# Occupational Eye Injury: The Neglected Role of Eye Protection

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**Objective: To evaluate the role of eye protection in patients with an occupational eye injury.**

**Setting: Ophthalmology Department, King Hamad University Hospital, Bahrain.**

**Design: A Prospective Cross-Sectional Study.**

**Method: All patients who presented with occupation-related eye injury from 1 January 2016 to 31 March 2016 were included in the study. A survey was filled regarding occupation, mechanism of injury, causative hazard and eye protective precaution used. Personal characteristics, examination, the degree of injury, diagnosis, management and complications were recorded. Birmingham Eye Trauma Terminology System was used in injury classification.**

**Result: Forty-two injured eyes were seen from 1 January 2016 to 31 March 2016. Forty (95.2%) were not using safety eyewear. Twenty-two (52.4%) had superficial foreign body, 17 (40.5%) had lamellar laceration, 2 (4.8%) had contusion and 1 (2.4%) had penetrating injury. Fifteen (35.7%) injuries were due to flying particles while grinding, followed by 5 (11.9%) due to hammering. Corneal foreign body was the most common injury, 19 (45.2%). Most frequently injured were construction workers, 14 (33.3%) followed by welders, 10 (23.8%).**

**Conclusion: Occupational eye injuries could lead to major complications ranging from mild abrasions to blindness. In our study, most of the injuries were due to ignorance and failure to use safety eyewear. It is highly recommended that all employers make it mandatory for all workers to wear appropriate protective eyewear as it decreases the incidence and severity of eye injuries.**

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Job-related eye injuries alone cost more than $300 million per year due to loss of production time, incurred medical expenses and worker compensation[1]. Ninety percent of these could have been prevented if the victims were wearing proper eye and face protection[2]. Two thousand US workers have job-related eye injuries. Many injuries are treated in emergency departments and many days of work are lost due to such injuries[3]. Approximately 70% of all reported facial injuries occurred to the eye. Approximately 70% of non-fatal eye injuries were caused by flying or falling objects or sparks[4].

The eyes are very delicate; a minor trauma or chemical liquid could cause permanent damage, which could lead to blindness. We noticed in our ophthalmology department that many of the job-related eye injuries occurred due to not using proper eye protection. Some patients lost their vision after receiving a penetrating injury.

The aim of this study is to evaluate the causes, eye protective methods and outcome of job-related eye injuries. To the best of our knowledge, no such study has been performed in Bahrain before.

## METHOD

All patients with job-related eye injuries from 1 January 2016 to 31 March 2016 were included in the study; written consent was obtained from all patients. History was recorded through a survey; the following were included: the occupation during the injury and the use of eye and face protection. Personal characteristics, examination, the degree of injury, diagnosis, management and complications were recorded. The injuries were classified clinically using Birmingham Eye Trauma Terminology (BETT) system as follows: superficial foreign body, contusion, lamellar laceration, rupture and laceration[5]. Corneal abrasion, chemical burn, photokeratitis and lid laceration were classified as a lamellar laceration. Management was classified into conservative (medical) and interventional (surgical).

## RESULT

Forty-two job-related eye injuries were seen during the study period. All of the injured patients were males between 25 and 44 years of age. Two (4.8%) patients were wearing safety devices

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during their work and 40 (95.2%) patients were not using any safety devices, see figure 1. The most common mechanisms of injury were grinding, 15 (35.7%), followed by hammering, 5 (11.9%). The impact was the most common causative hazard, 33 (78.6%), see figure 2. Two (4.8%) patients were wearing safety eyewear without side protection; one was a welder while other was a construction worker.

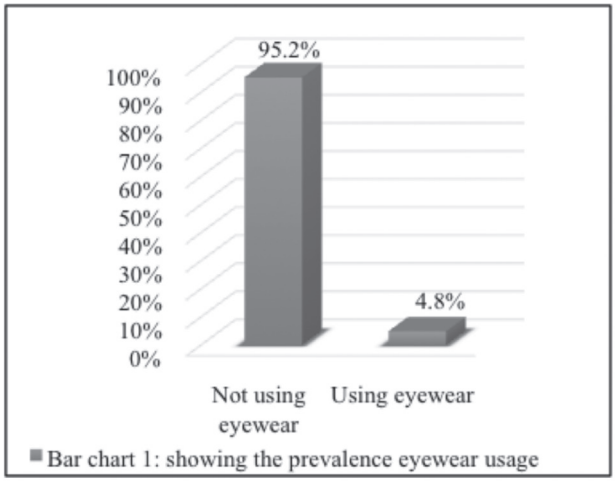


**Figure 1: Prevalence of Eyewear Usage**

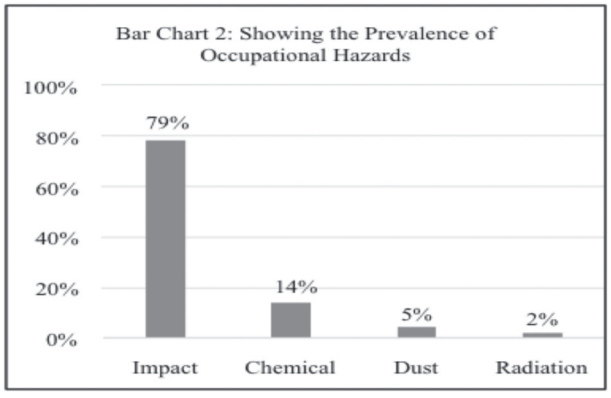


**Figure 2: Prevalence of Occupational Hazards**

According to BETT system, 22 (52.4%) had superficial foreign body, 17 (40.5%) had lamellar laceration, 2 (4.8%) had contusion and 1 (2.4%) had penetrating injury, see figure 3. Nineteen (45.2%) patients had corneal foreign body and 6 (14.3%) patients had chemical eye injury, see table 1.

**Table 1: List of Ocular Injuries**

| | | |
|---|---|---|
| **Contusion** | Subconjunctival Hemorrhage (2) | 2 |
| **Superficial Foreign Body** | Corneal Foreign Body (19) | 22 |
| | Conjunctival Foreign Body (3) | |
| **Lamellar Laceration** | Chemical Burn (6) | 17 |
| | Corneal Abrasion (5) | |
| | Partial Thickness Corneal Tear (3) | |
| | Conjunctival Tear (1) | |
| | Photokeratitis (1) | |
| | Marginal Eyelid Laceration (1) | |
| **Laceration** | Penetrating Intraocular Foreign Body (1) | 1 |

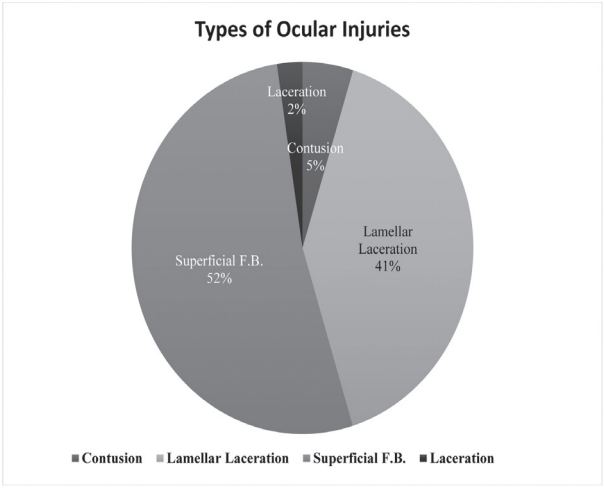


**Figure 3: Types of Ocular Injuries**

Fourteen (33.3%) construction workers were injured, followed by 10 (23.8%) welders, 3 (7.1%) fishermen, 3 (7.1%) carpenters, 1 (2.4%) mechanic, 2 (4.8%) electricians and 2 (4.8%) cleaners. One (2.4%) car washer, one (2.4%) storekeeper, one (2.4%) farmer, one (2.4%) satellite worker, one (2.4%) ship worker and one (2.4%) pipefitter were among the injured.

One (2.4%) patient had penetrating intraocular foreign body and became blind in the affected eye. Forty (95.2%) patients were treated medically and two (4.8%) patients had surgical interventions. Thirteen (31%) patients developed corneal opacities; three (7.1%) had a permanent reduction of vision secondary to central corneal opacification. The patient who became blind was a carpenter; he sustained penetrating eye injury while removing a nail.

## DISCUSSION

In this study, only 2 (4.8%) patients were using protective devices during their work. The rate of blindness due to occupational injury was 2.4%. Blindness due to eye injury had psychological, social and financial impact upon the patient. Apart from the employer suffering loss of working hours, it is a personal tragedy for the sufferer.

The most common occupational eye hazards are due to impacts, heat, chemicals, dust and optical radiation. Impacts could be flying particles which may stick to the eye and may cause abrasion or even perforation; it is usually associated with grinding, hammering, drilling, sawing, chipping, masonry works or wood works. Heat injuries result from exposure to high temperature, sparks or hot liquids. Chemical eye injury happens after exposure to alkali, acidic or solvent agents in solid, liquid or vapor form. Dust could cause an eye injury. Optical radiation secondary to ultraviolet or infrared light exposure could cause photokeratitis, retinal burn, cataract formation and may lead to total blindness[6].

According to American Optometric Association, the common occupations associated with high risks of ocular injuries are construction, manufacturing, mining, carpentry, auto repair, electrical work, plumbing, welding and maintenance[7].

Industrial ocular injuries are preventable if well-fitted protective eyewear is used with strict compliance[8]. Job-related ocular injury occurs either due to the workers were not using protective eyewear or using the wrong type of eyewear, as in our study. Different protective eyewears are available, such as safety glasses, goggles, face shields, welding helmets and full face respirators. The proper eye protection depends on the type of hazards at work environment: safety glasses for impact, safety glasses with side protection for flying particles impact, safety goggles for impact or chemical splash, face shield and welding helmet for heat or chemical splash and special filter added to goggles or helmets for protection against optical radiation[9].

## CONCLUSION

**Outcome from job-related injury could range from mild abrasions to blindness. We recommend that employers provide their employees with proper protective eye devices and educate their proper use; this would decrease the incidence of eye injuries and/or reduce the severity if injured.**

**The majority of our participants were construction workers and welders. Those populations of workers need to be properly educated on the importance of the use of protective eye devices and the hazards of not using them.**

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**Competing Interest:** None.

**Sponsorship:** None.

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