



## Original Article

# Childhood Ocular Trauma –Epidemiology and the Visual Outcome in A Tertiary Care Centre in Eastern India

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## Abstract

*In children eye injuries are an important cause of ocular morbidity.*

**Purpose:** *The purpose of this study was to identify the risk factors, different modalities of management and suggest preventive measures in children below 16 years of age.*

**Materials and Methods:** *A total of 290 children below 16 years of age with history of ocular injury were included in our study. A detailed history and complete ocular examination including Slit lamp examination, indirect ophthalmoscopy as well as special investigations like B-scan, X-ray were done wherever required and appropriate timely medical and surgical intervention was done.*

**Results:** *We observed the incidence of ocular trauma in this age group was 8.7%, male female ratio 2.5:1. Most of the injury occurred during outdoor activity and pointed objects mainly stick were the common cause of injury. Among all cases 75.2% were close globe injury, 16.6% cases were open globe injury and in 8.2% only ocular adnexa was involved. Most cases (76%) required conservative management only. At 6 months follow up 91.8% had BCVA  $\geq$  6/60, 3.9% had  $<$ 6/60, 4.3% had no perception of light.*

**Conclusion:** *In children ocular injuries are an important cause of unilateral & some time bilateral blindness. Such injuries could not be always preventable but by identifying the risk factors, most effective methods of management, parents' awareness and by reducing exposure to dangerous objects can prevent the morbidity to some extent.*

**Keywords:** *Mechanical injury, Close globe injury, open globe injury, Ocular adnexa injury, Ocular injury.*

## Introduction

Ocular injuries are the most common cause of uniocular blindness in children<sup>[1]</sup>. It is mainly accidental and has an age specific pattern. Children are most frequently injured at home by common and innocuous objects<sup>[2]</sup>. Penetrating

injury involving the posterior segment of the eye has a poorer prognosis as compared to blunt injury. Aim of this study is to determine the magnitude of the problem and identify the major causes for suggesting preventive strategies.

### **Purpose**

Purpose of this study was to identify the risk factors for ocular trauma, determine different modalities of management and suggest preventive measures in children below 16 years of age.

### **Material and Methods**

It is a longitudinal hospital based study done in a tertiary eye care centre in eastern part of Odisha. We included 290 children below 16 years of age with history of mechanical injury in the past one year, who presented within 5 days of injury. A detailed history was taken and data such as age, sex, eye involved, causes of injury, place and time of presentation, visual complaints and status of tetanus immunization were documented. Visual acuity was taken by snellen chart (wherever possible), pupillary reflex for relative afferent pupillary defect, ocular motility, periorbital area for associated injury was checked out. A complete slitlamp examination was done for status of lid & adnexa, conjunctiva, sclera, cornea, anterior chamber iris, pupil and lens was evaluated. IOP was taken by applanation tonometry in close globe injury only; gonioscopy was done to rule out angle recession and fundus examination by indirect ophthalmoscope for posterior segment involvement wherever possible. Wherever needed special investigation like B-scan, X-ray, and CT scan were done. Surgical and /or medical management was planned as per the need. Systemic antibiotics were started in all open globe injuries. Eyes with lid laceration were repaired with 6-0 silk or 8-0 polygalactin, conjunctival laceration with 8-0 or 10-0 polygalactin and cornea, corneo-scleral or sclera tear were closed with 10-0 nylon, uveal prolapse was managed by doing iris abscission & wound repair. Post-operative topical antibiotic, steroid (after ruling out fungal infection) and cycloplegic were given, also systemic antibiotic and steroid wherever needed given. In case of traumatic endophthalmitis intravitreal injection of antibiotic and steroid (Amikacin /Vancomycin + Dexamethasone) was given only after exclusion of fungal endophthal-

mitis. Core vitrectomy was done in all fungal and bacterial endophthalmitis not responding to conservative management.

The type of secondary surgery decided for different patients were – anterior capsulotomy and lens aspiration with or without PCIOL and with or without primary posterior capsulotomy, secondary IOL implantation, core vitrectomy, evisceration. IOL power was calculated with SRK formula II, where biometry was not possible it was done in other eye. Lens aspiration was done with a 3.5mm clear corneal incision superiorly 1mm into the limbus. Secondary IOL was given by 5mm corneo-scleral tunnel at 2mm from the limbus superiorly. A PCIOL (PMMA) preferably in the bag and sulcus fixated IOL where inadequate posterior capsule support, was implanted. Core vitrectomy was done by 20G, 3 ports pars plana route. Preferably general anaesthesia was given. Local anaesthesia was given in cooperative children above 10 years of age.

### **Observation and Result**

All patients were examined on next day, then subsequently after 1 week, 1 month and 6 months. At each visit the patients were assessed under these headings – visual acuity, detailed slit lamp examination including status of wound & suture, IOP with applanation tonometry and dilated fundus examination.

The data thus collected was compiled and analysed using SPSS software package (version - 11.0).

A total of 290 subjects were included in the study and the results are analysed.

Out of total 290 study subjects, 208 (71.7%) were male and 82 (23.3%) were female. Left eye (52.5%) was found to be involved more frequently than right eye (44.5%) and bilateral involvement seen in 2.8% cases. The most common place of injury was outdoors (60.3%) i.e. during the sport activity and at home in 39.7% cases. Playing with injurious object was found to be the most common circumstance of injury in our study. Among all 42.1% patients presented to the hospital within 24

hours of injury, 41.7% within 2-3 days and 16.2% within 4-5 days.

The most common type of injury was type B in Open globe injury and type A in Close globe injury.

Out of 290 cases, 229 (79%) children required only conservative management, primary repair was done in 53 (18.3%) cases, only intravitreal injection was given in 2 (0.7%) cases, repair with intravitreal was given in 2 (0.7%) and core vitrectomy with intravitreal injection was given in 1 (0.3%) case. Primary evisceration was done in 1 (0.3%) case.

Visual acuity at presentation and final visual outcome was compared. 100% (196) children had good final visual acuity who presented with good visual acuity ( $\geq 6/60$ ) as compared to 44.1% (15) children who presented with poor VA ( $< 6/60$ ). Vision could not be checked in 58 cases.

**Table – 1** Incidence of ocular trauma in children

| Total number of OPD patients | Total number of pediatric patients | percentage of pediatric patients (%) | Total number of pediatric patients with h/o trauma | Incidence of trauma in pediatric patients (%) |
|------------------------------|------------------------------------|--------------------------------------|----------------------------------------------------|-----------------------------------------------|
| 45,140                       | 4,644                              | 10.3                                 | 405                                                | 8.7                                           |

**Table -2** Age distribution

| Age group (years) | Numbers (n) | Percentage % |
|-------------------|-------------|--------------|
| 0-5               | 106         | 36.5         |
| 6-10              | 117         | 40.4         |
| 11-16             | 67          | 23.1         |
| Total             | 290         | 100          |

**Table – 3** Objects causing injury

| Objects causing injury       | Numbers (n) | Percentages % |
|------------------------------|-------------|---------------|
| Stick                        | 91          | 31.4          |
| Stone                        | 30          | 10.3          |
| Ball                         | 18          | 6.2           |
| Hypodermic needle            | 5           | 1.7           |
| Glass                        | 4           | 1.4           |
| Caterpillar hair             | 23          | 7.9           |
| Study material (pencil, pen) | 6           | 2.1           |
| Finger/fist                  | 59          | 20.4          |
| Metallic fragment            | 21          | 7.2           |
| Bird's beak                  | 3           | 1.1           |
| Miscellaneous                | 30          | 10.3          |
| Total                        | 290         | 100           |

**Table - 4** Type of injury

| Diagnosis                                                 | Number (n) | Percentage % |
|-----------------------------------------------------------|------------|--------------|
| Superficial injury                                        | 176        | 60.7         |
| Corneal/corneo-scleral/scleral tear without lens changes  | 36         | 12.4         |
| Lid injury                                                | 15         | 5.2          |
| Corneal ulcer                                             | 11         | 3.8          |
| Endophthalmitis/ Panophthalmitis                          | 11         | 3.8          |
| Corneal/corneo-scleral/sclera tear with lens changes      | 10         | 3.4          |
| Blunt trauma with cataract                                | 5          | 1.7          |
| Blunt trauma with posterior segment complication          | 4          | 1.4          |
| Miscellaneous (hyphaema, angle recession, sphincter tear) | 22         | 7.6          |
| Total                                                     | 290        | 100          |

**Discussion**

Though many reports are available on ocular injury<sup>[3-6]</sup>, very little literature is available on ocular injuries in children in this part of India. The diagnosis and management of injury in children is a real challenge. In our study the incidence of ocular trauma in children was 8.7% of all paediatric eye patients. It differs from the study by Takvam JA et al<sup>[7]</sup>, who found it to be 14%. Majority 40.4% of cases were children of 6-10 years of age group, Jaison SG et al<sup>[8]</sup> and Das gupta S et al<sup>[9]</sup> and also many other studies have shown the preponderance of this age groups<sup>[7],[10-13]</sup>. In our study male to female ratio was 2.5:1. The high incidence, in boys, in this study is consistent with finding of most other studies<sup>[2],[10][14-19]</sup>.

Pointed object, particularly sticks were the most common causative agent in this study as well as others<sup>[8,9][20,21]</sup>. In our study one of the major factors contributing to ocular injury in children was playing with injurious materials (41.4%) like stick, bow & arrow and sharp plastic toys, which can be prevented. And 55.5% of ocular injuries were avoidable.

Ocular injuries during outdoor activity like sports accounts for 60.3%, where as domestic activity accounts only 39.7% which was consistent with the study by Narang S et al<sup>[21]</sup> but different from other studies<sup>[2][12][16,17][22,23]</sup>.

In our study mechanical trauma was classified according to the Ocular Trauma Classification

Group recommendation by Pieramici DJ at al<sup>[24]</sup>. We found predominantly Close globe injuries (75.2%) and Open globe injuries amounted to 19.6%, this is also consistent with the study by Takvam JA et al<sup>[7]</sup>. We also found that injuries caused by hypodermic needle<sup>[14][25]</sup> and bird's beak were mostly associated with endophthalmitis.

In our study most of the cases had better visual outcome. At the end of 6 months follow up 91.8% had best corrected visual acuity  $\geq$  6/60, 3.9% had  $<$  6/60 and no PL in 4.3% cases. This varies considerably from the study by Desai P et al<sup>[22]</sup>, where 10.7% had visual acuity  $\geq$  6/60 and no patient registered blind. Dasgupta S et al<sup>[9]</sup> found No PL in 7 patients. Among open globe injury cases 15.4% had visual acuity  $<$  6/60 and 25.6% had No PL in our study. This differs from the study by Thompson CG et al<sup>[16]</sup> who found the visual acuity  $<$  6/60 in 31% cases. 68% of perforated eye had No PL at the end of treatment in the study by Jaison SG et al<sup>[8]</sup>. Delayed presentation and poor visual acuity at presentation were the main risk factors for poor visual outcome in our study.

### Conclusion

Good visual acuity at presentation and prompt management are two favourable prognostic factors for visual outcome in ocular trauma. Penetrating injuries result in poorer visual outcome as compared to blunt injuries.

This study shows, in 55.5% cases the injury was avoidable. But this may not be so easy. In children of preschool age group at home, injury can be prevented by parental supervision, awareness of child's activities and use of proper protective measures. Public education, general awareness and aggressive primary management may be indicated to improve the visual prognosis in children.

**What is already known** –Trauma is the commonest cause of monocular blindness in pediatric age group. Various etiological factors and preventable causes have been described and vary from study to study.

**What this study adds** – The cases which attend ophthalmic care within 24 hours of injury have a better prognostic visual outcome than those who report late. Most of the injuries are preventable. To the best of our knowledge we have reported 3 cases of ocular trauma by bird's beak all culminating in blindness secondary to endophthalmitis

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**Conflicts of Interest:** Nil

### Contribution

1. Dr Jasmita Satapathy: patient selection, data collection, primary treatment, follow-up, data compilation
2. Dr Anita Minj: Patient selection, manuscript compilation
3. Dr Devi Aiswarya Das: Surgical intervention, data analysis and manuscript compilation
4. Dr Navnit Gupta: Surgical intervention, data analysis and manuscript compilation

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