

Paediatric Ocular Trauma in a Tertiary Care Hospital in North Bengal- A Prospective Study

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ABSTRACT

BACKGROUND

Ocular trauma has been one of the notorious causes of monocular blindness and visual disability amongst children worldwide. In a booming populous country like India with a high birth rate, children often remain unguarded in many situations. Epidemiological factors leading to such injuries have often been implicated as common familiar objects having unexpected adverse consequences mostly due to faulty handling or lack of caring attitude.

METHODS

All patients below 14 yrs., with a history of ocular trauma and without any ocular co-morbidities admitted to the Department of Ophthalmology, North Bengal Medical College, during the study period of one year were grouped as per age and clinical diagnosis as per BETTS classification system. Management was done as per standard treatment protocols. Data was reviewed using SPSS version 20 software and outcomes were systematically assembled. Patients were followed up for 6 months on an outpatient basis after discharge.

RESULTS

Our study revealed that the most affected age group was from 1 - 5 years (n=19, 39%) followed by 11 - 14 years (37%). Boys were predominantly involved in ocular injuries in our study (n=39, 79.6%). Open globe injury was seen in 34.7% (n=17) cases, sole closed globe injury (without any breach in anatomy) in 24.5% (n=12) cases, isolated eyelid injury in 26.5% (n=13), chemical injury in 8.2% (n=4) children. Injury during play was the most common way of injury (n=17, 34.7%), followed by household trauma (n=11, 22.4%) while firecracker/chemical injury was seen in 8.2% of cases (n=4). Outdoor activities in school also contributed 10.2% of cases (n=5) among the injuries.

CONCLUSIONS

Ocular injury is one of the most catastrophic events in the lifetime of a child which can be mostly prevented by proper awareness and parental education. Epidemiological factors leading to ocular trauma must be ascertained, triaged, and properly taken care of.

KEYWORDS

Ocular Trauma, Paediatric Eye Trauma, Open Globe Injury

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BACKGROUND

Vision is an important key factor for neurological and psychosocial development. Visual impairment in early life may lead to permanent visual disability later on. Timely intervention is essential for the proper development of vision. Elimination of blindness in children is one of the priorities of the World Health Organization's VISION 2020 program.¹ Eye diseases in children are important causes of medical consultation and require prompt attention because of their impact on a child's development, education, future work, and quality of life. Monocular blindness in children is most commonly due to ocular injuries.^{2,3} Various studies have implicated the incidence of blindness in children due to ocular trauma from 2% to 14%, with 19 million cases of unilateral visual loss due to trauma.^{4,5,6}

Ocular evaluation in children is a difficult task due to lack of cooperation specifically after trauma. Furthermore, the prognosis of ocular injury in children become more guarded in most cases due to stormy post-operative course, caused by the increased propensity for inflammation, poor drug compliance, as well as increased chances of amblyopia.⁷ Eye problems in children, can have a severe negative impact on their education, personal development, and economic productivity. The impact of eye problems is greater and has severe consequences in poorer regions of the world where resources and educational supports are not enough. The aftermath of visual impairment at a young age may be extreme, especially poor effect on schooling, socio-economic liabilities of the care-givers as well as increase Disability Adjusted Life Years (DALYs).⁸ It reduces employability and productivity and in general impairs the quality of life, which has a direct bearing on the economic health of the nation as well as in terms of gross domestic product (GDP).

Objectives

- 1.To describe the socio-demographic variables of paediatric ocular trauma in a tertiary care hospital in a rural area.
- 2.To identify the epidemiological factors associated with paediatric eye injury which present as emergency cases in a tertiary care hospital in a rural setup. Such that identified factors may be avoided to prevent such injury as well as aid in the spread of social awareness as an outreach program in a rural region.

METHODS

This was a prospective study conducted in a rural medical care centre in north Bengal over a period of 1 year. The study adhered to the tenets of the Declaration of Helsinki. Clinical details of all cases were recorded on predesigned proforma. All the children under 14 years of age with ocular injury admitted to the in-patient department (IPD), Dept. of Ophthalmology were included in the study. Patients with

pre-existing ocular co-morbidities before the trauma were excluded from the study.

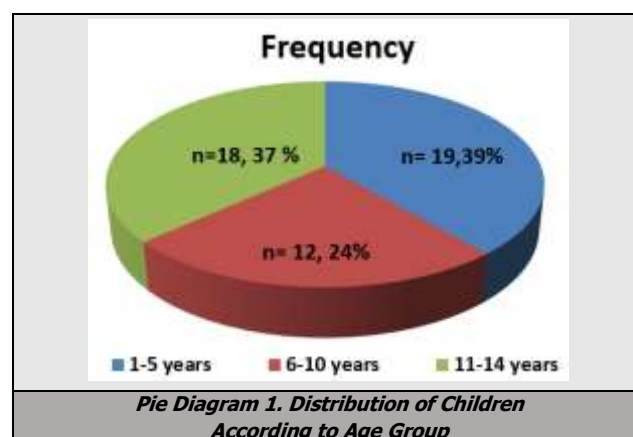
The age at presentation, gender, and clinical diagnosis informed consent was taken from the parents or guardians. The clinical diagnosis was grouped with the appropriate classification. The population was then further divided into four groups according to the children's age. All the injuries were managed by standard management protocol and follow up done.

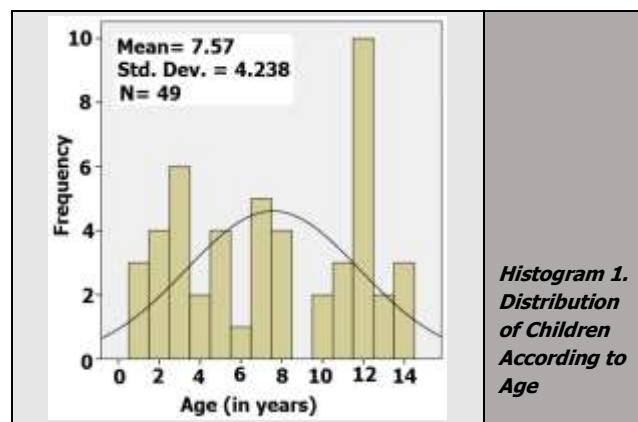
All required surgeries were done by a single competent ophthalmic surgeon. Surgical external injury cases were given systemic broad-spectrum antibiotics, tetanus prophylaxis (as and when required), and analgesic anti-inflammatory medication after immediate surgical intervention. Intraocular open globe injury patients were given systemic antibiotics, steroid, topical antibiotic-steroid eye drop, cycloplegic eye drops, and bandage contact lens to reduce foreign body sensation. Intraocular crystalline lens injuries managed with lens removal with vitrectomy, whenever required, and secondary intraocular lens implantation were done.

X-ray orbit, and CT scan of the brain, and orbit were done to exclude bony injuries and intracranial injuries. USG-B scan was done in every case to exclude posterior segment sequela of trauma. Trauma was classified by the BETTS classification system.⁹ Data were reviewed using SPSS version 20 (Statistical Package for Social Sciences) software and outcomes were compiled. During the follow-up period, three children discontinued the treatment due to some other systemic illness, for which they were treated in the same hospital. After recovery, treatment was started as per advice from the Department of Paediatric Medicine.

RESULTS

As ocular injury in the pediatric age group is not very uncommon, and in majority of cases like subconjunctival hemorrhages are not referred to tertiary care hospitals. So they remain unreported. Usually, those children were admitted in indoor who needed treatment under observation or surgical treatment or investigations. Many cases of minor ocular trauma were treated on an out-patient basis, which was not reported here in this prospective study.





	Frequency	Valid Percent
Valid	1	39
	2	10
	Total	49
		79.6
		20.4
		100.0

Table 1. Gender Distribution among Children (Male=1, Female=2)

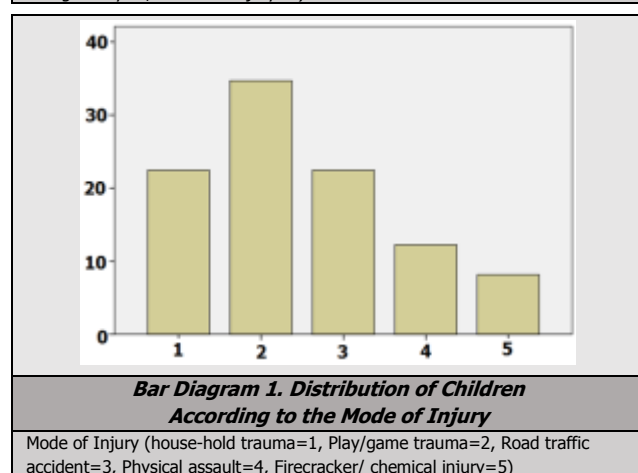
	Frequency	Valid Percent
Valid	1	22
	2	24
	3	3
	Total	49
		44.9
		49.0
		6.1
		100.0

Table 2. Distribution of Children According to the Involved Eye

	Frequency	Valid Percent
Valid	1	12
	2	13
	3	17
	4	3
	5	4
	Total	49
		24.5
		26.5
		34.7
		6.1
		8.2
		100.0

Table 3. Distribution of Children According to Diagnosis of Injury

Diagnosis (Closed Globe Injury=1, Eyelid Injury = 2, Open Globe Injury=3, Foreign Body=4, Chemical Injury=5)



The study revealed that the most affected age group was from 1-5 years (39%) with 11-14 years as a close second (37%). The age from 6-10 years were affected in 24% cases. The injury rates showed a spike in the age group of 12 years which is most probably due to injuries that took place during playing. Boys were predominantly involved in ocular injuries in our study (n=39, 79.6%), as in our country boys are more involved in outdoor games from early childhood.

The right eye was affected in 44.9% cases (n=22), left eye in 49.0% cases (n=24) while in 6.1% (n=3) cases both the eyes were affected. Though laterality does not confirm

any significant correlatable issue, firecracker injury or chemical burn involved both eyes with part of the face. It is most probably due to confrontation with the source of injury during battery or firecrackers handling. Though permanent disfigurement did not take place, those have the potential to create so and comorbidities following.

Of all the variants of injury patterns affecting the eye, open globe injury was seen in 34.7% (n=17) cases, closed globe injury per se (without any breach in anatomy) in 24.5% (n=12) cases, isolated eyelid injury in 26.5% (n=13), chemical injury was 8.2% (n=4) children, while foreign body (all being extraocular) in 6.1% cases (n=3).

Open globe injuries are potentially not only vision-threatening, but also undergo a chronic course of treatment with a strong potential to involve the other eye in the form of sympathetic ophthalmitis. Injury involving anterior segment (corneal or corneoscleral injury without posterior segment involvement or no breach in the posterior capsule and zonules) respects the structural integrity of the eyeball, compromising vision either due to corneal opacification or scar induced astigmatism. Open globe injuries occurred predominantly with a sharp object or blunt trauma directly to the eyeball causing rupture.

Injury during play was the most common way of injury (n=17, 34.7%), followed by household trauma (n=11, 22.4%) and road traffic accident (n=11, 22.4%), and physical assault accounted for 12.2% (n=6) of cases while firecracker/chemical injury for 8.2% of cases (n=4). Following fall on the ground or inadvertent trauma while playing contributed a major number of ocular injury cases among children. Outdoor activities in school also contributed 10.2% of cases (n=5) among the injuries. Firecracker injuries took place in the festival season, whereas all the chemical injuries were due to mishandling of battery containing chemicals in evening or night times during power cut-off.

DISCUSSION

Ocular trauma is a menace in both developed (12% of all admitted cases) as well as developing countries (12.9% of all admitted patients).¹⁰ The study revealed that the most affected age group was from 1-5 years (n=19, 39%) with 11-14 years as a close second (n=18, 37%). 24% (n=12) of total cases were in 6-10 years age group. In our study, the most commonly affected age group was 1-5 years consistent with other studies.¹¹ Consistent with our results, El-Sebaity et al. Egypt, found in their study that the majority of paediatric trauma occurred in children aged 2-7 years of age.² Other studies by Lee et al, Valbuena et al and Quamaruddin also show similar results.^{5, 12, 13}

The lower prevalence of ocular injury in neonates and infants can be well due to less exposure to the outside environment as well as lesser mobility and greater dependency on care-givers.¹⁴ In contrast Shoja et al. detected that a majority (58.3%) of injuries were seen in the 7-12 year of age group.¹⁵

A higher gender prevalence for ocular trauma amongst males (ratio of 3.9:1) was found in our study. This also conformed to other epidemiological studies, with a male- to female ratio varying between 1.8:1 to 5.4:1.^{5,16,17,18} The more propensity of boys to participate in aggressive sports and play may be one of the reasons for such gender discrepancies.¹⁹ In a developing country like India, the outdoor movement of a girl child are usually restricted by parents.

A retrospective study conducted by Edita Puodžiuvienė et al²⁰ showed that the incidence of closed globe injury was more (53.4%) than other morphological varieties of injuries. Another study in North India, conducted by Shazia Qayum et al²¹ showed that the incidence of closed globe injury was 67.8%. In our study also we have found the closed globe injury (including isolated eyelid injury, extra-ocular foreign body, and chemical injury) is the commonest presentation (65.3%).

Our study revealed the most common mode of injury was while playing which conformed with the POTS questionnaire developed in the United Kingdom which showed play related injury as high as 66.2%, whereas we have found 34.7% cases were due to injury during playing.²² Concentration solely on playing, is not only the key factor in all cases. Poor condition of the playgrounds, improper or no use of playing shoes during outdoor playing are among contributing factors.

A mechanical or chemical injury involving eye and/or face creates a big impact on the psychosocial development of a child. It not only hampers education or learning ability in school but also makes the brain vulnerable to live without a dream. So, awareness of parents regarding the psychosocial and scientific impact of ocular injury should be increased. To prevent it, the awareness of parents regarding potentially sharp or harmful objects in the home scenario must be escalated.²³

Uneven playgrounds in and around the school along with barefoot playing played a crucial role in injuries that took place while playing. Lack of concentration, in part of the parents and other senior members of the family, while doing work with instruments, potential to cause severe injuries is another common factor. Allowing the children to handle chemical products containing devices to be discouraged aggressively. Lastly, proper medical and surgical care seeking attitude should be practiced to have a good prognosis following such injuries.

CONCLUSIONS

Our study throws some light on the epidemiological aspects of eye trauma in children in a rural background. Ocular injury is one of the most catastrophic events in the lifetime of a child which can be mostly prevented by proper awareness and parental education. Epidemiological factors leading to ocular trauma must be ascertained, triaged, and properly taken care of.

Limitations of our study include fewer cohorts of patients and an inability for proper follow up. In the area of our study, mostly lack of knowledge about circumstances leading to childhood eye trauma as well as poor access to eye care facilities are the main hindrance for the prevention of such easily avoidable eye morbidities. So, this study may be used as a harbinger of awareness campaigns amongst rural and under-developed populations of the northern part of West Bengal and rural India.

REFERENCES

- [1] Resnikoff S, Kocur I, Etya'ale DE, et al. Vision 2020 - the right to sight. *Ann Trop Med Parasitol* 2008;102(Suppl 1):3-5.
- [2] El-Sebaity DM, Soliman W, Soliman AMA, et al. Pediatric eye injuries in Upper Egypt. *Clin Ophthalmol* 2011;5:1417-1423.
- [3] Kaur A, Agrawal A. Paediatric ocular trauma. *Curr Sci* 2005;89:43-46.
- [4] Al-Mahdi HS, Bener A, Hashim SP. Clinical pattern of pediatric ocular trauma in fast developing country. *International Emergency Nursing* 2011;19(4):186-191.
- [5] Lee CH, Su WY, Lee L, et al. Pediatric ocular trauma in Taiwan. *Chang Gung Med J* 2008;31(1):59-65.
- [6] Negrel AD, Thylefors B. The global impact of eye injuries. *Ophthalmic Epidemiol* 1998;5(3):143-169.
- [7] Behbehani AM, Lotfy N, Ezzdean H, et al. Open eye injuries in the pediatric population in Kuwait. *Med Principles Pract* 2002;11(4):183-189.
- [8] Rahi JS, Cumberland PM, Peckham CS. Visual function in working-age adults: early life influences and associations with health and social outcomes. *Ophthalmology* 2009;116(10):1866-1871.
- [9] Kuhn F, Morris R, Witherspoon CD, et al. The Birmingham eye trauma terminology system (BETT). *J Fr Ophtalmol* 2004;27(2):206-210.
- [10] Thylefors B. Epidemiological patterns of ocular trauma. *Aust N Z J Ophthalmol* 1992;20(2):95-98.
- [11] Khan MD, Kundi N, Mohammed Z, et al. A 6 1/2-years survey of intraocular and intraorbital foreign bodies in the North-west Frontier Province, Pakistan. *Br J Ophthalmol* 1987;71(9):716-719.
- [12] TGB Merca, Valbuena M. Epidemiology and visual outcomes of pediatric ocular trauma cases in a tertiary hospital. *Philipp J Ophthalmol* 2014;39(1):27-32.
- [13] Min FCL, Qamaruddin F. A West Malaysian study of pediatric ocular trauma. *Int Eye Sci* 2016;16:1212-1215.
- [14] Saxena R, Sinha R, Purohit A, et al. Pattern of pediatric ocular trauma in India. *Indian J Pediatr* 2002;69(10):863-867.
- [15] Shoja MR, Miratashi AM. Pediatric ocular trauma. *Acta Medica Iranica* 2006;44(2):125-130.
- [16] El-Sebaity DM, Soliman W, Soliman AM, et al. Pediatric eye injuries in Upper Egypt. *Clin Ophthalmol* 2011;5:1417-1423.

- [17] Brophy M, Sinclair SA, Hostetler SG, et al. Pediatric eye – related hospitalizations in the United States. *Pediatrics* 2006;117(6):e1263-1271.
<https://doi.org/10.1542/peds.2005-1950>.
- [18] Aghadoost D, Fazel MR, Aghadoost HR. Pattern of pediatric ocular trauma in Kashan. *Arch Trauma Res* 2012;1(1):35-37.
- [19] Baquet G, Ridgers ND, Blaes A, et al. Objectively assessed recess physical activity in girls and boys from high and low socioeconomic backgrounds. *BMC Public Health* 2014;14(1):192.
- [20] Puodžiuvienė E, Jokūbauskienė G, Vieversytė M, et al. A five-year retrospective study of the epidemiological characteristics and visual outcomes of pediatric ocular trauma. *BMC Ophthalmol* 2018;18(1):10.
- [21] Qayum S, Anjum R, Rather S. Epidemiological profile of pediatric ocular trauma in a tertiary hospital of northern India. *Chin J Traumatol* 2018;21(2):100-103.
- [22] Barry RJ, Sii F, Bruynseels A, et al. The UK Paediatric Ocular Trauma Study 3 (POTS3): clinical features and initial management of injuries. *Clin Ophthalmol* 2019;13:1165-1172.
- [23] Kelly SP, Reeves GMB. Penetrating eye injuries from writing instruments. *Clin Ophthalmol* 2011;6(1):41-44.