Epidemiology of Pediatric Eye Trauma

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Abstract

Young children have in common physical vulnerability, lack of coordination, and limited ability to avoid or escape from danger. Also young children show curiosity and a desire to explore, which may expose them to serious hazards. The epidemiological data varies from one part of the world to another. There was a significant increase in the pediatric portion of ocular trauma in Egypt compared to other studies. Wadeai et al noted an increase in the childhood trauma to the extent of 49.7% in the Egyptian population.

Key Words: Children, Eye, Trauma.

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Background

The epidemiology of eye injuries varies in different parts of the world and different age groups and depends on many factors including life style, socioeconomic status, traffic state, sport and creative activities and type of registration and recording of data. About half a million people in the world are blind as a result of eye injuries. About 30-40% of monocular blindness is due to ocular trauma**(Cao et al., 2013)**.

Regardless of eyes representing only 0.1 of the total body surface, their significance is disproportionally greater. The eyes are the third, after hands and feet, most affected parts of the body **(Elhesy, 2016)**.

Increasingly, attention has been focused on the worldwide epidemic of eye injuries in the pediatric population, which carries an incidence rate of 0.746 to 9.9 per 10,000 in the United States and other developed countries **(Armstrong et al., 2013)**.

Prior epidemiologic studies of eye injury have produced varied results, in part because of differences in study design, time and region. Population-based studies of pediatric ocular have indicated that approximately two-thirds of injured patients are males,predominantly with closed globe injuries at home **(Dulal et al., 2012)**.

However, when study subjects are restricted to eye injuries treated at any of the healthcare centers (including tertiary hospitals), visual impairments is mainly due to open injuries. From a public health and injury prevention prospective, identification of the frequency and spectrum of these injuries in a defined population and targeted educational and legislative efforts might be the tools to minimize eye injuries **(Cao et al., 2013)**.

The rate of hospitalization for pediatric eye injuries in the United States in 2000was 8.9 per 100,000 persons aged 20 years or less. Worldwide, the incidence of sever visual impairment or blindness, caused by ocular trauma in children varies from 2% to 14% according to different studies **(Aghadoost, 2014)**.

Each year in the United States an estimated 2 to 3 million people seek medical care for eye injuries. Among all patients with significant trauma, 16% have serious ocular or orbital injuries, whereas over 50% of patients with serious facial trauma have associated eye injuries that could threaten sight or lead to loss of vision **(Négrel & Thylefors, 1998)**.

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Trauma is the second leading cause of monocular blindness after cataracts; eye injuries are the

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number one cause of ophthalmologic hospital admissions in the each year in the United States.

It is hopefully supposed that training about hazards associated with specific activities, facilitating the availability of eye wears, accident prevention and training baby care givers for prevention and management of this disastrous incident **(Aghadoost, 2014)**.

High rates of eye trauma occur in young males aged (18-25), and this is related to work, sport, assaults and traffic. Less common causes of eye injuries are BB gun shot which usually leads to sever visual impairment despite modern surgical techniques, war-related ocular injuries and fireworks in children. Contact lens-induced keratitis and decreased vision is increasing due to wide-spread use of contact lenses **(Cao et al., 2013)**.

Age

Most studies report no significant difference in the prevalence of ocular trauma between age groups 0-5, 5-10, 10-15, and 15-18. According to one study which described the epidemiology of trauma in children 15 years and younger who underwent evaluation in an emergency room in Colombia found that approximately 71 percent of patients were 10 years or younger and the mean age was 7.78 years, but that the prevalence was not significantly different across the age groups **(Serrano et al., 2003)**.

According to another study which described ocular trauma in children registered in the National Registry found that children with ocular trauma presented with a mean age of 8.6 years. According to a recent European retrospective analysis of childhood eye injuries in children less than 12years of age, the mean age of patients was 7.2 years**(Tomazzoli et al., 2003)**.

The authors of a retrospective review in Turkey who studied children presenting with perforating eye injuries reported a mean age of 8.35 years. The factors that influence the mean age data include ages included in review and type of injuries noted **(Juthani, 2008)**.

Gender

Most studies in the literature show a higher prevalence of ocular injury involving males. The degree of increased prevalence among males usually varies by age group. Several studies have shown a male to female ratio ranging from 2.0 to 7.3:1**(Brophy et al., 2006)**.

Serrano, et al reported a male to female ration of 1.8:1, which was significant at p<.001. The study also found that the highest male to female ratio ocular trauma was found in the oldest age group (10-15 years) at 2.5:1. The youngest age group (0-5 years) showed a lower discrepancy between genders at 1.6:1 **(Serrano et al., 2003).**

In a study of perforating eye injuries in children 14 and younger, in Turkey, Soylu, et al found an overall ratio of males to females of 2.6:1. This study also reported a lower ratio in the youngest age group (1.29:1). The ratio increased with older age groups; the 5-9 years old age group had a ratio of 2.6, and the 10-14 age group had a ratio of 5.2 **(Soylu et al., 1998)**.

According to a subset of pediatric ocular trauma patients registered in the national pediatric trauma registry (NPTR), the overall ratio of males to females ages 0-18 was 1.86. Males in the 11-18 years age group were at the highest risk for eye injuries and females in the 6-10 years age group were at the lowest risk. In contrast, the American Academy of Pediatrics reported in 1987 a male to female predominance of approximately 4:1. Variations in gender predominance clearly exist by region, time period studied, and types of injuries studied **(Juthani, 2008)**.

Location

Several studies report that the most common location for an injury to take place was the home, accounting for more than 50% of all accidents. For children not yet in school or daycare, studies show that injuries occur almost exclusively in the home. Likewise, school-age children also suffered most injuries at home, which reflects the amount of time that spend at home and the potential sources of injury in and around the home**(Luff et al., 1993)**.

Other common locations for injury have been streets/roads, school/childcare, countryside, work premises, and recreation/sport. Previous studies have shown different results as to the prevalence of these other locations in ocular injuries **(Garcia et al., 2005)**.

Trauma is a major cause of monocular blindness in urban populations, although few studies have addressed the problem of trauma in rural settings. The etiology of ocular trauma is likely to differ between urban and rural areas, and is worthy of investigation. More appropriate targeting of resources toward preventing eye injuries may reduce this burden **(Ackah, 2020)**.

Cause and Mechanism of Injury

Flicking sand, flying pieces of wood, metal and stone are notorious for causing much of the eye trauma. Sporting balls such as cricket ball, lawn tennis ball, squash ball, shuttlecock, and other high speed flying objects can strike the eye. The eye is also susceptible to blunt trauma in a fistfight. The games of young children such as bow-and-arrows, bb guns and firecrackers can lead to eye trauma **(Feist et al., 1991)**.

Road traffic accidents (RTAs) with head and facial trauma may also have an injury – these are usuallysever in nature with multiple lacerations, shards of glasses embedded in tissues, orbital fractures, sever hematoma and penetrating open-globe injuries with prolapse of eye contents. Other causes of intraocular trauma may arise from workplace tools or even common household implements **(Seethalakshmi et al., 2015)**.

In the event of blunt trauma, the pressure, mechanism, and direction of trauma are incorporated in the resolution of the extent of injuries. Past ocular injuries by high-speed projectiles should alert the examiner to the potential of presence of an intraocular foreign body (IOFB). For penetrating injuries, one should determine the character of the potentially maintained foreign body (FB). Certain foreign objects can elicit sever inflammatory reaction or result in infection inside the globe, whereas some could be well tolerated **(Elhesy, 2016)**.

Socioeconomic Status

Ocular injuries, even minor types, may result in significant economic burdens to families and countries due to time lost from work, or school and family care giving, expensive hospitalization, specialist visit and treatment, prolonged follow-up and visual rehabilitation. Estimation of direct and indirect costs of ocular trauma is difficult because it needs accurate data which is not accessible without definite strategies and planning **(Naskar et al., 2018)**.

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