Original Article

Risk Factors, Early Trauma Management and Outcome in children presenting with ocular trauma in a Public Sector Tertiary Care Hospital – a cross sectional study

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Abstract

Introduction: Ocular trauma is an important, preventable, worldwide public health problem. Ocular injury is also the cause of acquired blindness and lifelong disability in children.

Objective: To assess risk factors, early trauma management and outcome in children presenting with Ocular Trauma in a public sector tertiary care hospital of Rawalpindi.

Materials and Methods: A descriptive cross-sectional study was conducted at Holy Family Hospital, Rawalpindi over a period of six months. Data was collected through a Self-structured mixed questionnaire. The demographic data and characteristics of injury events were noted. A detailed medical history was acquired. Visual acuity before and after treatment was recorded.

Results: Children aged 6-15 years suffered most ocular injuries. 41 (62%) were males and 25 (38 %) were females. A significant difference in occurrence between rural (32%) and urban (68%) children was revealed. The most frequent place of injuries turned out to be home (46%).

Conclusion: Considering the prevalence of ocular trauma, appropriate education and awareness should be given to parents to reduce the risk of trauma. Most eye injuries in children are preventable, reflecting the importance of adult supervision and health literacy for reducing the incidence and severity of trauma.

Key Words: Ocular trauma, Open globe injury, closed globe injury, Visual outcome, Paediatric ocular trauma.

Introduction

Vision is among the most important senses of humans. On the other hand, ocular trauma in children is a leading cause of visual morbidity. It remains a significant disabling health problem despite being a preventable cause of blindness. A crucial cause of visual impairment in children and persons associated with different occupations such as welders, electricians, and workers in the glass and steel industry is trauma to the eyeball. The consequences of such a childhood injury are devastating as they leave an impact that lasts a lifetime leading to permanent blindness as well as lack of concentration in daily activities due to decreased eyesight after trauma, lack of physical activity either due to fear of being hurt or other fears, lack of confidence due to cosmetic effects and abnormal physical outlook and peer pressure and other detrimental things. Ocular injury is also the origin of acquired blindness and lifelong disability in children[1]. About 1.6 million people are blind due to eye injuries; furthermore, 2.3 million have low vision bilaterally and 19 million suffer from unilateral visual loss, making eye trauma the most common etiology of unilateral blindness[2, 3].

Almost half of the patients presenting in eye outpatient departments (OPDs) are due to ocular trauma. Ocular problems in children are unlike in adults, not just because of the inability to express their problems but also due to the risk of developing amblyopia also called lazy eye, which results when one eye is not used for a long time. These injuries also affect the psychological, emotional and social growth and nourishment of a child. Ocular trauma is a significant, preventable, and globally prevalent health problem[4].

Eye trauma during childhood consists of a range of corneal surface abrasions to corneal and scleral perforations. Two broad classes of ocular injuries are usually described as being: (1) Open-globe injury and (2) Closed-globe injury. Open globe injuries are those in which the eyeball is damaged. These can either be penetrating (entry wound only) or perforating (entry and exit wounds both).An open-globe injury that is full-thickness commonly caused by a sharp object with the wound occurring at the impact site by an outside-in mechanism is categorized as a laceration. Closed globe injuries are broadly classified as contusions and lamellar lacerations. Open globe injury requires immediate attention and should be dealt with as an emergency[5]. Delay in the presentation of these kinds of injuries mostly due to lack of awareness leads to the formation of traumatic cataracts and further complications. The treatment for open globe injuries involves first extracting the foreign body, closing and reconstructing the eyeball, second fighting inflammation, and third restoring the visual function by cataract surgery.

For closed-globe injuries, surgical intervention is maybe needed. There is country-based

variation in the epidemiological profile of pediatric ocular injuries across the world.

Ocular trauma is more frequent in developing countries as compared to in developed countries[6, 7]. Developing and developed countries have different results in both the pattern of injury and visual outcome due to variations in demographic, social and cultural factors.

This study was done to investigate various etiological factors resulting in the causation of pediatric ocular trauma, the role of early trauma management and visual outcome in pediatric ocular trauma.

Materials and Methods

A descriptive cross-sectional study was conducted at Holy Family Hospital, Rawalpindi over a period of six months. A total of 66 children between 2 months to 15 years of age with ocular trauma presenting within 72 hours of injury were selected through nonprobability convenience sampling. Data was collected through a Self-structured mixed questionnaire. The demographic data and characteristics of injury events were noted. A detailed medical history was acquired. Visual acuity before and after treatment was recorded. The data was entered and analyzed using SPSS version 24. Frequency and percentages were calculated. Chi square test was applied to compare categorical variables. P value less that 0.05 was taken as significant.

Results

A total number of 66 pediatric ocular injury cases have been admitted to Holy Family Hospital, Rawalpindi during the study period of 6 months. The age of the children ranged from 1 year to 15 years. The study population was divided into three age groups: 1-5 years (21 %, n = 14),6-10 years (32 %, n = 21) and 11-15 years (47 %, n = 31) old.

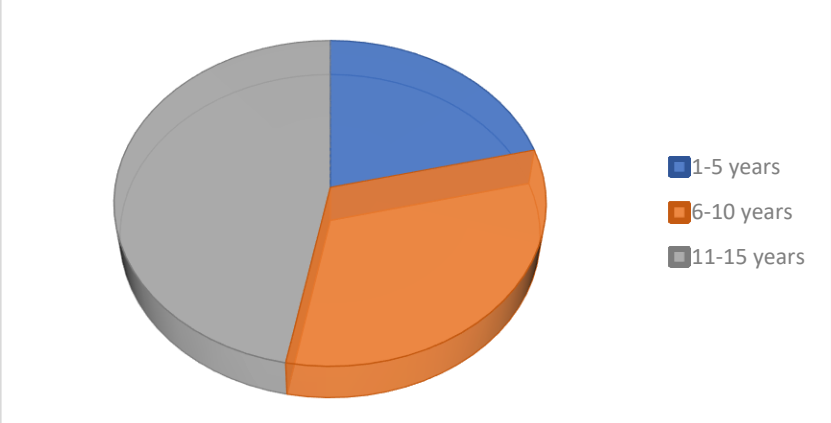

Figure 1: Frequency of ocular injuries according to age

The results revealed boys to be more likely to experience an ocular injury as compared to girls (ratio 1.6:1; p =0.204), and the frequency of eye trauma increased considerably over the age of 13 for boys and under 7 for girls. A higher incidence of ocular trauma was observed among children from urban backgrounds (urban-to-rural ratio 2.09:1; p=0.791). Mothers with primary education (18 %, n=12) Secondary education (24 %, n=16) Intermediate education (41 %,n=27) Graduated (17 %,n=11).

Place of injury: Home was the leading place of injury as shown in Table 1. A greater number of cases were reported during daytime than at night (ratio 4.49:1; p=0.747)

Place of injury	Number	Percentage
Home	30	46
Playground	15	23
Road	14	21
School	5	8
Work	2	2

Table 1: Frequency of ocular injuries according to the place of injury

Cause of injury: The highest percentage of ocular injuries in children were caused by blunt (9%, n = 6) and metal nail(24 %, n = 16), followed by wooden stick (12 %, n = 8), knife(11 %,n = 7), stone (8 %, n = 5), glass(6%, n = 4), RTA(8 %, n = 5) and table corner (6%, n = 4), dog bite(6%,n=4), pencil (3%,n=2), firearm(3%,n=2), fingernail(4%,n=3). Blunt objects, metal nails and stick injuries accounted for a greater number of eye injuries.

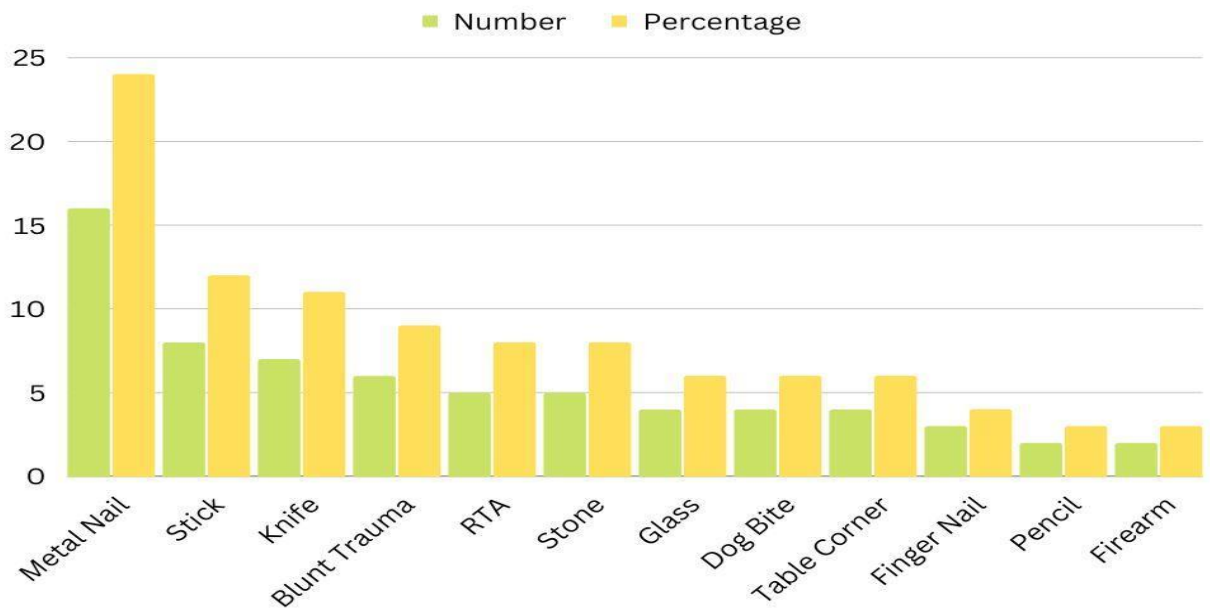

Figure 2: Frequency of ocular injury according to cause

Time of presentation to hospital: Patients were admitted to the hospital on the same day (52 %,n=34), during the first 24 h, 18 %,n=12), and after 48h(30 %,n=20). The delay in a presentation by 1 or 2 days was due to a lack of awareness (36 %, n=24) and distance from the place of the event (12 %,n=8). Presentation of trauma: First Aid was performed in 58 % of cases (n=38) while 42% of cases did not receive any first aid. (21%, n=14) cases were catered by professionals, while (35 %,n=23) were catered by non-professionals. Types of first aid involved were dressing (20 %, n=13), water rinsing (18 %, n=12), cold compression (11 %,n=7), both water and cold compression (6 %,n=4), and eye drops (2 %,n=1).

The pattern of ocular trauma: Common consequences of ocular trauma include corneal tear(34 %,n=30), iris prolapse(27%,n=24), eyelid laceration (12%,n=11), Scleral tear (12%,n=11), hyphema(10.9,n=1), subconjunctival hemorrhage (2 %,n=2), lens damage (2%,n=2] Open globe Injury was more prevalent (59 %,n=39), closed globe injury (41%,n=27). Among closed globe injuries, lamellar contusion accounted for (17%, n=11), followed by contusion(1.5%,n=1), and others (23%,n=15).

The outcome of treatment: Surgical intervention was done and after follow-up, the final visual activity was found in only 48 % of all patient records, among them visual acuity of 0.5 or better was regained by 55%. CGI was significantly related to a desirable visual outcome, meanwhile severe visual impairment (NLP) and VA of 0.03–0.1 with OGI.

Effect of trauma: Post-trauma children presented with a lack of awareness (36%,n=24), lack of concentration(38%,n=25), lack of physical activity (6.1%,n=4), lack of confidence due to cosmetic effect (1.5%,n=1) and all of above (54 %,n=36)

Discussion

Ocular trauma can cause serious complications like monocular visual disability and non-congenital unilateral blindness worldwide if not dealt with appropriately and in time. Children, however, are especially susceptible to ocular injuries either independently or in association with head or face trauma due to increased exposure to risk factors.

Pediatric ocular trauma results in about 7% of all physical injuries and 10 to 15% of all eye diseases in children, according to a study conducted in Yemen[8]. The incidence of ocular trauma in children was higher during Eid festivities, especially in males. Similarly, in a 2018 study that was done in India[9] the epidemiological statistics show that 76% of presenting children were below 12 years with a male-female ratio of 2.9 to 1. The place posing the highest risk for eye injury is the home (48%), followed by streets (17.9%) and playgrounds (14.9%). In 2020, a Spanish study[10] which included patients presenting over 24 months to the Pediatric Emergency Departments in five hospitals, concluded that several factors influenced the trauma. These factors include age group, being home (34.7%), and presence in schools or sports areas (34.3%) the most recurrent. The most frequent mechanism of trauma is blunt objects (48.6%). Closed globe injuries were the most frequent (85.5%), usually contusions (52.7%). Immediate sequelae were observed in fifty-eight patients (6.8%), with visual acuity as the most common impairment (70.7%). All these statistics reflect that certain age groups, male gender, daily activities, and specific cultural or religious festivals in which children are exposed to potentially threatening substances influence the epidemiology or occurrence of ocular trauma.

Our study included sixty-six children presenting with ocular trauma. The results showed a noteworthy correlation between increased prevalence in children aged 6-15 years, males, and increased prevalence under 7 years for females. The majority of cases were reported during day time, with the place of incidence being home the first and playgrounds as the second. For reference, A Brazilian study showed that the majority of ocular injuries in children occurred at home in the presence of adults due to the child's actions[11]. Boys were more likely than girls to be injured and have ocular injuries. The highest percentages of ocular injuries among children were caused by blunt objects, followed by metal nails, wooden sticks, stones and glass. The patients were presented to hospitals mainly during the first 24 hours. The delay of more than 24 hours was caused by either a lack of awareness or the distance of the healthcare facility from the place of injury. For reference, blunt trauma was the most common type of injury. An assault was the most common cause and accounted for the highest number of serious injuries[12]. Anti-tuberculous drugs and steroids show strong impact to cause posterior uveitis and poor response towards the treatment[13]. In case of

glaucoma associated with ocular trauma, micro-invasive glaucoma surgery (MIGS) is available in which stent is implanted that resides within Schlemm's canal and allows for direct bypass of the trabecular meshwork by aqueous fluid[14]. Standardized classification systems for ocular trauma are essential for consistent documentation and communication. The Ocular Trauma Score (OTS) provides a reliable and reproducible system for classifying and predicting the visual outcome of ocular trauma. Implementation of the OTS can facilitate better communication, standardization of research data, and comparisons between different studies on ocular trauma[15].

Conclusion

Ocular injuries are common among children 6-15 years of age. Male gender, urban middle class domestic living are factors associated with more common eye injuries. Children are at risk of potential blindness due to ocular trauma if they are not timely brought to a health care facility. It is imperative to comprehend the epidemiology and mechanisms of this diverse assortment of injuries to prevent the catastrophic results of potentially avoidable ocular trauma in children. A lot of these injuries have very poor visual outcomes, and their occurrence can be minimized as suggested by the evidence. Prompt and adequate First Aid and later on early presentation to the Hospital can significantly reduce the risk of blindness.

Accessing the risk factors and awareness of the severity of ocular trauma can help the population to take preventive measures beforehand. Public health officials must raise awareness about education related to pediatric ocular trauma. General safety precautions are necessary.

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