

# Hospital Based, Prospective Study to Identify Various Etiological Factors Involved in the Causation of Pediatric Ocular Injuries

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## Abstract

**Aim:** To identify various etiological factors involved in the causation of pediatric ocular injuries, implementation of preventive measures in the population, and the visual outcomes in pediatric ocular trauma.

**Methodology:** This hospital based, prospective, interventional, study was conducted over 1 year. 100 consecutive patients at the Department of Paediatric Surgery, Mahavir Vaatsalya Asptal, Patna, Bihar, India. Cases of ocular trauma in children aged 16 years or younger were evaluated. The patients who required admission were admitted and appropriate treatment was given the rest were managed on an outpatient department (OPD) basis. Patients were followed up on an OPD basis one week, four weeks, eight weeks and till six months. Data were analyzed by using descriptive statistics (SPSS 17).

**Results:** A total of 100 patients were included in this study. Among the patients 67 were male and rest 33 females in all age groups. Most of ocular injuries were in the age group > 5 – 10 years (45%) followed by 0 – 5 years (36%). Majority of the patients were from rural (43%) and semi urban (28%) background. Parents of 34% subjects had no formal education while parents with only primary education constituted 38% of the sample and secondary education 13%. Regarding location of injury it was observed that in our study most of the injuries occurred inside home (36%), followed by injury in play grounds (23%). Injuries in streets / road and schools accounted for 22% and 19%, respectively. Mechanical injuries were the leading cause for pediatric ocular trauma accounting for 74% cases, followed by 14% thermal/ firework injuries, and 12% chemical injuries. 36% of patients presented with 6/18 or better visual acuity while 28 % had visual acuity up to 3/60. Rest had no perception of light or poor than 3/60 visual acuity at presentation. After appropriate treatment 47% patients had 6/18 or better acuity.

**Conclusion:** Our study concludes that ocular injuries are a major cause of pediatric blindness in the Bihar region. Timely referral and management can help to prevent blindness originating from ocular trauma. Follow-ups of children are important for treating complications in the long term. It is very essential to educate children, parents, and teachers regarding ocular health and hygiene in order to minimize eye injuries.

**Keywords:** ocular, trauma, children

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## Introduction

Ocular injury is one of the common causes of acquired blindness in children. The consequences of childhood injury are harmful as it leads to permanent blindness and visual handicap. It adds to the economic burden on the society. It also affects the psychological, social, and emotional development of a child. At the same time, parents are also worried about the future of the child. The impact of trauma on a human eye may range from occurrence of minute corneal abrasions/innocuous sub-conjunctival hemorrhage to a badly lacerated globe. A large number of ocular injuries require posterior segment intervention.

Although eye represents only 0.1% of the total and 0.27% of the anterior body surface area, they are the third most common organ affected by injuries after hands and feet [1]. Ocular trauma is the leading cause of mono-ocular visual disability and non-congenital mono-ocular blindness [2, 3]. Worldwide there are approximately 1.6 million people blind from eye injuries and 2.3 million bilaterally visually impaired [4, 5]. Most of ocular trauma occurs in developing countries [6, 7]. Hospital based studies of eye trauma indicate that about two-third of those affected were males, predominantly children and young adults [7].

Ocular injuries have been broadly classified into two types: (1) open and closed globe and (2) adnexal injuries. Open globe injury is an emergency and requires immediate attention.<sup>7</sup> Childhood eye injury is different from adult ocular trauma in terms of the objects involved in causing injury, evaluation, and management protocols [8]. Childhood eye trauma includes a range of corneal surface abrasions to corneal and scleral perforations. The majority of ocular injuries in children are preventable by

taking minor precautions and identification of risk factors for ocular injury [9, 10].

Children are not aware of the objects or circumstances which can lead to severe ocular injury [11]. Pediatric ocular trauma has a significant impact on the future quality of life as injured eyes in this age group are more prone to amblyopia [12]. Disabilities caused by ocular trauma can lead to long term psychological and social problems for the individual. Due to longer life expectancies these problems are more pronounced in pediatric cases [13].

90% of ocular injuries are preventable [14]. Clinico-epidemiological study may help in determining the most effective measures to prevent visual loss which varies from country to country. Therefore, the present study was carried out to identify various etiological factors involved in the causation of pediatric ocular injuries, implementation of preventive measures in the population, and the visual outcomes in pediatric ocular trauma.

## Materials and Methods

This hospital based, prospective, interventional, study was conducted over 1 year .100 consecutive patients at the Department of Paediatric Surgery, Mahavir Vaatsalya Aspatal, Patna, Bihar, India

### Inclusion criteria:

Cases of ocular trauma in children aged 16 years or younger

### Exclusion criteria:

Children who had birth injuries, superficial injury e.g. conjunctival foreign body, ocular injury more one month duration, injury repaired elsewhere or who had injury in blind / atrophic eye, those who had follow-up period <6 month and comatose or unconscious patients were excluded from the study.

## Methodology

The following data was retrieved from all the study subjects-Demographic profile: (Age, sex, Date, time, cause and type of trauma) and clinical and radiological findings: (laterality, size & location of injury, structural involvement, Initial and final visual acuity etc.). The patients who required admission were admitted and appropriate treatment was given the rest were managed on an outpatient department (OPD) basis. Patients were followed up on an OPD basis one week, four weeks, eight weeks and till six months. Data were analyzed by using descriptive statistics (SPSS 17).

## Results:

Table 1: A total of 100 patients were included in this study. Among the patients 67 were male and rest 33 females in all age groups. Most of ocular injuries were in the age group > 5-10 years (45%) followed by 0-5 years (36%). Majority of the patients were from rural (43%) and semi urban (28%) background. Parents of 34% subjects had no formal education while parents with only primary education constituted 38% of the sample and secondary education 13%. However 15% parents had higher education. Majority of the study subjects belonged to average (44%) and low (29%) family income group.

**Table 1: Characteristics of Study Subjects**

Characteristics	No
<b>Gender</b>	
Male	67
Female	33
<b>Age group ( in years)</b>	
0-5	36
>5-10	45
>10-16	19
<b>Habitat</b>	
Rural	43
Semi Urban	28
Urban	29
<b>Level of Education</b>	
Illiterate	34
Primary school	38
Secondary school	13
Higher education	15
<b>Family Income</b>	
Low	29
Average	44
High	27

Table 2: Regarding location of injury it was observed that in our study most of the injuries occurred inside home (36%), followed by injury in play grounds (23%).

Injuries in streets / road and schools accounted for 22% and 19%, respectively.

Mechanical injuries were the leading cause for pediatric ocular trauma accounting for 74% cases, followed by 14% thermal/ firework injuries, and 12% chemical injuries.

**Table 2: Characteristics of Ocular Injury**

<b>Characteristics</b>	<b>No</b>
<b>Place of Injury</b>	
Home	36
Play ground	23
Road / Street	22
School	19
<b>Time of Injury</b>	
Morning	31
Mid-day	51
Evening	18
<b>Source of Injury</b>	
Mechanical Injury	74
- Projectile objects	24
- Sharp objects	20
- Fall / hits	16
- RTA	14
Thermal / Fire work Injury	14
Chemical Injury	12

Table 3: Commonest type of injury were injury of ocular adnexal (44%) and globe injuries (56%), out of which open globe

injuries constituted 31% and rest were closed globe injuries 25%. 21% had orbital fracture.

**Tables 3: Distribution of types Injuries**

<b>Types Injuries</b>	<b>No.</b>
<b>Adnexal Injury</b>	44
Orbital Fracture	21
Lid & Periocular Injury	23
<b>Globe Injury</b>	56
<b>Closed Globe Injury</b>	25
Lamellar Laceration	8
Contusion	17
<b>Open Globe Injury</b>	31
Full thickness Laceration	22
Intraocular Foreign Body (IOFB)	5
Globe Rupture	4

**Table 4: Distribution of initial and final visual acuity**

<b>Visual Acuity</b>	<b>At presentation</b>	<b>After treatment</b>
<b>6/6 – 6/18</b>	36	47
<b>&lt;6/18 -3/60</b>	28	31
<b>&lt;3/60 -NPL</b>	23	13
<b>Unknown</b>	13	9
<b>Total</b>	<b>100</b>	<b>82</b>

Table 4 shows the distribution of visual acuity of ocular injury patients at presentation and their best corrected visual acuity after treatment. 36% of patients presented with 6/18 or better visual acuity while 28 % had visual acuity up to 3/60. Rest had no perception of light or poor than 3/60 visual acuity at presentation. After appropriate treatment 47% patients had 6/18 or better acuity.

### Discussion:

Ocular trauma is an important cause of blindness and ocular morbidity. Most previous studies on the profile and prognostic factors in ocular trauma have been carried out in more developed countries where modern facilities for managing ocular trauma are widely available [15, 16]. Eye injuries account for approximately 8-14% of total injuries in children [17, 18]. Generally young children are more susceptible to eye injuries because of their immature motor skills, exposure to outdoor games, curious nature and their tendency to imitate adult behavior without evaluating risks [19]. They have physical vulnerability, lack of coordination and limited ability to avoid or escape from traumatic agents [11, 12]. Pediatric ocular injuries are distinct from those in adults, since such injuries are mainly accidental in nature and their diagnosis and treatment is always challenging. In children, post-operative management and visual rehabilitation is also very difficult and sub optimal care can lead to development of amblyopia [13, 17].

In our study, most of ocular injuries were in the age group > 5 – 10 years (45%) followed by 0 – 5 years (36%), similar to findings of Dulal S [3], McEwen [20] and Al-Bdour [21]. El- Sebaity et al [11] observed children < 7 years age group are most (50.7%) vulnerable to ocular trauma. Previous studies have reported that sex of the patient is important factor for eye injuries to children. This trend has been

attributed to the adventurous and aggressive nature of boys and they avail more freedom compared to female in all societies making them prone to ocular injury [13, 22, 23]. In our study 67% were male and rest 33% females in all age groups. Other study also show similar incidence of ocular trauma in males as compared to females [4, 24]. In our study, commonest place of injury was home (36%) followed by playground (23%) and Road /Street (22%). Our finding in this regard is in concordance to previous studies [3, 25, 26]. However MacEwenetal[20] has found 51% and Kaur A et al [27] observed 45.62% injury at home. El Sebaity et al [11] reported high proportion of pediatric ocular trauma occurring on road (54.7%) in contrast to findings of Dulal et al [3], who reported only 0.2% injuries on road. In our study it was found that 74% of all injuries in children were caused by mechanical trauma. While thermal injury was present in 14% of patients, rest had chemical or animal related injuries. Knife and scissor are found in virtually every household. It is important that these items be kept out of reach of children and used only under adult's supervision.

In this study, open globe injuries constituted 31% of all cases while closed globe injuries were present in 25% cases. Krishnan et al [28] also reported high incidence (69.20%) of open globe injury in India. Injuries caused by fishhook, traditional games like Gulli-danda and Bows & arrows are prevalent in rural areas [27]. We found that open globe injuries, in general, carries a poor prognosis and are more likely to require surgical intervention [22]. Road traffic accident often causes severe ocular injury. Ocular involvement in RTA does not show any age preference [27]. 23% of the children had either <3/60 or no perception of light. It was observed that visual prognosis in children is still

worse than adults due to earlier development of amblyopia.[29]

### Conclusion:

Our study concludes that ocular injuries are a major cause of pediatric blindness in the Bihar region. Timely referral and management can help to prevent blindness originating from ocular trauma. Follow-ups of children are important for treating complications in the long term. It is very essential to educate children, parents, and teachers regarding ocular health and hygiene in order to minimize eye injuries. Formation of a rapid action ocular trauma team may help to treat pediatric ocular trauma and create awareness and educate child, family, and society regarding ocular trauma.

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