

**CLINICAL AND SOCIO-DEMOGRAPHICAL STUDY OF PAEDIATRIC OCULAR INJURIES**Nalini S. Mahendraker<sup>1</sup>, G. Pavan<sup>2</sup><sup>1</sup>Postgraduate Student, Department of Ophthalmology, Vijayanagara Institute of Medical Sciences, Bellary, Karnataka, India.<sup>2</sup>Professor and HOD, Department of Ophthalmology, Vijayanagara Institute of Medical Sciences, Bellary, Karnataka, India.**ABSTRACT****BACKGROUND**

Ocular trauma can be a devastating injury, causing disability for a lifetime in children. Once described as the "neglected disorder," has recently been highlighted as a major cause of visual morbidity. Globally more than half a million blinding injuries occur every year. The prevalence of ocular trauma in India was reported as 2.4%. We wanted to identify the causes, demographic profile as well as the clinical profile of paediatric ocular injuries.

**METHODS**

64 children aged 16 yrs. or less presenting to our tertiary care centre with ocular injury were included. Demographic data, nature & cause of injury, duration between injury & presentation were recorded. Complete ophthalmic evaluation was done, appropriately managed & followed up to 6<sup>th</sup> week.

**RESULTS**

Majority of injuries occurred in children who were 5 years & older (69%). 68.75% were boys & 31.25% girls. 32 (50%) presented within 6 hrs. of injury, 11 (17%) presented after 24 hours. Most common cause of injury was stick 18 (28%). Open globe injuries accounted for 34.4%, closed globe for 32.8%, lid & lacrimal apparatus 26.6% & 6.25% were non mechanical injuries. BCVA of 6/12 or better was achieved in 14 eyes (66.7%) in closed globe group & only 1 eye (4.5%) in open globe group.

**CONCLUSIONS**

Most ocular injuries in children are preventable & occur from unsupervised activity which lead to significant visual loss.

**KEYWORDS**

Paediatric Ocular Trauma, Visual Impairment.

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**BACKGROUND**

Ocular trauma can be a devastating injury, causing disability for a lifetime in children. Once described as the "neglected disorder," has recently been highlighted as a major cause of visual morbidity.<sup>1</sup> Globally more than half a million blinding injuries occur every year.<sup>2</sup> The prevalence of ocular trauma in India was reported as 2.4%.<sup>3</sup> Worldwide, there are approximately 1.6 million people blind from eye injuries, 2.3 million bilaterally visually impaired, and 19 million with unilateral visual loss.<sup>4</sup> Ocular trauma is a major cause of preventable monocular blindness and visual impairment in the world.<sup>5</sup> Paediatric ocular trauma forms about 20–50% of all eye injuries<sup>6</sup> approximately 8–14% of total injuries in children.<sup>7</sup> 40,000-60,000 of eye injuries lead to visual loss.<sup>8</sup> Despite its public health importance, there is relatively less population-based data on the magnitude and risk factors for ocular trauma, especially from developing countries.<sup>9</sup>

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Trauma to the eye and ensuing visual disability is an important cause of preventable monocular blindness in the paediatric age group in India. The ensuing visual disability has significant emotional, psychological, and Socioeconomically impact on the individual person, family, and to the society as a whole.<sup>10</sup> Policy decisions helpful in preventing this kind of trauma and improving the required trauma management services warrant an accurate estimate of the pattern of the ocular trauma in Indian population.<sup>11</sup> Most of our understanding of this issue is based on the studies from developed countries<sup>12,13,14</sup>

**METHODS**

A prospective hospital based interventional study was done. The study duration spanned over a period Nov 2017 to April 2018.

**Inclusion Criteria**

- Patients presenting to ophthalmology outpatient departments of Vijayanagara institute of medical sciences, Bellary, Karnataka, India, with history and signs of blunt ocular trauma
- Patients who were willing to give consent.
- Age below 16 years.

**Exclusion Criteria**

- Patient in whom assessment is difficult due to severe head injury with reduced level of consciousness and cooperation.

- History of any past ocular pathology, which impairs best-corrected visual acuity (BCVA).

**Data Collection**

The following data was collected-

1. patients demographics
2. the patient's initial complaint
3. interval between the time of trauma and time of presentation
4. trauma details: date, time, location, type, and mechanism
5. clinical examination findings of the injured eye, the visual acuity, and globe injury according to the BETT
6. Visual acuity in preverbal children was evaluated with tests of-fixation and following/central steady maintenance.

**OTS**

Ocular trauma score (OTS) was assigned to all patients.

**Investigations**

1. Routine haematological investigations- haemoglobin, CBC, total count, differential count was done
2. X-ray orbit AP and Lateral view for PNS- Orbital fractures, IOFB and intraorbital FB.
3. Computed Tomography.
4. Ultrasonography was done.

**Treatment and Follow-Up**

First aid included the following

- Thorough eyewash for FB , chemical injuries
- Cleaning and dressing of the wounds
- Applied shield in open globe injuries
- Tetanus immunization
- Systemic Analgesics and antibiotics

Depending upon type and severity, definitive treatment was given.

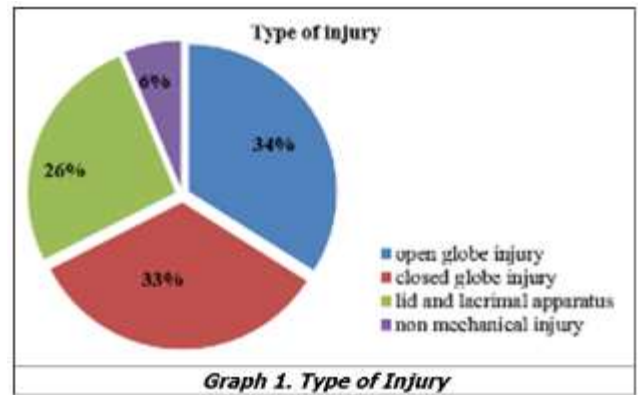
Patients were followed up on day 1, day 7, 1 month, and at 6 months. Final best-corrected visual acuity (BCVA) was evaluated after 6 months.

**RESULTS**

64 patients were included in study.

**Types of Injury**

- 22 Patients (34%) open globe injuries-95.5% penetrating, 4.5% intraocular FB.
- 22 Patients (33%) closed globe injuries-33.3%. contusion, 47.6% lamellar laceration, 9.5% superficial FB, 9.5% mixed.
- 16 Patients (26%) lid and lacrimal apparatus-23.5% canalicular tear, 23.5% full thickness lid tear, 52.9% partial thickness tear.
- 4 Patients (6%)-50% thermal 50% chemical.

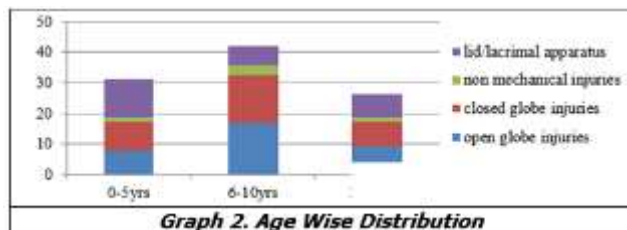


Age- 20 patients (31%) between 0-5 years, 26 (42%) between 6-10 yrs., 18(27%) between 11-16 yrs.

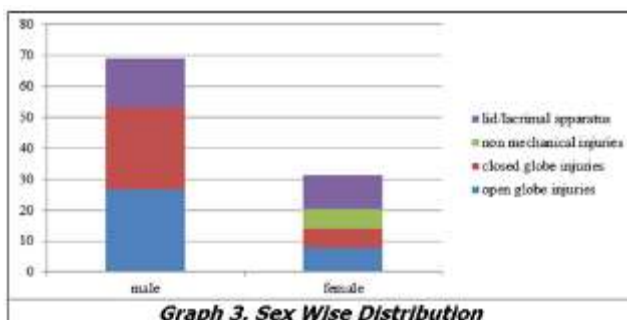
	Open Globe Injuries	Closed Globe Injuries	Non-Mechanical Injuries	Lid/Lacrimal Apparatus
0-5 yrs.	7.8%	9.3%	1.6%	12.5%
6-10 yrs.	17%	15.6%	3.1%	6.25%
11-16 yrs.	9.3%	7.8%	1.6%	7.8%

**Table 1. Age Distribution**

Sex-44 (68.75%) were boys and 20 (31.25%) were girls.



**Graph 2. Age Wise Distribution**



**Graph 3. Sex Wise Distribution**

**Materials Causing Injuries**

Stick is the most common material causing injury in open and closed globe injuries.

	Open Globe Injuries	Closed Globe Injuries	Lids and Lacrimal Apparatus
Stick	9	9	
Metal	3		2
Stone	6	3	
Glass material	1		
Bow arrow	3	1	
RTA		3	6
Cricket ball		4	
Gulli danda		1	
Fall			4
Blouse hook			3
Dog bite			2

**Table 2. Materials Causing Mechanical Injuries**

Non Mechanical Injuries	
Thermal	Chemical
1-Incandescent stick	1- Calotropis milk
1-Hot water	1- Limestone

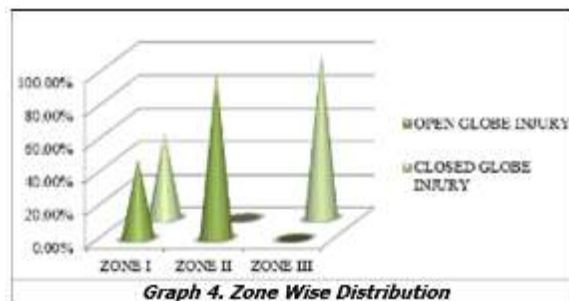
**Table 3. Materials Causing Non Mechanical Injuries**

**Zone of Injuries**

According to BETT (Birmingham Eye Trauma Terminology)- Zone 1-67.4% (48.3% open globe and 51.7% closed globe), Zone 2- 18.6% (all belong to open globe), Zone 3- 13.95% (all belong to closed globe).

	Open Globe Injury	Closed Globe Injury
Zone I	48.30%	51.70%
Zone II	100%	0
Zone III	0	100%

**Table 4. Distribution of Zones of Injuries**

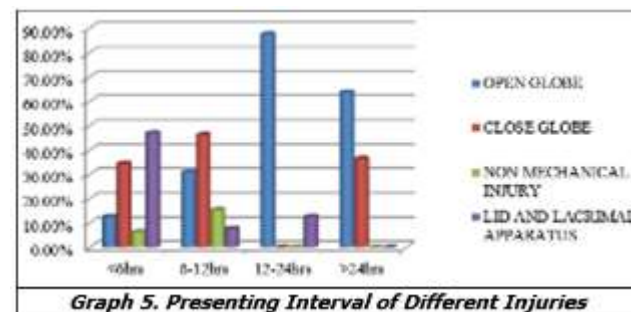


**Graph 4. Zone Wise Distribution**

**Presenting Interval**

	Open Globe	Closed Globe	Non-Mechanical Injury	Lid and Lacrimal Apparatus
<6 hrs.	12.50%	34.37%	6.25%	46.87%
6-12 hrs.	30.77%	46.15%	15.30%	7.60%
12-24 hrs.	87.50%	0%	0%	12.50%
>24 hrs.	63.63%	36.36%	0%	0%

**Table 5. Presenting Interval of Different Injuries**

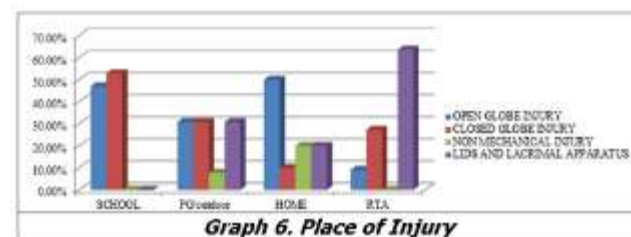


**Graph 5. Presenting Interval of Different Injuries**

**Place of Injuries**

	Open Globe Injury	Closed Globe Injury	Non-Mechanical Injury	Lids and Lacrimal Apparatus
School	47.05%	52.90%	0%	0%
PG/ Outdoor	30.77%	30.77%	7.70%	30.77%
Home	50%	10%	20%	20%
RTA	9.09%	27.27%	0%	63.63%

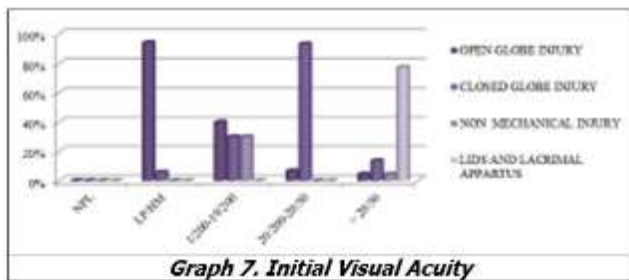
**Table 6. Place of Injury**



**Graph 6. Place of Injury**

	Open Globe Injury	Closed Globe Injury	Non-Mechanical Injury	Lids and Lacrimal Apparatus
NPL	0%	0%	0%	0%
LP/HM	94.12%	5.90%	0%	0%
1/200-19/200	40%	30%	30%	0%
20/200-20/50	6.66%	93.33%	0%	0%
> 20/50	4.50%	13.64%	4.50%	77.30%

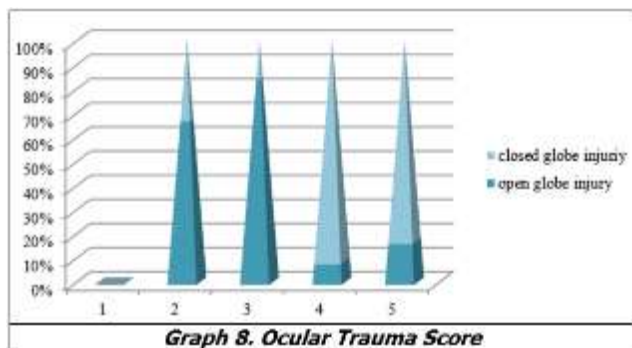
**Table 7. Initial Visual Acuity**



Graph 7. Initial Visual Acuity

Category	Open Globe Injury	Closed Globe Injury
1	0	0
2	66.67%	33.34%
3	84.20%	15.78%
4	8.33%	91.66%
5	16.67%	83.33%

Table 8. Ocular Trauma Score

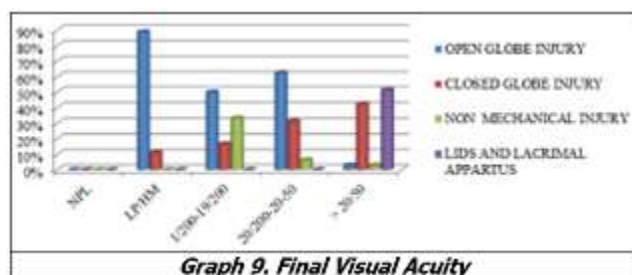


Graph 8. Ocular Trauma Score

Final Visual Acuity- BCVA at 6 weeks follow up.

	Open Globe Injury	Closed Globe Injury	Non-Mechanical Injury	LIDS and Lacrimal Apparatus
NPL	0%	0%	0%	0%
LP/HM	88.89%	11.11%	0%	0%
1/200-19/200	50%	16.67%	33.33%	0%
20/200-20-50	62.50%	31.25%	6.25%	0.00%
> 20/50	3.03%	42.42%	3.03%	51.51%

Table 9. Final Visual Acuity



Graph 9. Final Visual Acuity

**DISCUSSION**

Eye injuries per Birmingham classification (Birmingham Eye Trauma Terminology) BETT are divided into closed and open eye injuries.<sup>15,16-30</sup>

Zones of injuries for open globe injury

Zone (Location of Wound)
I. Cornea
II. Limbus to 5 mm posterior into sclera
III. Posterior to 5 mm from limbus

Zones of injuries for closed globe injury (based on location of injury)-

Zone 1: external (limited to bulbar conjunctiva, sclera and cornea)

Zone 2: anterior segment (including posterior lens capsule including pars plicata)

Zone 3: posterior segment (all internal structures posterior to the posterior lens capsule)

**Open Globe Injury Classification**

**Type**

1. Rupture
2. Penetrating
3. Intraocular
4. Perforating
5. Mixed

**Visual Acuity**

1. ≥20/40
2. 20/50 to 20/100
3. 19/100 to 5/200
4. 4/200 to light perception
5. No light perception

**Pupil**

- Positive-RAPD+ in affected eye.
- Negative-No RAPD in affected eye.

**Closed Globe Injury Classification-**

**Type:**

1. Contusion
2. Lamellar laceration
3. Superficial foreign body
4. Mixed
5. Grade- visual acuity
6. ≥20/40
7. 20/50 to 20/100
8. 19/100 to 5/200
9. 4/200 to light perception
10. No light perception

**Pupil**

- Positive- RAPD+ in affected eye.
- Negative- No RAPD in affected eye.

Ocular Trauma Score (OTS) which is used to predict the visual outcome of patients after open-globe ocular trauma. OTS scores range from 1 (most severe injury and worst prognosis at 6 months follow-up) to 5 (least severe injury and least poor prognosis at 6 months). Each score is associated with a range of predicted post-injury visual acuities. It has a predictive accuracy of approximately 80%.

Calculating the OTS- variables and raw points.

Variable	Raw Points
<b>Initial Vision</b>	
NLP	60
LP/HM	70
1/200- 19/200	80
20/200-20/50	90
≥20/40	100



Rupture	-23
Endophthalmitis	-17
Perforating Injury	-14
Retinal Detachment	-11
Afferent pupillary defect	-10
<b>Table 10. OTS- Variables and Raw Points</b>	

Depend on OTS: Categorization and potential visual acuity outcomes.

Sum of Raw Points	OTS	No PL	PL/HM	1/200-19/200	20/200-20/50	≥20/40
0-44	1	74%	15%	7%	3%	1%
45-65	2	27%	26%	18%	15%	15%
66-80	3	2%	11%	15%	31%	41%
81-91	4	1%	2%	3%	22%	73%
92-100	5	0%	1%	1%	5%	94%
<b>Table 11. OTS: Categorization and Potential Visual Acuity Outcomes</b>						

When our study was compared with other studies.

Age- in our study majority were in between 6-10 yrs. (42%), in Rohit Saxena et al.<sup>31</sup> Study 5 years and older (87%) and in Saha et al<sup>32</sup> 6-10 yrs. (47%).

Sex- majority were boys in our study 68% which is comparable to Rohit Saxena et al<sup>31</sup> 63% and Saha et al<sup>32</sup> 63% studies.

Type of injury-in our study 34% and 33%, in Rohit Saxena et al<sup>31</sup> 53% & 42% and in Saha et al<sup>32</sup> 53% & 32% open & closed globe injury respectively.

Object causing injury-stick is most common object causing injury in our study. bow and arrow and sharp objects in Rohit Saxena et al<sup>31</sup> and Saha et al<sup>32</sup> studies respectively.

Place of injury- playground/outdoor is most common place in ours and above two studies.

	Our study	Rohit Saxena et al	Saha et al
	6-10 yrs. (42%)	5 & older (87%)	6-10 yrs. (47%)
Boys	68%	63%	63%
Type of injury (open & closed respectively)	34% & 33%	53% & 42%	53% & 32%
Object causing injury	Stick	bow and arrow	sharp objects
Place of injury	Playground /outdoor	Outdoor	Playground
Presenting interval	<6 hrs.	>24 hrs.	>24 hrs.
<b>Table 12. Comparing Our Study with Other Studies</b>			

**Limitations**

Small sample size and short duration follow up.

**CONCLUSIONS**

Paediatric ocular trauma is an important cause of visual impairment and morbidity. Children need supervision of indoor and outdoor activities. Prompt surgical and medical intervention, optimal optical & orthoptic management and low visual aid services can reduce the burden of morbidity caused due to amblyopia. From a public health perspective,

neither bilateral nor unilateral blindness data provide a complete picture of the impact of ocular trauma on society. Severe ocular trauma requires expensive hospitalisation and specialist treatment, and often prolonged follow-up and visual rehabilitation. This has significant economic costs for the patient and the health service. It is therefore very important to better understand the local patterns of ocular injuries (through accurate data collection) and to develop appropriate prevention and management strategies.

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