

# Eye injury prevention: mini review

## Abstract

**Purpose:** To provide a mini review on eye injury prevention.

**Methods:** A systematic review of the literature.

**Results:** Eye trauma occurs frequently in high-risk environments like homes, work and at schools. Education and training are essential tools in eye injury prevention.

**Conclusion:** Eye trauma is a major cause of preventable vision loss worldwide. It is only through regular education and prevention that the incidence of vision threatening eye trauma can be reduced.

**Keywords:** ocular injury, eye trauma, prevention, protective eye wear

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**Abbreviations:** WHO, world health organization; US, united states; USEIR, united states eye injury registry; CDC, centers for disease control; ANSI, american national standards institute eye protection; HIV, human immunodeficiency virus; UV, ultraviolet

## Introduction

In the United States (US), 3% of all visits to the emergency room are the result of ocular injuries.<sup>1</sup> Ocular trauma remains a serious and preventable health care problem worldwide. It heads the list as the most important cause for unilateral blindness.<sup>2</sup> In a review by the World Health organization (WHO) in 1998, 55 million individuals sustained eye injuries that resulted in restricted activities for more than one day a year.<sup>3-5</sup> Of these eye injuries, 1.6 million resulted in complete blindness.<sup>5</sup> This is quite significant and impactful. Age, socioeconomic status, gender and lifestyle are all identified as risk factors for eye injuries.<sup>5</sup> A recent study looking at the rate of ocular injury in the US revealed that Caucasian males in their twenties had the highest rates of ocular trauma.<sup>6</sup> More than fifty percent of eye injuries occur in patients under age thirty according to the United States Eye Injury Registry (USEIR).<sup>4</sup>

The environment in which the eye injury occurs is yet another important risk factor. A significant percentage of ocular traumas occur in homes.<sup>4,7</sup> Other studies found the work place to be an even higher risk environment for ocular injuries.<sup>4,8,9</sup> Prevention is essential in decreasing the rate of occurrence of ocular trauma as it in the home, work environment, during a sporting activity or any other high-risk situation or environment. This can only be achieved by education on high-risk situations and ensuring that individuals are equipped to prevent such injuries from happening.<sup>4,10</sup> This article seeks to reinforce information on ocular trauma and prevention in various high-risk environments. We will review common high-risk situations where ocular injuries tend to occur and provide essential information on eye injury prevention.

## Discussion

### Eye injury prevention at work

Trauma to the eye can occur virtually anywhere, however occupational or work-related eye injuries make up the vast majority of patients presenting to emergency rooms across the US. The Centers for Disease Control (CDC) estimates that over 2,000 work related eye

injuries occur daily.<sup>11</sup> The injury itself can result from many different causes including blunt forces, foreign bodies entering the eye, and even ultraviolet (UV) radiation. Health care workers including physicians, nurses, lab technicians, and auxiliary staff are particularly at risk for exposure to infectious diseases including the Human Immunodeficiency Virus (HIV) and the Hepatitis B virus, which can be transmitted by direct contact via the mucous membranes of the eye.<sup>11</sup>

Preventative measures should be taken in the work place to prevent eye injuries in order to create a safe environment for employees.<sup>12</sup> Employers and administrative staff must identify potential hazards to employees. Once identified, the correct level of eye protection should be obtained and its use enforced. Every job is unique and hence safety requirements will differ.<sup>3</sup> Safety glasses are ideal for eye injury prevention in occupations that expose people to small particles such as dust, cement, nails, and wood pieces.<sup>10,11</sup> Safety glasses should be customized to the individual and to the task.<sup>10</sup> They should include side shields to increase the protective capabilities of the safety glasses, meanwhile ensuring that there is no obstruction to peripheral vision.<sup>11</sup> Individuals who wear glasses or contact lenses can have their safety glasses personalized to their prescription.<sup>12,13</sup> Safety glasses should be worn at all times by workers in high-risk environments.

In certain high-risk work areas such as that of industrial workers, there should essentially be "head to toe" protection.<sup>13</sup> The use of other protective devices such as a face shield provides an extra layer of protection. A face shield should be used in conjunction with safety glasses or goggles to provide optimal protection from particles and other objects.<sup>11</sup> Face shields can provide further protection from blood, chemicals and other things that can potentially cause splash injuries.<sup>12</sup> Goggles generally provide better protection in comparison to safety glasses. Goggles should be used by individuals who work in dusty environments, those at risk for chemical exposure and individuals who work with torches and welding lights.<sup>12</sup>

Workers should be adequately trained to use equipment to decrease the risk of ocular trauma. It is also essential that they are educated about the potential hazards at their specific work environment.<sup>13</sup> Here should be regular education and training sessions.<sup>10</sup> Training should also encompass what to do in case there is an eye injury with emergency eyewash nearby.<sup>12</sup> Hazard and caution signs and safety protection reminders should be placed around the workplace to further

aid in prevention of injury. Restrictions to hazardous areas should also be implemented by administration, prohibiting unauthorized entry to workers who do not have on the proper safety equipment.

### Eye injury prevention at school

Pediatric eye injuries are a major cause for ocular morbidity.<sup>14</sup> Children at school area increased risk for eye trauma. The pencil is a common offending agent for eye injuries at school.<sup>2</sup> Other common objects include pens, books, sticks, stones, and other things children may use or have access to at school. Teachers and parents along with legislators must play an active role in eye injury prevention in schools. Schools must educate attendees about eye injuries, which can be in the form of a lecture and or posters around the school. Young children should never be left unsupervised in the presence of potentially dangerous toys and school supplies. Parents and teachers alike should inform children of the dangers of sharp objects and be taught the correct handling of such objects for e.g. holding scissors. Students should also be equipped with eye safety equipment in the presence of chemicals such as during chemistry or biology labs.

Children and adolescents often participate in sports during and after school hours. Sports pose an increased risk of eye injury accounting for over 40% of eye injuries.<sup>7</sup> Hockey, baseball, racquetball, and basketball are the most common causes of sports related eye trauma.<sup>7</sup> Injuries can range from blunt to penetrating trauma. Sports played outdoors also pose the risk of UV radiation related injuries to the eyes. Eye protection in sports should follow specific guidelines for testing and material standards.<sup>13</sup>

### Eye injury prevention at home

Many consider their home a safe haven; however the potential for eye injury is vast. Eye injuries can occur in every room of the home with approximately 33% of injuries occurring in the kitchen, bedroom, bathroom, and living or family room.<sup>7</sup> Along with Shah et al.<sup>4</sup> the American Academy of Ophthalmology found that a significant percentage of eye injuries occur at home.<sup>7</sup>

“Do it yourself” (DIY) projects at home are hugely popular and can set the scene for ocular trauma. Other activities such as simply mowing the lawn or gardening can lead to foreign bodies entering the eyes like sand, dust, or chemicals. Safety glasses should be worn at all times when engaging in such activities. The American Academy of Ophthalmology recommends that each household have a pair of American National Standards Institute (ANSI) regulation eyewear. This should be worn when carrying out any potentially dangerous tasks. It has been shown that wearing protective eyewear can prevent up to 90% of eye injuries.<sup>7</sup>

Parents and guardians must ensure a safe environment for children, adolescents, elderly patients and all occupants of the household. They must keep in mind that certain objects, which may appear benign (for example toys) can also pose a huge risk to children. Corner guards should be placed on furniture and walls with sharp edges to protect children. Children should never be left unsupervised in the home and should be made aware of the dangers associated with sharp toys and projectiles. Additionally, parents should never allow children to play with laser toys as they can cause permanent and severe ocular injury. In the kitchen while cooking, grease shields on pans can be used to prevent splashing of grease onto the face and into the eye.<sup>7</sup> These

are all just various examples of ways we can prevent serious ocular trauma in the home.

### Conclusion

Eye trauma is a major cause of preventable vision loss worldwide. Regular education and training in schools, industrial plants and other work places inclusive of hospitals is essential to decreasing the incidence of injuries to the eyes. Frequent dissemination of information via review articles such as this, are also key to ensuring the sustained impact of education on these issues.

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### Conflicts of interest

The authors declare there are no conflicts of interest.

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