Original Research Article

Ocular Injuries – A Leading Cause of Preventable Blindness

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Abstract

Introduction: Ocular injures are very common and are of great variety and complexity. Besides structural and functional loss they have social, occupational and medico-legal implications. Ocular injury is an important preventable cause of ocular morbidity and blindness. **Objectives:** The objective of this study was to analyze the epidemiological profile of patients with ocular trauma. **Material and Methods:** This prospective study comprised patients presenting with ocular trauma at out-door, indoor and casualty at Jawaharlal Nehru Medical College, Aligarh from November 2007 to December 2008. An epidemiological study was performed on ocular injuries utilizing hospital eye services. It is direct culmination of MD Thesis of the first author. **Results:** It was found that injury was more common in urban area, males were more involved as compared to females, the left eye was more commonly affected than the right eye, most of the cases reported to the hospital within two days, in majority of the cases the cause was domestic injury, most of the injuries were due to blunt trauma and most of them were accidental in nature. Open globe injuries were more commonly associated with retinal detachments. Injury to lense capsule and delayed repair was associated with endophthalmitis. **Conclusion:** Prevention of blindness from eye injuries requires injury prevention, early presentation by the patient, accurate assessment and prompt referral.

Keywords: Ocular injury, grievous hurt, safety standards, closed globe injuries, open globe injuries, USG in ocular injuries, modes of ocular injuries.

Introduction

Ocular injures are very common and are of great variety and complexity. Besides structural and functional loss they have social, occupational and medico-legal implications. Everyday around the world, about 16,000 people die from injuries. World-wide, there are approximately 1.6 million people blind from eye injuries[1]. Ocular injury is an important preventable cause of ocular morbidity and blindness. The second clause of Sec 320 IPC defines loss of function of either eye as grievous hurt. Most ocular injuries can be prevented by proper safety precautions and early detection. Eye injuries are more common and more sever in their nature in developing countries. Besides causing pain and misery, ocular trauma has enormous human, social and economic consequences, especially if it is bilateral. Fortunately bilateral ocular trauma is rare and is mainly due to bomb blast, antipersonnel mines and road traffic accidents. Most of the time the outcome of trauma is poor because of late presentation at the hospital, infection and lack of appropriate facilities to manage the eye.

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The pattern of ocular injuries depends upon the activities of the people residing in that particular area. The frequency of the eye injuries particularly in the first three decades of life is remarkably high and the damage caused is often so serious that it may produce a physical and a psychological handicap for whole of the life. Therefore knowledge of the causes of ocular trauma is essential for their proper management and prevention[2]. The role of ocular injuries in causation of blindness has been a subject of immense importance and will remain so because of the rapid industrialization and mechanized farming in our country. Despite anatomical and physiological natural protection afforded to the eye, injuries of the eye leading to blindness of various degrees and permanent blindness are quite common. The pattern of injuries found here will be of utility not only in view of methods to be adopted for their protection but also as an eye opener for similar type of population in other parts of our country.

Aims and objectives

The objective of this study was to analyze the epidemiological profile of patients with ocular trauma considering following parameters:

- Age and sex distribution of ocular injuries
- Residence wise distribution of ocular injuries
- Location of occurrence
- Eye involved- left or right
- Duration of injury

- Common causes of ocular injuries
- Mechanism of ocular injuries
- Mode of ocular injuries –accidental, intentional or self inflicted
- BCVA at presentation
- Co-morbidities
- Treatments given

Material and Method

A total of 275 cases of ocular injuries who consulted the tertiary care centre were studied to find out the pattern of ocular injuries. This prospective study comprised patients presenting with ocular trauma at out-door, indoor and casualty at Jawaharlal Nehru Medical College, Aligarh from November 2007 to December 2008. An epidemiological study was performed on ocular injuries utilizing hospital eye services. It is direct culmination of MD Thesis of the first author. The patients were evaluated as per standard protocol observed. The patients were divided into four age groups i.e. 0-14 years, 15-25 years and 26-40 years and above 40 years. Patients residing in a place with no district hospital were categorized as rural. Complete detailed ophthalmic examination including 1) initial best corrected visual acquity 2) lid or facial injury, suconjunctival haemorrhage or laceration 3) presence or absence of corneal or sclera perforation, hyphema, iris injuries relative afferent papillary defect 4) presence or absence of vitreous haemorrhage, cataract, retinal detachment, foreign body, endophthalmitis, retinal breaks, choroidal rupture and or macular hole were noted. Detailed ophthalmic workup of all the patients including slit lamp examination, +90D examination and indirect ophthalmoscopy was carried out. Gonioscopy was done in all closed group injuries. In eyes with corneal edema and hyphema gonioscopy was done on next follow up. Ultrasonography was used whenever unclear media prevented fundus examination. Intraocular pressure was measured in all cases except in fresh open glob injuries. In suspected cases of intraocular or retrobulbar foreign body radiological investigations such as ultrasonography and NCCT was done. Orbital x rays were also done in some cases.

Observation and discussion

Gender wise distribution of ocular injuries

Table-1 Elucidates cases of ocular injuries in male and females.

Tabl-1: Sex-wise distribution of cases

Sex	No. of cases	Percentage
Male	226	82.18
Female	49	17.82
Total	275	100

This is in accordance with various studies conducted on this issue i.e. Thach AB et al (1999)[3]. The higher prevalence of ocular trauma in young males may be attributed to higher exposure of younger males to a hostile external environment and reckless and adventuresome behavior.

Age-wise distribution of ocular injury cases

Table-2 Elucidates cases of ocular injuries in different age groups.

Table-2: Age wise distribution of cases

Age In Years	No. Of Cases	Percentage
0-14	82	32
15-25	59	21.46
26-40	89	32.36
>40	39	15.18
Total	275	100

The peak incidence was observed in the age group 26-40 years comprising 32.36% of the cases.. Individuals in the first decade and third decade were most affected. This is in accordance with study done by Gupta A and Mittal A (1999)[4].

The reason for the above is that young adults are prime bread earners of the family and are more exposed to the external environment. Moreover children are more involved in sports and recreational activities and violence also. Glynn RJ (1988)[5] found a different pattern with maximum incidence in young adults and second peak in elderly people.

Residence-wise distribution of ocular injuries

Table-3 shows residence-wise distribution of ocular injuries.

Table-3: Residence wise distribution of ocular injuries

Residence	No. Of Cases	Percentage
Rural	101	36.73
Urban	173	63.27
Total	275	100

Majority of the cases were residents of urban areas (63.27%). Number of ocular injuries from rural areas was less i.e. 36.73%.

This result is in accordance with the study done by Singh DV et al. (2005)[6].

As opposed to injuries in factories (lock and brass factories) and industrial concerns where a workman is exposed to a constant hazard and the hazard is of a single nature, in villages the hazards are not constant and are of different kinds. It is therefore impossible and even absurd to think of protective measures and to educate the villager in the use of protective glasses.

The risk of injury is proportionately less, but as nearly 80% of the Indian population is agrarian, the number of such injuries is not small, and for reasons stated above - paucity of medical help and long distances to travel to seek medical assistance - minor injuries also become grave in many instances. The only education programmed in such environments is to extort villagers not to consider any injury to the eye as negligible and to seek medical help as early as possible. All the help we can offer is to provide as many district hospitals, manned with trained paramedical staff to give reasonably good and sensible treatment and to guide them to district or civil hospitals, as the need may be, providing them with free transport facilities wherever they exist.

Locations of ocular injuries

Table-4 sheds light on location of occurrence of ocular injuries.

Table-4: Locations of ocular injuries

Place	No. of cases	Percentage
Domestic	112	40.72
Street	83	30.18
Work place	31	11.27
Farm	27	9.82
Playground	17	6.18
Others	5	1.81
Total	275	100

Our findings are similar to those of MacEwen et al. (1999)[7], Kaur A and Agarwal A(2005)[8]. In contrast to the above finding, Al-Bdour and Azad (1998)[9] had reported a high incidence of sports-related injuries (71.4% of cases). Our finding is also different from those of Umeh and Umeh (1997)[10]. Jaison SG et al. (1994)[11] observed that sports related injury was most common (52.8%) in children.

Ratio of left to right eye involved

From table-5 it could be seen that injuries of left eye are more common than that of right eye.

Table-5: Eye involved

Eye Involved	No. Of Cases	Percentage
Left Eye	123	44.73
Right Eye	118	42.91
Both Eye	34	12.36
Total	275	100

Bilateral eye injuries are usually the result of road-traffic accidents. This study is in accordance with Oum et al. study (2004)[12], who observed 45.9% right eye involvement, 50.1% left eye involvement and 4% of both. But the study done by Singh DV et al (2005)[4] showed that most of the patients had unilateral ocular involvement, right eye was involved in 50.1% cases, the left eye in 46.8% and bothe eyes were involved in 3.1% cases.

Dhir SP et al. (1984)[13] observed no predilection for either eye and in 4.44% cases both eyes were injured.

Karaman et al. (2004) study[14] has given figures of 3.70% for bilateral trauma.

Time of presentation of the injury

Table-6 shed light on intervening period on which ocular injury occurred and admission to hospital was sought.

Table-6: Duration of injury

Time of presentation	No. of cases	Percentage
Less than 2 days	115	41.82
2-7 days	60	21.82
8-30 days	48	17.45
>30 days	52	18.91
Total	275	100

In Saxena et al (2002) study[15] of pediatric ocular trauma, 24% cases presented within 6 hours of injury while 34% presented after more than 24 hours after trauma.

Causes of ocular trauma

Table-7 describes causes of ocular trauma and their frequencies.

Table-7 Causes of ocular trauma

Causes	No. of cases	Percentage
Domestic	99	36
Occupational	59	21.45
Violence	24	8.73
RTA	75	27.27
Sports/Recreational	17	6.18
Unknown	1	0.36
Total	275	100

In 0.36% cases no cause could be attributed for ocular trauma because the patient was too young to describe about the event.

Mechanism of injury

Table-8 shows mechanisms of ocular injuries.

Table-8 Mechanism of injury

Mechanism of injury	No. of cases	Percentage
Blunt trauma	189	68.72
Penetrating trauma	70	25.46
Intra-ocular foreign body	7	2.55
Fire cracker burn	6	2.18
Chemical	2	0.73
Others	1	0.36
Total	275	100

This study is in accordance with MacEwen et al. study, blunt trauma 65%, penetrating trauma 24%, intraocular foreign body 4%, chemical 1% and others 6%. Similar findings were seen in Glynn CM (2006) study[8]. This is in contrast to Kaur A (2005)[10].

Mode of injury

Table-9 shows mode of ocular injuries.

Table-9: Mode of ocular injuries

Mode of injury	No. of cases	percentage
Accidental	256	93.1
Intentional	17	6.2
Self-inflicted	0	00
Unknown	2	0.7
Total	275	100

In 0.7% cases it could not be determined either it was self-inflicted, accidental or intentional because they were children and could not explain the thing properly. Assault related injuries were seen in 7.0% and 18% cases in Karaman et al. (2004)[16] and Wong TY and Teilsch(1999)[17] studies, respectively.

Best corrected visual acuity at presentation

Table-10 shows visual acuity at presentation.

Table-10: Visual Acquity

Visual acquity	No. of eyes	Percentage
6/6 -6/12	61	19.74
6/18 – 6/60	61	19.74
<6/60 – PL	110	35.59
NPL	77	24.91

In our study 19.7% eyes had visual acuity 6/6- 6/12. Visual acuity of 6/18-6/60 was present in other 19.7% eyes.35.59% eyes had visual acuity <60-PL. 24.91% eyes were NPL.

Ocular injuries

Total 309 eyes of 275 patients were examined. Open globe injuries affected 63 (20.38%). Corneal involvement is seen in 52 eyes, corneoscleral in 1 eye and sclera in 9 eyes. Intraocular foreign body is seen in 4 eyes. Co- morbidities in open globe injuries are shown in table 11.

Table-11: Open Globe Injuries (n=63)

Co-morbidities	No. of eyes	Percentage
Cataract	17	22.07
Hyphema	10	12.98
Uveal prolapse	03	3.89
Chorioretinal damage	01	1.29
Retinal detachment	03	4.76
Vitreous haemorrhage	06	7.79
glaucoma	01	1.29
Sympathetic ophthalmitis	01	1.29
3rd cranial nerve palsy	01	1.29
Orbital cellulitis	01	1.29
endophthalmitis	01	1.29
Optic Nerve Atrophy	01	1.29
IOF	04	5.19
Iris prolapsed	18	28.57

Closed globe injuries affected 185 (59.68%). Co- morbidities in closed globe injuries are shown in table 12.

Table-12: Closed Globe Injuries (n=185)

Co-morbidities	No. of eyes	Percentage
Cataract	28	16.34
Hyphema	16	9.35
Subluxated/ dislocated lense	3	1.75
Glaucoma	2	1.16
Chorioretinal damage	1	0.58
Blow out fracture	1	0.58
Retinal detachment	5	2.37
6th cranial nerve palsy	1	0.58
4th cranial nerve palsy	1	0.58
Vitreous haemorrhage	3	1.75
hypopyon	8	4.67
Iridodylisis	3	1.75
Postrerior synechiae	2	1.16

Superficial non-perforating eye lid and adenexal injuries and burns affected 61 eyes (19.74%) and co-morbidities are described in table 13.

Table-13: Superficial non perforating, eyelid and adenexal injuries and burns (n=61)

Complication	No. of eyes	Percentage
Lid		
• Laceration	29	47.54
Cicatricial ectropion	1	1.63
Canalicular damage	3	4.91
• Ptosis	5	8.19
• Oedema	54	88.52
• symblepharon	1	1.63
Cornea		
• Abrasion	25	40.98
• Foreign bodies	4	6.55
Orbit		
• Haematoma	42	68.85
• cellulitis	1	1.63
Burns		
• Chemical	2	3.27
• Fire	6	9.83
Conjunctiva		
• Lacerations	1	1.63
• Chemosis	4	6.55
• Foreign bodies	4	6.55
Extraocular Muscles		
• Medial rectus	1	1.63
• Lateral rectus	1	1.63
• Facial palsy	1	1.63

Surgical procedures done

Indirect traumatic rupture of globe carried poor prognosis. The visual acquity of light perception or less, abnormally deep anterior chamber and very low intraocular pressure are indicators of occult globe injury. Early detection and repair may improve prognosis in such cases. The younger, illiterate patients from rural background were more likely to develop endophthalmitis after trauma. Delayed presentation to the tertiary eye care centre was found to be associated to development of endophthalmitis. The larger lacerations were more likely to develop infections.

From the table-14 it can be seen that surgical intervention was done in 160 eyes (51.78%).

Table-14: surgical procedures done

Surgical Procedure	No. of cases (%)
Corneal / sclera repair	63 (20.38%)
Conjunctival foreign body removal	4 (1.29%)
Corneal foreign body removal	4 (1.29%)
IOF removal	4 (1.29%)
Vitreoretinal surgery for retinal detachment	8 (2.59%)
SICS	39 (12.62%)
ECCE	3 (0.97%)
Pars plana viterectomy	1 (0.32%)
Lid surgery	34 (11%)

It was found that the rapidity with which the treatment was instituted has important effect on final result. This is most profound in chemical burns. Open globe injuries were more likely to develop retinal detachment than closed globe injuries. The incidence of vitreous haemorrhage was more in open globe injuries. Blood in vitreous in presence of scleral wound was more associated with fibro-vascular proliferation and tractional retinal detachment.

Conclusion

The following conclusion was drawn:

- Ocular injuries are more common in males as compared to females. Higher incidence of ocular injuries among males was because of more exposure of males to the external environment.
- Majority of the patients are adults. This finding is because of risks involved in different jobs in whom adults are commonly involved
- The age of the victims ranged from 3-80 years. The peak incidence was found in 26-40 years.
- The current study points to male adults and children as the high risk groups and home and street as the high risk sites for ocular injuries.
- Majority of the patients belonged to urban areas.
- Majority of the patients presented within 2 days of injury.
- Left eye was more commonly involved.
- Blunt injuries were seen in majority of victims.
- Majority of the cases were accidental.

Following suggestions are proposed

1) It is necessary to implement mass education programs regarding effects of ocular trauma to raise public awareness using the media, especially radio, TV and newspapers.
2) The government should legislate and implement compulsory use of protective devices during work and recreation.
3) A network of community ophthalmic nurses can be established to provide appropriate first aid and refer from village level to secondary or tertiary care. This can significantly reduce visual impairment and blindness resulting from injuries.
4) Health facilities should be ready to deal with eye injuries by:

- Ensuring adequate training of health personnel to assess eye injuries and perform basic first aid procedures appropriate to their level of training.

- Ensuring a supply of equipment, drugs and consumables required to assess and provide first aid for eye injury
- Having a plan of how to refer patients requiring specialist management and facility for transporting patients in an emergency.

5) Prevention of blindness from eye injuries requires:

- Injury prevention (health promotion including advocacy)
- Early presentation by the patient (health promotion and health worker training)
- Accurate assessment (good primary eye care and first aid)
- Prompt referral of serious injuries requiring specialist management.

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