the outcome of their treatment.

Statistical Analysis: The collected data was entered and analysed using Microsoft Excel 2016. Continuous data such as age and time of presentation wetre presented with mean and standard deviation. Categorical data including gender, aetiology, characteristics of injury etc. were presented with frequency and percentage. Results were graphically represented where deemed necessary. Comparison of categorical data was done using Chi square test and p value less than 0.05 was considered as a significant.

Results

Total 80 patients with ocular trauma were reported in our institute. Mean age was 31.23 ± 10.65 years. The majority of the patients were belonged to 21 to 30 year (26, 32.5%) and 31 to 40 year (24, 30.0%). Out of 80 patients, 62 (77.5%) were males with 3.45: 1 male: female ratio (Table 1).

Table 1: Age and gender wise distribution of patients (n-80)

Age	No of cases	Percentage (%)
01 to 10	2	2.5
11 to 20	7	8.7
21 to 30	26	32.5
31 to 40	24	30.0
41 to 50	13	16.2
51 to 60	6	7.5
>60	2	2.5
Mean ± SD	31.23 ± 10.65	
Gender		
Male	62	77.5
Female	18	22.5
Male : Female ratio	3.45: 1	

Among 80 patients, 37 patients (46.3%) had isolated ocular injury and 43 patients (53.7%) had poly trauma. Of these 43 patients, 22 patients had head injury, 14 patients had oculofacial injury, 7 patients had maxillofacial injury. Left eye was involved in 46 patients (57.5%). Total 14 patients (17.5%) reported to hospital within 1 hour, 30 patients (37.5%) reported in 1 to 24 hours, 18 patients (22.5%) reported between 1 to 2 days. Thirty one patients (38.8%) presented with open globe injury and 49 patients (61.2%) presented with closed globe injury. Out of 31 open globe injury, 14 patients (45.2%), 6 patients (19.4%) and 11 patients (35.5%) had zone 1, zone 2 and zone 3 ocular injuries as per the BETTS classification (Table 2).

Table 2: Characteristics of Ocular trauma (n-80)

Characteristics	No of cases	Percentage (%)
Involvement of other part		
Isolated	37	46.3
Poly trauma	43	53.7
Eye involvement		
Left	46	57.5
Right	34	42.5
Time of presentation (hour)		
< 1	14	17.5
1 to 24	30	37.5
24 to 48	18	22.5
48 to 96	12	15
> 96	6	7.5
Type of injury		
Closed globe	49	61.2%
Open globe	31	38.8%
– Zone 1	14	45.2
– Zone 2	6	19.4
– Zone 3	11	35.5

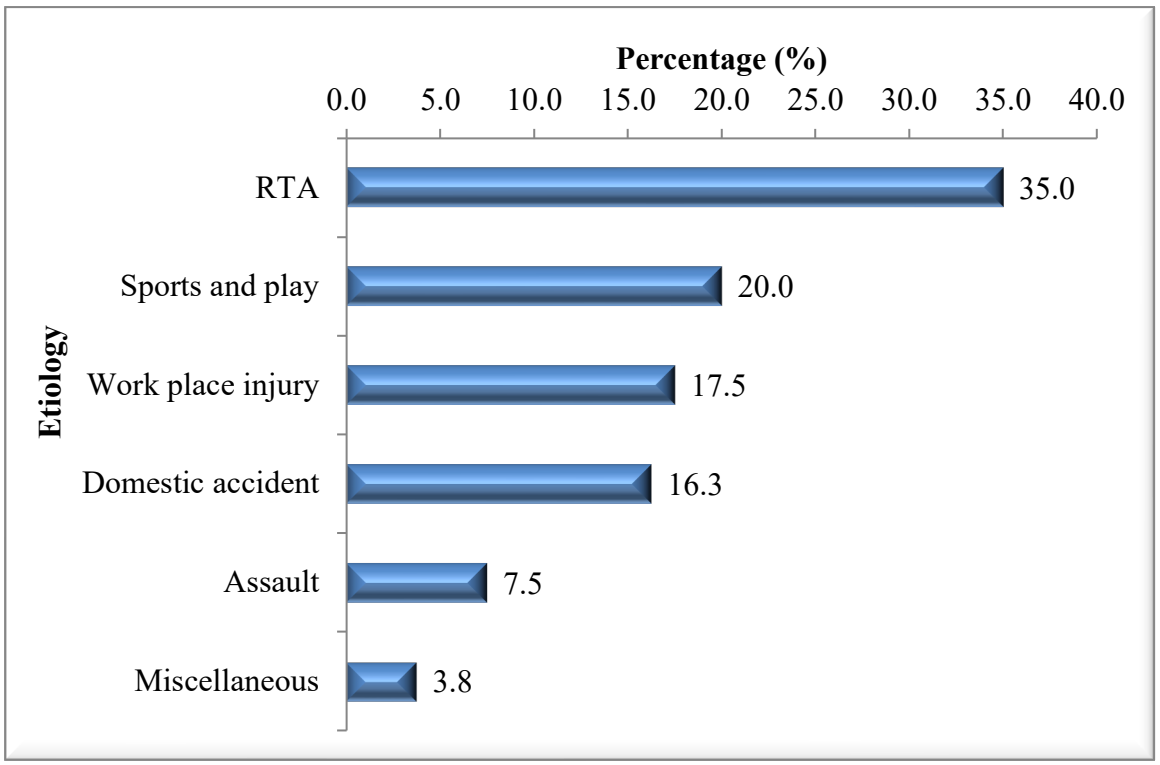

Figure 1: Etiology of ocular trauma (n-80)

Road traffic accidents (28, 35.0%) was most common cause of injury followed by sports (16, 20.0%), occupational injuries (14, 17.5%), domestic accidents (13, 16.3%), and assault (6, 7.5%). Out of 14 occupational injuries, 6 injuries were related to agriculture work, 4 injuries were related to steel

industry, 2 injuries were related to carpentry and 2 injuries were related to construction worker (Figure 1).

Adnexal injury accounted in 66 patients (82.5%). Lid laceration was observed in 53 patients (66.3%), vitreous loss in 26 patients (32,5%), facial trauma in 19 patients (23,8%) and lid abrasion in 18 patients (22.5%) (Table 3).

Table 3: Distribution of patients according clinical variable (n-80)*

Clinical variables	No of cases	Percentage (%)
Lid laceration	53	66.3
Vitreous loss	26	32.5
Associated facial trauma	19	23.8
Lid abrasion	18	22.5
Subconjunctival haemorrhage	14	17.5
Iris injury	11	13.8
Hyphema	10	12.5
Retinal detachment	6	7.5
Corneal abrasion	5	6.3
Vitreous haemorrhage	4	5.0
Traumatic cataract	3	3.8

***Multiple clinical variables in one patient**

Out of 80 patients, 77 patients (96.3%) underwent primary repair were performed in 77 patients (96.3%). Evisceration was required in 3 patients (3.8%). Main interventions performed in were lid suturing (52, 66.3%), foreign body removal (6, 7.5%) and corneal tear repair (9, 11.3%) (Figure 2).

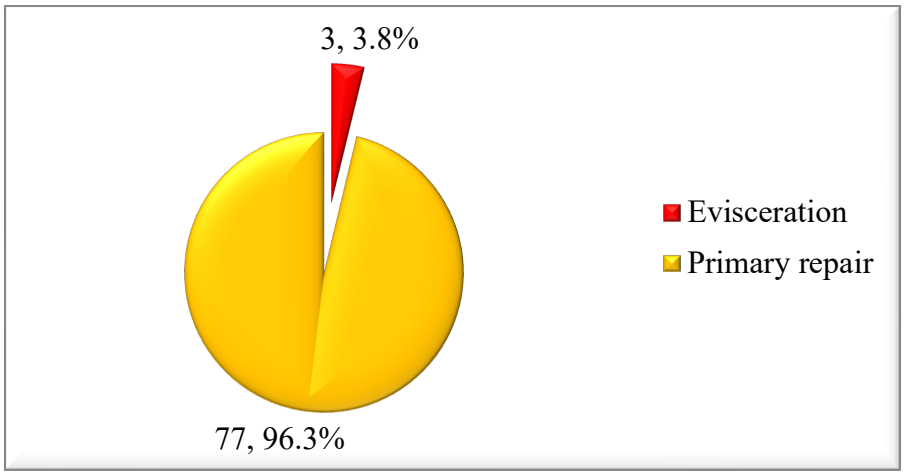

Figure 2: Distribution of patients according to surgical repair (n-80)

At time of presentation, we found that good vision in 10 patients (12.5%), and visual impairment (6/18 to 6/60) in 14 patients (17.5%) and blindness (< 6/60) in 56 patients (70.0%). At 6 week improvement was observed with 17 patients (21.3%) having good vision, 20 patients (25.0%) with visual impairment and 43 patients (53.7%) with blindness (Table 4).

Table 4: Comparison of visual acuity between at presentation and at 6 week (n-80)

Visual acuity	at presentation	at 6 week	X^2 value, p value
>6/12	10 (12.5%)	17 (21.3%)	X^2 value = 4.70, p value = 0.31
6/18 to 6/60	14 (17.5%)	20 (25.0%)	
6/60 to CF	33 (41.3%)	26 (32.5%)	
HM to PL	18 (22.5%)	14 (17.5%)	
NPL	5 (6.3%)	3 (3.8%)	

Discussion

In our study, we found that the majority of ocular trauma patients were in the young age group, with 32.5% being between 21-30 years and 30.0% between 31-40 years. The mean age of the patients was 31.23 ± 10.65 years. Interestingly, Wagh V et al. [8] reported a similar finding with a mean age of 32.28 ± 16.71 years, and the highest prevalence of

ocular injuries was also observed in the age group of 31-40 years, accounting for 28.3% of the cases. Additionally, Poy Raiturcar et al. [14] conducted a study among 500 patients and found that the highest prevalence of ocular injuries was in the age group of 21-40 *years, with a prevalence rate of 45%.

In our study, we discovered that a significant majority of the patients were male, accounting for 77.5% of the cases. This finding aligns with previous studies by Wagh V et al. [8] (88.3%), Maurya R et al. [4] (72.9%), and Agrawal et al. [15] (84.8%), which also reported higher proportions of males in their patient cohorts. The higher male representation may be attributed to their involvement in outdoor activities, adventurous games, and occupations that involve physical labour. Additionally, factors like violence and rash driving may contribute to the increased incidence of ocular injuries among males. [4]

In our study, we found that more than half of the patients (53.7%) had poly trauma, with head injury being the most common associated injury. Interestingly, in the study by Maurya R et al.[4], a similar proportion of patients (approximately 55.5%) had poly trauma. Additionally, Wagh V et al.[8] reported left eye involvement in 55% of their cases, which is consistent with our findings where the left eye was involved in 57.5% of our patients. It's worth noting that Misra et al. [13] and Maiya et al. [16] observed equal involvement of the right and left eyes. Furthermore, Maurya R et al. [4] also reported a higher prevalence of polytrauma, with head and neck injury being the most frequent associated injury (52.7%).

In our study, we found that 38.8% of the patients had open globe injuries, while 61.2% presented with closed globe injuries. Out of the 31 open globe injuries, 45.2% were in zone 1, 19.4% in zone 2, and 35.5% in zone 3. Similarly, in the study by Wagh V et al. [8], 80.0% of the patients had closed globe injuries, while 20.0% had open globe injuries. Shukla et al. [17] reported that 66.7% had closed globe injuries, and 26.7% had open globe injuries. Kaur A et al. [18]'s study revealed that 78.94% had open globe injuries. Kothari A et al. [11] also reported 45.0% Zone‑I, 18.0% Zone II and 37.0% Zone III ocular injury.

Our study found that only 17.5% of patients reported to the hospital within the first hour, 37.5% patients reported in 1 to 24 hours, and 22.5% patients reported between 1 to 2 days. These findings align with previous studies by Maurya R et al. [4] and Mahapatro S et al. [19] Maurya R et al. [4] observed that 24.4% of cases had treatment within 1 hour, 60.7% within 1 to 24 hours, and 14.4% after 24 hours. Mahapatro S et al. [19] reported that 50.0% of patients reported within 24 hours. This finding further emphasizes the importance of early reporting and timely treatment in effectively managing injuries

In the present study, we found that adnexal injuries accounted for 82.5% of the total injuries. The most common types of injuries observed were lid laceration (66.3%), vitreous loss (32.5%), facial trauma (23.8%), and lid abrasion (22.5%). These findings are consistent with previous studies by Wagh V et al. [8], who reported a 71.7% prevalence of adnexal injuries, with lid laceration observed in 71.0% of patients and corneal penetration in 20% of patients. Laishram et al. [20] found that 46.15% of cases had adnexal injuries, followed by 31.92% with contusion injuries, and globe rupture being the least common. Muralidhar et al. [21] reported that subconjunctival hemorrhage (70.0%) and ecchymosis (50.0%) were the most common types of injuries in their study.

In the present study, we observed that the majority of patients had a history of road traffic accidents (RTA) accounting for 35.0% of cases. Sports-related injuries accounted for 20.0%, followed by occupational injuries (17.5%), domestic accidents (16.3%), and assault (7.5%). Occupational injuries were commonly associated with agriculture, the steel industry, carpentry, and construction. To prevent these injuries, it is crucial to implement primary preventive strategies such as promoting safe driving practices, enforcing traffic regulations, adhering to speed limits, using seatbelts and helmets for head protection, and avoiding alcohol consumption. These measures can significantly reduce the occurrence of RTAs and subsequent ocular morbidity. [8]

In the study by Wagh V et al. [8], the majority of patients presented with a history of falls (56.7%), followed by trauma due to wooden stick/piece and iron particles (6.7% each), stone (5%), and glass particles and hand pumps (3.3%). Maurya R et al. [4] found that non-occupational injuries were the most common (82.3%), with recreational or sports-related injuries being the most prevalent (23.9%), followed by road traffic accidents (23.6%), assault-related injuries (17.2%), and domestic accidents (15.2%). In the study by Kothari A et al.[11], the most common mode of ocular injury was occupational (40.0%), followed by road traffic accidents (35.0%) and domestic accidents (23.0%).

In our study, we found that approximately 96.3% of patients underwent primary repair, while only 3.7% underwent evisceration. This is consistent with the findings of Kothari A et al. [11], where the majority of patients (95%) also underwent primary repair, with a small percentage (5%) undergoing evisceration.

In our study, we observed that initially, 70.0% of patients experienced blindness, but after 6 weeks of treatment, this decreased to 53.2 %. Wagh V et al.

[8] study reported a lower initial blindness rate of 23.2%, which further decreased to 10.0% after treatment at 6 weeks. Additionally, Mahapatro S et al. [19] reported a high rate of 79.4% blindness at the time of presentation.

Conclusion

Our study highlights that young adult males are more susceptible to ocular injuries, with road traffic accidents, sports injuries, and occupational injuries being the main causes. To address this, it is crucial to implement stricter safety protocols in the workplace and educate workers about safety measures. Additionally, increasing awareness about traffic rules can help reduce road traffic accidents. It is also important to emphasize the importance of seeking immediate treatment following injuries.

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