

MECHANICAL OPEN GLOBE INJURY IN TEA GARDEN POPULATION IN A TERTIARY CARE HOSPITAL IN NORTH BENGAL

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ABSTRACT

BACKGROUND

Post-traumatic blindness is one of the leading causes of blindness apart from cataract and glaucoma in India. Ocular injury leading to corneal opacification, resultant astigmatism and post-traumatic complications i.e. uveitis, glaucoma, vitreous haemorrhage, retinal detachment etc., are the major causes of blindness. In tea-garden population, ocular injury in work-place or during daily activities is mainly attributed to geography and poor visibility of walking road in tea gardens.

MATERIALS AND METHODS

In this study, 35 patients (n=35) from tea gardens with mechanical ocular injury were included in the first 6 months and they are followed up for next 6 months. Their socio-demographic variables, different factors related to injury and outcome were assessed clinically and by appropriate imaging technique. Outcome was tabulated and using SPSS Version 20, statistical calculations were performed.

RESULTS

In this study, 35 patients (n=35) from tea garden with mechanical ocular injury were included, with mean age 28.2 years and S.D. of 5.661. Majority were male (n=29, 82.9%) and 1 patient was having bilateral injury. The type of intra-ocular injury is mainly globe rupture (n=22, 62.9%). Wood and stone are the common offending agents (n=16, 45.7%) and major injuries occurred due to fall during work in the garden (n=20, 57.1%). In case of injury with wood, the development of endophthalmitis is significant (p=0.016) compared to the other. Due to small sample size, though statistical significance is not very evident, ocular trauma score, offending agents and type of intraocular injury are the predictors of final visual outcome.

CONCLUSION

In tea garden population, ocular trauma is one of the common health hazards mainly due to geographic pattern in tea garden and work environment. Appropriate assessment, ocular trauma score calculation and treatment are necessary for the better outcome.

KEYWORDS

Tea Garden, Ocular Injury, Ocular Trauma Score.

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BACKGROUND

Ocular injury is an important public health hazard. Ocular and orbital trauma remains a leading cause of ocular morbidity and blindness. Worldwide there are approximately 1.6 million people blind from eye injuries, 2.3 million bilateral low vision and 19 million are suffering from unilateral low vision.¹ There are almost 2.5 million incident cases of eye injuries/year in the United States alone.² Even though ocular trauma has been described as a neglected issue,³ it was highlighted as a major cause of visual morbidity more

recently. According to an estimate by WHO, more than 50 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 Though eye represent only 0.15% of the total body surface area, their importance to society and individuals is much higher due to its function and cosmetic property.⁵ Ocular injuries have its social and economic impact as it leads to human unhappiness, monetary loss and disability to perform daily activities. In certain scenario, occupational ocular injuries are leading causes.¹ Ocular trauma is a major cause of preventable monocular blindness and visual impairment in the world.⁶ 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 the pattern of ocular trauma in North Bengal and no such literature is available on tea garden population. So, in view of public health importance, this study has provided information on magnitude and pattern of ocular injuries in tea garden population at North

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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.

Aims and Objectives

- To study the various patterns of mechanical ocular injuries and their distribution in tea garden population attending a tertiary care hospital in North Bengal.
- To ascertain the different factors related to mechanical ocular injuries in tea garden population attending a tertiary care hospital in North Bengal.
- To evaluate the visual and pathological outcome and to correlate with the offending agent (by which the injury occurred).

MATERIALS AND METHODS

• Study Type and Design

Institution based observational study with longitudinal study design.

• Study Setting

The study was conducted in the Ophthalmology Department of North Bengal Medical College and Hospital, Sushrutanagar, Darjeeling, West Bengal.

• Study Duration

6 months for data collection and 6 months for follow up, data tabulation and analysis.

• Method of Sampling

A complete enumeration of all patients attending the eye OPD and Indoor during the stipulated 6 months of data collection period was included following the inclusion and exclusion criteria.

Inclusion Criteria

Patients of tea garden with unilateral mechanical ocular injuries occurred during their social and professional activities in tea garden area. If any patient had injury in both the eye, conventionally right eye has been included in the study.

Exclusion Criteria

- Pathological causes for diminution of vision including cataract, glaucoma, uveitis or any posterior segment pathology
- Systemic diseases causing diminution of vision
- Injury to crystalline lens or any structure beyond cornea, that will contribute in diminution of vision post-operatively.
- Unwilling patient

Data were collected from the eligible patients who were presented at the eye OPD and IPD in the 6 months duration. As these are basically injury cases, critical care and basic life support was given the utmost importance.

After primary stabilization of the patient, whenever needed, a detailed history was taken from the patient or any attendant or from the guardian in case of children. A pre-designed and pre-tested performa was used to collect the data.

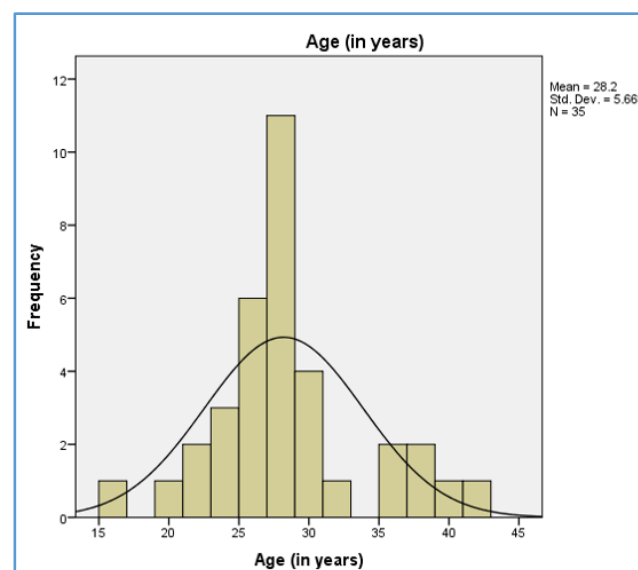
A thorough general examination including pulse, blood pressure, pallor etc., and systemic examination was done followed by detailed ocular examination including visual acuity (using Snellen's chart), colour vision with Ishihara's test chart of both eyes followed by diffuse torch light and then under slit lamp bi-microscope. Some special investigations, specifically USG-B scan, CT scan, Blood sugar, Aqueous and vitreous culture were done whenever required for the benefit of the patients in the institution. Ocular Trauma Score⁷ is calculated during course of treatment and follow up period. OTS scores range from 1 (most severe injury and worst prognosis at 6 months follow-up) to 5 (least severe injury and least poor prognosis at 6 months). Each score is associated with a range of predicted post-injury visual acuities. It has a predictive accuracy of approximately 80%, which means that the OTS will be accurate 4 out of 5 times.

Data Analysis

After data collection, data was checked for consistency and completeness. Then data was entered in Microsoft Office excel data sheet and 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). Finally, analysed data was presented in the form of tables, diagrams etc.

RESULTS

In this study, 35 patients ($n=35$) from tea garden with mechanical ocular injury were included in the first 6 months and they are followed up for next 6 months. Age distribution among the patients showed normal distribution with mean age 28.2 years and std. dev of 5.661.



Graph 1. Age Distribution of Patients (Following Normal Curve, Showing S.D. <1/2 of Mean Suggesting Normal Distribution)

Majority were male (n=29, 82.9%) and 1 patient were having bilateral injury and right eye was included in the study.

Gender (Male=1, Female=2)		
Sl. No.	Frequency	Percent
1.	29	82.9
2.	6	17.1
Total	35	100.0

Table 1. Gender Distribution of the Patients

Involvement (RE=1, LE=2, BE=3)		
Sl. No.	Frequency	Percent
1.	17	48.6
2.	17	48.6
3.	1	2.9
Total	35	100.0

Table 2. Laterality Distribution of the Eyes Among the Patients

Associated External Injury (Yes=1, No=2)		
Sl. No.	Frequency	Percent
1.	7	20.0
2.	28	80.0
Total	35	100.0

Table 3. Distribution of the Patients according to "Associated External Injury"

Among the patients, major patients did not sustained additional extra-ocular injury and the type of intra-ocular injury is mainly globe rupture (n=22, 62.9%). Two patients were found to have foreign body associated with intra-ocular injury. Wood and stone are the common offending agents (n=16, 45.7%) and major injuries occurred due to fall during work in the garden (n=20, 57.1%) followed by during work in factory (n=8, 22.9%). Injury in the other body parts were there and those were managed by standard management protocol. If any referral were needed for ocular or non-ocular cause, as per best of our knowledge, it was done and subsequent follow up were conducted. If any patient failed to communicate with us during follow up period, he/she has been excluded from the study.

Type of Intraocular Injury (Rupture =1, Penetrating=2, Perforation=3, FB=4)			
Sl. No.	Frequency		Percent
1.	1	22	62.9
2.	2	9	25.7
3.	2+4	1	2.9
4.	3	2	5.7
5.	3+4	1	2.9
6.	Total	35	100.0

Table 4. Distribution of the Patients According to "Type of Intra-ocular Injury (+/-) Foreign Body"

Offending Agent (Wood=1, Stone=2, Others=3)		
Sl. No.	Frequency	Percent
1.	16	45.7
2.	16	45.7
3.	3	8.6
Total	35	100.0

Table 5. Distribution of the Patients According to the "Offending Agent"

Mode of Injury (Fall During Work in Garden=1, During Work in Factory=2, Others=3)		
Sl. No.	Frequency	Percent
1.	20	57.1
2.	8	22.9
3.	7	20.0
Total	35	100.0

Table 6. Distribution of the Patients According to the "Mode of Injury"

Chi-square test is applied to test the significance between the qualitative variables and p value <0.05 is considered significant.

In case of injury with wood, the development of endophthalmitis is significant (p=0.016) compared to the other. Due to small sample size though statistical significance is not there in different crosstabs, it is very much evident that external injury has no role in final visual outcome in this study. Ocular trauma score, offending agents and type of intraocular injury are the predictor of final visual outcome.

		Endophthalmitis (yes=1, no=2)		Total	Sig (p)
		1	2		
Associated external injury (Yes=1, No=2)	1	4	3	7	1.00
	2	16	12	28	
Total		20	15	35	

Crosstab 1. Showing Relation between Endophthalmitis and Associated External Injury. (p=1.00)

		Ocular Trauma Score				Total	Sig. (p)
		1	2	3	4		
Associated external injury (Yes=1, No=2)	1	3	2	1	1	7	0.217
	2	12	8	8	0	28	
	Total	15	10	9	1	35	

Crosstab 1. Showing Relation between Ocular Trauma Score and Associated External Injury. (p=0.217)

		Final Visual Outcome (No PL=1, PL/HM =2, FC to 6/60=3, & GT; 6/60 to 6/15=4, & GT; 6/15=5)				Total	Sig (p)
		1	2	3	4		
Associated External Injury (Yes=1, No=2)	1	2	2	2	1	7	0.227
	2	9	12	7	0	28	
Total		11	14	9	1	35	

Crosstab 1. Showing Relation between Final Visual Outcome and Associated External Injury. (p=0.227)

		Endophthalmitis (yes=1, no=2)		Total	Sig (p)
		1	2		
Offending agent (Wood=1, Stone=2, Others=3)	1	13	3	16	0.016
	2	5	11	16	
	3	2	1	3	
Total		20	15	35	

Crosstab 1. Showing Relation between Endophthalmitis and Offending Agent. (p=0.016)

		Ocular Trauma Score				Total	Sig (p)
		1	2	3	4		
Offending agent (Wood=1, Stone=2, Others=3)	1	10	5	1	0	16	0.102
	2	3	5	7	1	16	
	3	2	0	1	0	3	
Total		15	10	9	1	35	

Crosstab 1. Showing Relation between Ocular Trauma Score and Offending Agent. (p=0.102)

		Final Visual Outcome (No PL=1, PL/HM =2, FC to 6/60=3, & gt; 6/60 to 6/15=4, & gt; 6/15=5)				Total	Sig(p)
		1	2	3	4		
Offending agent (Wood=1, Stone=2, Others=3)	1	8	6	2	0	16	0.161
	2	2	6	7	1	16	
	3	1	2	0	0	3	
Total		11	14	9	1	35	

Crosstab 1. Showing Relation between Final Visual Outcome and Offending Agent. (p=0.161)

		Endophthalmitis (yes=1, no=2)		Total	Sig (p)
		1	2		
Type of intraocular injury (Rupture =1, Penetrating=2, Perforation=3, FB=4)	1	10	12	22	0.335
	2	6	3	9	
	2+4	1	0	1	
	3	2	0	2	
	3+4	1	0	1	
Total		20	15	35	

Crosstab 1. Showing Relation between Endophthalmitis and Type of Intra-Ocular Injury. (p=0.335)

		Ocular Trauma Score				Total	Sig (p)
		1	2	3	4		
Type of intraocular injury (Rupture =1, Penetrating=2, Perforation=3, FB=4)	1	5	7	9	1	22	0.332
	2	6	3	0	0	9	
	2+4	1	0	0	0	1	
	3	2	0	0	0	2	
	3+4	1	0	0	0	1	
Total		15	10	9	1	35	

Crosstab 1. Showing Relation between Ocular Trauma Score and Type of Intraocular Injury. (p=0.332)

		Final Visual Outcome (No PL=1, PL/HM =2, FC to 6/60=3, & gt; 6/60 to 6/15=4, & gt; 6/15=5)				Total	Sig(p)
		1	2	3	4		
Type of intraocular injury (Rupture =1, Penetrating=2, Perforation=3, FB=4)	1	6	7	8	1	22	0.640
	2	2	6	1	0	9	
	2+4	1	0	0	0	1	
	3	1	1	0	0	2	
	3+4	1	0	0	0	1	
Total		11	14	9	1	35	

Crosstab 1. Showing Relation between Type of Intraocular Injury and Final Visual Outcome. (p=0.640)

Different factors related to these ocular injuries have specific effect in outcome. There may be other factors i.e. antibiotic coverage, selection of eye drops etc. may also have its effect in outcome. These injuries are managed by a single competent surgeon under general anaesthesia and standard post-operative care was provided.

DISCUSSION

Ocular trauma occurs frequently in India and constitutes a major health problem like in other developing countries.⁸

The nature and patterns of injuries differ from country to country and from region to region based on occupation and other socio-demographic factors.⁹

The study done by Wong T et al¹⁰ on ocular trauma estimated that life time risk of ocular injury approaches nearly 19.8%. In the United States, the National Society to Prevent Blindness estimated that more than 2.4 million injuries occur each year.¹¹ In New England, Glynn and co-investigators.¹² found incidence of eye injuries to be 9.75/1000 adult population.

A total of 35 patients with mechanical open globe ocular injuries were included in this study their socio-demographic variables, pattern and cause of injuries were tabulated and appropriate statistical tests are applied to test the significance. Age distribution among the patients showed normal distribution with mean age 28.2 years ($\pm$) 5.661.

Voon LW et al¹³ found that most of the ocular injuries occurred in less than 40 years age group population which is similar to our study (79%).

In our study population, males were predominantly affected (n=29, 82.9%) which is closely supported by the study done by Sthapit PR et al¹⁴ (72.3%) and Misra S et al¹⁵ (71.67%). In other studies like Cillino S et al,¹⁶ Sengupta P et al⁹ and Singh D.V. et al¹⁷ also found that males were affected mostly as 84.6%, 83.7% and 88% respectively.

In our present study 17(48.7%) patients presented with right eye (RE) injury and left eye (LE) injury each and 1(2.6%) presented with both eye (BE) involvement. According to Singh D V et al¹⁸ RE was involved in 50.1%, LE in 46.8% and both eyes were involved in 3.1%. Karaman et al¹⁹ found that 49.6% had RE injury, LE had 46.7% and rest 3.7% had bilateral injuries. Nirmalan PK et al,²⁰ Krishnaiah S, et al²¹ reported bilateral involvement of eye in 0.4% and 1% of cases respectively.

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.^{20,18,13} In our study majority of the incidences happened at working place which finding 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 playground. According to Sengupta P et al,⁹ 41.1% of the study population suffered injuries at the workplace including agricultural activities. 57.1% (n=20) injuries took place during work in garden followed by 22.9% (n=8) in the factory in our study.

Prognosis following trauma had been attributable to several factors, visual acuity at presentation being the most important one.^{22,23} Despite advancements in microsurgical techniques, in many cases, the eyes could not be salvaged,²⁴ hence the importance of prevention of eye injuries.

22 patients (62.9%) had rupture and wood and stone shared the similar percentage (n=16, 45.71%) as commonest offending agent. Injury due to wood significantly increases the chance of development of endophthalmitis (p=0.016).

CONCLUSION

Ocular trauma is becoming a major cause of ocular morbidity and blindness in a developing country like India. In the tea garden population, injury is mainly during work in the garden and in the factory. A developing tea tree is not as dangerous as the dry one as open globe injury is much more common after fall on those dry trees. And during the followup period, endophthalmitis is much more common in those than injury with stone. So, these factors should be taken care of and early intervention is required to prevent further complications.

REFERENCES

- [1] Negrel AD, Thylefors B. The global impact of eye injuries. *Ophthalmic Epidemiol* 1998;5(3):143-169.
- [2] Mishra A, Verma AK, Baranwal VK, et al. 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* 2014;2(3):141-144.
- [3] Khan MD, Mohammad S, Islam ZU, et al. An 11 years review of ocular trauma in the North West Frontier Province of Pakistan. *Pak J Ophthalmol* 1991;7:15-18.
- [4] Desai P, MacEwen CJ, Baines P, et al. Epidemiology and implications of ocular trauma admitted to hospital in Scotland. *J Epidemiol Community Health* 1996;50(4):436-441.
- [5] Nordberg E. Injuries as a public health problem in sub-Saharan Africa: epidemiology and prospects for control. *East Afr Med J* 2000;77(12 Suppl):1-43.
- [6] McCarty CA, Fu CL, Taylor HR. Epidemiology of ocular trauma in Australia. *Ophthalmology* 1999;106(9):1847-1852.
- [7] Scott R. The ocular trauma score. *Community Eye Health* 2015;28(91):44-45.
- [8] Ihsar M, Chirambo M, Belkin M. Ocular injuries in Malawi. *Br J Ophthalmol* 1982;66(2):145-148.
- [9] 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 and Medical Sciences (IOSR-JDMS)* 2016;15(3):92-97.
- [10] Wong TY, Dlein BE, Klein R. The prevalence and 5-year incidence of ocular trauma: The Beaver Dam Eye Study. *Ophthalmology* 2000;107(12):2196-2202.
- [11] Blomdahl S, Norell S. Perforating eye injury in the Stockholm population. An epidemiological study. *Acta Ophthalmol* 1984;62(3):378-390.
- [12] Glynn RJ, Seddon JM, Berlin BM. The incidence of eye injury in New England adults. *Arch Ophthalmol* 1988;106(6):785-789.
- [13] Voon LW, See J, Wong TY. The epidemiology of ocular trauma in Singapore: perspective from the emergency service of a large tertiary hospital. *Eye* 2001;15(Pt 1):75-81.

- [14] Sthapit PR, Marasini S, Khoju U, et al. Ocular trauma in patients presenting to Dhulikhel Hospital. Kathmandu Univ Med J 2011;9(33):54-57.
- [15] Misra S, Nandwani R, Gogri P, et al. Clinical profile and visual outcome of ocular injuries in a rural area of western India. Australas Med J 2013;6(11):560-564.
- [16] Cillino S, Casuccio A, Pace FD, et al. A five-year retrospective study of the epidemiological characteristics and visual outcomes of patients hospitalized for ocular trauma in a Mediterranean area. BMC Ophthalmol 2008;8:6.
- [17] Singh DV, Sharma YR, Azad RV, et al. Profile of ocular trauma at tertiary eye centre. JK Sci 2005;7(1):1-6.
- [18] Vats S, Murthy GVS, Chandra M, et al. Epidemiological study of ocular trauma in an urban slum population in Delhi, India. Indian J Ophthalmol 2008;56(4):313-316.
- [19] Karaman K, Antunica AG, Perk SR, et al. Epidemiology of adult eye injuries in Split-Dalmatian County. Croat Med J 2004;45(3):304-309.
- [20] Nirmalan PK, Katz J, Tielsch JM, et al. Ocular trauma in a rural south Indian population: the Aravind Comprehensive Eye Survey. Ophthalmology 2004;111(9):1778-1781.
- [21] 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.
- [22] Esmaeli B, Elner SG, Schork A, et al. Visual outcome and ocular survival after penetrating trauma. A clinicopathologic study. Ophthalmology 1995;102(3):393-400.
- [23] Groessl S, Nanda S, Mieler WF. Assault-related penetrating ocular injury. Am J Ophthalmol 1993;116(1):26-33.
- [24] Rahman I, Maino A, Devadason D, et al. Open globe injuries: factors predictive of poor outcome. Eye 2006;20(12):1336-1341.