

A STUDY OF MECHANICAL OCULAR INJURIES IN A TERTIARY CARE HOSPITAL IN NORTH BENGAL



Ophthalmology

KEYWORDS: Mechanical ocular injury, closed globe injury, open globe injury.

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ABSTRACT

Background: Ocular injury is an important public health hazard. It is an important cause of visual loss and disability. Many ocular injuries are avoidable causes of blindness and visual impairment.[1] Ocular injury is a major health problem in India also, blunt trauma being an important cause of ocular morbidity and blindness. Very few studies had been carried out on pattern of ocular trauma in North Bengal. So in view of public health importance, this study will provide information on magnitude and pattern of ocular injuries at North Bengal Medical College and Hospital, Darjeeling, a tertiary care centre in North Bengal. It will serve as a basis for designing and implementing preventive measures to be undertaken by respective authorities. **Objective:** To assess the pattern and to identify the socio-demographic factors and epidemiological correlates of the patients of mechanical ocular injuries attending in a tertiary care hospital in North Bengal, Darjeeling, West Bengal. **Materials & methods:** An institution based observational study was conducted in the Ophthalmology Department of North Bengal Medical College And Hospital, Darjeeling, for one year from 1st July 2015 to 30th June 2016 involving 162 patients with mechanical ocular injuries. Relevant data regarding socio-demographic factors and detailed history were taken from the eligible patients who were presented at the eye OPD and indoor. Detailed ocular and systemic examinations were done and primary management was given to all the patients. **Results:** Among 162 patients 73.5% were male. Majority of the study population belonged to 21-40 years age group. Most of the injuries (34%) were occurred at working place. Commonest occupation was unskilled worker (30.2%). Closed globe injuries were the commonest (66.7%) and contusion injury was the commonest (29.6%) among all type of injury. 35.2% of the study population had clinical blindness (VA < 3/60) at presentation.

Introduction

Ocular trauma occurs frequently in all parts of the world including India and constitutes a major health problem. The National Academy of Sciences has called trauma the 'neglected epidemic of modern society'.^[2] Worldwide there are approximately 1.6 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] According to an estimate by WHO about 55 million eye injuries restricting activities for more than one day occur each year. Of which 750000 cases requiring hospitalisation and among them 200000 cases are open globe injuries.^[4]

The age distribution for the occurrences of serious ocular trauma is bimodal with the maximum incidence in young adults and second peak in elderly.^[4,5] Worldwide the typical male to female ratio is 4:1^[6] and open globe injury is said to be more common.^[7] Both hospital and population based studies indicate a large preponderance of injuries affecting males.^[8] Approximately half of the patients coming to an eye casualty department present with trauma.^[9] Closed globe injuries in comparison to open globe injuries are less severe and have better prognosis which was proved in an epidemiological study of adult eye injuries in split Dalmatian county.^[10] In certain scenario, occupational ocular injuries are leading causes.^[3] Race and gender play an important role.^[11] Illiterate and poor people have more chances of ocular trauma.^[12] Road traffic accidents are also a leading causes of ocular injuries.^[13] Blunt objects like cricket balls, footballs, fists, stones are most common sources of ocular trauma.^[14] Approximately 15% of ocular trauma cases are related to violence.^[15] Now trauma is one of the leading causes of extended hospitalisation of ophthalmic patients in industrialised nations.^[16] The individuals affected from ocular injuries often have to face a loss of career opportunities, lifestyle changes and occasionally permanent physical disfigurement. The direct and indirect cost of eye injuries to society and individuals is not only economical but also physical and psychological.^[17]

Very few studies had been carried out on pattern of ocular trauma in North Bengal. So in view of public health importance, this study will provide information on magnitude and pattern of ocular injuries at North Bengal Medical College and Hospital, a tertiary care centre, North Bengal. It will serve as a basis for designing and implementing preventive measures to be undertaken by respective authorities

Materials & Methods

- Study type and design: Institution based observational study with cross sectional design.
- Study setting: The study was conducted in the Ophthalmology Department of North Bengal Medical College And Hospital, Sushrutanagar, Darjeeling, West Bengal.
- Study duration: From 1st July 2015 to 30th June 2016.
- Study population: All patients, irrespective of age, with mechanical ocular injuries attending the Ophthalmology outpatient department and who were admitted in the Ophthalmology indoor of North Bengal Medical College & Hospital.
- Inclusion criteria: All patients with mechanical ocular injury who were willing to give consent.
- Exclusion criteria: Patient with associated chemical, thermal or electrical burn injury and ocular injury associated with head injury and any life threatening emergency.
- Method of sampling: A complete enumeration of all patients attending the eye OPD and Indoor during the stipulated time period were included following the inclusion and exclusion criteria.

- Operational definitions of mechanical ocular injury were according to World Health Organization (WHO) and Birmingham Eye Trauma Terminology System (BETTS) and broadly classified as Open or Closed Globe Injury.^[6]

Method of Data Collection

After primary stabilization of the patient, whenever needed, a detailed history was taken in a pre-designed and pre-tested proforma to ascertain the socio-demographic factors responsible for the ocular injury. A thorough general examination followed by detailed ocular examination of both eyes were done. Relevant investigations were done in each case. After detail history taking and clinical work up all patients were classified according to the BETT system and appropriate ophthalmic medical and surgical management were provided. Primary repair of the wound in open globe injuries were given the utmost importance and were done as early as possible. The data was analysed using SPSS (Statistical Package for the Social Sciences) version-20 software. For statistical significance test, Chi-square test was done ($p < 0.05$ is considered as significant).

Results

Out of 162 patients, in our study, 119 (73.5%) patients were male and 43 (26.5%) were female. Hindu were the majority (71.6%) by religion followed by Muslim (16.7%), Christian (6.2%) and Buddhist (5.6%) respectively. 97 (59.9%) patients were from urban area and rest 65 (40.1%) were from rural area. Majority (47.5%) of the study population belonged to 21-40 years of age group. 137 (84.56%) patients were literate and rest were illiterate. Closed globe injuries were the commonest (108, 66.7%) type of injuries and majority (29.6%) of the study population had contusion injury followed by superficial foreign body (27.2%), rupture (15.4%), penetrating injury (14.8%) and IOFB (6%). Blunt trauma was the most common mode of injury (80.9%) and rest were by sharp object. The common occupations were unskilled worker (30.2%) followed by student (25.3%), skilled worker (12.3%), home maker (11.1%), agricultural worker (7.4%), service (6.2%), business (4.3 %) and at home (3.1%). Most (34%) of the injuries occurred at the working place. Road traffic accident comes next (20.4%). 14.8% injuries occurred at home and 11.1% at school. 5.6% injuries happened during playing. Physical assault (others) also occurred in a significant number of cases (13.6%). 35.2% patients had clinical blindness ($VA < 3/60$) at presentation and majority (84.2%) of the open globe injury had $VA < 3/60$ at presentation.

Discussion

Ocular trauma occurs frequently in India and constitutes a major health problem like in other developing countries.^[18] The nature and patterns of injuries differ from country to country and from region to region based on occupation and other socio-demographic factors.^[19]

Developing preventive protocols and proper planning of healthcare resources to tackle the problem demands epidemiological data specific to the region. Although ocular injury is an important cause of preventable loss of vision, particularly in developing countries, until recently there has been only limited progress towards understanding the epidemiology and prevention of eye trauma.

The prerequisite of any prevention programme for a disease is an understanding of the magnitude of the problem and the distribution and determinants of the disease. Only a thorough knowledge of the same will enable the institution to arrange appropriate and reliable preventive measures and plan resources at the treatment levels.

From the table 1 we found that all the age categories suffered ocular injuries of which 21-60 years age group population which comprises the working population suffered mostly (65.4%). Table no 4 shows that majority (80%) of the study population among less than 5 years had open globe injury. It was also the type of injury found more commonly in 5-10 years of age group (71.4%) (table 8). In other age groups closed globe injury was found more often than open globe

injury. The finding is found statistically significant. Voon LW et al^[20] found that most of the ocular injuries occurred in less than 40 years age group population which is similar to our study (79%). Sriwas S R^[21] reported incidence of child trauma 22% whereas Takvan JV et al^[22] found that 8-14% of the paediatric age group had ocular trauma which is almost close to our study (11.7%). Children are at risk of ocular trauma because of playing dangerous games with toys and also their tendency to experiment with new objects and to imitate adult behaviours without being aware of the risk. Majority of these cases usually occur from careless and unsupervised games.^[23]

Adult males more frequently are exposed to eye injuries at work, in road traffic accident, during recreation, in fight. Increased involvement in occupations, sports, risky and adventure seeking behaviour increases the chances of ocular injury among younger men to eye injuries.^[24] This phenomenon seems to be common throughout the world, as evidenced by the predominance of males in younger age groups reporting eye injuries in India^[25,26] as well as other countries in the developing and developed world.^[20,27,28,29,30]

In our study population, males were predominantly affected (73.5%) which is closely supported by the study done by Sthapit PR et al^[31] (72.3%) and Misra S et al^[32] (71.67%). Place of occurrence of ocular injury was another very important demographic factor. Work place injuries were the commonest cause of injury, similar to studies from India and other countries.^[8,20,33,34]

In our study majority of the incidences happened at working place (34%) a finding which is supported by most of the studies. 20.4% injuries were due to RTA, 14.8% and 11.1% injuries occurred at home and school respectively. 5.6% injuries occurred at play ground. Physical assault (others) also occurred in a significant number of cases (13.6%). India has a very high incidence of road traffic accidents (1,047.7 persons injured per 10000 kms of roads). In West Bengal 394.5 persons are injured in road traffic accidents per 10000 kms.^[35]

The common occupation for ocular injuries were unskilled workers (30.2%), comprising mostly of factory workers and tea garden workers, followed by students (25.3%), skilled workers (12.3%), home maker (11.1%), agricultural workers (7.4%) service (6.2%), business (4.3%) and at home (3.1%). (table 3)

In our study 108 (66.7%) patients suffered from closed globe injury whereas 54 (33.3%) patients had open globe injury. Majority (29.6%) of the study population had contusion injury followed by superficial foreign body (27.2%), rupture (15.4%), penetrating injury (14.8%) and IOFB (6%) (Table 5). Also, mixed closed globe injury was found in 4.9% of cases and mixed open globe injury was found in 2.5% of the study population. Table no 9 shows that all the occupational groups mostly suffered from closed globe injuries except at home group which had 80% open globe injuries. Home makers had majority of closed globe injuries (94.4%) followed by unskilled worker (75.5%), businessman (71.4%), agricultural worker (66.7), Students also had more (56.1%) closed globe injuries than open globe injuries. This finding is found statistically significant.

35.2% of the total study population had $VA < 3/60$ at presentation and it was found statistically significant that 84.2% of the open globe injury and 15.8% of the closed globe injury patient had $VA < 3/60$ at presentation.

Conclusion

Mechanical ocular injuries occurred mostly in the working place involving young adult males. Closed globe injuries were the commonest one and contusion type of injury found most commonly in our study. There were few limitations of the study like unavailability of posterior segment surgery, all mechanical ocular injury patients were not coming to this hospital and final VA following the trauma could not be assessed also. But still the present study helps us to understand a lot about the mechanical ocular injury and also to undertake preventive measures to reduce the burden of

the disease.

Table 1 Distribution of study population according to age of the patient (n=162)

Age in Years	Frequency	Percentage
<5	5	3.1
5-10	14	8.6
11-20	32	19.8
21-40	77	47.5
41-60	29	17.9
>60	5	3.1
Total	162	100

Table 1 shows that majority (47.5%) of the study population belonged to 21-40 years age group followed by 19.8% and 17.9% of the study population belonging to 11-20 years and 41-60 years of age group respectively.

Table 2 Distribution of study population according to gender (n=162)

Gender	Frequency	Percentage
Male	119	73.5
Female	43	26.5
Total	162	100

Table 2 shows that out of 162 study population majority i.e 119 patients (73.5%) were male and 43 patients (26.5%) were female.

Table 3 Distribution of study population according to occupation (n=162)

Occupation	Frequency	Percentage
Homemaker	18	11.1
Student	41	25.3
At home	5	3.1
Unskilled worker	49	30.2
Agricultural worker	12	7.4
Skilled worker	20	12.3
Business	7	4.3
Service	10	6.2
Total	162	100

Table 3 shows that majority of the study population (30.2%) were unskilled worker followed by student (25.3%). Home maker, at home, agricultural worker and skilled worker were 11.1%, 3.1%, 7.4% and 12.3% respectively.

Table 4 Distribution of study population according to the type of injury (n=162)

Type of Injury	Frequency	Percentage
Closed Globe	108	66.7
Open Globe	54	33.3
Total	162	100

Table 4 shows that majority (66.7%) of the study population had closed globe injury, whereas 33.3% had open globe injury.

Table 5 Distribution of study population according to the sub type of the injury (n=162)

Sub type of injury	Frequency	Percentage
Contusion	48	29.6
Lamellar laceration	8	4.9
Superficial FB	44	27.2

Closed Mixed	8	4.9
Rupture	25	15.4
Penetrating	21	13
IOFB	4	2.5
Open Mixed	4	2.5
Total	162	100

Table 5 clearly shows that majority (29.6%) of the study population had contusion injury followed by superficial foreign body (27.2%), rupture (15.4%), penetrating injury (13%) and IOFB (2.5%). Also, mixed closed globe injury was found in 4.9% of cases and mixed open globe injury was found in 2.5% of the study population.

Table 6 Distribution of study population according to the visual acuity at presentation (n=162)

Visual acuity at presentation (grade)	Frequency	Percentage
1	81	50
2	17	10.5
3	9	5.5
4	33	20.4
5	22	13.6
Total	164	100

Table 6 shows that 50% of the study population had grade 1 visual acuity at presentation and 13.6% had grade 5 (no PL) visual acuity at presentation.

Table 7 Distribution of study population according to the visual acuity <3/60 at presentation (n=162)

Visual acuity <3/60 at presentation	Frequency	Percentage
Yes	57	35.2
No	105	64.8
Total	162	100

Table 7 shows that 35.2% of the study population had visual acuity less than 3/60 at presentation.

Table 8 Distribution of ocular injuries among study population of different age groups (n=162)

Occupation	Type of injury		Total
	Closed globe	Open globe	
< 5	1 (20%)	4 (80%)	5 (100%)
5 - 10	4 (28.6%)	10 (71.4%)	14 (100%)
11 - 20	21 (65.6%)	11 (34.4%)	32 (100%)
21 - 40	61 (79.2%)	16 (20.8%)	77 (100%)
41 - 60	18 (62.1%)	11 (37.9%)	29 (100%)
> 60	3 (60%)	2 (40%)	5 (100%)
Total	108 (66.7%)	54 (33.3)	162 (100%)

Chi Square value = 19.895, df = 5, p value = 0.001

Above table shows that majority (80%) of the study population among less than 5 years had open globe injury. It was also the type of injury found more commonly in 5-10 years of age group (71.4%). In other age groups closed globe injury was found more than open globe injury. The finding is found statistically significant.

Table 9 Distribution of ocular injuries among study population engaged in different occupation (n=162)

Age in years	Type of injury		Total
	Closed globe	Open globe	
Homemaker	17 (94.4%)	1 (5.6%)	18 (100%)
Student	23 (56.1%)	18 (43.9%)	41 (100%)
At home	1 (20%)	4 (80%)	5 (100%)
Unskilled worker	37 (75.5%)	12 (24.5%)	49 (100%)
Agricultural worker	8 (66.7%)	4 (33.3%)	12 (100%)
Skilled worker	11 (55%)	9 (45%)	20 (100%)
Business	5 (71.4%)	2 (28.6%)	7 (100%)
Service	6 (60%)	4 (40%)	10 (6.2%)
Total	108(66.7%)	54 (33.3%)	162 (100%)

Chi Square value = 16.432, df = 7, p value = 0.021

Table 9 shows that all the occupational groups mostly suffered from closed globe injuries except at home group which had 80% open globe injuries. Home makers had majority of closed globe injuries (94.4%) followed by unskilled worker (75.5%), businessman (71.4%), agricultural worker (66.7), Students also had more (56.1%) closed globe injuries than open globe injuries. And the finding is found statistically significant

References

- Omolase, C.O., Omolade, E.O., Ogunleye, O.T., Omolase, B.O., Ihemedu, C.O., Adeosun, O.A. (2011) Pattern of ocular injuries in Owo, Nigeria Journal of Ophthalmic and Vision Research; 6(2):114-18.
- Committee on Trauma and Committee on Shock. Accidental death and disability: the neglected disease of modern society. National Academy Press: Washington 1966: p.5. Available at: http://www.nap.edu/catalog.php?record_id=9978. Accessed April 17, 2006.
- Negrel, A.D., Thylefors, B. (1998) The global impact of eye injuries. *Ophthalmic Epidemiol*; 5:143-69.
- Desai, P., MacEwen, C.J., Baines, P., Minaissian, D.C. (1996) Epidemiology and implications of ocular trauma admitted to hospital in Scotland. *J. Epidemiology Comm. Health*; 50:436-41.
- Glynn, R.J., Seddon, J.M., Berlin, B.M. (1988). The incidence of eye injuries in New England. *Arch Ophthalmology*; 106:785-89.
- Kuhn, F., Morris, R., Mester, V., Witherspoon, D. (2005). *Ocular Traumatology. Epidemiology of ocular trauma. Springer-Verlag Berlin Heidelberg*: 47-77.
- Gyasi, M.E., Amoaku, W.M.K., Adjuik, M.A. (2007). Hospitalized Ocular Injuries. *Ghana Medical Journal*; 41(4):171-75.
- Schein, O.D., Hibberd, P.L., Shingleton, B.J., Kunzweiler, T., Fraumbach, D.A., Seddon, J.M., Fontan, N.L., Vinger, P.F. (1988). The spectrum and burden of ocular injury. *Ophthalmology*; 95(3):300-5.
- Ilsar, M., Chiramso, M., Belkin, M. (1982). Ocular injuries in Malawi. *Br J Ophthalmol*; 66:145-48.
- Karman, K., Antunica, A.G., Perk, S.R. (2004). Epidemiology of adult eye injuries in Split Dalmatian County. *Croatian Medical Journal*; 45:304-9.
- Katz, J., Tielsch, J.M. (2003). Lifetime prevalence of ocular injuries from Baltimore eye survey. *Arch Ophthalmol*; 111:1564-68.
- Liggett, P., Prince, K., Barlow, W. (1990). Ocular trauma in urban population. *Ophthalmology*; 97:581-84.
- Kuhn, F., Mester, V., Witherspoon, C.D., Morris, R., Maisiak, R. (1998). Epidemiology and socioeconomic impact of eye injuries. In: Alfaro DV, Liggett PE, eds. *Vitreotomy in the Management of Injured Globe*. 1st ed. Philadelphia: Lippincott-Raven; 17-24.
- Kuhn, F., Collins, P. (1994). Epidemiology of motor vehicle crash related serious injuries. *Accid Anal Prev*; 26:385-90.
- Maltzan B, Pruzon H. (1976). A survey of ocular trauma. *Surv ophthalmol*; 21:285-90.
- Michael, I., Moses, C.H., Michael, B. (1982). Ocular injuries in Malawi. *Br J Ophthalmol*; 66:145-48.
- Karman, K., Antunica, A.G., Perk, S.R. (2004). Epidemiology of adult eye injuries in Split Dalmatian County. *Croatian Medical Journal*; 45:304-9.
- Michael, I., Moses, C.H., Michael, B. (1982). Ocular injuries in Malawi. *Br J Ophthalmol*; 66: 145-148.
- Sengupta, P., Mazumdar, M., Gyatsho, J. (March 2016). 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 and Medical Sciences*; 15: 92-97.
- Voon, L.W., Sec, J., Wong, T.Y. (2001). The epidemiology of ocular trauma in Singapore: perspective from the emergency service of a large tertiary hospital. *Eye (Lond)*; 15:75-81.
- Sriwas, S. R., Aung, Z. Kinzha. (1993). Orbital injuries in children: Play-related. *Indian J Ophthalmol*; 41:129-30.
- Takvan, J.V., Midelfort, A. (1993). Survey of eye injuries in Norwegian children. *Acta Ophthalmol*; 71:500-5.
- Mohan, A., Sharma, V.K. (2013). Pattern of ocular trauma in western Rajasthan. *Rajasthan Journal Of Ophthalmology*; 20-25.

- Wang, J.D., Xu, L., Wang, Y., You, X., Zhang, Q.S., Jonas, J.S. (2012). Prevalence and incidence of ocular trauma in North China: the Beijing eye study. *Acta Ophthalmologica*; 90(1):61-67.
- Mishra, A., Verma, A.K., Baranwal, V.K., Aggarwal, S., Bhargava, N., Parihar, J.S. (2014). The pattern and visual outcomes of ocular trauma in a large zonal hospital in a non-operational role: A 36 months retrospective analysis. *J Clin Ophthalmol Res*; 2: 141-4.
- Titiyal, G.S., Prakash, C., Gupta, S., Joshi, V. (2013). Pattern of Ocular Trauma in Tertiary Care Hospital of Kumaon Region, Uttarakhand. *J Indian Acad Forensic Med*; 35(2): 116-19.
- Cao, H., Li, L., Zhang, M. (2012). Epidemiology of Patients Hospitalized for Ocular Trauma in the Chaoshan Region of China, 2001-2010. *PLoS ONE* 7(10): e48377. doi:10.1371/journal.pone.0048377.
- Okoye, O.I. (2006) Eye injury requiring hospitalization in Enugu, Nigeria. A one-year survey. *Niger J Surg Res*; 8: 34-37.
- Guly, C.M., Guly, H.R., Bouamra, O., Gray, R.H., Lecky, F.E. (2006). Ocular injuries in patients with major trauma. *Emerg. Med. J.*; 23: 915-7.
- Nordber, E. (2000). Injuries as a public health problem in sub-Saharan Africa: Epidemiology and prospects for control. *East Afr Med J*; 77:1-43.
- Sthapit, P.R., Marasini, S., Khoju, U., Thapa, G., Nepal, B.P. (2011). Ocular trauma in patients presenting to Dhulikhel Hospital. *Kathmandu Univ Med J (KUMJ)*; 9(33):54-7.
- Misra, S., Nandwani, R., Gogri, P., Misra N. (2013). Clinical profile and visual outcome of ocular injuries in a rural area of western India. *Australas Med J*; 6(11):560-64.
- Nirmalan, P.K., Katz, J., Tielsch, J.M., Robin, A.L., Thulasiraj, R.D., Krishnadas, R., Ramakrishnan, R. (2004). Aravind Comprehensive Eye Survey. Ocular trauma in a rural south Indian population: the Aravind Comprehensive Eye Survey. *Ophthalmology*; 111(9): 1778-81.
- Vats, S., Murthy, G.V.S., Chandra, M., Gupta, S.K., Vashist, P., Gogoi, M. (2008). Epidemiological study of ocular trauma in an urban slum population in Delhi, India. *Indian J Ophthalmol*; 56(4):313-316.
- Government of India. Ministry of road transport & highways transport research win. New Delhi. Road accidents in India. 2013. Available at www.morth.nic.in.