

A Study to Describe the Demographics and Causes of Pediatric Ocular Trauma

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Abstract:

Introduction: Ocular injury is a common cause of acquired unilateral blindness in children. The consequences of childhood injuries are harmful, as they can lead to permanent blindness and visual impairment. It also increases the economic burden on society and affects a child's psychological, social, and emotional development.

Material and Methods: We conducted a prospective clinical study over 18 months to describe the demographics and causes of pediatric ocular trauma. We analyzed the mode, extent, and mechanism of injury, and assessed any concomitant pathologies that could worsen the outcome. Children aged 1 to 15 years with penetrating ocular trauma were included in the study.

Results: A total of 100 patients met the eligibility criteria. The majority of children were between 11-15 years (53%), followed by 6-10 years (37%). Males accounted for 70%, resulting in a gender ratio of 2.33:1. The most common injuries involved wooden sticks (26%), followed by thorn injuries (14%) and stone injuries (12%). Injuries in zone 1 occurred in 32% of cases, zone 2 in 32%, and zone 3 in 28%. Regarding ocular pathologies, 44 patients had iris prolapse, 40 had traumatic cataracts, and 38 experienced hyphaema. Vitreous hemorrhage was observed in 15 cases, and organic injuries in 11.

Conclusion: Ocular injuries remain a significant source of morbidity in children. There is a need to establish dedicated, integrated ophthalmic trauma units worldwide, staffed with expert and well-trained surgical teams. This is crucial because meticulous and proper techniques, even in high-risk injuries with poor visual potential, can lead to better outcomes when followed by timely surgeries.

Keywords: Pediatric Ocular Trauma, Demographics.

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Introduction

Childhood eye injury differs from adult ocular trauma in the objects involved, evaluation, and management protocols. [1] Most ocular injuries in children can be prevented with minor precautions and by identifying risk factors. [2-5] The nature of the injury and visual outcomes vary between developing and developed countries due to significant social, demographic, and cultural differences. [6]

The rate of childhood ocular trauma differs across regions and depends on factors like age and gender.

While many studies focus on ocular trauma in developed countries, the incidence in developing countries remains less understood. [7,8]

Although amblyopia and corneal opacities are the most common causes of reduced visual acuity (VA) after trauma in children, other concerning factors include young age at presentation, poor initial VA,

Zone 3 (posterior) injury location, wound length, lens involvement, vitreous hemorrhage, retinal detachment, and endophthalmitis. [9]

Subjects and Methods

Ethics: After obtaining written informed consent from patients or their relatives in the Department of Ophthalmology at J.L.N. Medical College in Ajmer [Rajasthan] and receiving clearance from the institution's Ethical Review Board, the research was carried out.

Statistical Analysis: The data collected will be entered into Microsoft Excel version, statistically analysed using SPSS version 22, and expressed as simple percentages and proportions. Data will be represented in the form of tables and analysed with the help of descriptive statistics.

Methods: Patients who presented themselves to the outpatient or emergency department of the J.L.N.

Medical College in Ajmer, Rajasthan, with penetrating ocular trauma, aged 15 or under, were included in the study.

A complete description of events surrounding the injury was elicited from the patient /parents/witness.

Patient's history was recorded to determine the age, gender, eye involved, mode of trauma, and the patient was examined thoroughly to establish the presence of any concomitant eye pathologies.

Results

The data of 100 patients were recorded and analysed as per the objective of the study. The

average age in the study group was 9.79+/-3, with the maximum number of children belonging to the 11-15 years (53%), followed by 37% in the 6-10 years group. 70% were males, resulting in a Gender ratio of 2.33. There was nearly equal distribution of the injury between both eyes. The majority were wooden stick injuries seen in 26% followed by thorn injuries in 14% and stone injuries in 12%. 40% of the injuries occurred in zone 1, followed by 32% in zone 2 and 28% in zone 3. Concerning eye pathologies, 44 patients had iris prolapse, followed by traumatic cataract in 40, and hyphaema in 38 patients. Vitreous haemorrhage was seen in 15, and organic injuries in 11.

Table 1: Age-wise distribution according to POTS Score:

Age group	Number of patients	Percentage
1-5 years	10	10%
6-10 years	37	37%
11-15 years	53	53%
Total	100	100%
Mean	9.79	
Standard deviation	3.30	

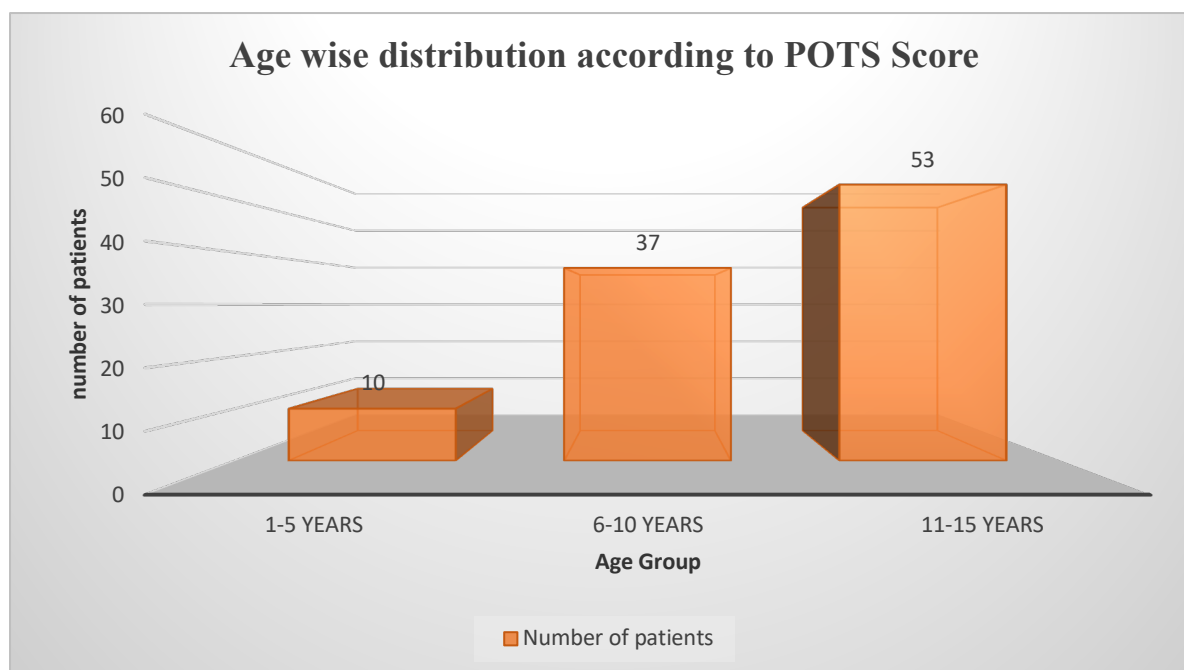


Chart 1: Age-wise distribution according to POTS Score

Table 2: Gender wise distribution:

Gender	Number of patients	Percentage
Male	70	70%
Female	30	30%
Total	100	100%

Table 3: Injury of Eye-wise distribution:

Eye	Number of patients	Percentage
Right	49	49%
Left	51	51%
Total	100	100%

Table 4: Mode of trauma-wise distribution:

Mode of trauma	Number of patients	Percentage
Knife	3	3%
Thorn	14	14%
Toys	6	6%
Finger nail	1	1%
Scissors	3	3%
Stone	12	12%
Vegetable peeler	2	2%
Fire Cracker	5	5%
Glass	8	8%
Metallic Stick	1	1%
Pencil	3	3%
Iron	6	6%
Wire	5	5%
Wooden stick	26	26%
Broomstick	5	5%
Total	100	100%

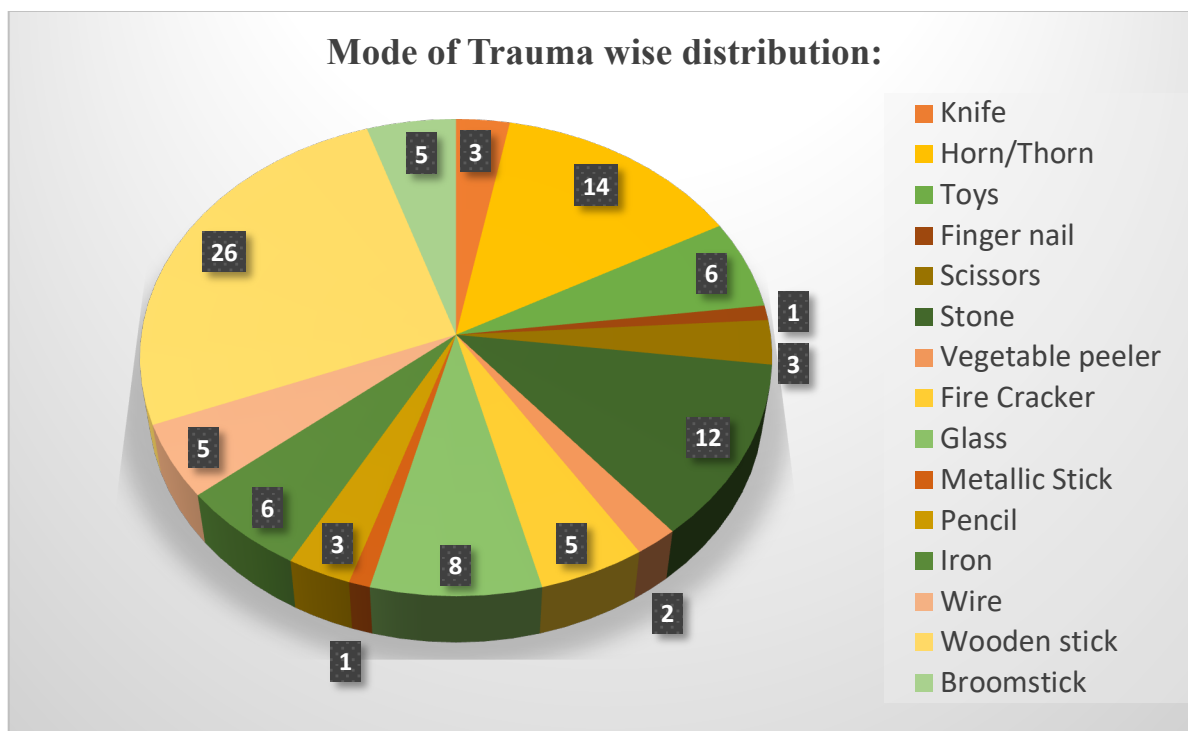


Chart 2: Mode of trauma-wise distribution:

Table 5: Zone-wise distribution of patients according to POTS Score:

Zone	Number of patients	Percentage
Zone 1	40	40%
Zone 2	32	32%
Zone 3	28	28%
Total	100	100%

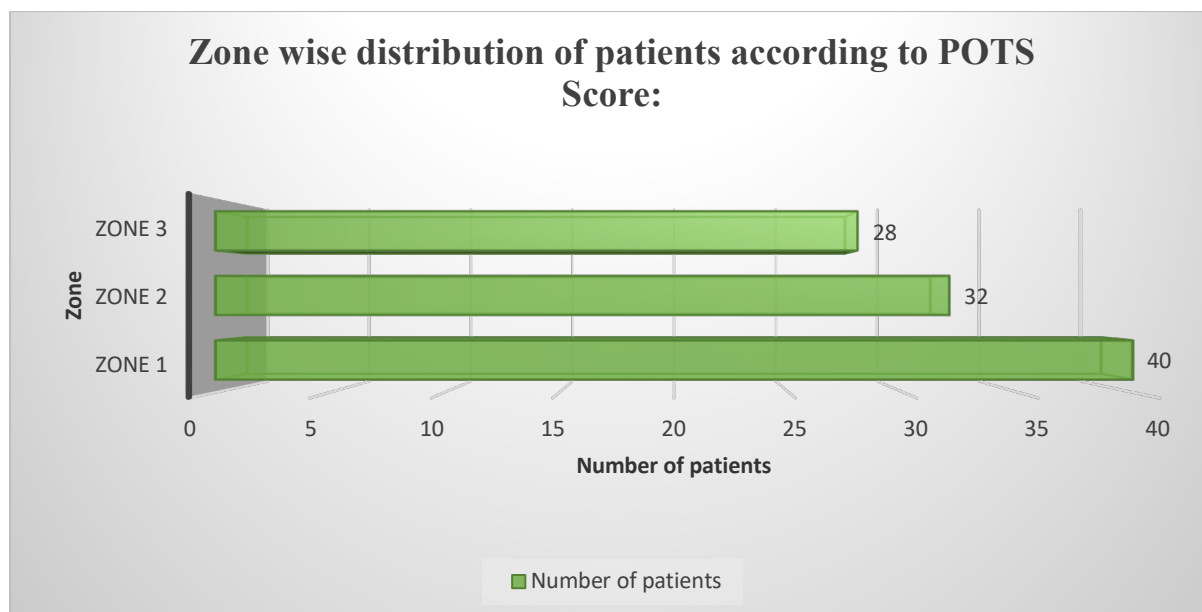


Chart 3: Zone-wise distribution of patients according to POTS Score:

Table 6: Concomitant Eye pathology wise distribution:

Concomitant Eye pathologies	Number of patients
Iris Prolapse	44
Hyphaema	38
Organic/ Unclean Injury	11
Traumatic Cataract	40
Vitreous Hemorrhage	15
Retinal Detachment	8
Endophthalmitis	3
Nil	12
Afferent Pupillary Defect	2
Globe Rupture	2

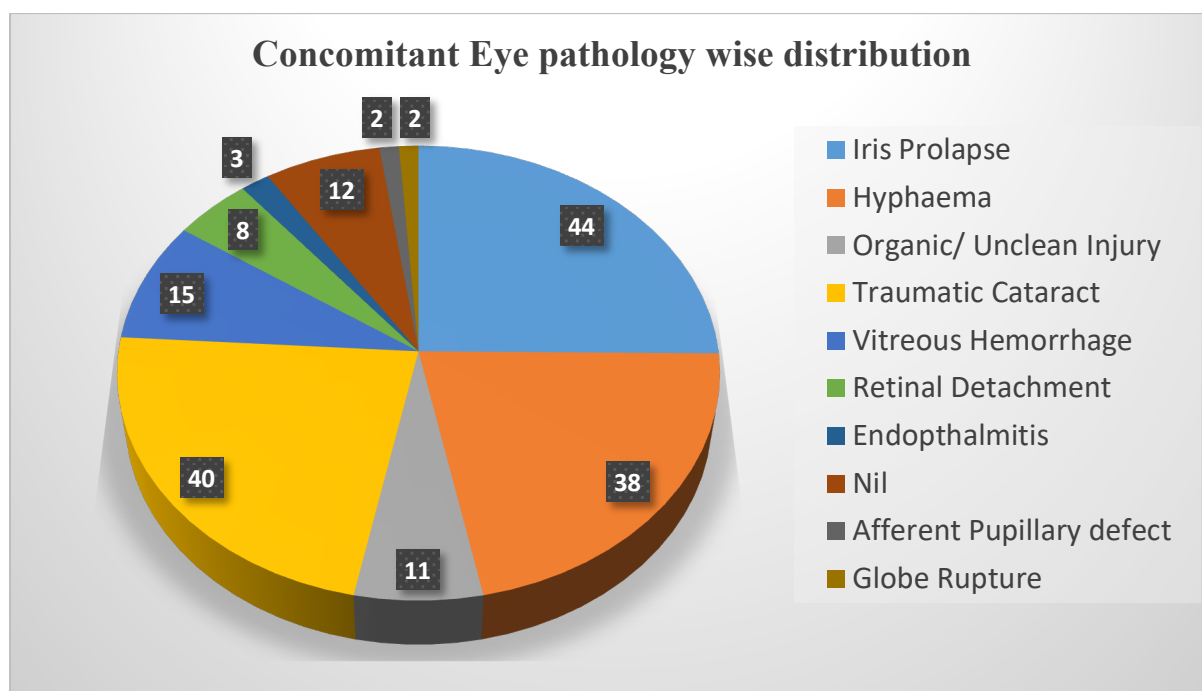


Chart 4: Concomitant Eye pathology wise distribution:

Discussion

Our population with pediatric globe trauma was similar to other reports to some extent. In the study by Irawati Y et al., male predominance (7:1) was consistent with previous studies, including ours. [10,11] The authors suggested that this finding could be because boys are more involved than girls in daily activities. They tend to be more curious, fearless, and eager to explore new things.

A study in central Maharashtra, India, [12] reported that children aged 6-10 years were the most affected, whereas in Western Australia, [13] children aged 0-2 years had the highest incidence of injuries; these findings differ from our study. In our research, the 11-15 year age group was the most affected, likely because children in this age range are in adolescence, a transition phase to adulthood, during which they usually participate in many outdoor activities. The distribution of laterality in our study closely matches that of similar studies. In the study by Howard Bunting et al., [14] glass, knives, and scissors were the most common causes of open globe injuries, accounting for 34.4% of cases. The most common cause of ocular injury in the Madan et al. [15] study was sports-related injuries (spinning top, cricket ball) in closed globe injuries, and wooden sticks in open globe injuries. In our study, the majority of injuries involved wooden sticks, seen in 26%, followed by thorn injuries at 14%, and stone injuries at 12%. The availability of wooden material near the home may explain this finding. In our study, 40% of injuries occurred in zone 1, followed by 32% in zone 2, and 28% in zone 3. Similarly, in the study by Irawati et al., [16] zone 1 injuries predominated in both open and closed globe injuries, consistent with other studies. [17,18] Although zone 1 involvement was common in our population, this finding is significant because it can affect children's visual outcomes and often lead to amblyopia. Regarding damage to different eye segments, Bhattad, C. P., et al. [19] observed that among 75 cases, 49 (65.3%) had anterior segment damage, 18 (24%) had posterior segment damage, and 8 cases (10.7%) had damage to both segments. The patients also exhibited conjunctival tears (22.7%), followed by corneal abrasions and hyphaema in 17.3% of patients and 16% of patients, respectively. Corneal tears and iris involvement in 10.7% each were observed. 9.3% of cases involved the lens, and 2.7% had RAPD. Similarly, anterior segment trauma was found to be more common in our study.

Conclusion

Ocular injuries remain a common source of morbidity in children. There is a need to develop dedicated integrated ophthalmic trauma units all over the world, having an expert and well-trained surgical team. This is important because meticulous

and proper techniques, even in high-risk injuries with poor visual potential, can have a better outcome with follow-up surgeries performed promptly.

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