
ORIGINAL ARTICLE

**A Prospective Study of Clinical Profile and Morbidity of Ocular Trauma
in a Tertiary Care Hospital**

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Abstract:

Introduction:

Ocular trauma is one of the major causes of preventable monocular blindness and visual impairment throughout the world. Common causes of ocular injuries include: chemical burns, heat, radiation, cut, scratch or blow to the eye. Around 90% of ocular injuries are preventable, so this study was conceptualized to study the pattern and epidemiology of ocular injuries in order to generate evidence for managing these injuries more effectively.

Materials and Methods:

This prospective, longitudinal study was carried out in 520 patients with ocular trauma. Ocular injuries were classified according to The Birmingham Eye Trauma Terminology (BETT) system. Final visual outcome was assessed at the end of 6 months. Data was analyzed using SPSS version 27 with McNemar test.

Results:

The 5-20 year olds had the highest overall rates of injury (45.96%), with a male to female ratio of 2:1. Most of the injuries occurred while doing agricultural or domestic work (31.9%). Wooden objects were most commonly involved in causing ocular injury (20.19%). Majority (54.4%) patients reached the hospital within 24 hours of injury. Cornea was the most commonly affected (54%) ocular structure. Closed globe injuries occurred in 90.38% cases and most of the patients had good visual acuity at presentation and at the end of six months.

Conclusion:

Ocular trauma can be prevented by creating public awareness regarding use of safety measures. The visual outcome depends on the site, size, type and extent of ocular damage, the period between the time of injury and initiation of treatment.

Key Words: Corneal injuries, eye injuries, hyphema, visual acuity.

Introduction:

Ocular trauma is a major cause of preventable monocular blindness and visual impairment throughout the world.¹ The World Health Organization (WHO) has estimated that 55 million ocular injuries occur each year, out of which 750000 people require hospitalization.² The prevalence of ocular trauma has been estimated to be around 2.4% in India.³ Of all the blindness cases, 1.2% are contributed by injuries.⁴ Children are commonly affected by trauma. Ocular injuries account for approximately 8%–14% of total injuries in children.⁵ The most common causes of ocular injury are chemical burns, heat, radiation, cut, scratch and impact to the eye. Impact of trauma on human eye ranges from minute subconjunctival haemorrhage to globe rupture. However, 90% of ocular injuries are preventable⁶ and epidemiological data is needed to formulate prevention strategies. Thus this study was conceptualized to study the pattern and epidemiology of ocular injuries in order to generate evidence for managing these injuries more effectively.

Methods:

This prospective, longitudinal study was carried out from October 2017 to March 2019 in a tertiary care teaching hospital in North India after obtaining ethical clearance from Institutional Ethics Committee.

This study included 520 patients with ocular trauma presenting to emergency and out-patient clinics of the hospital. Patients who fulfilled the following criteria were included in the study and a written informed consent was taken from all the study participants after explaining the purpose of the study.

Inclusion criteria:

Patients of all ages and either sex presenting with ocular trauma.

Exclusion criteria:

Patients with severe head injury and reduced level of consciousness, old ocular trauma (>1 month), surgically treated elsewhere, Injury in blind or atrophic eye, preexisting vision-threatening ocular diseases like glaucoma, age-related macular degeneration, etc and who did not give consent were excluded from the study.

Information on age, gender, residential area, occupation, per capita family income, and education level of patients was taken. Specific history of trauma including date, time, place, circumstances of injury (occupational or non-occupational), type of trauma (blunt or sharp), characteristic of traumatic agent and mode of injury was also taken. Visual acuity was recorded with Snellen vision chart and intraocular pressure (IOP) was recorded with non-contact tonometer. Detailed slit lamp examination of anterior segment was performed. Fundus examination was performed with 90D slit lamp biomicroscopy and indirect ophthalmoscopy. Radiological investigations like X-Ray, Computed Tomography (CT) scan, ultrasound B-scan, Magnetic resonance imaging (MRI) were also done, as and when required. Ocular injuries were classified according to The Birmingham

Eye Trauma Terminology (BETT) system.⁷ Ocular trauma score was assigned to each patient, to assess the final visual outcome.⁸

All the patients were followed up at regular intervals, after two days, one week, two weeks, one month, 3 months and 6 months. Final visual outcome was assessed at the end of 6 months. All the data was entered in Microsoft excel and was presented as proportions and percentage. Data was analyzed by IBM SPSS version 27 using McNemar test. p value <0.05 was considered statistically significant. All p values used were two-tailed.

Results:

The age and gender distribution in our study is shown in table 1. The male to female ratio was 2:1. Children (<20 years) were affected most commonly (45.96%).

As evident from table 2, most of the injuries (31.9%) occurred while doing agricultural work and household work like cutting of wood, harvesting crops and while handling pets (goat, cow).

Laterality distribution of ocular injuries is shown in figure 1. Bilateral involvement was seen in road traffic accidents, fire cracker injuries and in chemical injuries. The causative agent and type of injuries are depicted in table 3.

Most of the patients who presented late to the hospital belonged to far-flung areas and most of patients residing in the city presented within 24 hours of injury. (Table 4)

Out of 50 cases of open globe injury, 30 patients had clear corneal perforation, 8 cases had corneal scleral (zone I and zone II) involvement, 7 cases had zone II and 5 cases had zone III involvement. Structure of the eye involved in ocular injuries is shown in table 5. Sixty two cases of lid injury had lid lacerations. Conjunctival involvement was seen in the form of conjunctival tear, subconjunctival haemorrhage, chemosis and superficial foreign body. Injury to the lens resulted in traumatic cataract in 40 (7.7%) patients,

expulsion of lens from eye in six and phacodonesis in four patients.

All the patients with open globe injury and 15 cases of closed globe injury with traumatic cataract were managed surgically with aspiration of lens matter and intraocular lens placement and one patient of closed globe injury with persistent raised intraocular pressure (IOP) underwent trabeculectomy.

Patients with lid tear, conjunctival tear were repaired surgically and patients with periorbital edema, foreign body, undisplaced orbital wall fractures, subconjunctival hemorrhage, hyphema, uveitis, raised IOP were managed conservatively. Visual acuity of the patients assessed at the time of reporting and at subsequent completion of follow up is shown in table 6.

Table No.1 : Age and gender distribution of patients

Age	Males	Females	Total
5-20yrs	187	52	239 (45.96%)
21-40yrs	113	63	176 (33.84%)
40-60yrs	36	51	87 (16.73%)
>60yrs	11	7	18 (3.46%)
Total	347 (66.73%)	173 (33.26%)	520 (100%)

Table No.2 : Circumstance of injuries in patients

Circumstance of injury	Number of patients (n)	Percentage
Domestic/agricultural work	166	31.9%
Industrial work	119	22.8%
Road traffic accident	93	17.88%
Sports (play) related	79	15.19%
School activities/others	63	12.11%

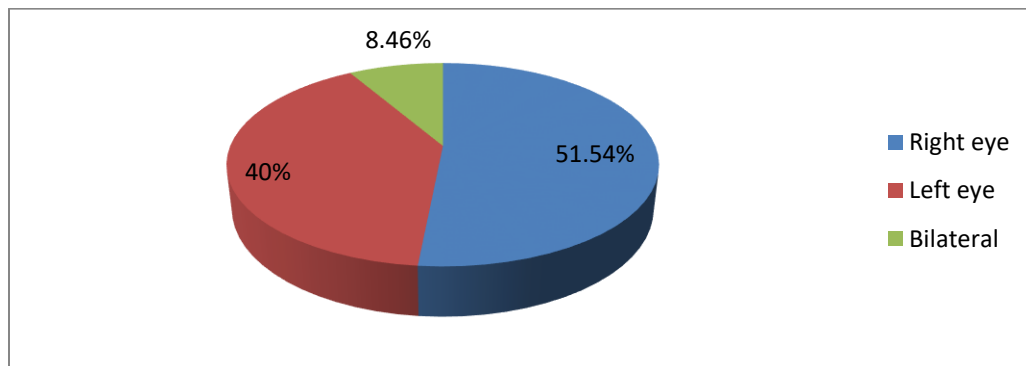


Figure 1: Laterality distribution of injuries

Table No.3: Causative agent and type of injuries

Causative agent	Open globe injury	Closed globe injury	Total
Wooden particles	33	72	105 (20.19%)
Foreign bodies	1	113	114 (21.92%)
Vegetative matter		13	13 (2.5%)
Metallic objects (metallic, rods, wire)	7	22	29 (5.57%)
Road traffic accidents	5	88	93 (17.88%)
Chemical injury	-	36	36 (6.92%)
Bow arrow	3	-	3 (0.57%)
Fall from height	-	20	20 (3.84%)
Injuries caused by animals	1	5	6 (1.15%)
Burns	-	6	6 (1.15%)
Cricket ball/gullidanda	-	22	22 (4.23%)
Fire crackers	-	20	20 (3.84%)
Stones	-	12	12 (2.30%)
Welding exposure	-	14	14 (2.69%)
Finger nail trauma/fist	-	17	17 (3.27%)
Sharp objects (scissors, pencils)	-	10	10 (1.92%)
Total cases	50(9.61%)	470(90.38%)	520 (100%)

Table No. 4: Time of presentation to hospital after injury.

Time of presentation	Number of cases (%)
<24 hrs	283 (54.4%)
1 – 3 days	160 (30.7%)
4 - 7 days	68 (13.07%)
>7 days	9 (1.7%)

Table No.5 : Ocular structures involved in injuries

Ocular structures involved	Number of cases (n)	Percentage
Cornea	281	54%
Conjunctiva	123	23.6%
Lids	112	21.53%
Lens (traumatic cataract, extrusion of lens, phacodonesis)	50	9.61%
Iris (sphincterectear, iridodialysis, traumaticmydriasis)	74	14.23%
Hyphema	69	13.26%
Uveitis	30	5.76%
Vitreous	24	4.61%
Retina	18	3.46%
Sclera	20	3.84%
Orbit	16	3.07%
Optic nerve	3	0.57%
Macular edema	18	3.46%
Intraocular foreign body	1	0.38%
Increased intraocular pressure	17	3.26%

Table No.6 : Visual acuity of patients at presentation and subsequent follow up

Visual Acuity	Number of Cases on presentation	Number of cases after appropriate treatment and required follow-up
< 3/60	79 (15.19%)	28 (5.38%)
3/60 -6/60	45 (8.65%)	4 (0.57%)
6/36 – 6/24	83 (15.96%)	8 (0.76%)
6/18- 6/12	127 (24.4%)	269 (51.73%)
6/9 - 6/6	186 (35.76%)	211 (40.57%)
Total cases	520	520

Discussion:

In our study of 520 patients with ocular injuries, the highest incidence of injuries was found in the age group of 5 – 20 years (45.96%) followed by 33.8% in the age group of 20-40 years. This is similar to findings of Misra S et al, who reported highest incidence of injury (51.67%) in children less than 20 years of age and 25.50% patients in the age group of 20 –40 years.⁹ Maurya RP et al, also reported 24.38% patients in 6–15 years followed by 23.88% patients in 16–25 years.¹⁰ This indicates ocular trauma as an important cause of childhood ocular morbidity. Singh S et al also reported highest incidence of ocular injuries (47.27%) in 6–10 year age group.¹¹

Misra S et al reported 71.6% males and 28.3% females in their study of ocular trauma.⁹ Wong TY et al found that males have 4 times higher risk of injury than females,¹² Singh S et al, reported that males were at 2.18 times higher risk as compared to females¹¹ and Syal E et al reported male : female ratio of 2.4 : 1¹³ in their study. Maurya RP et al, reported 72.9% males and 27.1% females in their study.¹⁰ All these findings corroborate well with our study, where males to female ratio was 2:1.

Misra S et al reported that maximum injuries (43.3%) occurred while undertaking agricultural work.⁹ Mishra A et al, reported that sports and recreational activities were the most common cause of injury (19.2%).¹⁴ Syal E et al, reported that workplace was the most common location of trauma accounting for 27.5% of the cases followed by road traffic accidents (23.5%). Trauma due to assault was present in 22.5% of the patients and trauma at domestic setup was present in 14.5% of the patients. Only 12% of the patients sustained injuries during sports/leisure activity in their study.¹³ Vats S et al and Krishnaiah S et al, reported that maximum injuries occurred at home and workplace in their study.^{3,15}

Singh S et al, reported that wooden object was the most common cause of the injury (29.54%).¹¹ Similar finding was reported by Abraham et al, wooden stick as an offending agent for ocular injury in 21% cases¹⁶,

Misra S et al, wooden stick in 21.05 % cases of ocular injury,⁹ and Maurya RP et al, wooden object being most common (24.9%) followed by metallic objects in 20.9% patients in their study.¹⁰ Singh D V et al, reported 5%¹⁷ and Karve et al reported 4% cases of chemical injury.¹⁸ All these findings are consistent with our study where wooden object was involved in 20.19% cases.

In our study, 54.4% patients reported to the hospital within 24 hours of injury. Karve et al found 35% cases reported within 24 hours¹⁸ and Gyasi ME et al, found that 57.3% cases sought medical attention within 48 hours.¹⁹ Adamu MD et al, also reported that most of the patients (42.3%) presented within 24 hours.²⁰

Karve et al found 85.04 % cases of closed globe injury and 14.96% of open globe injury¹⁸ while Woo JH et al found 95% injuries to be closed globe and 5% injuries were open globe injury,²¹ similar to our study where open globe injury was found in 9.61% cases and closed globe injury in 90.38% cases. Das S et al, reported corneal epithelial defects as the most common encountered lesion (32.9%) followed by corneal perforation in 11.4% cases and lid laceration in 7.1% cases. Traumatic anterior dislocation of lens were reported in 2.9% of cases, traumatic cataract in 5.7% cases, traumatic uveitis and traumatic mydriasis in 7.1% of cases, sub-conjunctival haemorrhage in 4.3%, conjunctival laceration in 2.9% of cases, traumatic hyphema in 5.7% of cases and globe rupture in 4.3% of cases in their study.²² Similar findings have been reported in other studies as well.^{13,14,20}

Adamu MD et al reported that majority of patients (48.7%) had visual acuity between 6/6-6/18 at presentation and also after treatment (71.9%).²⁰ Mishra A et al, also reported that 76.8% patients had visual acuity > 6/12 and two patients had no perception of light at the time of discharge,¹⁴ similar to our study where one patient with open globe injury had no perception of light at the end of six months.

Conclusion:

Most of the patients of ocular trauma belong to the economically productive age group. Ocular trauma can be prevented by creating public awareness regarding use of safety measures while doing household or industrial work and seeking early medical help. The visual outcome depends on the site, size, type and extent of ocular damage, the period between the time of injury and initiation of treatment.

Conflicts of interest: None

Sources of Support - Nil

References:

- Katz J, Tielsch JM. Lifetime prevalence of ocular injuries from the Baltimore eye survey. *Archives of Ophthalmology* 1993;111:1564-1568.
- Ngrel AD, Thylefors B. The global impact of eye injuries. *Ophthalmic Epidemiology* 1998;5:143-169.
- Vats S, Murthy GV, Chandra M, Gupta SK, Vashist P, Gogoi M. Epidemiological study of ocular trauma in an urban slum population in Delhi, India. *Indian Journal of Ophthalmology* 2008;56:313-316.
- Park K. Park's Textbook of preventive and social medicine. 17th edition Jabalpur: Banarsidas Bhanot Publisher. 2002; 295-300.
- Brophy M, Sinclair SA, Hostetler SG, Xiang H. Pediatric eye injury-related hospitalizations in the United States. *Pediatrics* 2006;117(6):e1263-1271.
- Hutton WL, Fuller DG. Factors influencing final visual results in severely injured eyes. *American Journal of Ophthalmology* 1984;97:715-722.
- Kuhn F, Morris R, Witherspoon CD, Mester V. The Birmingham Eye Trauma Terminology system (BETT). *Journal Français d Ophthalmologie* 2004;27:206-210.
- Kuhn F, Maisiak R, Mann L, Mester V, Morris R, Witherspoon CD. The Ocular Trauma Score (OTS). *Ophthalmology Clinics of North America* 2002;15:163-165.
- Misra S, Nandwani R, Gogri P, Misra N. Clinical profile and visual outcome of ocular injuries in a rural area of western India. *Australasian Medical Journal* 2013;6(11):560-564.
- Murya RP, Srivastav T, Singh VP, Mishra C P, Al-Mujaini A. The epidemiology of ocular trauma in Northern India: A teaching hospital study. *Oman Journal of Ophthalmology* 2019;12:78-83.
- Singh S, Sharma B, Kumar K, Dubey A, Ahirwar K. Epidemiology, clinical profile and factors, predicting final visual outcome of pediatric ocular trauma in a tertiary eye care center of Central India. *Indian Journal of Ophthalmology* 2017;65:1192-1197.
- Wong TY, Klein BE, Klein R. The prevalence and 5 year incidence of ocular trauma. The beaver dam eye study. *Ophthalmology* 2000;107:2196-2202.
- Syal E, Dhawan M, Singh SP. To study the epidemiological and clinical profile of ocular trauma at a tertiary health-care facility. *Delta Journal of Ophthalmology* 2018;19:259-267.
- Mishra A, Verma AK, Baranwal VK, Aggarwal S, Bhargava N, Parihar JS. The pattern and visual outcomes of ocular trauma in a large zonal hospital in a non-operational role: A 36 months retrospective analysis. *Journal of Clinical Ophthalmology and Research* 2014;2:141-144.
- Krishnaiah S, Nirmalan PK, Shamanna BR, Srinivas M, Rao GN, Thomas R. Ocular trauma in a Rural population of Southern India. *Ophthalmology*. 2006 2018;113:1159-64.
- Abraham DI, Vitale SI, west SI, Isseme I. Epidemiology of eye injuries in rural Tanzania. *Ophthalmic Epidemiology* 1999;6(2):85-94.
- Singh DV, Sharma YR, Azad R V, Talwar D, Rajpal. Profile of ocular trauma at tertiary eye centre. *JK Science* 2005;7(1):1-6.
- Karve S, Kolte A, Alfia A, Rathi H. Study of clinical profile of ocular trauma at a tertiary Eye Care centre. *International Journal of Contemporary Medical Research* Dec. 2017;4(12):2-41.

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19. Gyasi ME, Amokau WMK, Adjuik MA. Epidemiology of hospitalized ocular injuries in the upper east region of Ghana. Ghana Medical Journal 2007;41:171-175.
20. Adamu MD, Muhammad N. Pattern of ocular trauma in Gusau, north west Nigeria. Niger Journal of Ophthalmology 2017;25:11-13.
21. Woo JH, Sundar G. Eye injuries in Singapore-don't risk it. Do more. A prospective study. Annals Academy of Medicine Singapore 2006; 35(10):706-718.
22. Das S, Rana M. Pattern of Ocular Trauma Presenting to the Tertiary Eye Care Centre in the Islands of Andaman and Nicobar. Digital Journal of Ophthalmology 2020;30:20-26.
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