

**Research Article****CLINICAL AND DEMOGRAPHIC PROFILE OF PAEDIATRIC OCULAR TRAUMA IN TERTIARY CARE CENTRE****Reshu Malhotra, \*Anju Bhaskar and Neha Singh**

Department of Ophthalmology, Pt. JNM Medical College, Raipur, Chhattisgarh, India

**Received 24<sup>th</sup> June 2024; Accepted 27<sup>th</sup> July 2024; Published online 30<sup>th</sup> August 2024**

---

**Abstract**

**Background:** Ocular injury constitutes one of the most common causes of preventable ocular morbidity and blindness accounting for around 8%-14% of all childhood ocular trauma. In children it can lead to multifactorial and psychological implications. **Aims and objectives:** To study the epidemiological and clinical profile of ocular trauma in paediatric patients and the association of epidemiological factors (age, sex, and locality) with the clinical pattern (mode, nature) of ocular trauma. **Materials and Methods:** A hospital-based, cross-sectional analytical study was performed at the Department of Ophthalmology, Pt. J. N. M. Medical College, Raipur, Chhattisgarh from April 2021 to October 2022. Patients of the age group 0-14 years, with ocular trauma were included in the study. Demographic profile like age, sex, locality and clinical parameters such as type of injury, mode of injury, laterality, and objects causing ocular injury were analysed and detailed ophthalmic examination was done. **Results:** 437 children were examined out of which 120 had ocular trauma. Children aged 6-10 years (51.6%) were most commonly affected, followed by children from 11 to 14 years (26.6%). Males were affected (65%) more than females (35%) with a ratio of 1.85. Children from rural area are affected more (58.3%) than urban (41.7%) locality. Most patients had open globe injuries (n=46) followed by closed globe injuries (n=44) and adnexal injuries (n=30). The most common object causing injury was wooden object (n=16), followed by fall and sharp metal object related injuries (n=14). **Conclusion:** Ocular injuries are mostly preventable. To prevent ocular morbidity or blindness, awareness of parents and children is essential through health education, use of appropriate protective measures to decrease or prevent the incidence and severity of trauma.

**Keywords:** Paediatric ocular trauma, Open globe, Closed globe, Anterior segment.

---

**INTRODUCTION**

Ocular injury is one of the most common causes of childhood blindness.[1] As a result of ocular trauma, around 1.6 million people are blind, also 2.3 million have bilateral limited ocular morbidity and 19 million have a unilateral loss of vision, making ocular injury the most common cause of unilateral blindness. [2,3] Ocular injuries account for around 8%-14% of all childhood injuries. [4] Childhood ocular injury differs from adult ocular injury regarding the objects involved in eye injury, evaluation, and management. [5] Ocular damage in children can range from superficial corneal abrasions to corneal and scleral perforations. Identification of eye damage and risk factors can prevent most ocular injuries in children. [6,7] Ocular injuries are usually divided into two types: (1) open globe and (2) closed globe injuries. Others include adnexal injuries. An open globe injury requires early and timely intervention. [8] The epidemiological profile of ocular trauma in children varies by location and also by demographic data such as age and gender. Childhood ocular trauma have been studied in developed [9] and developing countries [10]. Ocular trauma is more common in developing countries than in developed countries. As studied in the United States, around 25.4% of ocular trauma occurred in children and young adults aged 12 to 18. [11] In study conducted in Pakistan, the mean age of children presenting with ocular damage was 7.03±3.61 years, with 42.9% attending school (6-11 years old). [12] In study done in Israel, nearly half (47%) of all eye injuries occurred in children under the age of 17, primarily between the ages of 6 and 12. [13] In affluent countries, numerous investigations on ocular trauma have been undertaken. Yet, the pattern of eye injuries in emerging nations is unknown [14].

In India, very few studies have been done to find out the magnitude of paediatric ocular trauma. As a result, the current study was conducted to identify the association of epidemiological factors with the clinical pattern of ocular trauma in paediatric patients in the tertiary eye care centre, of Central India.

**Materials and Methods**

A hospital-based, cross-sectional analytical study was performed at the Department of Ophthalmology, Pt. J. N. M. Medical College, Chhattisgarh from April 2021 to October 2022 after ethical clearance from the institute. Patients of the age group 0-14 years, with ocular trauma were included in the study. However, patients with a previous history of ocular surgery or any pre-existing ocular pathology were excluded from the study. Detailed ophthalmic examination including visual acuity at presentation using Kay's picture chart and Snellen's chart for children under 3 years and above 3 years of age, respectively, Anterior segment evaluation with slit lamp biomicroscopy, detailed fundus examination using indirect ophthalmoscopy with 20D for was done. B-scan, radiography (X-ray, CT-Scan, MRI) was performed in relevant cases. Ocular injuries were classified according to Birmingham Eye Trauma Terminology System (BETTS). The outcome variables were evaluated, including the type of injury, mode of injury, laterality, and objects causing injury, demographic profile like age, sex, locality was recorded. The data was collected using a pre-designed pretested structured proforma. Continuous variables were presented in mean ± standard deviation. Statistical analysis was performed using the software Statistical Package for Social Sciences, version-23.

---

**\*Corresponding Author: Anju Bhaskar**

Department of Ophthalmology, Pt. JNM Medical College, Raipur, Chhattisgarh, India.

## RESULTS

**Sociodemographic profile:** 6-10 years children are most commonly involved mainly from the rural locality. Males were more commonly affected than females with a ratio of 1.85. (Table 1)

**Table 1. Sociodemographic characteristics**

Sociodemographic variables	Number of children (N)	Percentage of children (%)
Age (years)		
0-5	26	21.6
6-10	62	51.6
11-14	32	26.6
Sex		
Male	78	65
Female	42	35
Residence		
Urban	50	41.7
Rural	70	58.3
Eye involved		
Left	63	52.5
Right	57	47.5
Duration of injuries		
<24 hours	37	30.8
>24 hours	83	69.2

**Nature of ocular injury:** The nature of injuries was classified into adnexal injury (25%), open globe (38.3%), and closed globe (36.6%) (Table 2)

**Table 2. Nature of ocular injury**

Ocular injury	Number of patients	Percentage %
Adnexal injury	30	25
Closed globe	44	36.6
Open globe	46	38.3

### Adnexal injury

In the adnexal injury profile, abrasion (n=8; 26.6%) and ecchymosis (n=7; 23.35) were more common. (Table 3)

**Table 3. Adnexal injury (n=30)**

Adnexal injury	Number of patients	Percentage %
Abrasion	8	26.6
Ecchymosis	7	23.3
Lid laceration	5	16.6
Lid swelling	4	13.3
Lid Burn	4	13.3
Lid tear	2	6.6

**Closed globe injury:** In a closed globe injury, conjunctival congestion (n=20, 45.4%) was the most common injury, followed by subconjunctival haemorrhage (n = 17, 38.6%). (Table 4).

**Table 4. Closed globe injury (n=44)**

Closed globe injury	Number of patients	Percentage %
Conjunctival Congestion	20	45.4
Subconjunctival Hemorrhage	17	38.6
Traumatic Cataract	4	9.0
Sealed Corneal tear	2	4.5
Foreign body granuloma	1	2.2

**Open globe injury:** In open-globe injury, corneal tear (n= 27, 58.6%) was most common finding. (Table 5)

**Table 5. Open globe injury (n=46)**

Open globe injury	Number of patients	Percentage %
Corneal Tear	27	58.6
Scleral Tear	5	10.8
Globe Rupture	4	8.6
Corneoscleral Tear	4	8.6
Conjunctival Tear	3	6.5
Limbal Tear	3	6.5

**Zone of injury:** Zone I injury was common in closed globe (n = 35) and zone 2 was more involved open globe injuries (n=19). (Table 6)

**Table 6: Zone of injury**

Zone of injury	Closed globe cases		Open globe cases	
	N	%	N	%
I	35	79.5	19	41.3
II	8	18.1	23	50.0
III	1	2.2	4	8.6

**Other ocular findings:** traumatic mydriasis (n= 34), subluxation of lens (n=5) and iridodialysis (n=10) was found in both open and closed globe injuries. (Table 7)

**Table 7: Other ocular findings**

	Number of patients	Percentage %
Traumatic mydriasis		
CGI	4	9.0
OGI	30	65.2
Lens subluxation		
CGI	3	6.8
OGI	2	4.3
Iridodialysis		
CGI	2	4.5
OGI	8	17.3

**Causes of injury:** Wooden objects-related injury was most common (n= 16), followed by those caused by falls (n= 14) and sharp metal objects (n=14). (Table 8)

**Table 8. Cause of injury**

Cause of injury	Number of patients	Percentage %
Wooden objects	16	13.3
Fall	14	11.6
Sharp metal objects	14	11.6
Foreign bodies	13	10.8
Stone	12	10
Toys	10	8.3
Hands	10	8.3
Stationary objects	9	7.5
Chemicals	5	4.1
RTA	3	2.5
Bird beak	3	2.5
Dust	3	2.5
Others	8	6.6

**Association of parameters with the nature of injuries**

**Table 9. Association of parameters with the nature of injuries**

	Mean Age(Years)	Gender		Residence		Zone Of Injury			Cause Of Injury (MostCommon)
		Male	Female	Rural	Urban	I	II	III	
Adnexal (N=30)	8.16	22	8	17	13	-	-	-	Fall(16.6%)
CGI(N=44)	8.93	22	22	23	21	35	8	1	Foreignbodies(29.5%)
OGI (N=46)	8.02	30	16	33	13	19	23	4	Sharp MetalObjects(30.4%)

**Association of parameters with eye segment involvement**

**Table 10. Association of parameters with eye segment involvement**

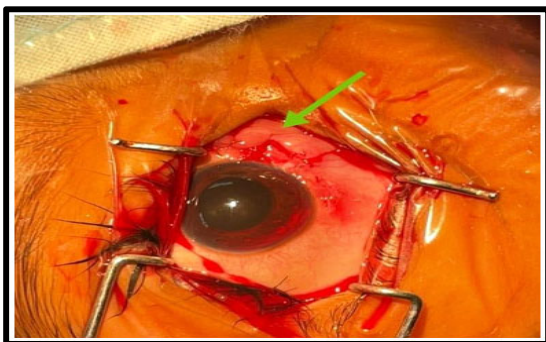
Association of parameters with eye segment involvement			Anterioreye segment	Posterior eye segment
1	No. of patients		50(41.6%)	40(33.3%)
2	Meanage		8.33	8.76
3	Gender	Male	28	22
		Female	22	18
4	Residence	Rural	31	25
		Urban	19	15
		Total	42	2
5	CGI	Vitreous Hemorrhage(VH)	-	2
		Retinal Detachment(RD)	-	-
		Total	8	38
		Vitreous Hemorrhage(VH)	-	35
6	OGI	Retinal Detachment(RD)	-	3



**Figure 1. Chemical injury (alkali burn)**



**Figure 2. Corneal tear with traumatic cataract and cortical matter at tear section**



**Figure 3. Conjunctival tear**



**Figure 4. Corneoscleral tear with iris tissue prolapse and hvnhema**



**Figure 5: Fish hook injury**

## DISCUSSION

This study has been done as limited data is available regarding paediatric ocular trauma in central India. In our study, the overall incidence of paediatric ocular trauma was determined to be 27.45%. 437 paediatric patients presented to the outpatient department with varied visual issues of which 120 children presented with ocular trauma. Singh *et al.* [10] reported a 12.8% prevalence of paediatric ocular trauma in the central Indian population. Saxena *et al.* [15] reported 20.8% incidence at a tertiary eye care centre. In an epidemiological study from northern India, Maurya discovered that approximately 30.35% of ocular damage occurred in the paediatric age group. [16] Variability in ocular trauma incidence documented in the paediatric population could be attributed to demographic variables, social factors, and study design. It also depends on the referral services and the facilities available for the treatment in the hospital. The mean age of paediatric patients with ocular injuries presented to our center was  $8.25 \pm 3.34$  years. The age-specific pattern of ocular injury was also observed in the study, with a maximum incidence in the 6–10 years age group (51.6%) followed by 11–14 years (26.6%) and 0–5 years (21.6%) age group. Dulal S *et al.* [17] found the highest incidence of ocular trauma in children between the 5–10 age group (38%), followed by the 10–15 (16.6%). Al-Bdour MD *et al.* [18] also found similar results, with the highest incidence (44.8%) in children aged 6–10 years, followed by 11–16-year-old (30.2%).

In our study, 65% of cases were males (M: F ratio 1.85:1). Strahlman *et al.* [19] also claimed boys were more prone to ocular injury than girls. Male predominance may be related to social or environmental factors, as males are allowed to go outdoors more and are also involved in vulnerable activities like risky sports or careless use of objects. In the present study, the proportion of paediatric patients suffering ocular injuries residing in rural areas was 58.3%. There were 41.7% of paediatric patients with ocular injuries lived in urban areas. Singh *et al.* [10] have shown a high preponderance of childhood trauma in the rural population. Their study demonstrated that rural area children are at 1.5 times higher risk of ocular injuries than urban children. In the present study, involvement of the left eye (52.5%) was slightly more than the right eye (47.5%). Comparable results were also obtained by Kim *et al.* showing greater involvement of the left eye (52%) compared to the right eye (48%). [20]

In our study, most cases (69%) presented after 24 hours. In a study by Saxena *et al.*, 34% of children presented 24 hours after injury. [15] Open-globe injuries (38.3%) were more common in our present study than closed-globe injuries (36.6%). Further, in the open globe group, corneal tear (58.6%) was the most common presentation. Conjunctival congestion (45.4%) and sub conjunctival haemorrhage (38.6%) were common presentations in the closed globe group. Similar trends have been observed in many other studies [10, 15, 21] claiming more occurrences of open-globe injuries than closed-globe injuries. However, few studies have observed closed globe injuries are more common than open-globe injuries. [16, 22, 23]. In the present study, zone I (79.5%) was most commonly involved, followed by Zone II (18.1%) and Zone III (2.2%) in closed globe injuries. Whereas in the open globe group, Zone II (50%) was most commonly involved, followed by Zone I (41.3%) and Zone III (8.6%). Studies conducted nationally and internationally also found similar results;

Madan *et al.* <sup>24</sup> found 77% of all cases with zone I involvement, of which 54% were with OGI and 23% with CGI. Hyphema was present in 11 out of the 90 cases constituting 12.2%. [24] As per the American Academy of Ophthalmology, hyphema grading, in closed globe injury cases, was present only in 2 (4.5%) out of 44 cases which were of Grade-I category, while in open globe injury cases, hyphema was present in 9 (19.5%) out of 46 cases. Our findings were similar to Wadei *et al.* [21], which also showed the presence of hyphema less in the closed globe (3.75%) and more in open globe cases (31.25%). Similarly, the posterior eye segment (vitreous hemorrhage, retinal detachment) was involved in 33.3% (N=40) cases, of which 5% (N=2) cases had close globe injuries and 95% (N=38) had open globe injuries. Comparable results were shown by Wadei *et al.*, [21] the anterior segment was involved in 50 eyes (62.5%), of which 86% (N=43) cases had closed globe injuries, and 14% (N=43) had open globe injuries. Injury by wooden objects (stick, gulli-danda, etc.) was the most common cause of trauma, followed by falls and sharp metal objects, the second most common cause in our study. Most studies demonstrate the wooden stick as a common cause of injury. [16, 21, 23] Researchers worldwide have recommended greater knowledge of eye damage prevention among young patients, including advice for parents. [25, 26] Also, an increased understanding of the destructive nature of ocular injuries and research into risk factors will aid in developing a comprehensive plan for educating parents and children to reduce preventable eye injury sequelae. [27]

## Conclusion

In central India, ocular injuries are a leading cause of blindness in children. Trauma is more likely in children aged 6 to 10 years. Blindness caused by ocular injuries can be avoided by early and prompt referral and intervention. Educating and creating awareness among children, parents, teachers and society about ocular health and hygiene is critical to prevent ocular injuries.

## REFERENCES

1. Kaur A, Agrawal A. Paediatric ocular trauma. *Curr Sci.* 2005;89:43–46.
2. Parver LM. Eye trauma. The neglected disorder. *Arch Ophthalmol.* 1986;104 (10):1452–1453.
3. Négre AD, Thylefors B. The global impact of eye injuries. *Ophthalmic Epidemiol.* 1998;5(3):143–169.
4. Brophy M, Sinclair SA, Hostetler S.G. Pediatric eye injury-related hospitalizations in the United States. *Pediatrics.* 2006;117(6):e1263–e1271.
5. Agrawal R, Rao G, Naigaonkar R, *et al.* Prognostic factors for vision outcome after surgical repair of open globe injuries. *Indian J Ophthalmol.* 2011;59(6):465–470.
6. Gupta KK, Garg H, Singh G, Singh A. Effect of Adding Dexamethasone to Ropivacaine in Transversus Abdominis Plane Block for Lower Abdominal Surgeries: A Prospective Randomized Trial. *Journal of Research and Innovation in Anesthesia* (2022): 10. 5005/jp-journals-10049-2012
7. Hoskin AK, Philip SS, Yardley AM, *et al.* Eye injury prevention for the pediatric population. *Asia-Pac J Ophthalmol.* 2016;5(3):202–211.
8. Desai T, Vyas C, Desai S, *et al.* Pattern of ocular injuries in paediatric population in western India. *NHL J Med Sci.* 2013;2:37–40.

9. Loon SC, Tay WT, Saw SM, *et al.* Prevalence and risk factors of ocular trauma in an urban south-east Asian population: the Singapore Malay Eye Study. *Clin Exp Ophthalmol.* 2009;37 : 362–367.
10. Singh S, Sharma B, Kumar K, *et al.* Epidemiology, clinical profile, and factors predicting final visual outcome of pediatric ocular trauma in a tertiary eye care center of Central India. *Int J Ophthalmol.* 2017;65:1192.
11. McGwin G., Jr., Xie A., Owsley C. Rate of eye injury in the United States. *Arch Ophthalmol.* 2005;123(7):970–976.
12. Noorani S., Ahmed J., Shaikh A. Frequency of different types of pediatric ocular trauma attending a tertiary care pediatric ophthalmology department. *Pak J Med Sci.* 2010;26: 567–570.
13. Rapoport I., Romem M., Kinek M. Eye injuries in children in Israel. A nationwide collaborative study. *Arch Ophthalmol.* 1990;108(3):376–379.
14. Nordberg E. Injuries as a public health problem in sub-Saharan Africa: epidemiology and prospects for control. *East Afr Med J.* 2000;77(12 Suppl): S1–S43.
15. Saxena R, Sinha R, Purohit A, Dada T, Vajpayee RB, Azad R V. Pattern of pediatric ocular trauma in India. *Indian J Pediatr* 2002;69(10):863–7.
16. Maurya RP, Srivastav T, Singh VP, Mishra CP, Al-Mujaini A. The epidemiology of ocular trauma in Northern India: A teaching hospital study. *Oman J Ophthalmol* 2019;12(2): 78–83.
17. Dulal S, Ale JB, Sapkota YD. Profile of pediatric ocular trauma in mid-western hilly region of Nepal. *Nepal J Ophthalmol* 2012;4(7):134–7.
18. Al-Bdour MD, Azab MA. Childhood eye injuries in North Jordan. *Int Ophthalmol.* 1998;22:269–73.
19. Strahlman E, Elman M, Daub E, Baker S. Causes of Pediatric Eye Injuries: A Population-Based Study. *Arch Ophthalmol.*, 1990;108:603–6.
20. Kim JH, Yang SJ, Kim DS, Kim JG, Yoon YH. Fourteen-year review of open globe injuries in an urban Korean population. *J Trauma - Inj Infect Crit Care* 2007; 62(3):746–9.
21. Al Wadei EAY, Osman AA, Macky TA, Soliman MM. Epidemiological Features of Pediatric Ocular Trauma in Egypt. *J Ophthalmol.* 2016;1–6.
22. Al-Mahdi HS, Bener A, Hashim SP. Clinical pattern of pediatric ocular trauma in fast developing country. *Int Emerg Nurs.*, 2011;19(4):186–91.
23. Sharifzadeh M, Rahmanikhah E, Nakhaee N. Pattern of pediatric eye injuries in Tehran, Iran. *Int Ophthalmol.* 2013;33(3):255–259.
24. Madan AH, Joshi RS, Wadekar PD. Ocular trauma in pediatric age group at a tertiary eye care center in central Maharashtra, India. *Clin Ophthalmol.* 2020;14:1003–9.
25. Dulal S, Ale JB, Sapkota YD. Profile of pediatric ocular trauma in mid-western hilly region of Nepal. *Nepal J Ophthalmol* 2012;4(7):134–7.
26. Archambault C, Gabias C, Fallaha N, Bélanger C, Superstein R. Pediatric ocular injuries: a 3-year review of patients presenting to an emergency department in Canada. *Can J Ophthalmol.*, 2019;54(1):83–6.
27. Al-Rawee, R., Al-Fathy, D. M. ., & Bashir Alsabee ., D. W. . . (2022). Delivering Integrated Health Care: Role and Importance of Multidisciplinary Team Clinic Role and Importance of Multidisciplinary Team Clinic in Nineveh Province. *Journal of Medical Research and Health Sciences*, 5(10), 2278–2294. <https://doi.org/10.52845/JMRHS/2022-5-10-2>

\*\*\*\*\*