

EPIDEMIOLOGY, AETIOLOGY AND PATTERN OF PENETRATING OCULAR TRAUMA IN KOLKATA AND SURROUNDINGS

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ABSTRACT

BACKGROUND

The purpose of the study was to determine the epidemiology, aetiology and pattern of penetrating ocular trauma in Kolkata and surroundings.

MATERIALS AND METHODS

It was a retrospective study of patients with open globe injuries who underwent surgery from July 2015 to June 2016 at Regional Institute of Ophthalmology, Calcutta Medical College, West Bengal. We examined and classified the injuries based on BETTS (Birmingham eye trauma terminology system).

We included 192 eyes from 192 patients. The majority of injuries occurred in young (48% patients were <16 years). 54.17% patients were male and 45.83% were female. Most common mode of trauma was Stone (52), Followed by Iron Rod or Piece (44) and Wood (32). Other causes were Cow's horn (14), Needle (12) Knife (8), Arrow (6), Sickle (6), Rubber Tube (4), Glass (2), Crackers (4), Metal Instrument (2), Bird Beak (2) and Pencil (2).

RESULTS

The highest proportion of injuries occurred at home followed by outside. According to BETTS, 61 patients had zone 1, 29 patients - zone 2, 6 patients - Zone 3 injury. Associated features were iris prolapse, hyphaema, anterior capsular rupture, lid tear and impacted foreign body. Mean period of presenting at hospital was 2.72 days. Most common visual acuity at presentation was less than 6/60 to perception of light.

CONCLUSION

In our study, serious ocular trauma frequently occurred at home followed by outside and the young were particularly at risk. Most common mode of trauma was stone. Most of the injuries were limited to cornea up to limbus. More adequate adult supervision and educational measures are necessary in order to reduce the prevalence of these accidents.

KEYWORDS

Ocular Trauma, Epidemiology, Aetiology.

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BACKGROUND

Ocular injury remains an important cause of avoidable and predominantly, monocular visual impairment and blindness.^[1,2] It is a preventable cause of blindness and yet it remains a significant disabling health problem that affects all age groups. Worldwide, there are approximately 6 million people blind from eye injuries, 2.3 million bilaterally visually impaired and 19 million with unilateral visual loss; these facts make ocular trauma the most common cause of unilateral blindness.^[3] The age distribution for the occurrences of serious ocular trauma is bimodal with the maximum incidence in young adults and a second peak in elderly.^[2,4] Even though, ocular trauma has been described

as a neglected issue,^[5] it was highlighted as a major cause of visual morbidity more recently.

According to estimates by WHO, about 55 million eye injuries restricting activities for more than one day occur each year, 7,50,000 cases requiring hospitalisation, which includes 2,00,000 open globe injuries.^[4] Types of injuries vary from closed globe to an open globe injury. Worldwide the typical male-to-female ratio is 4:1^[6-8] and open globe injury is said to be more common.^[9-12] Penetrating ocular injuries in particular carry high risk of visual morbidity in all age groups. In the Indian context, ocular injury as a cause of blindness constitutes 1.5% of total cases (NPCB 2002).

According to Birmingham Eye Trauma Terminology or BETT, open globe injury can be classified into four types:

1. Rupture.
2. Penetrating injury.
3. Intraocular foreign body.
4. Perforating injury.

Ocular trauma classification group has classified open globe injury as follows.^[13]

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| Type | Grade (Visual Acuity) | Pupil | Zone |
|--------------------------|-----------------------|--------------|--|
| Rupture | >20/40 | RAPD present | Up to limbus |
| Penetrating | 20/50-20/100 | RAPD absent | Limbus to 5 mm posterior into sclera |
| Intraocular foreign body | 19/100-5/200 | | More than 5 mm posterior into a sclera |
| Perforating | 4/200-PL +ve | | |
| Mixed | No PL | | |

Recognition of the public health importance of ocular trauma has sparked growing interest in studies on eye injuries.^[14] Ocular injuries can assume unusual social and economic importance involving a huge cost in human unhappiness, economic inefficiency and monetary loss. However, no studies had been carried out on patterns of ocular trauma in the study area. So, in view of public health importance, this study will provide information on magnitude and pattern of ocular injuries in Kolkata and its surroundings. It will serve as the basis for designing and implementing preventive measures to be undertaken by respective authorities.

AIM AND OBJECTIVES: The aim of the study was to determine the epidemiology, aetiology and pattern of penetrating ocular trauma in Kolkata and its surroundings.

MATERIAL AND METHODS

It was a retrospective study carried out at Regional Institute of Ophthalmology, Calcutta Medical College, Kolkata, West Bengal. We examined all the patients under slit lamp and classified the injuries based on Ocular Trauma Classification Group.

Inclusion Criteria: All patients with open globe injuries who underwent surgery from July 2015 to June 2016 at Regional Institute of Ophthalmology, Calcutta Medical College, Kolkata, West Bengal were included in this study.

Exclusion Criteria:

1. Patients who were not admitted in the hospital.
2. Patients with blunt ocular trauma.
3. Patients who underwent surgery outside.
4. Patients with PL -Ve visual acuity.

RESULTS

We examined 192 eyes of 192 patients. Highest proportion of injuries occurred at home followed by outside. Mean period of presentation was 2.72 days. Most common visual acuity at presentation was less than 6/60 to perception of

light. According to their sex distribution, males (54.17%) were slightly more affected than females (45.83%).

The age distribution of the patients shows that children at the age group of 0-10 yrs. were affected most (84). Commonest cause of trauma was stone (52). Then, comes iron rod/piece (44) and wood (32). Other causes were cow’s horn (14), needle (12), knife (8), arrow (6), sickle (6), rubber tube (4), glass (4), crackers (4), metal instrument (2), bird beak (2) and pencil (2). The commonly noted associated features were iris prolapse (58), hyphaema (36), anterior capsular rupture (22), lid tear (8) and impacted foreign body (6). In most of the cases, injury were in Zone 1, i.e. 122. Zone 2 injury were 58 and in 12 cases injury were in Zone 3.

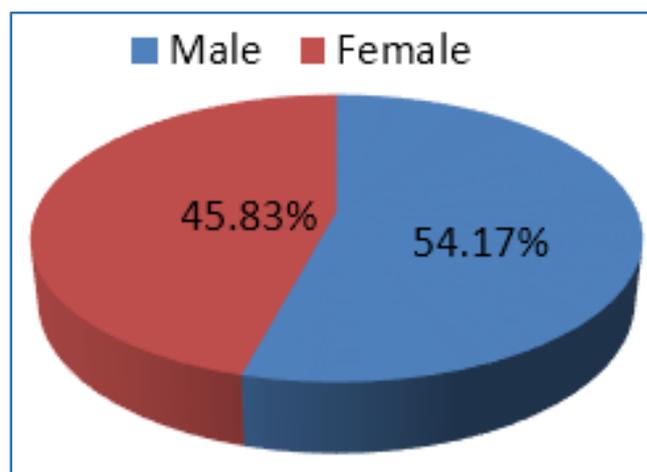


Fig. 1: Pie Chart showing Sex Distribution of the Patients - Male - 54.17% and Female 45.83%

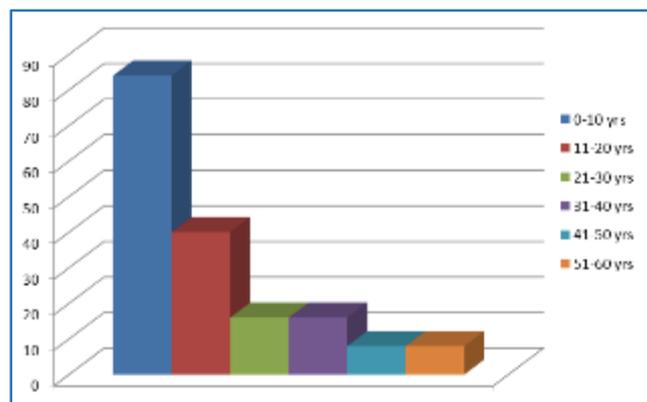


Fig. 2: Bar Diagram Showing Age Distribution of the Patients. 0-10 yrs.-84; 11-20 yrs.-40; 21-30 yrs.-16; 31-40 yrs.-16; 41-50 yrs.-8; 51-60 yrs.-8

| Associated Features | No. of Cases |
|---------------------------|--------------|
| Iris prolapse | 58 |
| Hyphaema | 36 |
| Anterior capsular rupture | 22 |
| Lid tear | 8 |
| Impacted FB | 6 |

Table 1: Showing Associated Features in Some Patients. Iris Prolapsed was seen to be Most Common Associated Feature

| Causes | No. of Cases |
|------------------|--------------|
| Stone | 52 |
| Iron rod/piece | 44 |
| Wood | 32 |
| Cow's horn | 14 |
| Needle | 12 |
| Knife | 8 |
| Arrow | 6 |
| Sickle | 6 |
| Rubber tube | 4 |
| Glass | 4 |
| Crackers | 4 |
| Metal instrument | 2 |
| Bird beak | 2 |
| Pencil | 2 |

Table 2: Showing Causes of Trauma in the Patients. Most Common Cause was Stone, Followed by Iron Rod/Piece and Wood

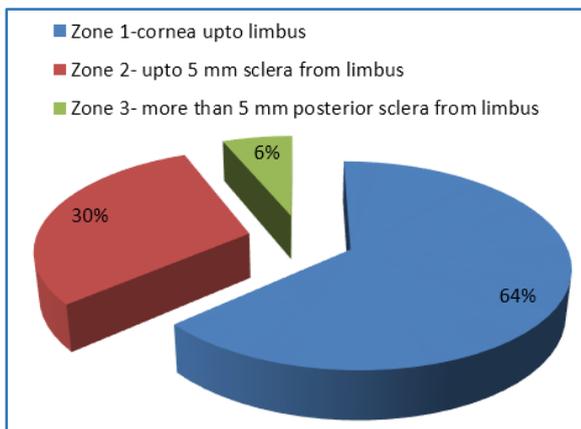


Fig. 3: Pie Chart showing Zonal Distribution of the Ocular Injuries. Most Injuries were in Zone 1; whereas Zone 3 Injuries were Least Common

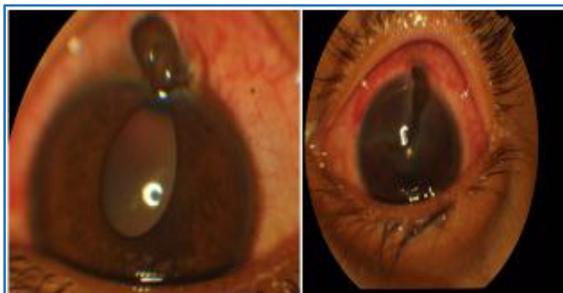


Fig. 4: Pics showing Corneal Rupture Associated with Iris Prolapse

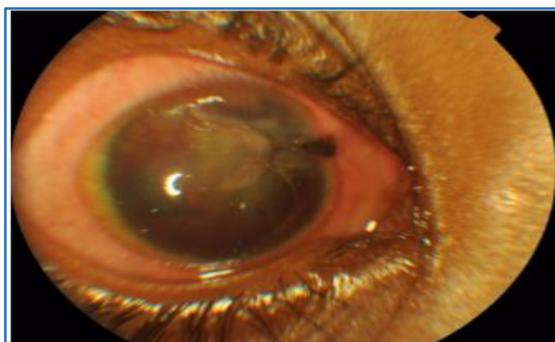


Fig. 5: Pic showing Corneal Rupture Associated with Hyphaema

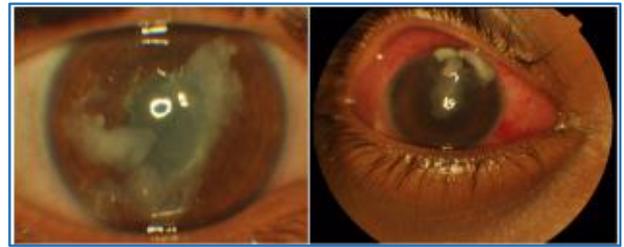


Fig. 6: Pics showing Corneal Rupture Associated with Anterior Capsular Rupture

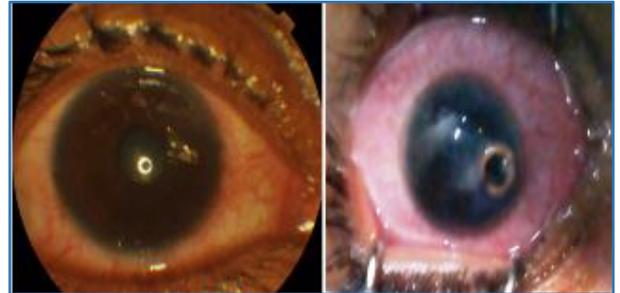


Fig. 7: Pics showing Corneal Rupture Associated with Impacted Foreign Body



Fig. 8: Pics showing Zone 1 Type Corneal Rupture



Fig. 9: Pics showing Zone 2 Type Corneal Rupture



Fig. 10: Pic showing Zone 3 Type Corneal Rupture

DISCUSSION: Ocular trauma is an important cause of blindness and ocular morbidity. Most previous studies on the profile and prognostic factors in ocular trauma have been carried out in more developed countries where modern facilities for managing ocular trauma are widely available.^[14,15] There is paucity of studies on the profile of ocular trauma from the less developed countries.^[16] Such studies can play an important role not only in defining the target groups for prevention and education on ocular trauma, but also in prognosticating ocular injuries at the time of presentation, prevent many unnecessary surgical procedures and also help ophthalmologists dealing with ocular trauma in making clinical decisions. Rohit Saxena et al found that bow and arrow was the most common cause of paediatric ocular trauma in their study. Boys were significantly more affected than girls.^[17] Krishnaiah S. et al found vegetative matter to be the most common mode of trauma in their study. Males were more likely to have ocular trauma than females in this study also.^[18] Govind Singh Titiyal et al found in their study that the commonest material accounting for trauma was wooden stick in 27 (16.7%) patients, followed by stone in 18 (10.9%), followed by finger nail trauma, fall from height and playing with ball in 6 cases each. Other miscellaneous mode of injury included fire cracker injury, injury with hot oil, blunt trauma, iron rod. Open globe injuries were found to be more common accounting for 75 (45.5%) patients than closed globe injuries, which accounted for 54 (31.9%) patients.^[19]

D. V. Singh et al found that ocular injuries were most commonly caused by metallic objects (8.9%) and vegetable matter (8.9%). Other causative agents included bow and arrows (7.46%), sports related including cricket and tennis balls, badminton rackets and shuttle cocks, bat and gillie (7.6%), Hammer and chisel (6.7%), gunshot (3.2%), blast injuries (2.5%) and other occupational injuries (6%).^[20] According to a study conducted in Haryana, males (76.01%) were more frequently affected than females (23.99%). Among non-occupational injuries (61.74%) those occurring due to playing and sports among children were the main aetiological factor (33.67%). In occupational injuries (38.26%), those occurring during agricultural activities (19.9%) were most common followed by industrial accidents (12.24%). Cornea was the most affected part of eyeball (47.6%) followed by iris injury (32.64%).^[14] A study in a tertiary hospital of northern India shows 54.9% patients were below age of 25 yrs. and male:female ratio was 3.5:1. Road traffic accidents are the most common cause of ocular trauma and accounts for 87 cases (34%). Other causes included sports related and recreational 75 (29.7%), occupation related 51 (20.1%), domestic accidents 24 (9.4%) and violence related 16 (6.3%). Among the type of injuries, open globe injuries accounted for 184 cases (72.7%) and 69 patients (27.3%) suffered closed globe injuries.^[21] A study in a tertiary referral hospital in south Tamil Nadu shows 80% of the patients belonged to the age group of 25-35 years. 71% of them were male and 29% were female.

Regarding the causes of ocular trauma, road traffic accidents formed the major bulk of causes, followed by assault and accidental fall.^[22] Another study done in a tertiary rural hospital in Maharashtra shows maximum patients were males and 66 (92.95%) were between the age group of 11-30 years. The most common cause of injury was road traffic accidents followed by sports activities and assaults.^[23] A recent study done in northern rural part of West Bengal in a tertiary hospital shows 83.7% were male. Adults, children and elderly comprised 79%, 17.6% and 3.3% of the study population. Closed globe injuries were the commonest (72.2%). More than 40% of the patients with eye injuries suffered these injuries at the workplace including agricultural activities.^[24]

In a study done on paediatric ocular trauma done at a tertiary eye care centre in western India showed that a higher frequency of ocular trauma occurred at home (45.62%), followed by school (31.33%), playground (13.82%) and finally the street (9.66%). Wooden stick was the cause of injury in 15.20% of patients followed by cricket ball (15.2%) showed that about 61.28% of paediatric ocular trauma occurred in children aged 1-10 years. Younger children have common physical vulnerability, lack of coordination and limited ability to avoid or escape from danger. Also, children show curiosity and a desire to explore, which may expose them to serious hazards.^[25] In contrast, stone followed by iron and wood were found to be the most common mode of ocular trauma in our study. Males and females were almost equally affected with slightly higher male preponderance. Age group 0-10 years was most commonly affected.

We accept few limitations of our study such as:

1. Since this was a retrospective record-based study, only data recorded in the register could be used. Detailed sociodemographic records were not kept at the institute records and hence not included in the study.
2. No active followup of the patients were undertaken and hence the long-term outcome of the patients were not available.
3. There being a large number of alternate service providers in the study area, a part of the population especially from the higher socioeconomic strata is likely to attend these paid private providers. So, the figures in the present study likely to be underestimated as patients from higher socioeconomic strata would not have attended our hospital.

CONCLUSION

Although, eyes represent only 0.1% of the total body surface and only 0.27% of the anterior body surface, their significance to individuals and society is disproportionately higher. Those affected from ocular injuries often have to face loss of career opportunities, major lifestyle changes and occasionally permanent disfigurement. 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.

Trauma has become the most common reason for extended hospitalisations of ophthalmic patients in industrialised nations.^[24] In our study, serious ocular trauma frequently occurred at home followed by outside and the young were particularly at risk. Most common mode of trauma was stone. Most of the injuries were limited to cornea up to limbus. More adequate adult supervision and educational measures are necessary in order to reduce the prevalence of these accidents. The target groups for the purpose of prevention of ocular trauma are young males less than 40 years especially less than 25 years, students and those involved in mechanical jobs where they are working in close proximity to revolving machinery. These groups should be focused and made aware of the ocular trauma, its consequences and measures for prevention and early visit to eye care centre.

REFERENCES

1. Editorial: progress in surgical management of ocular trauma. *British J Ophthalmology* 1976;60(11):731.
2. Desai P, MacEwen CJ, Baines P, et al. Incidence of cases of ocular trauma admitted to hospital and incidence of blinding outcome. *Br J Ophthalmol* 1996;80(7):592-596.
3. Negrel AD, Thylefors B. The global impact of eye injuries. *Ophthalmic Epidemiol* 1998;5(3):143-169.
4. Glynn RJ, Seddon JM, Berlin BM. The incidence of eye injuries in New England adults. *Arch Ophthalmol* 1988;106(6):785-789.
5. Khan MD, Mohammad S, Islam ZU, et al. An 11 years review of ocular trauma in the northwest frontier province of Pakistan. *Pak J Ophthalmology* 1991;7:15-18.
6. Kuhn F. Epidemiology of ocular trauma. In: Kuhn F, Morris R, Mester V, et al, eds. *Ocular traumatology*. Berlin Heidelberg: Springer-Verlag 2005:47-77.
7. Framme C, Roider J. Epidemiology of open globe injuries. *Klin Monatsbl Augenheik* 1999;215:287-293.
8. Casson RJ, Walker JC, Newland HS. Four-year review of open eye injuries at the Royal Adelaide hospital. *Clin Exp Ophthalmol* 2002;30(1):15-18.
9. Gyasi ME, Amoaku WMK, Adjuik MA. Epidemiology of hospitalized ocular injuries in the upper east region of Ghana. *Ghana Medical Journal* 2007;41(4):171-175.
10. Serrano JC, Chalela P, Arias JD. Epidemiology of childhood ocular trauma in North eastern Colombian region. *Arch Ophthalmol* 2003;121(10):1439-1445.
11. Woo JH, Sundar G. Eye injuries in Singapore- don't risk it. Do more. A prospective study. *Ann Acad Med Singapore* 2006;35(10):706-718.
12. Asaminew T, Gelaw Y, Alemseged F. A 2-year review of ocular trauma in Jimma University specialized hospital. *Ethiop J Health Sciences* 2009;19(2):67-76.
13. Pieramici DJ, Sternberg P, Aaberg TM, et al. A system for classifying mechanical injuries of the eye (globe). The ocular trauma classification group. *Am J Ophthalmol* 1997;123(6):820-831.
14. Parmar IPS, Sunandan S, Nagpal RC. Pattern of ocular injuries in Haryana. *Ind J Ophthalmol* 1985;33(3):141-144.
15. De Juan E, Sternberg P, Michels RG. Penetrating ocular injuries: types of injuries and visual results. *Ophthalmology* 1983;90(11):1318-1322.
16. Esmaeli B, Elner SG, Schork MA, et al. Visual outcome and ocular survival after penetrating trauma. A clinicopathologic. *Ophthalmology* 1995;102(3):393-400.
17. Saxena R, Sinha R, Purohit A, et al. Pattern of pediatric ocular trauma in India. *The Indian Journal of Pediatrics* 2002;69(10):863-867.
18. Krishnaiah S, Nirmalan PK, Shamanna BR, et al. Ocular trauma in a rural population of southern India: the Andhra Pradesh eye disease study. *Ophthalmology* 2006;113(7):1159-1164.
19. Titiyal GS, Prakash C, Gupta S, et al. Pattern of ocular trauma in tertiary care hospital of Kumaon region, Uttarakhand. *J Indian Acad Forensic Med* 2013;35(2):116-119.
20. Singh DV, Sharma YR, Azad RV, et al. Profile of ocular trauma at tertiary eye centre. *JK Science: Journal of Medical Education & Research* 2005;7(1):14-19.
21. Qayum S, Anjum R, Garg P. Epidemiological pattern of ocular trauma in a tertiary hospital of northern India. *International Journal of Biomedical Research* 2016;7(7):420-422.
22. Sharmila N, Kavitha K, Rajesh SG, et al. Pattern of ocular trauma in a tertiary referral hospital in south Tamil Nadu. *International Journal of Scientific Study* 2016;4(4):167-169.
23. Ghonsikar S, Khan M. Evaluation of ocular trauma at a rural tertiary centre. *Indian Journal of Applied Research* 2016;6(3):536-539.
24. Sengupta P, Mazumdar M, Gyatsho J. Epidemiology of ocular trauma cases presenting to a tertiary care hospital in a rural area in west Bengal, India over a period of 2 years. *IOSR Journal of dental & medical sciences* 2016;15(3):92-97.
25. Desai T, Vyas C, Desa S, et al. Pattern of ocular injury in pediatric population in western India. *NHL Journal of Medical Sciences* 2013;2(2):37-40.