

PROFILE OF PEDIATRIC OCULAR TRAUMA AT A TERTIARY EYE CARE CENTRE IN NORTHERN INDIA

Rajendra P Maurya^{1,*}, Virendra P. Singh², Ishan Yadav³,
Mahendra K. Singh⁴, C.P.Mishra⁵, Prithvi R. Sen⁶, Abhijeet Kunwar⁷

¹Assistant Professor, ^{2,4}Professor, ³Senior Resident, Department of Ophthalmology,

⁵Professor, Department of Preventive and Social Medicine,

⁶Senior Medical Officer, Emergency Outpatient Department,

⁷Senior Resident, Trauma Center

Institute of Medical Sciences, Banaras Hindu University, Varanasi-221005 UP, India

***Corresponding Author:**

Email: mauryarp_bhu@yahoo.com

ABSTRACT

Purpose: To evaluate the pattern, causes and treatment outcome of ocular trauma in pediatric age group.

Methods: This prospective interventional study was conducted among all patients, up to 16 years of age, with ocular trauma, who visited the Ophthalmology OPD and Emergency OPD of S S Hospital, Banaras Hindu University, Varanasi between October 2011 to April 2014. The Demographic data, causes, type, extent & severity of injuries and impact on vision were identified and analyzed.

Results: Out of 82 patients, 54 (65.85%) were boys and 28(34.15%) were girls. The age ranged from 2 -16 years. Mechanical injuries accounted for 78.05%, while rests were chemical (12.20%) and thermal / firework injury (9.76%). Most of the injuries occurred at home (n=28, 34.15%) while rest (66.85%) occurred away from home e.g. playground (n=20, 24.39%), street/Road (n=18, 21.95%) and school (n=16, 19.51%). Most common cause of injury was projectile objects like ball/ stone/ toy gun /gulli (24.39%), followed by sharp objects like knife/needle/wire (19.51%), fall (15.85%), RTA (14.63%) and firework /cracker (9.76%) while the least common cause was animal injury (4.88%). Commonest type of injury was globe injury (51.22%) followed by Lid & partcular injury (43.90%) and orbital fracture (21.95%). 29.27% had open globe injury while 21.95% had closed globe injury. Left eye was affected in 46.34%, Right eye in 42.68 %, while in 10.98 % cases both the eyes were injured. The most common complication was hyphema (31.70%) followed by traumatic cataract (21.95%), iris prolapse/ iridodialysis (19.51%), vitreous hemorrhage/retinal detachment (14.63%), endophthalmitis (6.10%) and disorganized globe or phthisis (13.41%). 47.56 % injured children were treated surgically while rest 52.44 % were managed by medical treatment .Initial visual acuity was good (> /= 6/12) in 36.59%, moderate vision(6/18-6/60) in 26.83% and poor vision (<6/60) in 21.95% while assessment was not possible in 14.63%. Final visual acuity was 6/18 or better in 46.34 %, between <6/18 to 3/60 in 21.95% and <3/60 to no PL in 19.51%. Final visual acuity could not be evaluated in 12.20 % cases.

Conclusion: This study emphasizes the need for eye injury prevention in children particularly during playing and while moving on road / street.

Key words: Blunt trauma, Corneal laceration, Cracker injury, Hyphema, Penetrating injury

INTRODUCTION

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].

Children are not aware of the objects or circumstances which can lead to severe ocular injury [8]. 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 [9]. 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 [10]. 90% of ocular injuries are preventable [11]. Clinico-epidemiological study may help in determining the most effective measures to prevent visual loss which varies from country to country.

Clinico-epidemiological information regarding pediatric ocular trauma in developing countries are very scarce. There is paucity of population based data to accurately estimate the magnitude of ocular trauma in children in terms of the characteristics at risk, causes of injury, environmental determinants and clinical profile. Hence this study was conducted to evaluate the pattern, causes and treatment outcome of pediatric ocular trauma in this part of country.

METHODS

This hospital based, prospective, interventional, study was conducted over 2 years period at the emergency OPD and Ophthalmology OPD, S S Hospital, Institute Of Medical Sciences, BHU, Varanasi, UP, India. Study included 82 consecutive cases of ocular trauma in children aged 16 years or younger. Children who had birth injuries, superficial injury eg. 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.

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

Based on our selection criteria, a total of 82 patients were included in this study. Among the patients 54 (65.8%) were male and rest 28 (34.15%) females in all age groups (Table 1 & 2). Most of ocular injuries were in the age group > 5 – 10 years (43.9%) followed by 0 – 5 years (37.80%). Majority of the patients were from rural (n=38, 46.34%) and semi urban (n=26, 31.71%) background. Parents of 30(36.59%) study subjects had no formal education while parents with only primary education constituted 35.37% of the sample and secondary education 14.63%. However 11(13.41%) parents had higher education. Majority of the study subjects belonged to average (47.54%) and low (30.49%) family income group (Table 1).

Regarding location of injury it was observed that in our study most of the injuries occurred inside home (34.15%), followed by injury in play grounds (24.4%). Injuries in streets / road and schools accounted for 21.95% and 19.5%, respectively (Table 3). The right eye was involved in 35 (42.68%) subjects, left eye in 32 (39.02%) cases and the injury was bilateral in 15 (18.29%) cases [figure 1]. Mechanical injuries were the leading cause for pediatric ocular trauma accounting for 78.05% cases, followed by 12.20% thermal/ firework injuries [figure 2a & 2b, 3] and 9.75 % chemical injuries (Table 4 & figure 4).

Among the mechanical causes, ocular injuries caused by projectile objects was 24.39% (stone/ ball / gulli/ toy gun) [figure 5] followed by sharp objects (19.5%) like knife/ needle/ wire [figure 6] while rest of the injuries were caused by fall/hit (n=13, 15.85%) and RTA (n=12, 14.63%) [Figure 7 & 8], (table 3). Most common mode of trauma was blunt mechanism (n=46, 56.10%) [Table5]. Commonest type of injury were injury of ocular adnexae (n=47,57.32%) and globe injuries (n=42,51.22%), out of which open globe injuries constituted 29.27% and rest were closed globe injuries (21.95%). 21.95% had orbital fracture [table 4 , figure 7 & 8] The most common complication was hyphema (31.7%) while traumatic cataract occurred in 21.95% , iris prolapse / iridodialysis in 19.5% , vitreous prolapsed [figure 9] or hemorrhage /retinal detachment in 14.63% and phthisis bulbi presented in 13.4% cases .

Table 6 shows the distribution of visual acuity of ocular injury patients at presentation and their best corrected visual acuity after treatment. 36.6% of patients presented with 6/18 or better visual acuity while 26.8 % had visual acuity up to 3/60. Rest (21.9%) had no perception of light or poor than 3/60 visual acuity at presentation. After appropriate treatment 46.3% patients had 6/18 or better acuity [table 6].

Tables 1: Characteristics of Study Subjects

| Characteristics | No | % |
|------------------------------|----|-------|
| Total | 82 | 100 |
| Gender | | |
| Male | 54 | 65.85 |
| Female | 28 | 34.15 |
| Age group (in years) | | |
| 0-5 | 31 | 37.80 |
| >5-10 | 36 | 43.90 |
| >10-16 | 15 | 18.30 |
| Habitat | | |
| Rural | 38 | 46.34 |
| Semi Urban | 26 | 31.95 |
| Urban | 18 | 21.71 |
| Level of Education | | |
| Illiterate | 30 | 36.59 |
| Primary school | 29 | 35.37 |
| Secondary school | 12 | 14.63 |
| Higher education | 11 | 13.41 |
| Family Income | | |
| Low | 25 | 30.49 |
| Average | 39 | 47.54 |
| High | 18 | 21.95 |

Tables 2: Age and Sex wise Distribution

| Age in Years | Male % | | Female % | | Total % | |
|--------------|-----------|--------------|-----------|--------------|-----------|---------------|
| 0-5 | 21 | 25.61 | 10 | 12.20 | 31 | 37.80 |
| >5-10 | 24 | 29.27 | 12 | 14.63 | 36 | 43.90 |
| >10-16 | 09 | 10.97 | 06 | 7.32 | 15 | 18.30 |
| Total | 54 | 65.85 | 28 | 34.15 | 82 | 100.00 |

Tables 3: Characteristics of Ocular Injury

| Characteristics | No | % |
|----------------------------|----|-------|
| Place of Injury | | |
| Home | 28 | 34.15 |
| Play ground | 20 | 24.39 |
| Road / Street | 18 | 21.95 |
| School | 16 | 19.51 |
| Time of Injury | | |
| Morning | 24 | 29.27 |
| Mid-day | 40 | 48.78 |
| Evening | 18 | 21.95 |
| Source of Injury | | |
| Mechanical Injury | 64 | 78.04 |
| - Projectile objects | 20 | 24.39 |
| - Sharp objects | 16 | 19.51 |
| - Fall / hits | 13 | 15.85 |
| - RTA | 12 | 14.63 |
| Thermal / Fire work Injury | 10 | 12.20 |
| Chemical Injury | 8 | 9.75 |

Tables 4: Distribution of types Injuries

| Types Injuries | No. | % |
|--------------------------------|-----|-------|
| Adnexal Injury | 47 | 57.32 |
| Orbital Fracture | 18 | 21.95 |
| Lid & Periocular Injury | 36 | 43.90 |
| Globe Injury | 42 | 51.22 |
| Closed Globe Injury | 18 | 21.95 |
| Lamellar Laceration | 6 | 7.32 |
| Contusion | 12 | 14.63 |
| Open Globe Injury | 24 | 29.27 |
| Full thickness Laceration | 18 | 21.95 |
| Intraocular Foreign Body(IOFB) | 4 | 4.88 |
| Globe Rupture | 6 | 7.32 |

Table 5: Comparison of mechanism of Ocular injuries

| Mechanism of Injury | Present Study % of Cases | Krishnan M etal % of Cases | Bukhari S et al % of Cases | Mac.Ewan etal % of Cases |
|---------------------|--------------------------|----------------------------|----------------------------|--------------------------|
| Blunt | 56.10 | 30.80 | 51.00 | 65.00 |
| Penetrating | 21.95 | 69.20 | 29.00 | 24.00 |
| Chemical | 9.75 | - | 1.00 | 1.00 |

Tables 6: Distribution of initial and final visual acuity

| Visual Acuity | At presentation | | After treatment | |
|-----------------------|-----------------|---------------|-----------------|---------------|
| | No | % | No | % |
| 6/6 – 6/18 | 30 | 36.59 | 38 | 46.34 |
| <6/18 -3/60 | 22 | 26.83 | 18 | 21.95 |
| <3/60 -NPL | 18 | 21.95 | 16 | 19.51 |
| Unknown | 12 | 14.63 | 10 | 12.20 |
| Total | 82 | 100.00 | 82 | 100.00 |

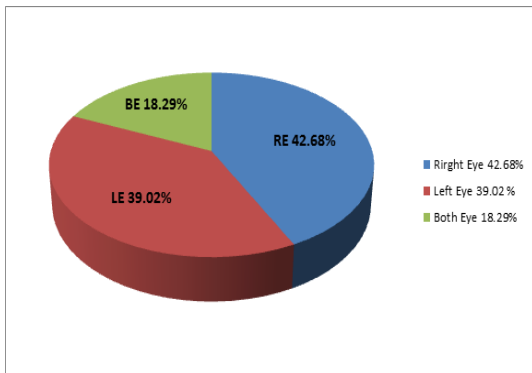


Figure. 1: Distribution according to Laterality



(2b)

Figure. 2: Photograph (a) showing thermal flame burn& (b) Corneal burn with hot stick (Agarbatti)



(2a)



Figure 3: Photograph showing Right eye injury due to cracker

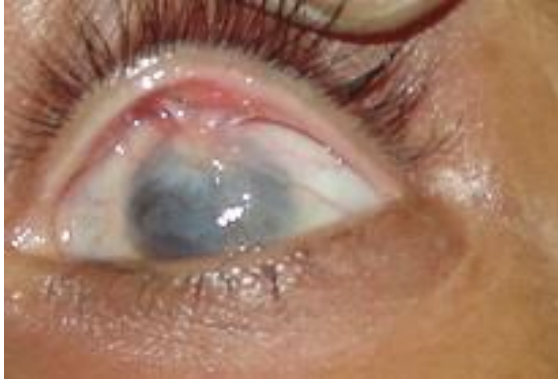


Figure 4: Photograph showing Post Alkali burn (Symblepheron)



(5a)



(5b)

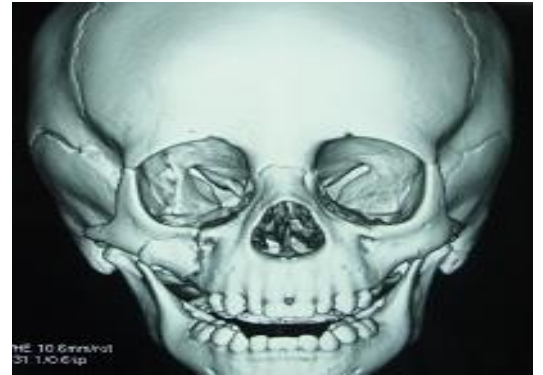
Figure 5 (a & b): Left eye open globe injury with hyphema & prolapsed iris due to blunt projectile object (Gulli).



Figure 6: Right eye Penetrating corneal injury by fishhook



(7a)



(7b)

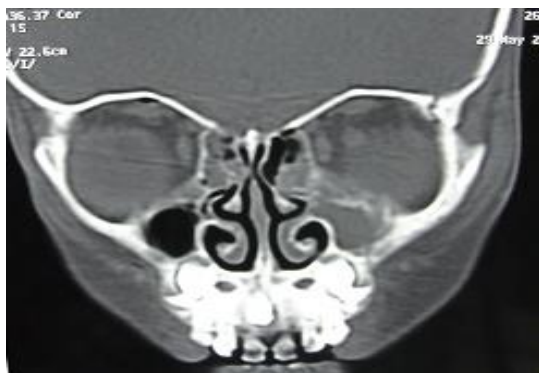
Figure 7: (a) Orbital trauma due to fall from height, (b) 3 Dimensional CT Scan showing fracture of temporal bone & lateral orbital wall, floor of left orbit & maxilla.



(8 a)



(8b)



(8c)

Figure 8: (a) Orbital trauma due to Road traffic accident, (b) 3 Dimensional & (c) coronal view of CT scan showing fracture of frontal bone, medial orbital wall, floor & roof of left orbit.



(9a)

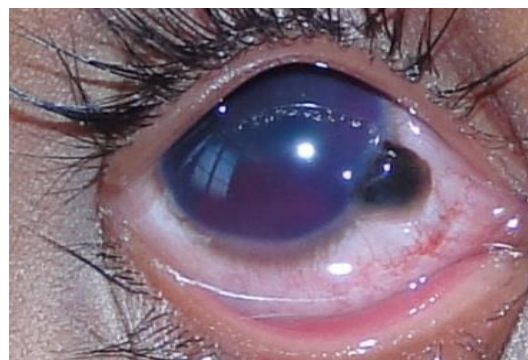


(9b)

Figure 9 (a & b): Corneoscleral laceration with hyphema & iris incarceration (a), Open globe injury with prolapsed vitreous & uveal tissue (b)



(10 a)



(10 b)



(10 c)

Figure 10: Photograph (Pre-operative) showing Right eye penetrating injury with Bow & Arrow (a & b) Post-operative photograph (C).



Figure 11: Photograph showing severe laceration of Right side of face, lids & forehead

DISCUSSION

Eye injuries account for approximately 8-14% of total injuries in children [12, 13]. 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 [14]. They have physical vulnerability, lack of coordination and limited ability to avoid or escape from traumatic agents [8, 9]. 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 [10, 12].

In our study 43.9 % of the study subjects belonged to 5-10 years age group, similar to findings of Dulal S [3], McEwen [15] and Al-Bdour [16]. El-Sebaity et al [8] observed that 2- < 7 years age group people 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 [10, 17, 18]. In our study males (65.85%) sustained injuries nearly twice as females (34.15%). Other study also show similar incidence of ocular trauma in males as compared to females [4, 19]. In our study, commonest place of injury was home (34.15%) followed by playground (24.39%) and Road /Street 21.95%. Our finding in this regard is in concordance to previous studies [3, 20, 21]. However MacEwen et al [15] has found 51% and Kaur A et al [22] observed 45.62% injury at home. El Sebaity et al [8] 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 78.04% of all injuries in children were caused by mechanical trauma. While thermal injury was present in 12.2% 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 29.27 % of all cases while closed globe injuries were present in 21.95% cases. Krishnan et al [23] also reported high incidence (69.20%) of open globe injury in India. Injuries caused by fishhook, traditional games like Gulli-danda and Bows & arrows [figure 10 a,b,c] are prevalent in rural areas[22]. We found that open globe injuries, in general, carries a poor prognosis and are more likely to require surgical intervention [17]. Road traffic accident often causes severe ocular injury [figure 11]. Ocular involvement in RTA does not show any age preference [22]. 19.51% 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.

CONCLUSION

Pediatric ocular trauma can cause loss of vision, cosmetic and personality defects. Our data support the need for prevention of eye injury in children. The parents, elders, caretakers and teachers have an important role to play in prevention by recognizing hazardous situation and adopting

appropriate preventive measures and protective devices. There is need of sensitizing people regarding psychological and economical impact of injury. Legislation is needed to ban / discourage the use of crackers, gulli danda & bows and arrows by children. Media can play important role in creating awareness or sensitizing the mass regarding prevention of ocular trauma.

REFERENCES

1. Norbder E .Injuries as a public health problem in sub-Saharan Africa: Epidemiology and prospects for control. *East Afr Med J* 2000; 77: 1-43.
2. Carolene J, MacEwen C J ,Paul S, Baines P, Desai P. Eye injuries in children: the current picture. *Br J Ophthalmol*.1999;83:933-6.
3. Dulal S, Ali JB, Sapkota YD. Profile of pediatric ocular trauma in mid hilly region of Nepal. *Nepal J Ophthalmol*.2012;4(7):134-137.
4. Serrano JC, Chalela P, Arias JD. Epidemiology of childhood ocular trauma in Northeastern Colombian region .*Arch Ophthalmol* 2003; 121:1439-1445.
5. Pizzarello LD. Ocular trauma: time for action. *Ophthalmic Epidemiol* 1998;5:155-116.
6. Strahlman E, Elman M, Daub E, Baker S. Causes of pediatric eye injuries. A population based study. *Arch Ophthalmol* 1990; 108:603-606.
7. Lithander J, Al Kindi H, Tonjum AM. Loss of visual acuity due to eye injuries among 6292 school children in the Sultanate of Oman. *Acta Ophthalmol Scand*. 1999; 77: 697-99.
8. El-Sebaity, Soliman W, Soliman A MA, Fathalla A M. Pediatric eye injuries in Upper Egypt. *Clinical Ophthalmol* 2011;5: 1417-1423.
9. Negral AD, Thlefors B. The global impact of eye injuries. *Ophthalmic epidemiology*. 1998;5: 143-69.
10. Niiramen M, Raivio I. Eye injuries in children. *Br J Ophthalmol* 1981;65 (6):436-438.
11. Christopher J L, Murray, Theo Vos, Rafael L, Naghavi M , Flaxman AD, Michaud C, Ezzati M , Shibuya K et al. Disability – adjusted life years (DALYs) for 291 disease and injuries in 21 regions. 1990-2010: a systemic analysis for the Global burden of disease study 2010. *Lancet* 2012; 380 (9859): 2197-2223.
12. Eravin-Mulvey LD, Nelson LB, Freeley DA. Pediatric eye trauma. *Pediatr Clin North Am*. 1983; 30(6): 1167-1183.
13. Takvam J A and Midelfart A. Survey of eye injuries in Norwegian children. *Acta Ophthalmol (Copenh)* 1993;71:500-505.
14. Thordarson U, Ragnarsson AT, Gudbrandsson B. Ocular trauma: observation in 105 patients. *Acta Ophthalmol (Copenh)* 1979;57 (5) :922-928.
15. MacEwen C J, Baines PS and Desai P. Eye injuries in children: the current picture. *Br J Ophthalmol* 1999; 83: 933-936.
16. Al- Bdour M D and Azab M A. Childhood eye injuries in North Jordan. *Int Ophthalmol* 1998;22: 269-273.
17. Bukhari S, Mahar P S, Qidwai U, Bhutto I A, Memon A S. Ocular trauma in children 2011;27(4): 208-213.
18. Strahlman E, Elman M, Daud E et al. Causes of pediatric eye injuries: a population based study. *Arch Ophthalmol* 1990; 108: 603-606.
19. Brophy M, Sinclair SA, Hostetler SG and Xiang H. Pediatric eye injury related hospitalization in the United States. *Pediatrics* 2006; 117: 1263-1270.

20. Luff A J, Hodgkins P R, Baxter R J. Etiology of perforating eye injury. *Arch Dis Child* 1993;83: 682-683.
21. Umeh RE, Umeh OC. Causes and visual outcome of Childhood eye injuries in Nigeria. *Eye* 1997; 11: 489-495.
22. Kaur A and Agrawal A. Pediatric ocular trauma. *Current Science* 2005; 89: 43-46.
23. Krishnan M, Sreenivasan R. Ocular injuries in Union territory of Pondicherry. Clinical presentation. *Indian J Ophthalmol* 1998;36:82-5.