



Original Research Article

A hospital based study to evaluate etiology and epidemiology of occupational corneal foreign bodies

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ABSTRACT

Context: Occupational injuries to eye are very common. Corneal foreign bodies (CFB) are common occupational eye injury. Studies on corneal foreign bodies due to occupational exposure are ignored in developing countries like India.

Aims: Our study objective was to determine various occupations related to corneal foreign bodies and demographics, level of education and awareness of patients presenting with CFB acquired during occupational work.

Settings and Design: A hospital based cross sectional study at a tertiary hospital at Pali, Rajasthan.

Materials and Methods: Patients presenting with CFB were asked about their occupation, level of education, awareness about complications of CFB and use of protective equipments at workplace.

Results: We examined total 62 patients with CFBs. All patients were male. 34% were in the age group of 18-29 yrs and 58% were in the age group of 30-45 yrs. Metal work industry was responsible for 29% of presentations and construction work industry for 26% of cases. Only 18% were using protective equipments during occupational activity. 58% patients attempted self-removal of foreign body.

Conclusion: CFBs are common among various occupations. The sufferers are commonly young males who are poor and have low education. This occupational hazard can have blinding complications and is generally overlooked. Awareness regarding protective measures must be increased and access to eye care hospital must be increased.

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1. Introduction

Occupational trauma is a major cause of ocular morbidity and vision loss.¹⁻³ Corneal foreign body is the commonest occupational eye injury.^{4,5} Ocular injuries are most commonly seen in metal industry and construction industry.⁶⁻⁸ Corneal foreign bodies can cause corneal scarring leading to visual impairment and blindness.^{9,10} Most corneal foreign bodies are preventable by personal protective equipments.^{11,12} India has a large workforce in construction and metal industry which is exposed to such injuries. Such injuries have significant socioeconomic

impact.

Despite the public health importance, there are very few studies on magnitude, risk factors, and awareness of occupation related ocular trauma especially in developing countries like India.

The purpose of our study was to describe the epidemiology of occupation related corneal FBs presenting in our hospital. We sought to (1) define the population at risk (2) identify the occupation and activity related to CFBs (3) examine the education and awareness regarding CFBs among workers (4) suggest strategies for prevention, management and future research regarding occupational corneal FBs and ocular trauma.

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2. Materials and Methods

This hospital based cross-sectional study was done at a tertiary hospital at Pali, Rajasthan. All patients who presented with a CFB sustained during occupational work during the period of April 2020 to September 2020 were included in this study. All patients were asked a set of questions by the ophthalmologist in their language and the responses were recorded. This study was approved by the institutional review board and adhered to the Declarations of Helsinki. Written consent was taken from all the patients in their language before inducting in the study. This hospital based cross-sectional study was approved by the institutional ethics committee.

All patients were examined with a slit-lamp. FBs and rust rings were removed using a 26-gauge needle under topical anaesthesia. A topical antibiotic (Ciprofloxacin, four times a day) was prescribed after FBs were removed. The locations of the FB, rust marks, superadded infection and any corneal scars from previous FBs were noted.

We recorded demographic information of each patient, which included age, gender and education. We enquired about their occupation and activity at the time of incident and experience in number of years of work in the present occupation. To evaluate the awareness of the patient regarding eye injury at work questions were asked about time between the incident and visit to an ophthalmologist, number of previous similar eye injuries, availability of protective goggles at work, protective goggle use during the incident, attempted FB removal by the patient, technique used if self-removal was attempted. We asked whether they understood that repetitive FB injuries can cause serious visual impairment and FB removal themselves can cause serious eye infection.

3. Results

We examined 62 patients with corneal foreign body acquired due to occupational work. All patients were male with a mean age of 34.15 years. 34% were in the age group of 18-29 yrs and 58% were in the age group of 30-45 yrs.(Table 1)

Metal work industry was responsible for 29% of presentations, construction work industry for 26% while electricians were 15% , carpenters 8% , agriculture sector 6% ,and others were 16%. Corneal foreign body injuries occurred while metal grinding / cutting in 29%,while welding in 24%,with cement work in 18%, wood cutting in 10% and other activity in 19%.(Table 2)

29% workers had job experience of 1-5 years while 63% had experience of over 5 years.58% had history of previous corneal foreign bodies 2 or more times while 27% had no previous history of corneal foreign bodies. The number of FB injuries increased with number of years at work.

We examined the patient's knowledge about corneal FBs and his approach to treatment. 52% of patients presented within 1 day of injury, 37% within 2-5 days of injury and 11% presented after 5 days of injury. We observed that 58% patients attempted self removal of foreign body. 32% used water, 15% used cloth while paper was used by 3% for the removal of foreign body.(Table 3)

Corneal scars due to previous FB injuries were present in 56% patients.

Only 18% were using protective equipments like goggles during activity. 56% had no protective equipment available at the workplace.(Table 4)

Table 1: Patient Demographics

Age	
18-29 yrs	34%
30-45 yrs	58%
46 – 60 yrs	6%
> 60 yrs	2 %
Gender	
Male	100%
Education	
Illiterate	11%
Grade 1-5	37%
Grade 6-10	42%
Grade 11 and above	10%

Table 2: Occupational factors

Occupation	
Metal work industry	29%
Construction industry	26%
Electrician	15%
Carpenter	8%
Agriculture	6%
Others	16%
Activity at the time of injury	
Metal Grinding / Cutting	29%
Welding	24%
Cement work	18%
Wood cutting	10%
Others	19%
Job Experience	
< 1 year	8%
1-5 years	29%
>5 years	63%

4. Discussion

Our study demonstrated that 92% of patients were in the age group of 18-45 yrs and all were males. This suggests the increased risk of young males to occupational eye injuries. A study by Zghal-Mokni et al. demonstrated mean age of 31 years old, for occupation related CFB. ¹³ The preponderance among young males suggests decreased carefulness among

Table 3: Previous FBs and Time of presentation after injury

Previous CFBS	
0	27%
1	15%
2 or more	58%
Time of presentation after injury	
Within 1 day	52%
2-5 days	37%
>5 days	11%

Table 4: Reason for not wearing protection and material used for self-removal

Wearing protection	18%
Lack of protection at workplace / Not provided	56%
Removed for some time	18%
Forgot to wear	5%
Uncomfortable	3%
Material used for self-removal	
Self-removal not attempted	42%
Water	32%
Cloth	15%
Paper	3%
Others	8%

young workers.

90% of patients had an education of 10th standard or below. In a similar study by Agarwal et al stated 95% of patients had an education of 10th standard or below.¹⁴ A study by Kumar et al. calculated 86.6% of patients to have an education of 10th standard or below.¹⁵ This suggests that people with lower education have to do high risk jobs.

In our study 55% of corneal FBs were accounted by metal work and construction industry. 53% of corneal foreign body injuries occurred during metal grinding/cutting and welding. In a study by Agarwal et al metal grinding and welding accounted for 67% of corneal FBs.¹⁴

We also assessed that only 18% of the patients were wearing protective glasses at the time of injury. 56% of workers were not provided with protective glasses at their workplace. 26% of workers were not wearing glasses despite availability of protection. Similarly Agarwal et al also observed that 47% of the patients were not provided with protective glasses; only 27% of the patients were wearing it.¹⁴ Over 3/4 of the injuries are preventable by personal protection equipment.¹¹ This suggests that usage of protective glasses can lower the incidence of corneal foreign bodies. A mandatory rule of using safety goggles in workplaces with strict compliance on the part of employer and employee can lower the visual morbidity due to occupational CFBs.

We observed that 18% patients sustained corneal FB injury while wearing proper protection for eye. In a similar study, 45% patients sustained an eye injury while wearing some form of eye protection.¹¹

Of the reasons for not wearing the eye protection in our study, 18% removed the glasses for some time, 5% forgot to wear the glasses and 3% found the eye protection uncomfortable. This suggests that improvement in the design of protective glasses and workplace ergonomics is required.

In our study 58% patients attempted self removal of corneal FB. Corneal FBs themselves can spread infections, and use of contaminated and potentially traumatic materials for removal of corneal FB can increase the risk of corneal infections. These secondary corneal infections may deleteriously affect the quality of vision and can cause corneal scarring. In a study conducted by Filho et al., several microorganisms apart from the normal conjunctival flora were isolated from 19.8% conjunctival swabs of patients with corneal FBs.¹⁶

In our study 52% of patients presented within 1 day of injury, 37% within 2-5 days of injury and 11% presented after 5 days of injury. A study by Ramakrishnan et al. concluded that the delay in seeking treatment from an ophthalmologist and the attempt of removing the FB is directly related to development of corneal scar and rust ring.¹¹ Such delay in treatment can cause significant visual impairment due to infections and corneal scarring. This emphasises the necessity of health education regarding potential harm caused by corneal FBs, self treatment and delay in treatment to the workers.

5. Limitations

Our investigation was a hospital-based study that does not include data on occupation related corneal FBs treated outside of our hospital setting or where no treatment was done. In addition, because of the short time of study the sample size was small and limited information could be reported. However, these limitations do not significantly affect the major findings.

6. Conclusion

CFB are encountered in a number of industries most commonly in metal work industry and construction industry. This affected population is generally poorly educated and do not understand the risk of vision impairment CFBs may cause. Health education should be imparted to workers. Ocular safety measures should be strictly imposed at particularly hazardous workplaces. Designs of protective equipments need to be improvised. Urgent referral to an ophthalmologist is must and self removal must be discouraged.

7. Source of Funding

None.

8. Conflicts of interest

There are no conflicts of interest.

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