

PENETRATING OCULAR INJURIES- A PROSPECTIVE STUDY IN A TERTIARY EYE CARE CENTRE

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ABSTRACT

BACKGROUND

Analysis of clinical profile, the objects of injury and various ocular structures involved causing penetrating injury of the eye in a tertiary eye care centre in South India.

MATERIALS AND METHODS

It was an analytical prospective study. 200 patients who presented with penetrating injury of the eye were studied at our institution for a period of 1 year. All the cases were handled like an ocular emergency. Each patient was evaluated in the following manner, which began with eliciting the detailed history and recording the visual acuity at the time of presentation. A thorough examination of the patients were conducted by examining the eye. The findings were meticulously recorded.

RESULTS

In our study, the incidence of penetrating injury was more in age group of 10-30 years, which accounted to 60% of the study population. Male preponderance was observed. Penetrating injury was more common in the rural population with incidence of 68%. Right eye was mostly affected. Regarding the structural involvement, cornea was the most common ocular structure involved following penetrating injury followed by the scleral involvement, which accounted for 65.5% and 53.1%, respectively.

CONCLUSION

Involvement of the iris, ciliary body, lens and posterior segment shows a grave prognosis and functional recovery was poor. Most of the patients were affected due to the carelessness among the young population.

KEYWORDS

Penetrating Injury, Corneal Tear, Rosette Cataract.

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BACKGROUND

"Vision is next to the life" was quoted by Duke Elder. Trauma to the eye and its surrounding structures remain a leading cause of blindness and visual morbidity. It leaves behind a trail of disaster with far reaching consequences. So any injury to the eye, however, trivial it may appear, must be deemed to be an ocular emergency and must be handled with utmost care. The penetrating injuries of the eye are common and they may occur in our day to day life. In children, the injury to the eye is frequently observed during sports and games.¹ In adults, it is mostly industrial injuries.² Since, ours is predominantly an agricultural

country, and farmers are also at risk. In modern world, ocular emergencies are common in road traffic accidents.³ The human eye is protected in a bony socket called the orbit, which also contains the muscles, nerves and vessels, which are essential for its proper functioning.

The eyelids form one of the most important elements in the protection of the eye by a sensory action of the cilia in the form of a blink and menace reflex. The retrobulbar fat within the muscle cone and the peripheral orbit acts as a shock absorber and dampens the impact of the object. The globe is least protected in the anterior aspect of the eye. The ciliary region, which is 2-7 mm from the limbus is called the danger zone of the eye⁴ because of the possibility of sympathetic ophthalmia. The vitreous loss through the wound will almost always result in phthisis bulbi.

Classification of ocular injuries based on Duke Elder classification.⁵

1. Intrauterine injuries.
2. Birth injuries.
3. Domestic injuries.

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4. Injuries due to travel and sports.
5. Injuries caused in agriculture.
6. Industrial injuries.
7. War injuries.

Aim of the Study

To study the clinical profile, the objects of injury and various ocular structures involved causing penetrating injury of the eye in a tertiary eye care centre in South India.

Exclusion Criteria- Penetrating injury with intraocular foreign body, chemical injury, birth and intra uterine injury, war injuries and radiational injury.

MATERIALS AND METHODS

This was a prospective analytical study. About 200 patients were studied at our institution for 1year duration between January 2014 to December 2014. History included the name, age, sex, complaints, residence and occupation.

A detailed history included the time interval between the injury and the first consultation as well as the time of presentation in our institute. The exact mode and the circumstances in which the injury occurred. The object causing the injury, the history of any co-morbid condition and associated symptoms, which required the intervention of an ENT surgeon and neurologist opinion, if required.

Examination- Functional, anterior segment and posterior segment.

The functional examination included the visual acuity, which was checked using Snellen’s chart, ocular tension of the contralateral normal eye.

Anterior segment examination was carried out initially with torch light examination followed by slit lamp examination. The details of each of the structure was noted.

The posterior segment examination was carried out by fundus copy whenever possible. An attempt was made to examine at subsequent intervals.

RESULTS AND ANALYSIS

Age Distribution

In our study, it was found that the maximum incidence of penetrating injury was noticed between 10-30 years, which accounted to 60% of the study population.

From this, it was presumed that the majority of the injuries occurred in the bread winning group of individuals in our country. In many instances, appropriate ocular protective precautions were ignored. Children playing without adult supervision were innocent victims (Figure 1).

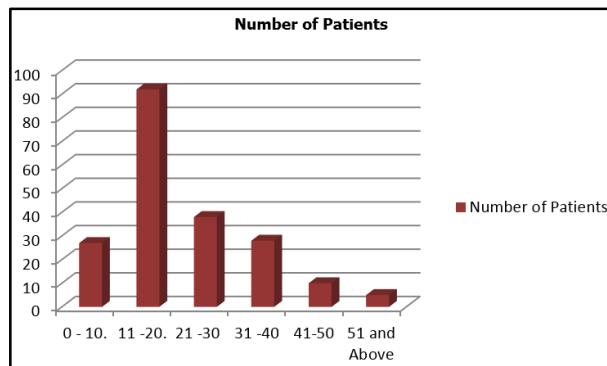


Figure 1. Showing the Age Distribution Pattern

Sex Distribution

In this study, there was a slight male preponderance. Males accounting for 91% of patients. Most of them belonging to the age group of 11 to 30 years (Figure 2).

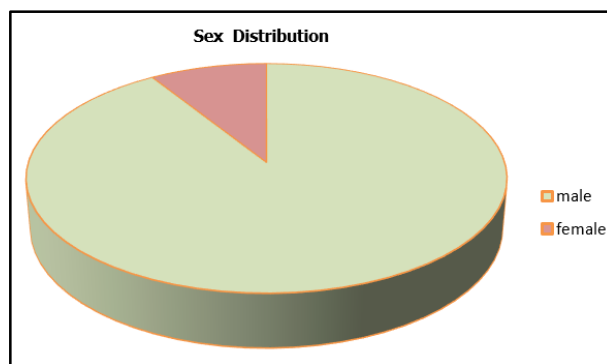


Figure 2. Showing the Sex Distribution

Laterality

In this study, it was found that right eye was most commonly affected. One of the cases had avulsion of the globe with corneoscleral tear due to road traffic accident (Figure 3).

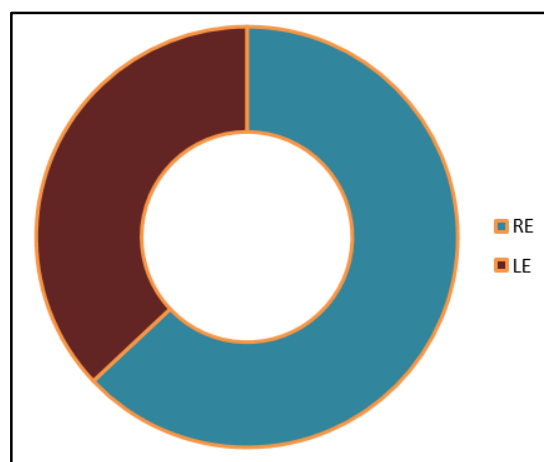


Figure 3. Showing the Laterality

Endemicity

In our study, it was found that the penetrating injury was more common in the rural population with incidence of 68% (Figure 4).

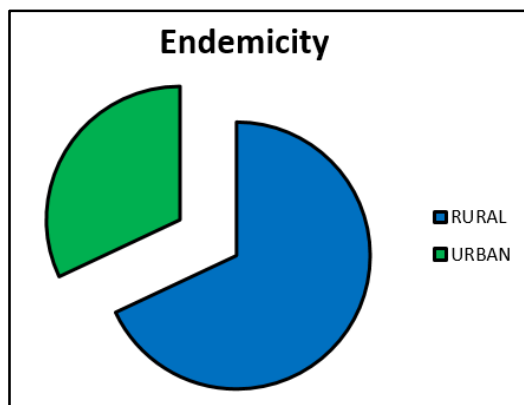


Figure 4. Showing the Endemicity

Relationship of Endemicity and the Agents Causing Injury

Agents Causing Injury	Rural	Urban
Fist (finger ring, nail)	20	29
Sharp objects	44	30
Broken glass	7	6
Cracker injury	2	1
Stone	16	4
Toys	13	4
Miscellaneous	14	10

Table 1. Showing the Relationship between the Agents Causing Injury and Endemicity

The above table shows the number of cases that presented to us. It was found that most of the study population belonged to the rural population, which accounted for 58%.

In our study, among the rural population, the injury by sharp objects and fist are much more common compared to the other causes listed above. Among the urban population, the injury caused by fist and sharp objects were common. The sharp objects causing injury among children both in rural and urban population were pencil (5%), ballpoint pen (40%), compass (2%), scissors (5%), sharp end of toys (46%) and accidental injury with knife (2%). Among the adults, most common sharp object causing injury was fast moving machinery with pointed end at workplace (60%), followed by assault with bill hook (23%), accidental injury with knife (10%) and sickle injury in rural population (7%). Hence, the population should be educated about the importance of the protective wear at the workplace. Toys were found to be the most common agent causing injury among children in both rural and urban population. Fire cracker injury were encountered during the festive seasons.

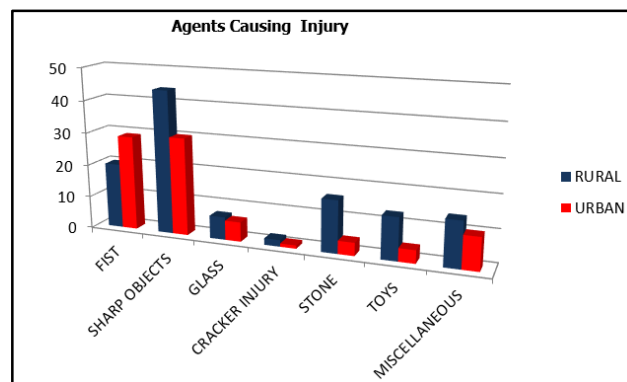


Figure 5. Showing the Relationship between The Agents Causing Injury and Endemicity

Modes of Injury

In our study, the commonest mode of injury was industrial, which accounted for 65.5%. Next common included agricultural. This was mostly seen among the rural population. Road traffic accident was most common among the urban population, which accounted for 6.5% of total study population (Figure 6). Miscellaneous group included injuries due to assault, domestic injuries, sports injuries and bystanders.

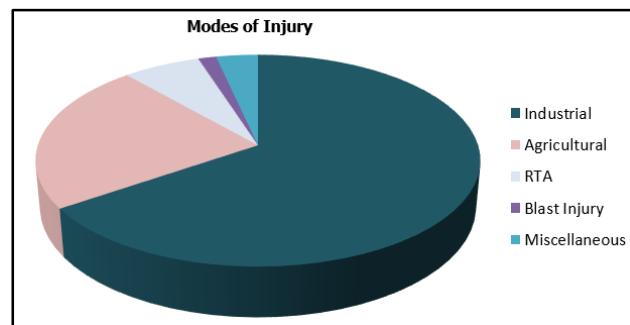


Figure 6. Modes of Injury

Occupation	Rural	Urban
Students	7	15
Sedentary workers	15	14
Farmers	67	0
Labourers	37	42
Housewives	6	4
Industrial workers	4	10

Table 2. Relationship between Occupation and Endemicity

In our study, farmers were most commonly affected in the rural population and labourers among the urban population (Figure 7).

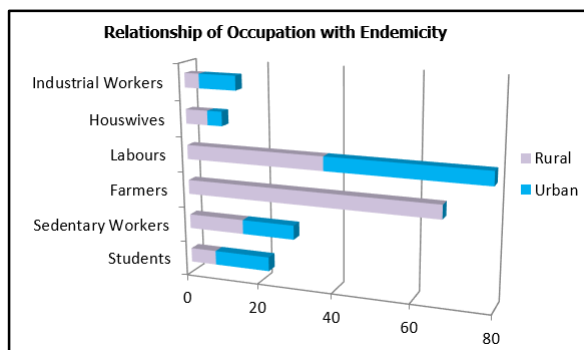


Figure 7. Showing the Relationship Between Occupation with Endemicity

Structures Involved in the Ocular Trauma

In our study, cornea was the most common ocular structure involved following penetrating injury followed by the scleral involvement, which accounted for 65.5% and 53.1%, respectively. 36.7% of the study population had associated lid injury. Uveal tissue involvement was seen in 30.7% of the study population. Lens was involved in 25.4%. 14.1% presented with vitreous haemorrhage (Figure 8).

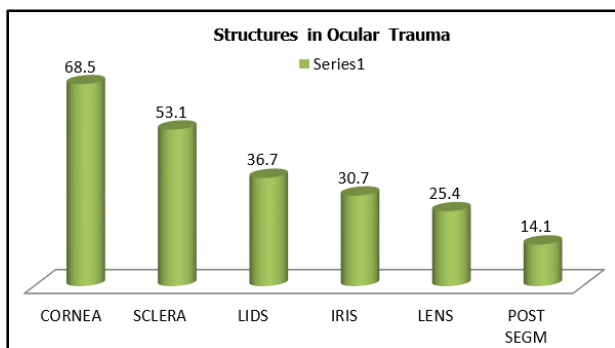


Figure 8. Structures Involved in the Ocular Trauma

Analysis of the each structure of eye (Table 3a-3c).

A. Lids

	Number	Percentage
Tear	120	60%
Burn	36	18%
Canaliculus	12	6%
Oedema and contusion	200	100%
Ptosis	4	2%

Table 3a. Showing Number of Cases with Lid Involvement

From the above table, it was found that all the patients in the study population presented with lid oedema and contusion. 60% presented with lid tear. 18% presented with lid burns, which was observed during the festive seasons. Canalicular involvement was seen in 6% and ptosis in 2%. This was mostly mechanical ptosis.

B. Cornea

	Number	Percentage
Tear	127	92.7%
Opacity	3	2.1%
Blood staining	7	5.1%

Table 3b. Showing Number of Cases with Corneal Involvement

In our study, among 200 patients, 137 patients presented with corneal tear. 92.7% presented with full thickness corneal tear. Three patients presented with corneal opacity and 5.1% presented with blood staining of cornea.

C. Sclera - 53.1% of the total study population presented with scleral involvement. 89% among them presented with a sclerocorneal tear. 11% presented with scleral tear with corneal sparing (Figure 9).

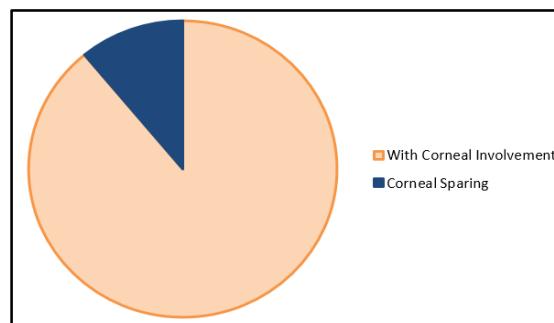


Figure 9. Showing Involvement of Sclera

D. Iris

	Number	Percentage
Prolapse	20	32.2%
Incarceration	10	16.1%
Iridodonesis	30	48.3%
Iridodialysis	2	3.2%

Table 3c. Showing the Involvement of Iris

In our study, 62 patients had involvement of iris in the form of prolapse, incarceration, iridodonesis and iridodialysis, which accounted for 32.2%, 16.1%, 48.3% and 3.2%, respectively.

E. Lens

In our study, 25.4% had involvement of the lens in the form of anterior capsular opacity, anterior capsulorhexis, rosette cataract and subluxation of lens (Figure 10).

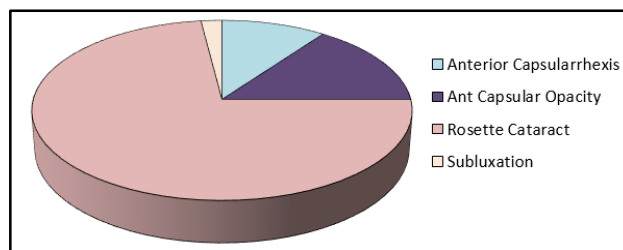


Figure 10. Showing Involvement of Lens

F. Posterior Segment

In our study, 14.1% of the total study population presented with involvement in the form of posterior segment. 95% presented with dense vitreous haemorrhage with no view on fundus examination. 4% presented with subretinal haemorrhage. 1% presented with retinal detachment (Figure 11).

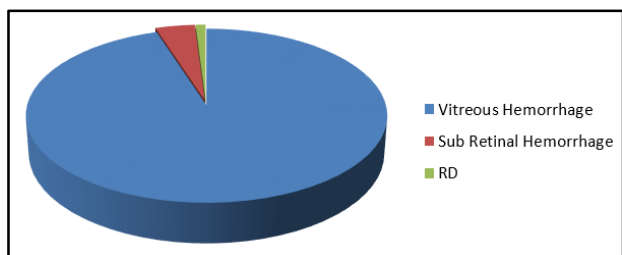


Figure 11. Showing Involvement of Posterior Segment

Visual Acuity

All the patients presented with a drop in vision ranging between PL +to 6/36 (Figure 11).

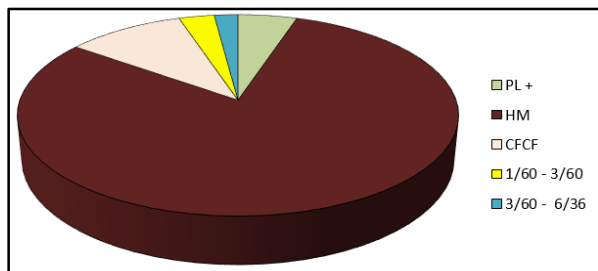


Figure 11. Showing the Distribution of Visual Acuity

DISCUSSION

Trauma to the eye and its surrounding structures remain the leading cause of blindness and visual morbidity. There are very few studies in our country on which to base the incidence of ocular trauma, but it is generally believed that out of 9 million blind person, eye injuries accounted for 1.5% of these cases. Penetrating injury of the eye represents a major threat to vision in the workplace, home, school, playground, battlefield and sports.⁶

In our study, it was found that the maximum incidence of penetrating injury was noticed between 10-30 years, which accounted to 60% of the study population.

From this, it was presumed that the majority of the injuries occurred in the bread winning group of individuals in our country. It also shows the carelessness, lack of responsibility and lack of awareness in young population. Similar findings were reported by Kuhn et al in their study of the United States Eye Injury Registry over a seven-year period (1982-1989).⁷

1. There was a slight male preponderance accounting for 91% of the study population. This indicates the risk of exposure to this sex to occupational hazards.
2. In our study, the commonest mode of injury was industrial, which accounted for 65.5%. Next, common included agricultural. This was mostly seen among the rural population. Road traffic accident was most common among the urban population, which accounted for 6.5% of total study population, which was similar to the previous studies.⁸
3. In our study, farmers were most commonly affected in the rural population and labourers among the urban population.
4. Cornea was the most common ocular structure involved following penetrating injury followed by the scleral involvement, which accounted for 65.5% and

53.1%, respectively. 36.7% of the study population had associated lid injury. Uveal tissue involvement was seen in 30.7% of the study population. Lens was involved in 25.4%. 14.1% presented with vitreous haemorrhage. Open globe intraocular injuries were classified into mild, moderate and severe based on the classification by Vasu et al, which was adapted from the Organ Injury Scaling VII described by the American Association for the surgery of trauma.⁹

Clinching Features in Our Study

In this study, the endemicity was more prevalent among the rural population. The mode of injury was in the form of sharp objects during agricultural activity. So, the rural mass must be taught about the seriousness of the injury that if not attended early are likely to lose vision due to mycotic infections. Among the urban population, the industrial workers must be educated about the protective measures thereby preventing visual loss due to injury.

Injuries due to firecracker also needed a special attention. Most of them affected were children belonging to the school going age group. Here, awareness about the safety use of crackers must be emphasised.

No case of sympathetic ophthalmitis was reported in this study due to advent microsurgical procedure and use of steroids.¹⁰

CONCLUSION

Penetrating injuries to the eyes causes serious permanent visual impairment and blindness, which is preventable. They carry a high risk of visual morbidity in all age groups. Even though, the most updated and heroic procedures may bring a complete cure, "an ounce of prevention is better than a pound of cure." An awareness should be created in the public about the prophylaxis through a stronger educational campaign.

But, once trauma has occurred, the ophthalmologist should spare no pains to treat the injury as an emergency with all the tools that modern medicine has provided to restore the structural as well as functional capacity of the eye.

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