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RETROSPECTIVE STUDY OF WORK RELATED OCULAR INJURIES IN A TERTIARY HOSPITAL, EGYPT

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Abstract

Introduction: Ocular trauma is a major cause of visual impairment and morbidity worldwide. **Aim of work:** This study aimed to use discharge records of a tertiary hospital in Egypt to analyze the patterns of work related ocular injuries and prospectively document safety advice. **Materials and Methods:** Hospital-based, retrospective study conducted on admitted cases of work related ocular injuries in Menoufia University Hospital, Egypt over a period of two years from January 2012 to December 2013. A total of 160 patients of ocular trauma were included. Demographic data, cause and type of injury were recorded as well as visual outcome was assessed. **Results:** Work related ocular injuries constituted (38.5%) of all admitted cases of eye injury in the Ophthalmic department in the hospital. Most of the injuries that occur appear to be relatively minor and most involve foreign bodies on the eye (46.1%). The majority had good final visual acuity outcomes. Eye injuries were predominant in construction workers (23.1%) followed by factory workers (21.9%) and farmers (19.4%). Grinding and drilling are the two most common tasks being performed when an eye injury developed. Deficient protective measures in workplaces seem to be the major cause of ocular injury. **Conclusion:** Work related eye injuries remain an important problem. Deficient protective measures in workplaces seem to be the major cause of ocular injury. It can be assumed that health education, as well as application of safety measures and regulations, will significantly reduce the incidence of work related eye injuries.

Key words: Ocular injuries, Work related, Tertiary hospital, Farmers and Egypt

Introduction

An injury is damage to a person or a tissue/organ caused by transfer of energy – mechanical, thermal, chemical, electrical or radiant. Ocular injury is a worldwide cause of visual morbidity, a significant proportion of which occurs in the workplace and includes a spectrum of simple ocular surface foreign bodies (FBs)/minute corneal abrasions to devastating perforating injuries causing blindness (Ngo and Leo, 2008). The significance of the problem is compounded by the fact that most of these injuries are preventable, thus making it a social and medical concern On the whole, ocular injuries at work are attributable to the misuse or non-use of protective eyewear (Shashikala et al., 2013). Safety education has been highlighted by previous studies as they have reported worker noncompliance with personal protective equipment (PPE), with up to half of workers not complying with health and safety regulations. (Thompson and Mollan , 2009).

Meanwhile, from a public health point of view, these injured workers may be the major supporters of their families and also the most productive sector of the workforce, which means that policy makers should put the prevention of occupational eye injuries high on their list of priorities (Chi-Kung et al., 2007).

Aim of Work

The aim of the current study was to use discharge records of a tertiary hospital in Egypt to analyze the patterns of work related ocular injuries and prospectively document safety advice.

Materials and methods

-Study design: This is a hospital-based retrospective study.

-Place and duration of study: It was performed at Menoufia University Hospital, Egypt using eye injury cases who had been admitted to the Ophthalmology Department over 2-year period from January 2012 to December 2013.

- Methods:

Data were obtained from hospital discharge patient records. A total of 416 cases of eye injury, 160 (38.5%) cases were recognized as work related. This included any injury occurring to the eye and/or adnexa that occurred

in the workplace. For these cases, socio-demographic variables (age, sex, residence, and occupation), circumstances of ocular trauma, object causing trauma, eye protection usage and details of clinical outcome were recorded.

The criteria for inclusion in our study were age ≥ 15 years with a major diagnosis of eye injury. Patients re-admitted for treatment of previous eye injuries were excluded .

All patients examined clinically by Landolt Chart (visual acuity chart), Ophthalmoscope, Slit lamp and Ultrasonography when needed. Management whether conservative or surgical was recorded. The patients were followed up from 1- 12 months. Visual outcome were assessed according to the initial and final visual acuity.

The visual outcome categorized according to WHO (world health organization) visual quality classifications (WHO, 2003):

- Normal vision: 6/6-6/9-6/12.
- Visual impairment: 6/18-6/60.
- Legally blind: < 6/60-HM (hand movement).
- Clinically blind: NPL (no perception of light).
- Undetermined: unknown

Statistical analysis

The results were collected, tabulated and statistically analyzed using SPSS statistical package, version 11. The data are presented as descriptive statistics and the chi-squared test was done to determine outcome by comparing visual outcome at presentation with final visual outcome.

Consent:

Authors declare that a verbal consent was taken from the studied group, confidentiality was maintained.

Ethical approval

Authors declare that a verbal consent was taken from Forensic Medicine and Clinical Toxicology Department, Faculty of Medicine, Menoufia University to collect data where health records of all injuries were kept.

Results

Table (1): Characteristics of work related ocular injury cases.

Characteristics	Work related ocular injury cases (n=160)	
	No	%
-Age (years):		
< 20	8	5.0
20-40	80	50.0
>40	72	45.0
-Sex:		
Male	113	70.6
Female	47	29.4
Male/female ratio	2.8	
-Residence:		
Rural	128	80.0
Urban	32	20.0
-Occupations		
Construction workers	37	23.1
Farmers	31	19.4
Automobile repair workers	29	18.2
Factory workers	35	21.9
Others	28	17.4
-Side of injury:		
Right	72	45.0
Left	88	55.0
-Circumstances:		
Accidental	152	95.0
Assault	8	5.0
-Use of protective eyewear at time of trauma:		
Yes	22	13.8
No	138	80.6
undetermined	9	5.6

-Time from trauma to presentation at hospital (hours):		
< 2	46	28.8
2-6	83	51.9
>6	31	19.3
Management:		
Surgical	113	70.6
Medical_	47	29.4
-Length of hospital stay (days):		
X±SD	3.54±3.59	
range	(1-15)	

Table (1) showed that most of the cases of work-related eye injury aged from 20-40 years, males, from rural areas. Construction workers have the highest rate of eye injury in the present study (23.1%). This group included welders, plumbers, insulators, painters/glazers, supervisors and electricians. The majority of cases developed accidentally. Most of the cases reported none applying of protective eye wear at the time of injury. About half of them arrived to hospital from 2-6 hours after injury. Surgical management applied to about (70.6%) of the cases. The mean length of hospital stay was (3.54±3.59) days.

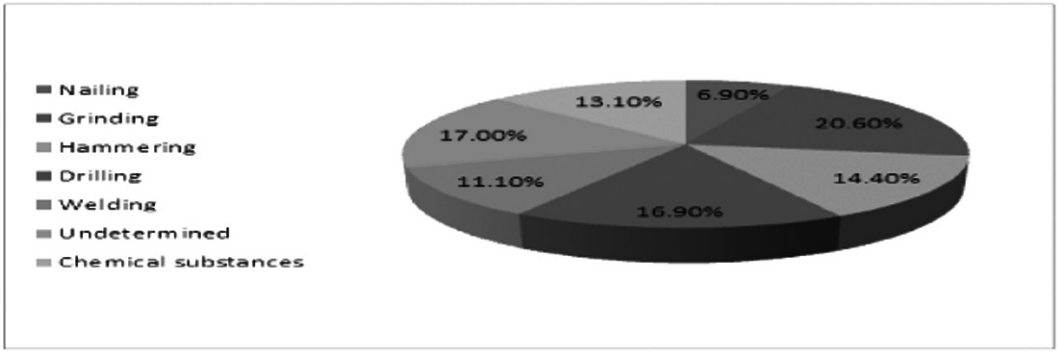

Fig (1): Work related ocular injury cases regarding activity at time of trauma

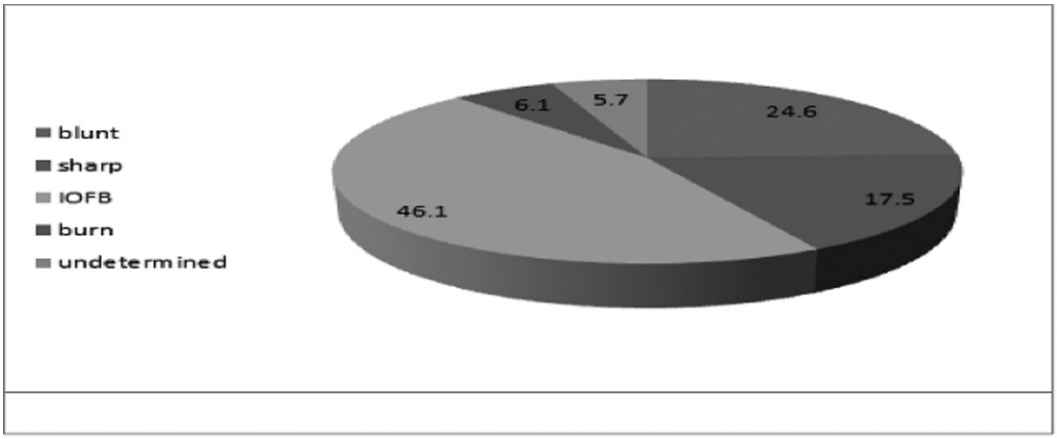

Fig (2): Work related ocular injury regarding object causing injury.

NB: Burns included injury caused by caustic substances as well as those caused by fire and heat or hot substances

IOFB = Intraocular foreign body

Grinding, drilling and hammering were the common activities performed at time of injury as shown in Fig (1). Moreover, intraocular foreign body (IOFB), followed by blunt trauma were the common cause of eye injuries Fig (2).

Fig (3): Work related eye injury regarding sites of ocular injury.

Minor injuries to eye lids followed by conjunctiva and cornea were the commonest ones as shown in Fig (3).

Ultrasonography was performed to about one third of cases (52 cases; 32.5%). Among these cases (35.3%) were normal. Hyphema was detected in (41.0%) and hyphema with cataract and vitreous hemorrhage presented in (11.8%) of the cases. While, lens cataract was detected in (5.9%).

Table (2): Characteristics of rupture globe cases (n=19)

Characteristics	Rupture globe cases (n=19)	
	No	%
-Age (years):		
< 20	0	0.0
20-40	10	52.6
>40	9	47.4
-Sex:		
Males	9	47.4
Females	10	52.6
-Circumstances:		
Accidental	16	84.2
Assault	3	15.8
-Object causing injury:		
Blunt	12	63.2
Sharp	3	15.8
Foreign body	4	21.1
-Time from trauma to presentation at hospital (hours):		
< 2	3	15.8
2-6	10	52.6
>6	6	31.6

Rupture globe (Full-thickness wound of the eye wall, caused by a large blunt object) was the diagnosis of 19 cases (11.9%). It developed mainly accidentally (84.2%) and by blunt objects (63.2%) as shown in Table (2)

Table (3): Visual outcome of work related ocular injury cases.

Visual acuity	WHO visual Quality	VA at presentation		Final VA	
		No.	%	No.	%
6\6-6\12	Normal vision	52	32.5	83	51.9
6\18-6\60	Visual impairment	9	5.6	31	19.4
<6\60-HM	Legally blind	46	28.8	3	1.9
NPL	Clinically blind	28	17.5	28	17.5
Undetermined*		25	15.6	15	9.3

P=0.000

VA= Visual acuity HM= Hand movement NPL = No perception of light

The visual outcome of eye injury cases were generally good as reflected from significant better final visual acuity than visual acuity at presentation in eye injury cases Table (3).

Discussion

Ocular trauma is an important, preventable public health problem worldwide. Our study found that work related eye injuries account for more than one third (38.5%) of eye injury patients admitted at the Ophthalmology Department in Menoufia University Hospital. This reflect the importance of prevention measures planning to this problem. Also, a five years retrospective study of ocular emergency in Egypt (El-Mekawey et al, 2011) found that occupational accidents constituted (26.3%) of cases. In addition our result was compatible with a previous study in Taiwan (Chi-Kung et al., 2007), in The United States (McCall and Horwitz, 2006).

The proportion of ocular trauma occurring at work varies between studies. It constituted about 31% in a Scotland study (Thompson and Mollan, 2009) to 60% in an Australian study (McCarty et al., 1999) and as high as 70% reported in a study conducted in Singapore (Li et al., 2001).

The minority of cases in our study (19.4%) use protective eyewear at time of trauma. This low prevalence of eyewear use has been a consistent

finding in Scotland (Thompson and Mollan, 2009), in Singapore Scotland (Thompson and Mollan, 2009) and in India (Shashikala et al., 2013).

A significant proportion of workers not using proper eye protection gave the reason that safety eyewear was not usually indicated for their jobs (e.g. driving).This necessitates safety education and training of protective eyewear using for workers.

UK legislation and Health & Safety Executive guidance, 2005 stated that eye protection was not worn in over half of those affected, and of greater concern is the fact that just under half of the injuries occurred despite wearing eye PPE. This later result may be due to false reporting, improper usage, the wrong type of PPE for the job or poor design. This is particularly the case for persons using grinders and, to a lesser extent, people sustaining an injury while welding.

About one half of work related eye injury cases in this study were in the middle age (20-40 years) and male gender constituted most cases (70.6%) as middle aged males were predominated at work places especially in jobs requiring intensive manual labor. These results were coincided with a study in Australia (Australian Safety and Compensation Council, 2005) and United States (Harris, 2004).

On the other hand, previous epidemiologic studies on occupational eye injuries in Hong Kong (Yu et al., 2004) and US (McCall and Horwitz, 2006, Xiang et al., 2005) revealed that workers aged 30–49 years were most prone to be hurt.

Construction workers have the highest rate of eye injury in the present study followed by factory production workers. Construction exposes workers to pretty much all kinds of hazardous materials including saw dust, sand, metal shavings, paint, stone dust, chemicals, dirt, nails, adhesives, toxic chemicals and even radiation. While the factory workers exposed to flying particles or falling objects striking the eye at a high rate of speed as well as to hazardous chemicals. These results coincided with Welch et al., (2001) who found that about 20% of occupational eye injuries occur in construction workers especially from a foreign body. Similar results were obtained in Australia

(Australian safety and compensation Council, 2005).

Otherwise, the Bureau of Labor Statistics (BLS) (Harris, 2004) data showed that most workers with eye injury were in manufacturing (29.4%), followed by the wholesale and retail trades (22.1%), services (19.9%), and construction (14.9%).

Moreover, as farming is the main occupation in Menoufia Governorate, farmers constituted about 13.1% of all work related eye injuries in our study and injuries often caused by branches or other foreign objects. Misra et al., (2013) reported that, ocular injuries are more common in rural areas as people are illiterate and have poor socio-economic status. They are unaware of protective devices like goggles and protective shields. The type of injury is also different as the majority is related to agricultural work and animal handling.

Most work-related ocular injuries in this study occurred in well-defined, predictable and consistent settings and activities as grinding, welding and cutting metal, drilling and hammering. So, more attention and preventive measures should be applied for future prevention of eye injury in these situations.

The most common object causing eye injury in this study was foreign body, followed by blunt then sharp ones. Injuries to the eye lids, cornea and conjunctiva were the commonest sites of injury. This pattern is compatible with previously reported population-based studies from other countries. (Yu et al., 2004, McCall and Horwitz, 2006 and Mustafa et al., 2013).

About one tenth (11.9%) of cases complained of ruptured globe. Most of them were caused by blunt instruments. Blunt trauma causes ocular damage by the coup mechanism, the contre-coup mechanism or ocular compression. Coup refers to local trauma at the site of impact. Contre-coup refers to injuries at the opposite side of the eye caused by the shock waves that traverse the eye and strike the posterior pole (Julie and Stephanie, 2001). This finding correlates with the literature and is explained by limited tissue damage due to different velocity and mechanism of injury with sharp edges of the wound that promote accurate and less disfiguring wound closures (Greven

et al., 2000). Otherwise, females were more complaining of rupture globes than males this result was compatible with Parisa et al., (2013) who reported that fall-related ruptured globe comprised the most common pattern of injury in women.

The majority of work related eye injuries in the present study have good final visual acuity as their injuries are generally minor with short durations of hospital stay. Visual outcome of ocular injuries depends on the type of trauma sustained and the time lapse between injury and report to hospital emergency (Rashid et al., 2011).

Our study is a retrospective analysis based on review of case sheets. This provides a good overall perspective of work-related eye injury; however, there are limitations, such as only admitted cases were recorded . This could lead to underestimation of the cases as injuries treated in emergency department not included.

Conclusion and Recommendations:

Work related eye injuries remain an important problem. Most of the injuries that occur appear to be relatively minor and most involve foreign bodies on the eye and the majority had good final visual acuity outcomes. Grinding and drilling are the two most common tasks being performed when an eye injury developed. Deficient protective measures in workplaces seem to be the major cause of ocular injury. It can be assumed that health education, as well as application of safety measures and regulations, will significantly reduce the incidence of work related eye injuries.

Conflict of interest:

Authors have declared that no conflict of interests exists.

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