

The Epidemiology, Etiology and Short Term Visual Outcome of Paediatric Ocular Emergencies in Tertiary Care Centre

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Abstract

Background: Vision development is a complex system that requires the development of neuro ocular pathways and depends on proper visual stimulation of both eyes. Paediatric age group is more vulnerable to ocular injuries and any damage to eyesight will result in affecting the child in their growth and development. **Aims:** To Study the patterns of ocular emergencies in Indian paediatric population and its short term visual outcome. **Setting and Design:** Observational study, analytical study carried out for a period of two years. Data collection from August 2017 to September 2019 including demographic profile, place of injury, type of health care facility first sought, time delay in first treatment, pattern of ocular injury on Birmingham Eye Trauma Terminology System (classification), treatment given by us, and best corrected visual acuity (BCVA). **Results:** Mean age of patients is 7.79 ± 2.53 years with 105 (60%) male patients and 70 (40%) female patients. In traumatic injuries children between the age of 7 and 10 years constituted the largest group accounting for 62.7% (94/150) of total patients. 50.2% were from urban population. 50.7% of total cases contacted first sought treatment at tertiary health facility. Mean definitive treatment time interval (23.30 ± 8.04 h) was significantly higher when patients sought primary care at Primary health facility or private health facility first rather than coming directly to the tertiary care centre (15.70 ± 5.20 h). 58% (n=87) of total injuries were due to blunt objects. At the end of 2 months 92.6% of closed globe injury cases had VA of 6/18 or better. **Conclusion:** Majority of paediatric ocular emergencies are traumatic in nature, more in 7-10 years age group with equal rural and urban distribution. Most of the injuries were sustained in domestic environment.

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

Introduction

Vision development is a complex system that requires the development of neuro ocular pathways and depends on proper visual stimulation of both eyes. There are approximately 1.6 million people blind from eye injuries and 2.3 million bilaterally visually impaired.^{1,2} Studies of eye trauma indicate that about two third of those affected were males, predominantly children and young adults.³ Various studies have been done documenting the nature and causes of eye injuries in children. However, the etiology, nature and visual outcome of ocular trauma in children is very different due to the vast differences in the demography, social and cultural factors. Paediatric age group is more vulnerable to ocular injuries and any damage to eyesight will result in affecting the child in their growth and development. There are approximately 270,000 – 320,000 blind children in India, and larger number has visual disorders leading

to impairment. Ocular trauma is said to be responsible for 20-40% of mono ocular blindness.⁴This study is being conducted with keen interest to find out the impact of changing lifestyle and urbanisation on the pattern of eye emergencies in children in western India.

Materials and Methods

This is observational study, analytical study carried out for a period of two years. i.e. August 2017 to September 2019. The study is conducted at a tertiary care eye hospital after obtaining Institutional Review Board (IRB) approval and written informed consent for the study. All the patients attending the emergency department have been screened and those patients who are of age of 12 years or younger are included in the study. The necessary details of the patients shall be obtained from the available data.

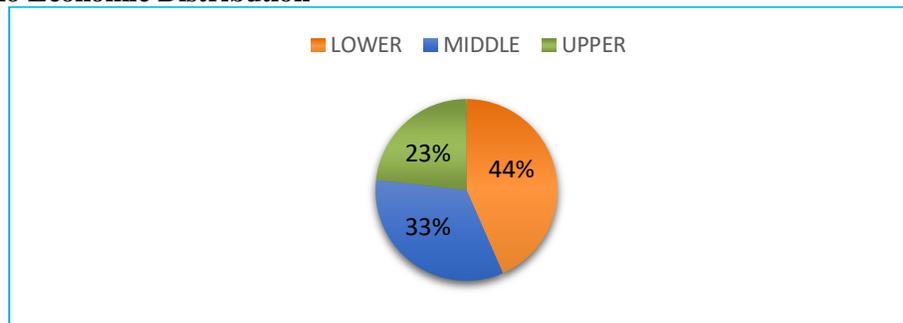
Results

We included data from 175 patients who presented with different types of ocular emergencies during the study period.

Demographic distribution

The mean age of patients is 7.79 ± 2.53 years with 105 (60%) male patients and 70 (40%) female patients. Out of 175 patients 88 (50.2%) were from urban population. 43.4% of patients were from lower socio economical class. 150 out of 175 (85.7%) patients were of traumatic injuries.

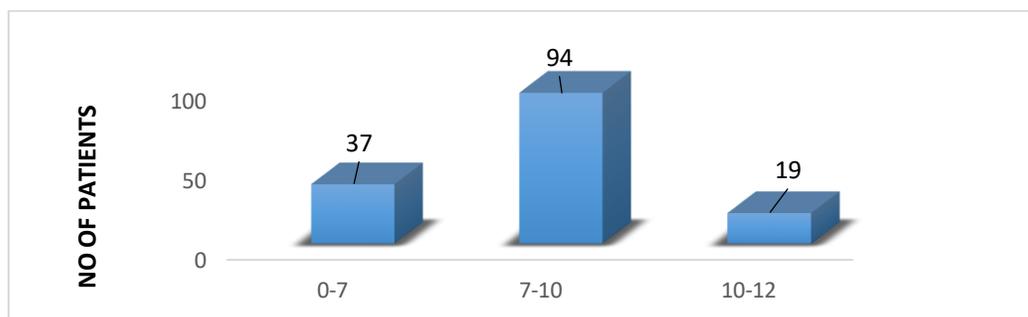
Figure 1 Socio Economic Distribution



Traumatic Injuries

Age group: In traumatic injuries children between the age of 7 and 10 years constituted the largest group accounting for 62.7 % (94/150) of total patients.

Figure 2 Age-Wise Distribution



Etiological distribution

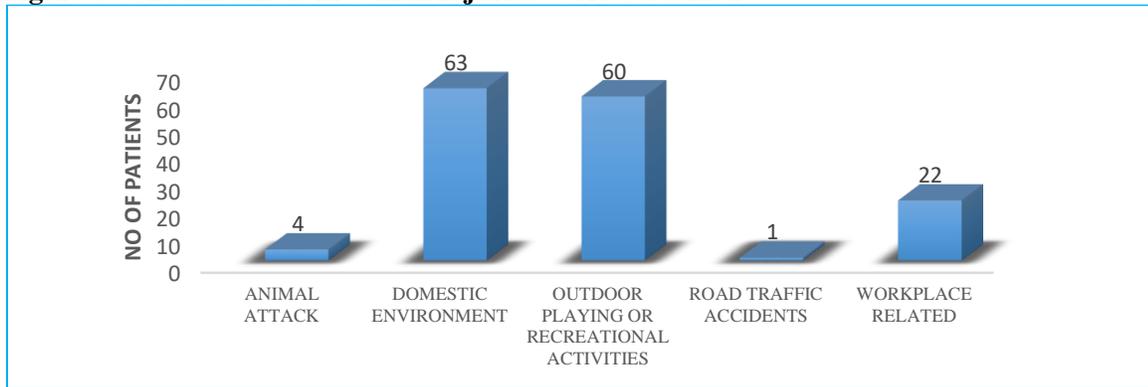
58% (n=87) of total injuries were due to blunt objects. Only 8.7% were due to chemical injury. 18% (n=27) of injuries were due to firecracker, 14.7 % (n=22) were due to stone.

Table 1 Type of Injury

Type Of Trauma	No of Patients	Percent
Blunt Trauma	87	58.0
Chemical	13	8.7
Sharp Trauma	35	23.3
Thermal	15	10.0
Total	150	100.0

Our study found that most of the injuries occurred in domestic environment (42%, n=63) or playing outdoors (40%, n=60). 14.7 % of injuries sustained in work place environment suggesting higher rate of child labour in India.

Figure 3: Circumstances in Which Injuries Were Sustained



According to BETTS classification in our study 47.1% of mechanical injuries were closed globe injury, 30.0% were laceration and 22.8 % were rupture due to blunt trauma.

Table 2: Classification of Trauma According to Betts Classification

Betts Classification ⁷	No of Patients	Percent
Closed Globe Injury	41	47.1
Laceration	26	30.0
Rupture	20	22.9
Total	87	100.0

According to diagnosis our study found that 46/150 (30.6%) were corneal or scleral perforation. Hyphema accounting for 13.3% of total injuries.

Point of contact and time interval.

Our study found that 50.7% of total cases contacted first sought treatment at tertiary health facility. 30.7% first sought treatment at Primary health facility. 1st point of contact is least at 18.7% for private health facility.

In our study Mean time interval from the onset of event to the first contact with tertiary health facility was 9.45 ± 3.61 hours (hr), with Primary health facility and private health facility combine 9.19 ± 4.11 h. Difference between the two is not significant with p value 0.6832 with unpaired t test.

Mean definitive treatment time interval (23.30 ± 8.04 h) was significantly higher when patients sought primary care at Primary health facility or private health facility first rather than coming directly to the tertiary care centre (15.70 ± 5.20 h) ($P < 0.001$, Unpaired t test).

Cases with associated head injury or face injury: In our study 36.6% of patients had facial trauma with ocular injury and only 6% cases had associated head trauma.

Cases with posterior segment involvement: In our study 61 out of 150 cases had posterior segment involvement due to trauma. More than half (55.7%) of these cases were of open globe injuries.

Table-3 Average Time Taken from Trauma to Point of 1st Contact and Definitive Treatment

Point Of First Contact	No	(%)	First Contact Time Interval (In Hours)	SD	Time Interval Between Injury And Definitive Treatment (In Hours)	SD
Primary Health Facility(PHC)	46	30.7	9.54	2.949	23.28	6.719
Private Health Facility	28	18.7	8.61	5.533	23.32	9.967
Tertiary Health Facility	76	50.7	9.45	3.613	15.70	5.203
Total	150	100.0				

No of patients undergoing surgical intervention: In our study 97 out of 150 (64.6%) patients had undergone 1 or more than 1 surgical intervention. Out of 97 patients, 24 (24.7%) patients had undergone 2 surgical interventions. Only 3 cases had undergone more than 2 surgical interventions.

Visual acuity (VA): In our study 60.9 % of cases presented with the VA 6/60 or lower. Almost all of the cases (97.8%) of open globe injuries presented with VA 6/60 or lower. This number is almost similar for Chemical injury (92.3%) and lower for thermal injury (53.3%). At the end of 2 months 92.6% of closed globe injury cases had VA of 6/18 or better. Only 21.7% of open globe injury cases had VA of 6/18 or better. 80% of thermal injury case had VA of 6/18 or better compared to chemical injury cases in which 38.4 % of patients had VA of 6/18 or better.

Non Traumatic Group

Age group distribution: Out of 25 case 12 were from 0-7 years 12 were from 7-10 and 1 case was from 10-12 years of age. These were the children with mainly acute inflammation or acute infection of eye and adnexa.

Distribution according to diagnosis

Majority of patients visited emergency department for acute conjunctivitis (76%). With orbital cellulitis, acute dacryocystis, corneal ulcer and rhabdomyosarcoma accounts for only 1 case (4%) each.

Discussion

To the best of our knowledge, this study is the first of its kind to reflect the magnitude of ocular trauma in a large sample of western Indian population and adequately puts down the incidence; sociodemographic pattern and visual outcome of paediatric ocular trauma in western India which has previously not been reported.

Demographic distribution

In our study mean age of patients is 7.79 ± 2.53 years with 105 (60%) male patients and 70 (40%) female patients. Out of 175 patients 88 (50.2%) were from urban population. 43.4% of patients were from lower socio economical class. 150 out of 175 (85.7%) patients were of traumatic injuries.

Comparing to Katiyar et al.⁵ which found Mean age of injury was 7.6 ± 3.3 years (range 1–14 years) with 151 (79.1%) males, which is similar to our study. 78% of patients were from rural areas.

Singh, et al. found⁶ mean age of presentation was 8.74 ± 3.93 years. 60% of patients are from the rural population. Higher prevalence was seen in lower socioeconomic group (50.90%).

Traumatic Injuries

Age group

In traumatic injuries children between the age of 7 and 10 years constituted the largest group accounting for 62.7 % (94/150) of total patients.

Comparing to Singh et al.⁶ Maximum incidence of ocular injuries was found to be 47.27% in 6–1 year age group.

Comparing to katiyar et al.⁵ children between the age of 6 and 10 years constituted the largest group accounting for 41.1% (80/191) of total patients. Both studies found similar results to our study that school going children are more affected by traumatic eye injuries.

Etiological distribution

58% (n=87) of total injuries were due to blunt objects. Only 8.7% were due to chemical injury. 18% (n=27) of injuries were due to firecracker, 14.7% (n=22) were due to stone.

In contrast to our study katiyar et al found Fire cracker injuries accounted for only 7.3% (14/191) of injuries. Singh et al. found⁶ Wooden object was the most common cause of the injury which accounted 29.54% of all cases. Our study found that most of the injuries occurred in domestic environment (42%, n=63) or playing outdoors (40%, n=60). 14.7% of injuries sustained in work place environment suggesting higher rate of child labor in India. In contrast to our study katiyar et al⁵ found only 21.5% of total injuries sustained in domestic environment and 13.6% of injuries sustained in recreational activities. According to BETTS classification in our study 47.1% of mechanical injuries were closed globe injury, 30.0% were laceration and 22.8% were rupture due to blunt trauma.

In contrast to our study katiyar et al⁵ found 30.9% injuries were closed globe injuries. Only 12.6% of injuries were rupture due to blunt trauma. Majority of injuries 48.2% were laceration injuries from sharp trauma. According to diagnosis our study found that 46/150 (30.6%) were corneal or scleral perforation. Hyphema accounting for 13.3% of total injuries. In contrast to our study Singh, et al.⁶ found 67.79% of cases of Open globe injury.

Point of contact and time interval.

Our study found that 50.7% of total cases contacted first sought treatment at tertiary health facility. 30.7% first sought treatment at Primary health facility. 1st point of contact is least at 18.7% for private health facility. Katiyar et al⁵ found 43% of cases first sought treatment at other government facility. Almost similar number (42%) sought medical or surgical help at the tertiary centre on the first place. Only 14.7% patients sought treatment from a private practitioner in the first place which is similar to our study.

In our study Mean time interval from the onset of event to the first contact with tertiary health facility was 9.45 ± 3.61 hours (hr), with Primary health facility and private health facility combine 9.19 ± 4.11 h. Difference between the two is not significant with p value 0.6832 with unpaired t test.

Mean definitive treatment time interval (23.30 ± 8.04 h) was significantly higher when patients sought primary care at Primary health facility or private health facility first rather than coming directly to the tertiary care centre (15.70 ± 5.20 h) ($P < 0.001$, Unpaired t test). In contrast to our study **Katiyar et al⁵** found The mean first contact time interval (11.8 ± 20.3 h) was significantly higher for other government health facility, rather than coming to the tertiary centre (5.2 ± 5.7 h) ($P < 0.001$). The mean definitive treatment time interval (39.4 ± 45.4 h) was significantly higher for other government health facility than for the tertiary centre (11.2 ± 25.1 h) ($P < 0.001$) which is similar as our study.

Cases with associated head injury or face injury

In our study 36.6% of patients had facial trauma with ocular injury and only 6% cases had associated head trauma. Katiyar et al⁵ found 18% of patients had facial trauma along with ocular injury and 8.8% cases had associated head trauma.

Cases with posterior segment involvement: In our study 61 out of 150 case had posterior segment involvement due to trauma. More than half (55.7%) of these cases were of open globe injuries.

No of patients undergoing surgical intervention: In our study 97 out of 150 (64.6%) patients had undergone 1 or more than 1 surgical intervention. Out of 97 patients 24 (24.7%) patients had undergone 2 surgical interventions. Only 3 cases had undergone more than 2 surgical interventions. **Katiyar et al⁵** found 62.3% (119/191) patients required surgical intervention.

Visual acuity(VA): In our study 60.9% of cases presented with the VA 6/60 or lower. Almost all of the cases (97.8%) of open globe injuries presented with VA 6/60 or lower. This number is almost similar for Chemical injury (92.3%) and lower for thermal injury (53.3%). At the end of 2 months 92.6% of closed globe injury cases had VA of 6/18 or better. Only 21.7% of open globe injury cases had VA of 6/18 or

better. 80% of thermal injury case had VA of 6/18 or better compared to chemical injury cases in which 38.4 % of patients had VA of 6/18 or better. **Katiyar et al**⁵ found only 13.79 % of cases with VA of 6/18 or better for open globe injury and 52.9% of cases for closed globe injury which are much lower than our study.

Non Traumatic Group

Age group distribution: Out of 25 case 12 were from 0-7 years 12 were from 7-10 and 1 case was from 10-12 years of age. These were the children with mainly acute inflammation or acute infection of eye and adnexa.

Distribution according to diagnosis: Majority of patients visited emergency department for acute conjunctivitis (76%). With orbital cellulitis, Acute dacryocystitis, corneal ulcer and rhabdomyosarcoma accounts for only 1 case (4%) each.

Conclusion

Majority of paediatric ocular emergencies are traumatic in nature, more in 7-10years age group with equal rural and urban distribution. Most of the injuries were sustained in domestic environment. Majority are closed globe injuries. Early visual outcome is found to be worst in open globe injuries.

Paediatric ocular trauma can cause loss of vision and cosmetic 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 situations and adopting appropriate preventive measures. Better health care facilities in remote areas can prevent delay in management hence reducing load of preventable childhood blindness.

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