



A CLINICAL STUDY OF OCULAR INJURY, ITS VISUAL OUTCOME IN PAEDIATRIC OCULAR TRAUMA.

Ophthalmology

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ABSTRACT

Background: Ocular injuries comprise a group of disorders with a wide variation in clinical presentation, causes, and visual outcome. Ocular injuries are the most common cause of acquired unocular blindness in children. Penetrating trauma involving the posterior segment of the eye has a poorer prognosis compared to anterior segment trauma. Ocular injuries eventually lead to decrease in vision, cosmetic blemishes and are associated with psychosocial problems. Most paediatric trauma is preventable by simple measures. Increased literacy and health awareness is vital. This study aim to gain the knowledge of circumstances of injuries, their nature and damages caused , to determine the epidemiological profile ,visual outcome in paediatric ocular trauma. **Methodology:** The present study is prospective observational study conducted on 115 patients under the age of 15 years and younger sustaining eye injuries and presented to the outpatient department or emergency department of tertiary care hospital. The duration of the study was 2 year. **Results:** out of 115 patients ,males (73.04%) are more commonly injured than females(26.96%).The children between 6-9 years of age had more ocular injury(29.56%).unilateral eye injury(93.04%) and bilateral eye injury is(6.96 %).The most common cause of trauma is accidental likely from falls, with a total of 22 (19.13%) cases. This is followed by road traffic accidents with 15(13.04%) cases. Of these patients, 73.92% (85 people) sustained blunt injuries, 15.65% (18 people) had a chemical injury. 5.22% (6 people) sustained penetrating injuries, 5.22% (6 people) had an intraocular foreign body. The most common place of injury for the children was the home 62 children (53.91%) being injured.6 (5.22%) sustained open injuries, while 109 (94.78%) sustained closed injuries. Adnexal injuries are the most common type of injury in children. The majority of the children (41) had 6/6 vision at presentation(35.65%).The results of the study showed that the majority of the children (84.35%) achieved a visual acuity of 6/6 after treatment. Children with posterior segment injury along with lens injury has bad prognosis. **Conclusion:** The age group from 6 to 10 years is susceptible for ocular trauma. Majority of pediatric eye injuries are preventable as most of the injuries occur at home. Blindness in paediatric ocular trauma is mainly attributed the injury to posterior segment. Blindness due to penetrating trauma in the pediatric age group can be reduced by educating parents and spreading awareness about same.

KEYWORDS

Paediatric Ocular Truma, blunt Truma, penetrating Injury, close Globe Injury, open Globe Injury, blindness.

INTRODUCTION:

In India, ocular injuries have been identified as the major cause of acquired monocular blindness in children^[1,2,3]. Vision is the most precious gift given by God. Ocular trauma is an important cause of preventable blindness & visual impairment. It is common in young adults as well as paediatric patients. Blindness in childhood is a tragedy insurmountable, because it affects not only the individual but also the family and society as a whole. 5 to 15 % of childhood blindness is due to trauma. It continues to be a major public health problem in our country and assumes special importance in children due to the number of years of blindness and the loss of man-hours that ensues. Ocular trauma is one of the important cause of ocular morbidity and blindness^[4,5].

The eye is encased in the orbital bony cavity cushioned with a layer of fat and covered with two vertically sliding lids each containing a protective shield of tarsal plate. In spite of this protection to eyes, injuries to globe do occur frequently. Most common emergencies are due to open globe injuries and require immediate interventions^[2,6]. It is essential to study not only recent injuries but also to study the eyes which have sustained injury at variable time intervals earlier. Delayed presentation results in substantial damage to the ocular structures and poor visual outcome in these children.

Ocular trauma is the most important preventive cause of blindness or partial loss of vision in more than half a million people worldwide, the commonest victim is young population^[6]. In addition to physical and psychological costs of eye injuries to the individual, the direct and indirect cost of eye injuries to the society is enormous. The impact of ocular trauma in terms of need for medical care, loss of income & cost of rehabilitation services point towards the need for strengthening of preventive measures among the people.

Aims and Objectives:

To study

- 1) Different causes of pediatric ocular trauma, Different mode of injury, Mechanism of trauma

- 2) To determine incidence of injury in different pediatric age group, demographic variation, eye involvement, place of injury, visual outcome.
- 3) To assess causes of pediatric ocular blindness after ocular trauma.

MATERIAL AND METHODS:

The present prospective observational study was conducted on 115 patients attending the ophthalmology OPD of Shri Chhatrapati Shivaji Maharaj General Hospital , Solapur from December 2020 to October 2022. The study included all children of age group 15 years and younger sustaining eye injuries and presented to the outpatient department or emergency department of tertiary care hospital. The duration of the study was 2 year.

A detailed medical history was obtained. Informed consent was obtained from the parents or guardians. Those who went home against medical advice, who could not commit to the follow-up schedules, or who did not give consent to the study were excluded. The patients were examined and the following data were collected: age; sex; date, time, and place of injury; mechanism & nature of injury, complete eye evaluation including visual acuity on initial presentation, medical & surgical interventions. After the initial consult and management, patients were scheduled for follow up after seven days and one month.

RESULTS:

Data collected from 115 patients were analyzed and presented in tabular form.

Table 1 : Age wise distribution of patients.

AGE (in years)	NUMBER OF PATIENTS	PERCENTAGE
0 to 2	9	7.8
3 to 5	29	25.21
6 to 9	34	29.56
10 to 12	25	21.73
13 to 15	18	15.65

Table 1:Incidence of injury was 7.80 % in children <2 yrs and 25.21% in children between 3-5 years of age. The children between 6-9 years of age had more ocular injury the incidence is 29.56%.The incidence for 10-12 years and 13-15 years to 21.73% and 15.65% respectively.

Table 2: Distribution of patients according to the mechanism of trauma

MECHANISM OF INJURY	NUMBER OF PATIENTS	PERCENTAGE
Blunt	85	73.92
Penetrating	6	5.22
Intraocular foreign body	6	5.22
Chemical	18	15.65

Table 2: The study data shows 73.92% (85 people) sustained blunt injuries, 15.65% (18 people) had a chemical injury. 5.22% (6 people) sustained penetrating injuries, 5.22% (6 people) had an intraocular foreign body.

Table 3: Distribution of patients according to anatomical region involvement

ANATOMICAL REGION	NUMBER OF PATIENTS	PERCENTAGE
Adnexa	91	79.13
Anterior segment	3	2.6
Posterior segment	0	0
Adnexa and anterior segment	16	13.92
Anterior segment and posterior segment	5	4.34

Table 3: The results showed that the majority of injuries (79.13%) were located in the adnexa region. Only posterior segment injuries were not reported.

Male children were more commonly injured than females.The incidence was 73.04% in male and the incidence was 26.96% in female children.

This study examined the laterality of paediatric ocular trauma and found that unilateral ocular trauma was much more common than bilateral ocular trauma. Specifically, the study found that 93.04% of the 115 paediatric ocular trauma cases studied were unilateral, while only 6.96% were bilateral.

The study examined the types of injuries sustained by 115 children. Of the 115 children, 6 (5.22%) sustained open injuries, while 109 (94.78%) sustained closed injuries

The study shows that the most common place of injury for the children was the home, with 62 children (53.91%) being injured there. The second was the street, with 33 children (28.7%). School was the third most common place of injury, with 13 children (11.3%), and other places (such as parks, workplaces, etc.) were the least common place of injury, with only 7 children (6.08%) being injured.

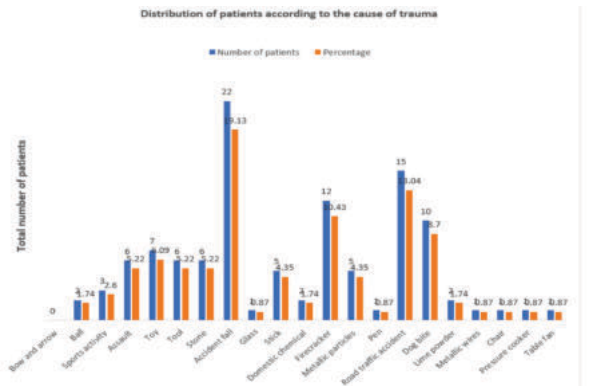


Chart 1: Bar chart depicting distribution as per causes of trauma
Chart 1: In this study the most common cause of trauma was accidents from falls, with a total of 22 cases. This was followed by road traffic accidents with 15 cases. Dog bites account for 10 cases, while firecrackers account for 12 cases. Other causes of trauma include ball (2 cases), sports activity (3 cases), assault (6 cases), stick (5 cases), stone (6 cases), domestic chemical (2 cases), lime powder (2 cases),

and metallic particles (5 cases),other (6 cases). The least common causes of trauma were bow and arrow with 0 cases, glass with 1 case, pen with 1 case, metallic wires with 1 case, chair with 1 case, pressure cooker with 1 case, and table fan with 1 case. It was clear from this data that accidents from falls and road traffic accidents are the most common causes of trauma.

Table 4: Distribution of patients according to visual acuity at presentation and final visual acuity

VISUAL ACUITY AT PRESENTATION	NUMBER OF PATIENTS	PERCENTAGE	FINAL VISUAL ACUITY	NUMBER OF PATIENTS	PERCENTAGE
6/6	41	35.65	6/6	97	84.35
6/9	37	32.17	6/9	4	0.35
6/12	11	9.57	6/12	2	1.74
6/36 to 6/60	9	7.83	6/24	2	1.74
Fc+4m to +6m	4	3.48	Fc+4m to +6m	0	0
Fc+6 inches	1	0.87	Fc+1m to +3m	0	0
PL+	4	3.48	HM+	1	0.87
PL-	0	0	PL-	0	0
Cannot be assess	15	13.04	Cannot be assess	9	7.83

Table 4: The majority of patients (35.65%) had a visual acuity of 6/6 at presentation, while 32.17% had a visual acuity of 6/9. The remaining patients had visual acuities ranging from 6/12 to PL+. At the end of the treatment, the majority of patients (84.35%) had a visual acuity of 6/6, while only 0.35% had a visual acuity of 6/9. The remaining patients had visual acuities ranging from 6/24 to HM+. Notably, none of the patients had a final visual acuity of Fc+4m to +6m or Fc+1m to +3m.

DISCUSSION:

Incidence according to age :

This study had a total of 115 patients, out of which, 73.04% (84) were male and 26.95% (31) were girls. The mean age of injured patients was 8.7 years. It was found that 9 children aged 0 to 2 years were injured(7.8%) of the total injuries. 29 children aged 3 to 5 years were injured(25.21%).34 children aged 6 to 9 years were injured (29.56%).25 children aged 10 to 12 years were injured (21.73%). It is important to note that the rate of injury was highest among the children, aged 6 to 9 years. This result was similar to study done in India by Katiyar et al^[7]involving 41.1% (80/191) of total patients in that study and Madan et al^[8]. This could be due to their physical vulnerability and lack of experience in navigating the world. The rate of injury among the older children, aged 10 to 15 years, was lower than the younger age groups.

Incidence according to sex:

Male preponderance was common feature of eye injuries in children. Thus, our findings were consistent with that of all other similar studies, as marked increase of the male-female ratio in children older than age of 5 yrs. Higher incidence amongst males can be explained on the basis, that boys were granted more freedom than girls and tend to spend more time outside with less adult supervision and exhibit more uninhibited behavior as compared to female.

Authors	No. of cases	Male (%)	Female (%)
Our study	115	73.04	26.95
Dr.Vishal Wagh ,Dr.Pravin Tidake[9] (WR,India)	60	88.33	11.67
Katiyar, et al[7] (India)	191	79.1	20.9
Madan et al[8] (Nagpur)	61	62.3	37.7

Laterality and Eye involvement

This study examined the laterality of paediatric ocular trauma and found that unilateral ocular trauma was much more common than bilateral ocular trauma. Specifically, the study found that 93.04% of the 115 paediatric ocular trauma cases studied were unilateral, while only 6.96% were bilateral.

This study highlights the importance of screening for eye involvement in children to ensure that appropriate interventions are taken to provide the best possible outcomes.

Place of injury

This study revealed that more than half of all injuries occurred in the

home environment. This suggests that more attention needs to be paid to the safety of children in the home, such as supervision, educating children on proper safety measures, and making sure all objects that could potentially cause harm are out of reach. Furthermore, 11.3% of injuries occurred in school settings, meaning that more attention needs to be paid to ensuring that the environment should be safe for children. According to Mayouego Kouam J et al^[10], the main places of occurrence of the injuries were home (64.15%) and school (18.11%).

Mechanism of injury

The result of mechanism of injury show that most cases (73.92%) were caused by blunt trauma, followed by chemical trauma (15.65%), penetrating trauma (5.22%) and intraocular foreign body (5.22%). These findings were consistent with previous studies, blunt trauma was the most common cause of paediatric ocular trauma. Like MacEwen et al^[11]. The high number of children affected by blunt trauma was likely due to the fact that these types of injuries were often the result of falls, sports injuries, and other everyday activities.

Type of injury

6 children (5.22%) experienced open trauma, while 109 children (94.78%) experienced closed trauma. This was similar to study done by Jac. Okereke et al^[12] having Closed globe injuries constituted 76% of all injuries. Similar result published by the study done by Karve, et al^[13]. Closed globe injuries were present in 324 (85.04%) of cases & open globe injuries were present in 57 (14.96%) cases. The Birmingham Eye Trauma Terminology System (BETTS)^[14] was a commonly used system to classify and describe the severity of eye trauma. The severity of eye trauma can vary depending on the type of injury and the degree of damage. Open trauma is typically considered more serious than closed trauma. However, open trauma were more serious and can lead to more extensive damage to the eye.

Causes of trauma

The most common cause of trauma was an accident fall, which accounted for 19.13% of the total cases. Second most commonly cause was road traffic accident accounts for 13.04% of injuries. Sports activities were responsible for 2.6% of the trauma cases, while assault caused 5.22%. Toy, tool and stone were each responsible for 6.09%, 5.22% and 5.22% of the cases respectively. Other causes of trauma included firecracker (10.43%), dog bite (8.7%), domestic chemical (1.74%), lime powder (1.74%), metallic particles (4.35%) and metallic wires (0.87%). Of the 115 cases, only 6 (5.22%) were included in other category. The wide variety of causes without one outstanding, predominant cause is a common finding in previous studies, like Karve, et al^[13]. The causes of ocular injuries were diverse and tend to vary in different geographical areas. As results of causes of trauma in paediatric populations were different Percentage wise as seen in different studies done by Jac. Okereke et al^[12]. Madan et al^[8], Katiyar, et al^[7]. They were also related to the socio-economic status of the study population. Chemical injuries to the eye are an emergency and may have devastating results if left unattended. Alkali burns were frequently more disastrous than those caused by acids, as alkalis saponify the lipids of cell membranes and produce total disruption of cells. Acids quickly precipitate tissue proteins and therefore less penetrating. Simple measures like wearing protective clothing, gloves and goggles can protect against chemical burns. Immediate copious irrigation of the eyes using the most readily available source of clean water can be sight-saving in chemical injuries. After first aid, early further management under the care of an ophthalmologist is essential.

Anatomical region

Of the 115 children studied, 91 (79.13%) had injuries to the adnexa, 3 (2.6%) had injuries to the anterior segment, 0 (0%) had isolated injuries to the posterior segment, 16 (13.92%) had injuries to both the adnexa and the anterior segment. Injuries to the adnexa can cause scarring, inflammation. This findings were similar to study done by Karve, et al^[13]. Anterior segment was most commonly involved in study with 82.75%. Also Wagh et al^[9] found similar results adnexal injury accounted for 71.67% of the total.

Visual acuity

This study investigated the visual acuity of 115 patients at presentation after injury and at final treatment. The results showed that 35.65% of patients had a visual acuity of 6/6 at presentation, 32.17% of patients had a visual acuity of 6/9, 9.57% of patients had a visual acuity of 6/12, 5.22% of patients had a visual acuity of 6/24, 7.83% of patients had a visual acuity of 6/36 to 6/60. Our study found that patients presenting

early after receiving a blunt ocular trauma and having pathologies such as a black eye, subconjunctival haemorrhage, corneal abrasions, and corneal oedema regained normal vision after proper management and timely intervention. After treatment, 84.35% of patients had a visual acuity of 6/6, 0.35% of patients had a visual acuity of 6/9, 0.87% of patients had a visual acuity of HM+, 0% of patients had a visual acuity of PL-, and 7.83% of patients had a visual acuity that could not be assessed. Overall, the results of this study indicate that the visual acuity of patients after injury was improved significantly by the treatment. The majority of patients had a visual acuity of 6/6 at final treatment, which is significantly higher than the visual acuity at presentation. Similar result found by study done by Wagh et al^[9]. Agrawal et al^[15] demonstrated poor visual outcome in patients with posterior segment trauma.

CONCLUSION

The age group from 6 to 10 years is susceptible for ocular trauma. Majority of pediatric eye injuries are preventable as most of the injuries occur at home, watching carefully for children by the parents or care givers can prevent most of the injuries. Timely referral and management can help to prevent blindness originating from ocular trauma. Blindness in paediatric ocular trauma is mainly attributed the injury to posterior segment, corneal tear or perforation which may also leads to low vision in some children. Follow-ups of children are important for treating complications in the long term. It is very essential to educate children, parents, and teachers regarding ocular health and about wearing protective goggles and hygiene in order to minimize eye injuries.

Activities such as burning fire crackers should be done under proper supervision. The profound visual loss was associated with delayed intervention especially in cases with poor vision at presentation and involvement of the posterior segment.

The three most important factors determining the final visual outcome were size and site of injury, as well as the time interval between the incidence and presentation of ocular injuries. Blindness due to penetrating trauma in the pediatric age group can be reduced by educating parents and spreading awareness about same.

Clinical pictures:



Fig 1: Bilateral lower lid laceration- table fan



Fig2: Chemical injury- Lime



Fig 3: Blunt trauma to right upper eyelid



Fig 4: sclero-limbal tear with iris tissue



Fig 5: Conjunctival laceration with sub conjunctival

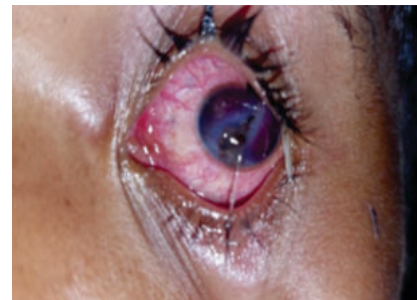


Fig 6: Corneal tear with iris tissue prolapse

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