INDUSTRIAL OCULAR TRAUMA- A CLINICAL AND EPIDEMIOLOGICAL PROFILE

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ABSTRACT

BACKGROUND

Incidence of ocular injuries is on the rise and is the commonest cause of unilateral blindness. Some individuals are at increased risk of eye injury as a result of their occupation.

MATERIALS AND METHODS

Data was obtained from case files of the patients in the retrospective group. In the prospective group, a complete ophthalmological examination including fundus was done for each patient. A final visual outcome was recorded at the end of 3 months post trauma based on visual acuity.

Settings and Design- This was a 1 year retrospective and 1 year prospective study done in the Department of Ophthalmology, CMC, Ludhiana.

Statistical Analysis- The clinical data collected was analysed for frequencies and proportions.

RESULTS

The industries where ocular trauma was found to be highest were the metal industries (61.7%) followed by automobile industries (19.1%). Textile and woollen industry accounted for 5.8% cases. Metal objects caused injury in 81.7% of the cases.

CONCLUSION

Injuries occurring in industries are severe and males in age group of 21-30 years are most vulnerable. In view of costly medical care required and loss of productivity, preventive measures must be taken to avoid such injuries.

KEYWORDS

Ocular Trauma, Industries, Blindness.

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BACKGROUND

The incidence of ocular injuries is increasing day by day. Ocular trauma is a significant, but preventable cause of blindness worldwide.[1] Despite anatomical and physiological natural protection afforded to the eye, injuries of the eye leading to visual impairment of various degree ranging from little deterioration of vision to permanent blindness are quite common. Ocular injuries are the most common cause of monocular blindness.[2] From the international perspective, an estimated 5,00,000 blinding eye injuries occur annually worldwide.[3] Every year, approximately 2 million eye injuries occur in the United States, of which, more than 40 thousand results in permanent visual impairment.[4,5] When considering eye injuries requiring hospital admission, rates have ranged from 8 to 57 per 1,00,000.[6] These injuries can occur at the workplace, during sports and recreational activities, home, agricultural settings, road traffic accidents and assault.

Profile of ocular trauma varies with country, geography, industrialisation and development of the place. These injuries do not occur as random events and there is evidence that some individuals are at increased risk because of exposure to hazards and/or inability to avoid or detect hazards.[7] Some individuals are at increased risk of eye injury as a result of their occupation. Small scale and large scale industrial workers constitute a group of individuals at high risk. These workers are exposed to such hazards as flying metal chips, burns in the eye and injury from radiation.[8] Occupational eye injuries maybe very disabling. They occur most frequently in the active years of life and apart from visual impairment, they are known to cause significant morbidity in terms of pain, psychosocial stress and economic burden.[9] Occupational eye injuries are more common in younger men and comprise 70% of all the ocular injuries. Males have a 2.2 to 5.5 times higher risk of sustaining eye injuries than females.[10,11]

Given the magnitude and scope of the public health problem presented by work-related ocular injuries, the need for comprehensive prevention strategies is clear. Developing such strategies begins with identifying epidemiological data

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characterising the distribution and determinants of work-related ocular injury.

Ludhiana and neighbouring areas are heavily industrialised mainly with metal-related products. Hence, incidence of industrial ocular trauma is expected to be high. This study of industrial ocular trauma cases coming to Christian Medical College and Hospital, Ludhiana, attempted to gather epidemiological information regarding the numbers and characteristics of people injured, mechanisms and circumstances surrounding ocular injury and eventual outcome of treatment.

AIMS

This study of industrial ocular trauma cases coming to Christian Medical College (CMC), Ludhiana, is an attempt to gather epidemiological information regarding the numbers and characteristics of people injured, mechanisms and circumstances surrounding ocular injury and eventual outcome of treatment.

MATERIALS AND METHODS

This was a 1 year retrospective and 1 year prospective study done in the Department of Ophthalmology, CMC, Ludhiana. Data was obtained from case files of the patients in the retrospective group. In the prospective group, standard protocol was followed for each patient. Detailed history regarding cause and nature and extent of trauma was recorded. Type of industry the patient was working in was recorded. Ocular examination findings like visual acuity, anterior segment examination by slit lamp was recorded. Fundus examination by direct or indirect ophthalmoscopy was noted. Final visual outcome was recorded based on visual acuity at 3 months post trauma.

RESULTS

This survey included 68 cases who had sustained ocular injury at the workplace in various industries and had presented to the Christian Medical College and Hospital, Ludhiana, directly or by referral. The clinical data collected was analysed for frequencies and proportions.

The injured were in the age group of 30.5 ± 9.8 years and were as young as 18 years, the oldest being 58 years.

Most of the injuries were in the age group of 21-30 years. There were no women in the study sample.

Age Group	Number	Percentage
<20	18	26.4%
21-30	34	50%
31-40	13	19.2%
>40	3	4.4%
Total	**68**	**100%**

Table 1. Age Wise Distribution of Ocular Trauma

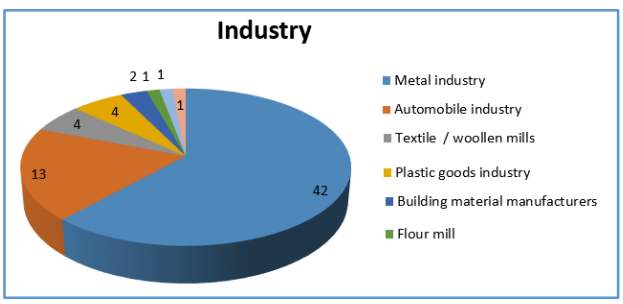
Laterality

Two (2.9%) cases had injuries in both eyes. Among the unilateral injuries, the eye, which was involved was the left eye in a majority 31 (44.9%) of the cases and the right eye in 31 (44.9%) cases.

The industries where ocular trauma was found to be highest were the metal industries (61.7%) followed by automobile industries (19.1%). Textile and woollen industry accounted for 5.8% cases.

Type of Industry	Number	Percentage
Metal industry	42	61.7%
Automobile industry	13	19.1%
Textile/woollen mills	4	5.8%
Plastic goods industry	4	5.8%
Building material manufacturers	2	4.9%
Flour mill	1	1.4%
Shoe factory	1	1.4%
Electrical equipment manufacturers	1	1.4%

Table 2. Industry Wise Distribution of Ocular Trauma



Industry Wise Distribution of Ocular Trauma

Metal objects caused injury in 81.7% of the cases.

Object of Injury	Number	Percentage
Metal objects	61	89.7%
Stones	2	2.9%
Plastic	1	1.5%
Chemicals	1	1.5%
Molten metal burns	3	4.4%
Total	**68**	**100%**

Table 3. Type of Object Causing Injury

The presentation to the clinic was early in a majority of the cases.

Reporting Time	Number	Percentage
<24 hrs.	39	57.3%
24-48 hrs.	8	11.7%
48-72 hrs.	5	7.3%
>72 hrs.	16	23.5%
Total	**68**	**100%**

Table 4. Time Taken For The Presentation

Amongst total 68 cases, 49 cases (72.1%) presented with open globe injuries, while 19 cases (27.94%) presented with closed globe injuries, 18 cases had retained intraocular foreign body.

Type of Injury	Number	Percentage
Open globe	49	72.06%
IOFB	18	26.47%
Perforating	22	32.35%
Rupture	9	13.23%
Close globe	19	27.94%

Table 5. Type of Injury

The Presenting Visual Acuity (VA)-

The grading of the visual acuity was done according to the ninth revision (1977) of the International Classification of Diseases (ICD)[12] as follows-

Grade I 6/6 to 6/18.
Grade II 6/24 to 6/60.
Grade III <6/60 to 3/60.
Grade IV <3/60 to NPL (no perception of light).

All injuries were graded for subjective visual acuity. 66.2% eyes had visual acuity of <3/60. 23.5% patients had visual acuity 6/18 or better.

Final Visual Outcome

VA at 3 months was taken as final visual outcome.

VA at 3 Months	Number	Percentage
6/6 to 6/18	27	39.7%
6/24 to 6/60	11	16.18%
<6/60 to 3/60	2	2.94%
<3/60	28	41.18%

Table 6. Final Visual Outcome at 3 Months

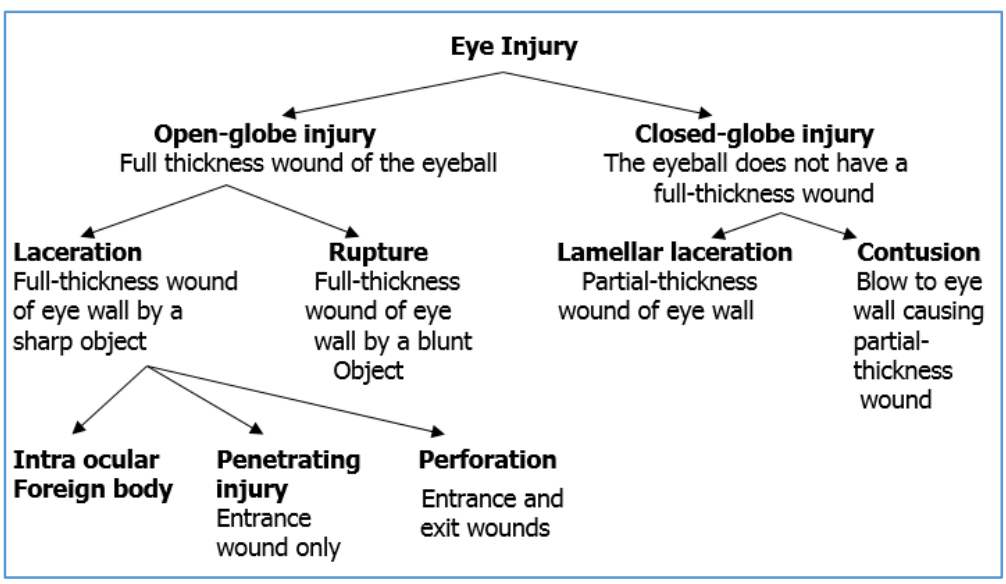
39.7% eyes had final visual acuity of 6/6-6/18 and 41.18% eyes had final visual acuity of <3/60.

DISCUSSION

Eye injuries exhibit a high variability ranging from mild, non-vision threatening to serious with blinding consequences. An accurate data essential for guiding management and prevention is difficult to record due to a number of factors-

- The different environments in which injuries occur.
- The wide range of causes.
- The wide spectrum of clinical (anatomical) presentations.
- Different data sources, e.g. hospital discharge data, outpatient visits.
- The lack of a widely used standardised template for reporting injuries.[13]

Mechanical Injuries are Broadly Classified According to the BETTS[14] Classification as follows-



In our study, a majority of the injuries were found in the 21 to 30 years age group. Probably, the cases were under training in their respective areas and hence were more exposed to the injuries due to ignorance or inexperience. All injured patients were male. No women presented with industrial ocular trauma.

The trauma was found to be highest in the workers of metal industries (61.7%) followed by automobile industries (19.1%). Textile and woollen industry accounted for 5.8% cases. Therefore, workers of industries who operate machines or are exposed to flying particles/splinters are more prone to eye injuries.

The object causing the injury was a metallic object in 81.7% of the cases. Stones caused trauma in 2.9%. Plastic and chemicals was the cause of injury in 1.5% of the cases each. 57.9% of the objects causing injuries were sharp, 34.3% were projectiles and 7.8% were blunt objects. The anterior segment of the eye is more commonly involved than the posterior segment in majority of the mechanical injuries to the eye. It may affect the conjunctiva, the cornea, the iris, the lens or the angle of the anterior chamber.

In our study, the presentation to the clinic was early in a majority of the cases. This shows that eye injuries are real ophthalmic emergencies, which demand prompt and early attention. The presentation to the hospital is influenced mainly by the type and severity of the injury.[15]

In our study, 49 cases (72.1%) presented with open globe injuries, while 19 cases (27.94%) presented with close globe injuries; 18 cases had retained intraocular foreign body.

All injuries were also graded for subjective visual acuity based on the ICD classification by the WHO. 66.2% eyes had visual acuity of <3/60. 23.5% patients had visual acuity 6/18 or better. A strong association of the presenting visual acuity is seen with the type of injury. Closed globe injuries are associated with better visual acuity than open globe injuries.

The final visual outcome was assessed at the end of 3 months in which 39.7% eyes had final visual acuity of 6/6-6/18 and 41.18% eyes had final visual acuity of <3/60.

A number of factors influence the final visual outcome in case of ocular injuries. Young age, early presentation, closed globe injury and a good presenting visual acuity are associated with a good outcome.

CONCLUSION

Injuries occurring in industries are severe and males in age group of 21-30 years are most vulnerable. Most of these injuries are preventable. Visual impairment following ocular trauma affects the social and economic status of the individual as well as society. In view of costly medical care required and loss of productivity, great care must be taken to prevent such injuries. Some of preventive measures are-

1. Health education of workers.
2. Safe machine designs.
3. Good illumination of workplace.
4. First aid and referral facility.
5. Use of proper protective wear for eyes.
6. Enforcing existing laws regarding safety at workplace.

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