Clinical profile and visual outcome of ocular injuries in a rural area of western India

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RESEARCH

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Abstract

Background
Ocular trauma is a major cause of visual impairment and morbidity worldwide.

Aims
To identify the various type of ocular injury in a rural area, determine the presence of any associated visual damage and assess the final visual outcome after treatment.

Method
Hospital-based, prospective study conducted over a period of two years. A total of 60 patients of ocular trauma were included.

Results
Ocular injuries were more commonly seen in adult (55 per cent) patients who were associated with agricultural work (43.33 per cent). They were more common in male patients (71.67 per cent). Closed globe injury (68.33 per cent) was more common than open globe injury (31.67 per cent). Both in open and closed globe injuries, the commonest object causing injury was a wooden stick. Just 26.7 per cent of the patients had a visual acuity better than 6/60 at presentation; while after completed treatment at two months follow-up, 68.3 per cent had best corrected visual acuity better than 6/60.

Conclusion
Agricultural trauma is an important cause of monocular blindness in rural India. The visual outcome depends upon the site and size of the injury and the extent of the ocular damage.

Key Words
Closed globe injury, open globe injury, rural India, visual outcome

What this study adds:

1. **What is known about this topic?** Ocular trauma is one of the commonest causes of unilateral blindness.
2. **What new information is offered in this study?** Agricultural trauma is an important cause of ocular injury especially in a developing country like India.
3. **What are the implications for research, policy or practice?** The counselling of farmers regarding the usage of protective glasses at work and the education of parents and teachers regarding the prevention of ocular injuries in children may reduce the visual morbidity from ocular trauma.

Background

An injury is damage to a person or a tissue/organ caused by transfer of energy – mechanical, thermal, chemical, electrical or radiant.[1] The eyeball is a fairly well protected structure in our body. The eye is protected from direct injury by the lids, eyelashes, and the protecting margins of the orbit. Physiologically, it is protected by the blink reflex, head turning reflex, and lacrimation which follows intrusion of any irritant material. Despite these protective mechanisms, injuries to the eye are commonly found. It can be open globe or closed globe injury. The effects of such injuries are much more severe than in any other part of the body because of the delicate nature of the ocular tissues resulting in permanent blindness.

Ocular trauma is a major cause of worldwide visual impairment and morbidity.[2] In India, there are more than 50 million blind people and this number increases by about 3.8 million per year. Amongst the total number of blind cases,

1.2 per cent is contributed by injuries which are preventable.[3] The aim of this study is to find out the types of ocular injuries in rural areas, the extent of damage by these injuries and the visual outcome after treatment. Ocular injuries are more common in rural areas as people are illiterate and have poor socio-economic status. They are unaware of protective devices like goggles and protective shields. The type of injury is also different as the majority are related to agricultural work and animal handling.

Method

The study was a hospital-based, prospective, observational study conducted over a two-year period at a tertiary rural hospital in western Maharashtra, India. Written informed consent was taken from all the study patients. Institutional ethics committee approval was taken before starting the study.

Sample Size: 60 patients of ocular trauma were studied.
Inclusion Criteria: Patients with ocular injuries, reporting to casualty and ophthalmology OPD were included.
Exclusion Criteria: Patients with birth injuries, war injuries, thermal injuries, ultrasonic injuries and radiation injuries were not included in the study.

A detailed history and ocular examination of each patient were recorded. The patients who required admission were admitted and appropriate treatment was given. The rest were managed on an out patient department (OPD) basis. Patients were followed up on an OPD basis one week after discharge, thereafter four weeks and eight weeks. During follow up, their visual acuity was recorded. Whenever required, refractive testing was done and glasses were prescribed.

Results

The present study shows the highest incidence of ocular injuries in the first decade of life (26.67 per cent). Also it is seen that ocular injuries are more common in males compared to females (Table 1).

Table 1: Age and sex wise distribution of patients

Age in years	Males	Females	Total	Per cent
0 – 10	9	7	16	26.67
11 – 20	11	4	15	25
21 – 30	7	1	8	13.33
31 – 40	5	2	7	11.67
> 40	11	3	14	23.33
Total	43 (71.67%)	17 (28.33%)	60	100

More cases had a closed globe (68.33 per cent) type of injury than the open globe (31.67 per cent) type (Table 2). Table 3 shows that agricultural work-related ocular injuries formed the commonest mode of injury followed closely by injury while playing.

Table 2: Type of Injury

Type	No. of patients	Per cent
Open Globe	19	31.67
Closed Globe	41	68.33
Total	60	100

Table 3: Mode of Injury

Mode of Injury	No. of patients	Per cent
Agricultural work	26	43.33
Play	22	36.67
Domestic work	10	16.67
Road traffic accident	2	3.33
Total	60	100

Amongst the objects causing ocular injury, the main culprits were wooden sticks and sugarcane leaves. Also injury due to an accidental splash of lime in the eye and blunt trauma by stone were common. Injury due to thorn, bull horn, metal rod were also seen (Table 4)

Table 4: Objects causing ocular injury

Objects	Open Globe Injury	Closed Globe Injury	Total
Wooden stick	4	10	14
Sugarcane leaf/ stick	1	8	9
Lime	0	6	6
Tree branch	1	4	5
Stone	3	3	6
Thorn	0	3	3
Animal	2	0	2
Finger nails	0	2	2
Metal rod/ wire	4	3	7
Cricket Bat/ Gulli danda	2	1	3
Sharp particles (glass/metal)	2	1	3
Total	19	41	60

Table 5 shows the distribution of visual acuity of ocular injury patients at presentation and their best corrected visual acuity (BCVA) at two months follow-up after treatment. Twenty-six per cent had visual acuity better than

6/60 at presentation and 40 per cent of patients presented with visual acuity from 6/60 to 3/60 At two months follow-up after treatment, 68 per cent of patients had visual acuity better than 6/60. One patient had just light perception (PL) and four patients had no perception of light (No PL) at presentation.

Table 5: Extent of visual loss at presentation and BCVA at two months follow-up after treatment

Visual Acuity	No. of cases at presentation	Per cent	No. of cases at 2months follow-up	Per cent
> 6/60	16	26.67	41	68.33
6/60 – 3/60	24	40	10	16.67
3/60 – 1/60	15	25	4	6.66
PL present	1	1.67	1	1.67
No PL	4	6.66	4	6.66
Total	60	100	60	100

Discussion

In our study, there was increased incidence of ocular injuries in adult patients (55 per cent) with a male preponderance (71.67 per cent). This study was in close relation with Michael et al, Niiranen and Jain et al.[4,5,6] Male preponderance is seen because males are more frequently exposed to outdoor work than females and hence more prone to injuries.

There was a higher percentage of closed globe injuries (41 cases, 68.33 per cent) when compared to open globe injuries (19 cases, 31.67 per cent). This finding correlates well with Karaman et al. (2004).[7]

The most common cause of circumstance in which injury occurred in adults was while undertaking agriculturally related work (43.33 per cent). The incidence of agricultural ocular injuries is more frequent in our study than most other studies we reviewed.[8,9,10,13] This may be due to the fact that our study was conducted in a rural area where farming is the main occupation. In the paediatric age group, most of the ocular injuries were sustained while at play (36.67 per cent). Umesh et al, Krishnan et al, Canavan et al also found similar results in their studies.[11-13] Certain indigenous games such as 'gulli-danda' are notorious for causing ocular injuries as was the case in two children.

We found that out of 19 patients with open globe injury, the commonest object causing injury was a wooden stick (21.05 per cent), followed by a stone (15.79 per cent) and a bull's horn (10.53 per cent). These findings correlate well with studies done by Umesh et al and Krishnan et al.[11,12] The commonest object causing closed globe injury in 41 patients was a wooden stick (24.39 per cent) followed by sugarcane leaf (19.51 per cent). Krishnan et al reported similar findings in their study.[12]

At presentation, 40 per cent of the patients had a visual acuity between 6/60 to 1/60; 26.67 per cent of patients had visual acuity above 6/60 and 25 per cent had visual acuity reduced to just presence of light perception (PL) and accurate projection of rays (PR).

The majority of the patients in our study presented with only anterior segment involvement (86.67 per cent). None of the patients seen had isolated posterior segment involvement. 13.33 per cent patients in our study had both anterior as well as posterior segment involvement.

Patients with open globe injury, presented with a corneal tear with or without uveal tissue prolapse (Figure 1), traumatic cataract, corneoscleral tear, foreign body in anterior chamber, vitreous hemorrhage, retinal detachment and intraocular foreign body. Patients having closed globe injury presented with alkali burn (Figure 2), full thickness upper or lower lid tear (Figure 3), conjunctival tear, subconjunctival hemorrhage, corneal lamellar laceration, corneal ulcer with hypopyon (Figure 4), corneal abrasions (Figure 5), hyphaema, traumatic cataract, macular edema and choroidal tear. These findings coincide well with the findings of Bigar F, Ariturk et al and Thompson et al.[14-16]

All the patients with open globe injury were managed surgically (31.67 per cent), while only 19 (46 per cent) out of 41 patients of closed globe injury required surgical intervention

Figure 1: Corneal tear with uveal prolapse

Figure 2: Alkali burn injury (lime particles)

Figure 3: Full thickness upper lid tear

Figure 4: Corneal ulcer with hypopyon

Figure 5: Multiple corneal abrasions following windshield glass injury in road traffic accident

In our study, 38 (63.33 per cent) of patients were managed surgically and the remaining 22 (36.67 per cent) were given medical treatment. Amongst the patients with closed globe injury, 53.66 per cent were given medical treatment and 46.34 per cent were managed surgically.

At presentation just 16 per cent of cases had visual acuity better than 6/60 while at two months follow-up after treatment this number increased to 68 per cent. We conclude that most of the patients showed improvement in vision after treatment. In one patient, there was unfortunately no improvement in vision as he developed a central corneal opacity after the healing of corneal ulcer and was referred for penetrating optical keratoplasty. Four patients presented with badly injured, irreparable, no perception of light (PL) and hence had to be enucleated.

Conclusion

Ocular trauma is one of the most common causes of monocular blindness, especially in rural areas. Ocular injury can occur at any age, but is more common in adults. Agricultural trauma is an important cause of ocular injury in India as the majority of the Indian population lives in a rural area, farming being a common occupation. The incidence of ocular trauma can be decreased by the proper use of safety devices like protective goggles or shields, face masks etc. during work. The visual outcome depends upon the site, the size of the injury, the type of injury (whether open globe or closed globe), the extent of ocular damage, the period between the time of injury and the instigation of treatment. The counselling of farmers regarding the usage of protective glasses at work and the education of parents and teachers regarding the prevention of ocular injuries in children may go a long way in reducing the visual morbidity from ocular trauma.

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PEER REVIEW

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests. We also declare that all the authors have approved the final version of this manuscript.

ETHICS COMMITTEE APPROVAL

The Institutional Ethical Committee (IEC) and Institutional Research Cell (IRC) of Pravara Institute of Medical Sciences, Loni, India approved the study design. Informed consent was obtained from all the study patients for the purpose of reproduction of the medical information and images.