

Original research article: A retrospective study of industrial eye injuries

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Abstract

Background: Each day, an estimated 2,000 workers suffer eye injuries on the job, which not only robs many of them of their sight, but also costs employers and insurance companies millions of dollars a year. These injuries incur more than \$924 million annually in workers' compensation, and nearly \$4 billion in wage and productivity losses, according to the U.S. Bureau of Labor Statistics (BLS).

Aim: To study various aetiological factors which are responsible for ocular injuries in various industrial environments and to assess the types of injuries and their outcomes in various types of occupations.

Material and Methods: This study included 70 cases with a history of trauma, which was sustained while working, who presented directly or were referred to our institute. Detail history was taken that includes type of injury, duration of injury etc. Their visual outcomes were considered.

Results: Male were more affected as compared to female. The commonest age group which was affected was the 21-30 years age group. Mechanical injuries were the most common type of injury.

Conclusion: An attempt was made to find out the various aetiological factors for ocular injuries and their visual outcomes.

Keywords: Eye industry, Visual activity

Introduction

Each day about 2000 U.S. workers have a job-related eye injury that requires medical treatment. About one third of the injuries are treated in hospital emergency departments and more than 100 of these injuries result in one or more days of lost work. The majority of these injuries result from small particles or objects striking or abrading the eye. Examples include metal slivers, wood chips, dust, and cement chips that are ejected by tools, windblown, or fall from above a worker. Some of these objects, such as nails, staples, or slivers of wood or metal penetrate the eyeball and result in a permanent loss of vision. Large objects may also strike the eye/face, or a worker may run into an object causing blunt force trauma to the eyeball or eye socket. Chemical burns to one or both eyes from splashes of industrial chemicals or cleaning products are common. Thermal burns to the eye occur as well. Among welders, their assistants, and nearby workers, UV radiation burns (welder's flash) routinely damage workers' eyes and surrounding tissue.^[2]

In an Indian survey, injuries were found to be the cause of blindness in 11.8% of the total blind subjects (A pilot survey from Jaipur, Rajasthan). The lifetime prevalence of ocular injuries in the USA is estimated at over 1400/100,000 population. The annual rate of eye injuries is 13.2/1000 population^[3, 4].

In addition to common eye injuries, health care workers, laboratory staff, janitorial workers, animal handlers, and other workers may be at risk of acquiring infectious diseases via ocular exposure. Infectious diseases can be transmitted through the mucous membranes of the eye as a result of direct exposure (e.g., blood splashes, respiratory droplets generated during coughing or suctioning) or from touching the eyes with

contaminated fingers or other objects. The infections may result in relatively minor conjunctivitis or reddening/soreness of the eye or in a life threatening disease such as HIV, B virus, or possibly even avian influenza.^[5, 6]

Methodology

This retrospective study was conducted at Pramukhswami medical college and hospital, Karamsad, Gujarat from may 2013-june 2014.

A total of 70 cases were included, with a history of trauma which was sustained while working, who presented directly or were referred to our hospital. The age group of the patients ranged from 18-58 years.

In all the cases, a thorough history was obtained, with particular emphasis on the type of industry, the nature of work, the hours of work daily, the exact nature of the event which led to the injury and the object which caused the injury. A proforma was drawn up and the details were recorded for each patient.

The patients' symptoms following the injury like pain, watering, photophobia, diminished vision, loss of vision, floaters, redness, bleeding, etc., were enquired about in detail. All the patients were subjected to a complete ophthalmic examination, which included: visual acuity assessment by using the standard Snellens chart in literates and the 'E' chart in illiterates, slit-lamp biomicroscopy and fundus examination by using direct and indirect ophthalmoscopy. Tonometry with applanation, tonopen or a non-contact tonometer, gonioscopy with a 4-mirror lens and refraction by using tropicamide and phenylephrine were done to assess the posterior segment in appropriate cases. All the ocular findings were recorded by using diagrams wherever necessary and the important fundus

findings were also documented by colour photography by using a fundus camera and slit lamp photography.

Results

A survey on 70 cases (81 eyes), with a history of injury which was sustained at work in various industries. Comparison of the categorical variables was done by using the Pearson's Chi Square test for association. A "p" value which was less than 0.05 was considered to be significant. (Table 1-8)

The injured were aged 31.8 years and were as young as 20 years, the oldest being 57 years.

Most of the injuries were in the age group of 21-30 years. There was only one (2.5%) female in the study sample.

The object of the injury was flying particles in 69.23% of the cases. Splashing of dangerous chemicals was the cause of injury in 25.1% of the cases.

Mechanical injuries were the most common type of injury in a large proportion of patients as compared to the non-mechanical injuries.

Table 1: Age and sex wise distribution of participants

Age Group(Yr)	Number (n)	Percentage (%)
<20	08	11.4
21-30	33	47.14
31-40	12	17.14
41-50	10	14.28
>50	07	10
Total	70	100

Table 2: Occupation wise distribution of participants

Age Group(Yr)	Number (n)	Percentage (%)
Furnace operators	08	11.4
Mechanics	11	15.71
Machine tool operators	04	5.71
Assembly workers	05	7.14
Chemical handlers	05	7.14
Furnace operators	02	2.85
Weavers	02	2.85
Quarry workers	05	7.14
Innocent bystanders	02	2.85
Supervisors	03	4.28
Labourer	16	22.85
Spinning mill worker	02	2.85
Electrician	02	2.85
Fitter	03	4.28
Total	70	100

Table 3: Analysis of history of activity during injury

Activity	Number (n)	Percentage (%)
Hammering	27	38.57
Handling chemicals	17	24.28
Welding	3	4.28
Handling hot metal	5	7.14
Sewing	4	5.71
Machine operation	9	12.85
Bystander	1	1.42
Supervision	2	2.8
Weaving	1	1.42
Grinding	1	1.42
Total	70	100

Table 4: Industry wise distribution of participants

Activity	Number (n)	Percentage (%)
Workshop	37	52.85
Textile industry	14	20
Quarry	5	7.14
Motor factory	5	7.14
Quarry	5	7.14
Others	4	5.71
Total	70	100

Table 5: Offending agent of injury

Activity	Number (n)	Percentage (%)
Blunt injury	17	24.82
Alkali burns	05	7.14
Sharp object	32	45.71
Acid burns	5	7.14
Quarry	6	8.57
Others	4	5.71
Total	70	100

Table 6: Industry wise distribution of participants

Activity	Number (n)	Percentage (%)
Workshop	37	52.85
Textile industry	14	20
Quarry	5	7.14
Motor factory	5	7.14
Quarry	5	7.14
Others	4	5.71
Total	70	100

Table 7: Type of injury

Type	Open globe		Close globe	
	Number(n)	Percentage (%)	Number(n)	Percentage (%)
Rupture	8	22.2	4	50
Perforation	20	55.6	4	50
IOFB	8	22.2	-	-
Total	36	100	8	100

Table 8: Structure wise involvement in injury

Structure	Number (n)	Percentage (%)
Lids	17	23.9
Conjunctiva	24	33.8
Cornea	52	73.2
Sclera	12	16.4
Iris	5	7.14
Lens	16	22.5
EOM Damage	01	1.4
Orbital fracture	01	1.4
Choroid	04	5.6
Retina	11	15.5
Vitreous	18	25.4
Anterior chamber	41	57.4

Discussion

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. There appeared to be a very less proportion of women who reported with an injury. This could be due to reasons such as (1) less number of women in the industries, (2) women being employed in less dangerous

departments or (3) women being very careful in their work and adhering to the safety measures. This finding was similar to that of other studies by Lambah, Malik and Shukla, who reported that a high number of males were affected as compared to the females varying from 80-90% [7, 8, 9].

Awareness and the usage of protective gear: Forty-four (67.7%) cases were not aware that there was a possibility of eye injuries. The rest (21 cases) who were aware of the possibility of an injury, knew that they had to use protective gear at their workplace.

The provision of protective gears for the eyes was not available in a major proportion (76.9%) of the cases. Of the 15 cases that had the provision, 9 (13.85%) wore it 'regularly' and 6 (9.2%) wore it 'occasionally'.

Most (87.7%) of the cases were not wearing protective gear at the time of the injury. Eight persons (12.3%) had an injury in spite of wearing protection at the time of the injury.

Previous ocular eye examination: Only 9 (13.8%) cases had their eyes examined prior to the injury. The reason for the eye examination was glass penetration in 5 (55.6%) cases and a routine checkup in 4 cases. One patient was one-eyed. Presbyopia was the predominant (12.3%) problem which was reported before the injury. Uncorrected refractive error was reported by 3 (4.6%) cases. There was one squint eyed and one hyperopic case in the study sample.

Conclusion

Potential eye hazards are found in nearly every industry. Males were more commonly injured than the females. The commonest age group which was affected was the 21-30 years age group. The higher incidence among the youth causes visual disability and has a tremendous burden on the financial and social perspectives and on the quality of life of the individuals.

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