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Clinical Profile of Ocular Injuries in Pediatric Age Group Attending Department of Ophthalmology- VIMS, Ballari- A Prospective Study

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ABSTRACT

Background: Ocular trauma is a significant contributor to preventable monocular blindness and visual impairment globally, necessitating a comprehensive understanding of its epidemiology and risk factors. This study aimed to analyze pediatric ocular trauma's prevalence, patterns, and related factors at Vijayanagar Institute of Medical Sciences, Ballari, India.
Methods: A prospective study was conducted over 1.5 years, involving 60 pediatric ocular trauma cases.
Results: The highest incidence was found in children aged 6-9 years (41.67%), followed by 9-12 years (25%). Males were more affected (66.7%) than females. Most cases (56.67%) were from rural areas. About 50% of the patients presented to the hospital between 24 hours and 3 days post-injury. Home was the most common location of injury (46.67%), followed by playgrounds (23.33%). Open globe injuries were the most common (58.34%), with vegetative matter being the primary cause (36.67%). The most common area of open globe injury was Zone 1 (88.57%).
Conclusions: Our study highlights the significance of ocular trauma in children, emphasizing the need for targeted interventions and awareness programs to prevent these incidents.

Key Words: *Ocular Trauma, Pediatric, Prevalence, Risk Factors, Open Globe Injury, India*

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INTRODUCTION

Pediatric ocular injuries represent a global public health concern, constituting a significant contributor to preventable visual impairment and blindness among children worldwide[1]. The World Health Organization approximates that nearly 19 million children are affected by some form of visual disability, a substantial fraction of which is ascribed to ocular trauma[2].

The nature and repercussions of pediatric ocular injuries diverge greatly from those experienced by adults due to a combination of distinctive anatomic and physiologic aspects of children's eyes, their behavioral tendencies, and the environments they inhabit[3]. The incidence, causative factors, and outcomes of these injuries exhibit regional disparities, underlining the necessity for locale-specific research to inform targeted preventative measures and treatment modalities[4].

The investigation of pediatric ocular injuries demands a multifaceted approach. A deeper understanding of the epidemiological patterns, etiology, severity, and visual sequelae can provide valuable insights into developing effective preventive strategies and optimizing management[5]. Studies have indicated that majority of ocular injuries in children are avoidable, emphasizing the need for public health initiatives in raising awareness and promoting eye safety practices[6].

This paper aims to contribute to the growing body of knowledge on pediatric ocular injuries. It seeks to elucidate the patterns of ocular trauma in children, the predominant causes, the types of injuries, their management, and outcomes. The findings will support global efforts in preventing childhood blindness and visual impairment, augment the current understanding of pediatric ocular injuries, and provide data that can guide health policy and interventions.

OBJECTIVES:

1. To know the sociodemographic profile of patients with pediatric ocular trauma.
2. To know the clinical characteristics and to analyse mode of pediatric ocular trauma.

MATERIALS AND METHODS

Study Design and Setting

This is a prospective interventional study, conducted in the Department of Ophthalmology, Vijayanagar Institute of Medical Sciences (VIMS), Bellary from November 2019 to June 2021.

Patient Population

The study comprised a sample of 60 pediatric patients presenting with ocular trauma.

Inclusion Criteria

The study included all pediatric patients presenting with ocular injuries of any type at the Department of Ophthalmology, VIMS, Bellary.

Exclusion Criteria

Children previously diagnosed with pre-existing ocular diseases affecting visual acuity were excluded from the study.

Data Collection

Patients fulfilling the inclusion criteria and those whose parents or guardians provided valid consent were included in the study. A detailed ophthalmic evaluation was performed, and the data were recorded in a specifically designed proforma. This data was transferred to a master sheet and subjected to statistical analysis by the institution's biostatistician.

Preoperative Assessment

This involved eliciting appropriate history, visual acuity testing using Snellen's chart and other charts such as LEA Symbols, E Chart, C Chart and by using matching letters and toys. Further, a slit-lamp examination, fundus examination, B-scan, radiograph of the orbit, lacrimal sac syringing, and CT scan of the orbit were conducted in relevant cases.

Postoperative Assessment

Post-operative evaluation included visual acuity, slit-lamp bio microscopy, detailed fundus examination, and B-scan in relevant cases at every visit on the first and seventh day, then the sixth and twelfth week.

Surgical Procedures

Surgical procedures were carried out in cases where required. Informed written consent was obtained from all parents. General anesthesia was given. The operative procedure included globe repair alone or globe repair with cataract extraction.

Postoperative Measures

Postoperative measures included the administration of systemic analgesics and antibiotics, examination of the eye on the first postoperative day, initiation of topical medications, and administration of anti-glaucoma medications in selected cases.

Statistical Analysis

Results were entered in an Excel spreadsheet and analyzed using SPSS Statistics 20.0 and Open Epi Info. The results were expressed in rates, ratios, and percentages. Significant values were calculated using ANOVA test.

Ethical Considerations

The study was conducted after obtaining permission from concerned authorities and ethical clearance from the Ethical Committee, VIMS, Bellari.

RESULTS

The study group comprises of 60 cases of paediatric ocular trauma presenting to VIMS ophthalmology department. The study considers clinical profile of children presenting with ocular trauma, visual acuity at presentation, visual outcomes after management are recorded and analysed.

Table 1: Age and Sex distribution

AGE	NUMBER OF CASES	PERCENTAGE
< 3 years	**2**	**3.33%**
3-6 years	**12**	**20%**
6-9 years	**25**	**41.67%**
9 -12 years	**15**	**25%**

12 - 16 years	**6**	**10%**
GENDER		
BOYS	**40**	**66.67%**
GIRLS	**20**	**33.33%**
TOTAL	**60**	**100%**

Table 2 showing place of injury

PLACE	NUMBER OF CASES	PERCENTAGE
HOME	**28**	**46.67%**
SCHOOL	**7**	**11.66%**
PLAYGROUND	**14**	**23.33%**
FARM	**5**	**8.33%**
RTA	**6**	**10%**
TOTAL	**60**	**100%**

Out of 60 cases, majority of injuries occurred in home 28 cases(46.67%), followed by playground 14 cases(23.33%), school 7 cases(11.6%),RTA 6 cases(10%),farm 5 cases(8.33%) .

Table 3 Showing type of injury

TYPE OF INJURY	NUMBER OF CASES	PERCENTAGE
OPEN GLOBE INJURY	**35**	**58.34%**
CLOSED GLOBE INJURY	**23**	**38%**
OTHERS	**2**	**3.33%**

Among 60 cases, 35 cases had penetrating injury comprising 58.34% of study population, 23 cases (38%) had closed globe injury and 2 cases were of chemical injury (3.33%).

Table 4: Percentage and number of cases among urban and rural.

URBAN /RURAL	NUMBER OF CASES	PERCENTAGE OF CASES
URBAN	**26**	**43.33%**
RURAL	**34**	**56.67%**
TOTAL	**60**	**100%**

Among 60 cases, majority were from Rural accounting for 56.67%(34 cases),43.33% were from urban population(26 cases).

Table 5: Showing time since injury.

TIME SINCE INJURY	NUMBER OF CASES	PERCENTAGE
<6hrs	**4**	**6.70%**
6-24hrs	**11**	**18.30%**
1day to 3days	**30**	**50%**
3days to 7 days	**12**	**20%**
1 week to 1 month	**2**	**3.30%**
>1month	**1**	**1.70%**
TOTAL	**60**	**100%**

Majority presented between 1 day to 3 days (50%) that is 30 cases, followed by 3 to 7 days 12 cases(20%),11 cases(18.30%) presented between 6 to 24 hrs,4 cases (6.70%)presented within 6 hours, 2 cases(3.30%) presented after 1 week to 1month,1 case (1.70%) presented after 1 month.

Table 6 showing types of objects causing paediatric ocular injury

TYPES OF OBJECTS	NUMBER OF CASES	PERCENTAGE
VEG MATTER /SHARP STICKS/WOOD	23	38%
ACCIDENTAL FALL	2	3.33%
BALL/BAT	8	13.33%
IRON ROD/NAIL	4	6.67%
SCISSORS COMPASS	4	6.67%
STONE	4	6.67%
RTA	6	10%
RANGOLI POWDER	2	3%
THORN	2	3%
BINDING WIRE	1	1.67%
TOYS	1	1.67%
BADMINTON RACKET SHUTTLECOCK	2	3.33%
PEN	1	1.67%
TOTAL	60	100%

Vegetative matter/sharp sticks/wooden objects had been the most common agent of injury in this study accounting to 38.33%(23) cases followed by ball ,bat 13.3 %(8 cases), Iron nails, rods accounted for 6.67%(4) of cases, Scissors, compass and stone constituted 6.67%(4 cases) each and 10% (6)cases were due to road traffic accidents, Rangoli powder, thorn. Badminton racket and shuttlecock constituted 3.33%(2 cases) each,3.33%(2 cases) due to accidental fall, binding wire, pen and toys constituted 1.67%(1 case) each.

Table 7 showing cause of paediatric ocular injury

CAUSE OF PEDIATRIC OCULAR INJURY	NUMBER OF CASES	PERCENTAGE
HOUSEHOLD OBJECTS	8	13.33%
BLUNT OBJECTS	9	15%
VEGETATIVE MATTER/SHARP STICK	22	36.67%
PROJECTILE OBJECTS	7	11.67%
RTA	6	10
SPORTS	4	6.67%
ACCIDENTAL FALL	2	3.33%
CHEMICAL	2	3.33%
TOTAL	60	100.00%

Out of 60 cases,8 cases(13.33%) were due to household objects like pen, scissors, iron nail, compass, binding wire.9 cases(15%) due to blunt objects like iron rod, stone, table edge,wood.22 cases(36.67%) were due to vegetative matter/sharp stick/thorn,7 cases(11.67%) due to projectile objects like ball,toys.6 cases (10%) due to Road traffic accidents,4 cases(6.67%) due to sports by objects like ball, shuttlecock, badminton racket.2 cases (3.33%) due to accidental fall,2 cases(3.33%) due to chemical injury by rangoli powder.

Table 8: showing open globe injuries zones involvement

ZONES INVOLVED	NUMBER OF CASES	PERCENTAGE
Zone 1	31	88.57%
Zone 2	3	8.57%
Zone 3	1	2.86%
TOTAL	35	100%

Out of 35 cases having penetrating eye injuries, 31 (88.57 %) cases involved zone 1 and rest 3 cases (8.57%) involved zone 2 . 1 case(2.86%) involved zone 3.

DISCUSSION

Ocular trauma significantly contributes to preventable monocular blindness and visual impairment across the globe[7,8]. Despite its critical implications on public health, population-based data on ocular trauma's prevalence and risk factors remain scarce, particularly from developing nations[9,10]. With around 1.6 million individuals experiencing blindness and 19 million people experiencing unilateral visual loss due to eye injuries, this issue merits further investigation[11]. Moreover, India houses 23.5% of the world's blind population, thereby emphasizing the need for comprehensive studies in this context[11].

Our prospective study at Vijayanagar Institute of Medical Sciences, Ballari, analyzed 60 pediatric ocular trauma cases over one and a half years. It investigated the incidence of ocular trauma in children and the factors impacting visual outcomes.

In our research, we observed the highest incidence of pediatric ocular trauma in children aged 6-9 years (41.67%), followed by 9-12 years (25%), with only 3.33% of cases involving children under 3 years. These findings can be rationalized by understanding that the 6-9 year age group tends to engage more in unsupervised games and high-risk activities. Children below three years, usually under constant parental supervision, are less susceptible to ocular trauma. Other studies have reported similar findings, further corroborating our observations[12,13].

Our study found a higher incidence of ocular trauma in males (66.7%), which aligns with the results of other studies. This prevalence can be attributed to the cultural norm of boys having more freedom and lesser adult supervision than girls, thus exhibiting more uninhibited behavior that could potentially lead to injuries[12,13].

In terms of geographical distribution, a significant portion of the cases (56.67%) were from rural areas. This trend is consistent with the findings of other studies, such as that by Hamid Hosseini et al. where 55.75% of the children sustaining ocular injuries were from rural populations[14].

Considering the timeline between the injury occurrence and hospital presentation, we found that 50% of the cases presented between 24 hours to 3 days of injury, while 25% of cases presented within the first 24 hours. This delay in seeking treatment can be attributed to the lack of transportation during the COVID-19 pandemic and general negligence. Similar findings were reported in other studies[15-17].

Regarding the location of injury, most injuries occurred at home (46.67%), followed by playgrounds (23.33%), schools (11.6%), road traffic accidents (10%), and farms (8.33%). This trend might reflect the increased time spent at home due to COVID-19 restrictions. Other studies have also identified home as the most common place of injury[18,19].

Examining the type of injuries, our study found that open globe injuries were the most common, constituting 58.34% of cases, followed by closed globe injuries (38%) and chemical injuries (3.33%). While these results might indicate a higher frequency of open globe injuries, it should be considered that cases of closed globe injuries with less severe consequences might not have sought immediate medical attention due to unaffected initial visual acuity or general negligence. Similar trends were reported in other studies[20,21].

Our study identified vegetative matter, such as sharp sticks and wood, as the most common agents causing ocular injury, accounting for 36.67% of the cases. Other injury-causing agents included projectile objects (11.67%), household items (13.33%), road traffic accidents (10%), and blunt objects (15%). These findings reflect the common availability and accessibility of these objects, and their potential to cause open globe injuries. Other studies also reported wooden objects as the most common cause of injuries[22,23].

Lastly, for open globe injuries, our study found the most common area of injury to be Zone 1, involving 88.57% of the cases. This result is consistent with the findings of other studies, which showed a majority of open globe injuries in Zone 1[12,24,25]. Given the cornea's exposure and the prevalence of sharp objects causing injuries, this observation is understandable.

In summary, our study provides insights into pediatric ocular trauma in terms of age, gender, geographical distribution, time to presentation, location, type of injury, injury-causing objects, and injury zones. It is crucial to continue research in this area, given the significant impact of ocular trauma on visual health, particularly in developing nations.

CONCLUSION

Our findings suggest a high incidence of pediatric ocular trauma, especially in children aged 6-9 years, and males. The majority of the cases were from rural areas and sustained injuries mostly at home. Open globe injuries, predominantly caused by vegetative matter, were the most common, with Zone 1 being the frequently affected area. These results highlight the importance of creating awareness about eye safety, especially among children, and emphasizing preventive measures. Prompt access to healthcare services post-injury is also crucial, considering the significant delay in hospital presentation observed. Further research is necessary to better understand ocular trauma's epidemiology and devise effective preventive strategies, especially in countries like India, which harbors a significant portion of the world's blind population.

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