

# Paediatric Ocular Trauma: A Population Based Study on Ocular Morbidity in Children and Prevention of Monocular Blindness in Cases Attending a Tertiary Care Teaching Hospital.

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## ABSTRACT

**Background:** Ocular trauma especially in children is an unpleasant occurrence. A protocol for timely presenting the patient before the nearest available physician or ophthalmologist and rapid evaluation of severity along with indispensable clinical management must be followed at all levels of healthcare. The aim of the study is to evaluate the causes and management of blunt ocular trauma in children and prevention of monocular blindness in a rural area in Bihar. Design of the study – A tertiary centre based retrospective and observational study. **Methods:** Children up to the age of fifteen years who presented with ocular trauma between September 2014 and February 2016 to the outdoor clinic of Department of Ophthalmology or any of the primary health centres of Katihar Medical College were undertaken for this study. **Results:** A total number of 212 children presented with ocular trauma. The minimum age at presentation was 1 year while the maximum was at 14 years and 9 months. Out of 212 cases, 159 (75%) were males and 53 (25%) were females. Blunt mode of ocular trauma was observed in 180 (85%) cases and was more common than penetrating mode of ocular trauma which was observed in 32 (15%) cases. Among the cases with blunt trauma, 132 (63%) received conservative treatment with weekly follow up for visual acuity. The remaining 80 (27%) underwent surgery. Post trauma the two most common complaints of visual impairment were compression of the globe in 30 (14%) cases followed by of corneal opacity in 19 (9%) cases. **Conclusion:** Ocular trauma in general particularly in children of is alarming. Majority of presenting cases are boys. There is a need for creating awareness among family members and school teachers. Emphasis must be laid on seeking quality treatment within shortest possible time. improved health care facilities should be provided at the primary health care levels.

**Keywords:** Blunt, Ocular, Paediatric, Trauma, Visual.

## INTRODUCTION

Blunt trauma forms a major part of ocular trauma. Balls and falls are the most common causes of blunt ocular trauma in the paediatric age group. It causes ocular damage by the mechanism of ocular compression. Concept of coup and countercoup injury similar to brain injury was used to explain the pathophysiology of blunt trauma to the eyeball.<sup>[1,2]</sup> Few examples of coup injuries in blunt trauma are corneal abrasions, subconjunctival haemorrhages, choroidal haemorrhages, and retinal necrosis and the best example of a countercoup injury is commotio retinae. Ocular trauma in children is a leading cause of visual morbidity. Ocular injuries accounts for approximately 8-14% of total injuries suffered by children.<sup>[3]</sup> Besides, direct damage to the ocular structures may result in loss of vision, poor visual outcome and amblyopia caused by prolonged period of light. Children are more prone to injuries because of their inability to avoid hazards.<sup>[4]</sup>

The male child is in particular more vulnerable to have eye injuries as compared its female counterpart<sup>[4,5]</sup>. Etiologically such injuries are largely accidental. Infants and children, less than 3 years of age sustain fewer injuries due to close parental supervision. Older children injure themselves by spikes of toys, pencils, arrows, needles, thorns and stones. Sports related injuries are common in children from 5-15 years of age.<sup>[4,5]</sup> Injuries by animal tail and bird beak are common in rural areas<sup>[5]</sup>. Thermal non-penetrating injuries caused by fire crackers and toy pistols on religious events such as Diwali, Eid and Shab-e-Barat lead to loss of many eyes every year<sup>[6]</sup>. This study was conducted with the sole aim of documenting ocular trauma in children in a rural area.

## MATERIALS AND METHODS

This retrospective observational study was conducted jointly by the Department of Ophthalmology and Department of Community Medicine of Katihar Medical College during September 2014 to February 2016 after obtaining permission from the Institutional Ethics Committee. All paediatric cases of ocular trauma less than 15 years of age who attended the primary health centres in rural areas under the Department of Community Medicine of Katihar Medical College and the

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outdoor clinic of Department of Ophthalmology of Katihar Medical College, directly or through referral, were included. A detailed history of each case was recorded followed by physical examination. Visual acuity was measured at the time of presentation. Pre-school and school going children were examined using appropriate methods and different methods were used to assess the visual acuity of literate and illiterate children. Ocular examination was performed using with slit lamp, hand held slit lamp and direct ophthalmoscope and fundoscopy was performed using an indirect ophthalmoscope. Cases with insignificant ocular damage or with minor subconjunctival haemorrhage were discharged and advised for follow up. Foreign bodies lodged superficially were removed under local anaesthesia. Cases diagnosed with corneal abrasions or lacerations were prescribed antibiotic or antifungal eye drops. Ointments and cycloplegics were also prescribed depending on the severity of trauma. Cases with uveitis were treated with either with topical or systemic corticosteroids. Cases of hyphaema were treated with conservative approach such as bed rest and topical medication. Cases presenting with penetrating ocular injuries required surgeries. The same was performed in the O.T. under G.A. using operating microscope. Globe repair was done as early as possible in cases of globe damage or damage to several intraocular structures. Following these procedures, cases discharged were advised weekly follow up for visual acuity and final visual acuity was recorded after 6 months. Cases with prior management of long standing trauma were excluded from this study. Statistical analysis of data was performed.

## RESULTS

Two hundred and twelve children attended the primary health centres of Katihar Medical College and the outdoor clinic of Ophthalmology of Katihar Medical College from September 2014 to February 2016. The minimum and maximum presenting ages were 1 year and 14 years and 9 months respectively [Table 1]. Out of these 212 students, 159 and 53 were males and females respectively. In male children the right eye and left eye were involved in 93 (58%) and 66 (42%) cases respective. In female children the right eye and left eye were involved in 37 (70%) and 16 (30%) cases respectively. Blunt mode of trauma was the most frequently observed mode of injury among children. It was seen in 180 (85%) cases. Other modes observed are described in tabular form. Most common finding seen in cases after ocular trauma was subconjunctival haemorrhage, which was seen in 39 (18%) cases followed by corneal lesions seen in 19 (9%) cases [Table 2]. Damage to multiple ocular structures was seen in 23 (11%) cases. Surgical intervention was required only in 80 (27%) cases. Compressed globe

was the most common cause of decreased vision and was seen in 31 (14%) cases followed by corneal opacity in 11 (5%) cases [Table 2].

**Table 1:** Distribution of gender and age among presenting cases.

Gender	No. of patients	Minimum Age	Maximum Age
Male	159 (75%)	1 year	14 years 9 months
Female	53 (25%)	1 year 2 months	13 years 3 months

**Table 2:** Ophthalmic findings among presenting cases

Clinical signs on examination	Frequency among presenting cases
Conjunctival tear	5 (2.3%)
Corneal abrasion	27 (12.7%)
Corneal abscess	21 (9.9%)
Corneal foreign body	4 (1.9%)
Corneal opacity	7 (3.3%)
Corneal tear	5 (2.3%)
Dislocated lens	6 (2.8%)
Ecchymosis	9 (4.2%)
Endophthalmitis	12 (5.7%)
Hyphaema	9 (4.2%)
Lid tear	16 (7.5%)
Multiple ocular structure damage	22 (10.4%)
Retinal detachment	5 (2.3%)
Retinal oedema	3 (1.4%)
Scleral tear	2 (0.94%)
Subconjunctival haemorrhage	39 (18.4%)
Subluxated lens	6 (2.8%)
Traumatic cataract	2 (0.94%)
Uveitis	11 (5.1%)
Vitreous haemorrhage	1 (0.47%)
Total	212

## DISCUSSION

Children are more susceptible to ocular trauma because of their immature motor skills and curious nature.<sup>[7]</sup> Ocular trauma is the leading cause of acquired monocular blindness in young patients.<sup>[8]</sup> Our study focuses on the causes of eye injuries in children who presented to the primary health centres under the Department of Community Medicine or to the Department of Ophthalmology of our medical college. We also evaluated the severity and clinical management in these paediatric patients. Male children were observed to be more susceptible than their female counterparts.<sup>[8]</sup> Adult supervision has been found to play an important role in the prevention of paediatric ocular injuries. Children less than 3 years of age sustain fewer injuries because of close supervision by parents.<sup>[8]</sup> The male children are more affected as they tend to spend more time outdoors. We observed higher percentage of cases sustaining close globe injuries in our study. Ocular trauma among 126 children in Nepal and their visual outcome has been reported.<sup>[9,10]</sup> The injury caused by blunt object was seen in 180 (85%). In a study that looked at the medical records of 481 children of up to 16 years who had sustained ocular trauma, about

51% injuries were of open-globe type and 37.6% were closed-globe injuries.<sup>[10,11]</sup> Our study showed that vegetative material and wooden sticks were among the commonest causative agents. The injuries from plastic pellets and firecrackers on religious events accounted for significant number of ocular injuries and if early treatment is not provided, may lead to ocular damage either because of trauma but also due to late presentation because of government holidays on these events. The visual prognosis of eye injuries improves when prompt examination, diagnosis and treatment is provided. However socioeconomic, cultural and awareness factors may also play a role in receiving timely attention. A significant number of children of children in this study received medical attention during 24 hours after injury. Open-globe injuries generally result in poorer visual outcome compared to their close-globe counterparts.<sup>[11,12]</sup> Blunt trauma involving anterior segment has better visual outcome than when posterior segment is involved.<sup>[12]</sup> The non-perforating vegetative trauma can cause corneal erosions and ulcers, which can be complicated by polymicrobial infections leading to severe visual deterioration<sup>[13]</sup>. Therefore, proper antimicrobial treatment is required at an early stage. The traumatic hyphaema is usually managed conservatively. The glaucoma resulting from trauma may have early, intermediate and delayed presentation. The lens injuries can lead to traumatic cataract formation or subluxation of crystalline lens.<sup>[13,14]</sup> The perforating anterior segment trauma may cause corneal or scleral injury with varying degree of uveal tissue, lens and vitreous involvement. Unrepaired cases may carry a potential risk of endophthalmitis and panophthalmitis. The reported incidence of post-traumatic endophthalmitis is high compared to intraocular surgery.<sup>[14]</sup> The posterior segment involvement adversely affects visual outcome.<sup>[15]</sup> Manifestations such as commotio retinae, choroidal rupture, macular hole, retinal breaks and retinal detachment are critical for improvement of visual acuity. Patients with traumatic retinal detachments need to be operated as early as possible irrespective of the delay in presentation.

## CONCLUSION

Ocular injuries in paediatric age group are to be taken seriously. Most can be prevented by promoting general awareness and first aid techniques among parents and schoolteachers. Child labour should be discouraged and children exposed to firecrackers during festivals must be properly supervised. Better health care facilities should be provided at both levels of primary and secondary health care centres for prevention of ocular morbidity. Health care workers should be trained for avoiding delay in seeking timely treatment for ocular trauma. This

article is a community based study and is in the interest of public health and public safety.

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