

Profile of Eye Injury-Related Risk Factors in an Urban Area, Ahvaz, Iran

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Abstract

Background: Eye trauma is a leading cause of blindness worldwide. A variety of risk factors can cause eye trauma.

Objectives: This study was designed to determine the risk factors leading to mechanical eye injuries for planning a blindness prevention program in Ahvaz, Iran.

Materials and methods: This was a cross-sectional study conducted on 9,855 patients with ocular trauma who were reviewed at inpatient or outpatient settings in the ophthalmology clinic at Imam Khomeini hospital, Ahvaz, Iran, from March 2009 to March 2010. Data collection was performed by an ophthalmologist.

Results: Males (8,593 patients) were more likely to have eye trauma than females (1,262). The mean age for the outpatient cases was 20.3 ± 16.39 years and for the inpatient cases it was 22.7 ± 18.95 years. The workplace was the most common site for trauma and the cornea was the most reported anatomically injured site. For those patients who had not used safety and protection equipment, 93.1% were referred to the outpatient setting and 95.7% to the inpatient setting.

Conclusions: The risk factors found in this study are preventable in many situations. Preventive strategies such as increasing societal awareness, mandatory training courses for using protective eyewear, and early intervention following an injury could decrease the burden of eye trauma in Ahvaz, Iran.

Keywords: Eye Injuries, Eye, Risk Factors, Occupation

1. Background

Eye trauma is a leading cause of blindness worldwide (1-3) with different agents causing eye trauma. Wood pieces, thorns, and branches are the most likely causes of eye injuries in developing countries (4). However, in developed countries, ground sports and recreation, and in children, blunt and sharp objects, are the most frequently reported causes (5, 6). More than 90% of eye injuries are preventable with appropriate eyewear (7, 8). Microsurgery is the final needed approach in most eye trauma patients. However, this type of surgery has improved dramatically; the prognosis for these patients is still poor (9, 10).

2. Objectives

This study was designed to determine the risk factors leading to mechanical eye injuries for planning a blindness prevention program in Ahvaz, Iran.

3. Materials and Methods

This was a cross-sectional study conducted on 9,855 patients with ocular trauma between March 2009 and March

2010. The patients were admitted to the emergency department of Imam Khomeini hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. Ahvaz had a population of approximately 1,338,126 in 2006.

This study was approved by the medical research and ethical committee of the ophthalmology department, and all participants provided their informed consent.

Ophthalmic examinations included visual acuity measurements and anterior segment assessments by slit lamp for all patients. If possible, the posterior segment was evaluated and intraocular pressure was determined. Other important variables were the type of ocular surgery; the number of operations; hospital admission durations; visual acuity of patients at admission, discharge, and 6 months after discharge; anatomic place of the injury; eye protection equipment usage; and the cause of the trauma.

Inclusion criteria were patients who were admitted due to mechanical eye injuries.

The analyses were performed using SPSS statistics (SPSS Inc., Chicago, IL, USA). Qualitative variables are described as a number and percentage. Quantitative variables are presented as a mean and standard deviation (SD).

4. Results

A total of 9,855 patients with eye trauma were evaluated. The average number of patients with eye injuries per day was 27. The mean age for outpatients and inpatients were 20.3 ± 16.39 years and 22.7 ± 18.95 years, respectively. Demographic and employment profiles of patients with ocular trauma are demonstrated in Table 1.

Table 1. Demographic and Employment Profiles of Patients With Ocular Trauma

Variables	Outpatients, No. (%)	Inpatients, No. (%)
Age group, y		
≤ 10	414 (4.4)	67 (15.1)
11 - 20	2,757 (29.3)	120 (27)
21 - 30	2,926 (31.1)	152 (34.2)
31 - 40	1,797 (19.1)	40 (9)
40 - 50	1,383 (14.7)	24 (5.4)
> 50	133 (1.4)	42 (9.3)
Sex		
Female	1,157 (12.3)	105 (23.6)
Male	8,253 (87.7)	340 (76.4)
Type of work		
Technical	7,321 (77.8)	278 (62.5)
Transportation	781 (8.3)	45 (10.2)
House worker	668 (7.1)	52 (11.6)
Athlete	198 (2.1)	11 (2.4)
Others	442 (4.7)	59 (13.3)
Type of technical work		
Metal industry	5,096 (69.6)	198 (71.1)
Mechanic	981 (13.4)	29 (10.5)
Construction worker	1,076 (14.7)	41 (14.9)
Others	168 (2.3)	10 (3.5)
Education		
Illiterate	781 (8.3)	87 (19.6)
Up to high school	7,453 (79.2)	325 (73)
High school or university	1,176 (12.5)	33 (7.4)

Right eye (OD: oculus dexter) injuries and left eye (OS: oculus sinister) injuries were found in 4,874 (51.8%) and 4,433 (47.1%) outpatient cases, respectively. There were also 103 (1.1%) cases in the outpatient setting who had bilateral injuries. OD, OS, and bilateral injuries requiring hospitalization were identified in 235 (52.8%), 203 (45.6%), and 7 (1.6%) patients, respectively.

Of the injuries requiring outpatient treatment, we observed 414 (4.4%) with open-eye trauma and 8,995 (95.6%) with closed-eye trauma. Of the hospitalized patients, approximately 405 (91%) had open-eye injuries and 40 (9%) had closed-eye injuries.

Predictors of ocular trauma are shown in Table 2. Only 17 (4%) hospitalized patients received drug therapy, while 376 (84.4%), 44 (9.8%), and 8 (1.8%) patients underwent ocular surgery for 1, 2, and 3 or more times, respectively. Of the 12 (9 men, 3 women) patients who needed ocularectomy, six underwent this surgery, but the other six cases rejected the loss of an eye.

Safety indicators are shown in Table 3. Common causes of eye trauma in outpatients were metal filings (78.8%), sharp objects (8.3%), vehicle accidents (8.1%), battery and being beat (2.9%), chemical and thermal burns (9.3%), and other cause (9.7%). Causes of eye injuries in hospitalized patients were sharp objects (61.6%), vehicle accidents (15.1%), beating and battery (5.5%), explosion (2%), and other causes (15.8%).

The visual acuity of hospitalized patients at admission, discharge, and 6 months after discharge are shown in Table 4. Statistical analysis by chi-square test did not find any significant differences between visual acuity of patients at discharge and 6 months later ($P = 0.83$).

5. Discussion

The results of this study provide the causes of ocular trauma, delays in accessing treatment, and patient outcomes in Ahvaz, Iran. Men (76.4% of outpatients and 87.7% of inpatients) were more likely to have eye injuries than women, a finding that concurs with previous studies (1-3, 11, 12). The male-to-female ratio in outpatients and hospitalized patients were 7.1:1 and 3.2:1, respectively, which seems reasonable since men have a higher attendance in workplaces. In the present study, the highest percentages of patients were between 21 and 30 years of age (31.1% of outpatients and 34.2% of inpatients). Consistent with our results, it is reported that those who most frequently have eye injuries have mean ages of 32 years for men and 36 years for women (13). Technical work in this study was the most common type of job in those with eye injuries (77.8% of non-hospitalized patients and 62.5% of hospitalized patients). In technical jobs, metal agents (69.6% of non-hospital and 71.1% of hospitalized patients) were the most frequent cause of trauma. In the current study, site for eye injuries was in the workplace (69.8% and 41.8% in non-hospitalized and hospitalized patients, respectively). Fong et al. reported that the incidence of eye injuries in the workplace and house are 44% and 36%, respectively (3).

Table 2. Predictors of Ocular Trauma in Ahvaz, Iran

Predictor	Outpatients, No. (%)	Hospitalized Patients, No. (%)
Location of trauma		
Workhouse	6,568 (69.8)	186 (41.8)
Home	1,298 (13.8)	113 (25.4)
School	104 (1.1)	24 (5.4)
Street	1,167 (12.4)	99 (22.2)
Sport sites	132 (1.4)	11 (2.5)
Other places	141 (1.5)	12 (2.7)
Season		
Spring	2,428 (25.8)	102 (22.9)
Summer	3,313 (35.2)	181 (40.7)
Fall	2,051 (21.8)	84 (18.9)
Winter	1,618 (17.2)	78 (17.5)
Time of injury, h		
1 - 6	169 (1.8)	20 (4.5)
7 - 12	4,037 (42.9)	143 (32.1)
13 - 18	4,395 (46.7)	203 (45.6)
19 - 24	809 (8.6)	79 (17.8)
Type of injury		
Penetrating	969 (10.3)	314 (70.5)
Blunt	8,347 (88.7)	122 (27.4)
Burst	94 (1)	9 (2.1)
Delay in presentation, h		
≤ 8	5,401 (57.4)	290 (65.2)
9 - 16	1,901 (20.2)	106 (23.9)
17 - 24	1,534 (16.3)	34 (7.6)
> 24	574 (6.1)	15 (3.3)
Anatomical site of trauma		
Cornea	8,478 (90.1)	111 (25)
Sclera	113 (1.2)	74 (16.6)
Eyelid	198 (1.2)	28 (6.3)
Nasolacrimal duct	66 (0.7)	22 (4.9)
Intra ocular bleeding	433 (4.6)	62 (13.9)
Conjunctiva	84 (0.9)	44 (9.9)
Binocular	38 (0.4)	104 (23.4)

Actually, there is a meaningful relevance between eye injuries and the workplace. As a result, policy makers of public health, especially occupational health, should consider preventive methods in working environments. In this study, the most common cause of eye trauma was metal filings in outpatients (78.8%) and sharp objects in inpatients

(61.6%). Similarly, Fong et al. reported that sharp objects and metals are the most common causes of eye trauma (3). In the current study, most of the injuries occurred during the summer. In the summer, people spend more hours during the day at work, therefore, an increased number of eye injuries seems to be reasonable during this time.

Table 3. Safety Indicators in Patients With Eye Trauma

Safety Indicators	Outpatients, No. (%)	Inpatients, No. (%)
Access to safety equipment		
Yes	1,383 (18.9)	52 (18.7)
No	5,938 (81.1)	226 (81.3)
Safety equipment worn at the time of injury		
Yes	607 (43.9)	21 (40.3)
No	776 (56.1)	31 (59.7)
Safety training courses		
Yes	505 (6.9)	12 (4.3)
No	6,816 (93.1)	266 (95.7)

Table 4. Visual Acuity of Hospitalized Patients

Visual Acuity of Inpatients	At Admission, No. (%)	At Discharge, No. (%)	6 Months After Discharge, No. (%)
No light perception	17 (3.8)	12 (2.7)	12 (2.8)
Light perception	39 (8.8)	25 (5.6)	20 (4.6)
Hand motion	123 (27.6)	61 (13.7)	50 (11.3)
Counting fingers	83 (18.7)	157 (35.4)	167 (37.8)
Able to distinguish the largest optotype on the Snellen chart	152 (34.2)	159 (35.7)	163 (36.8)
Not assessable	31 (6.9)	31 (6.9)	28 (6.7)
Total	445 (100)	445 (100)	445 (100)

In the present study, the most common type of trauma in non-hospitalized patients was non-penetrating eye injuries (88.7%), and in hospitalized patients, it was penetrating eye injuries (70.5%). Another study reported that for non-penetrating and penetrating injuries, burning injuries, and other injuries, their frequencies were 30.2%, 33.6%, 22.1%, and 14.1%, respectively (14). We identified the cornea as being involved in eye injuries more than other anatomical sites in both non-hospitalized and hospitalized patients (90.1% and 25%, respectively). While Chang et al. (15) reported that the bleeding in the anterior chamber and vitreous hemorrhage were the most common findings, corneal ruptures were the main anatomically damages site in their patients. We found that the most common type of eye injury in non-hospitalized patients was closed-eye injury (91%). However, in a similar study, it was reported that the incidence of open-eye injury was 45% in patients with eye trauma at the workplace (15).

We found that only 18.9% of non-hospitalized and 18.7% of hospitalized patients had access to eye safety equipment. Furthermore, among those with eye safety equipment, the use of these devices was only 43.9% in outpatients and 40.3% in inpatients. Fong et al. (16) reported that

only 16% of patients used safety equipment at work. We observed that approximately 6.9% of patients requiring outpatient treatment and 4.3% of inpatients completed the safety training courses. Our findings showed that most of the hospitalized patients were able to distinguish at least the largest optotype on the Snellen chart (34.2%). The visual acuity of patients at discharge and 6 months later were improved compared to when they were admitted, which indicates high levels of efficiency in the pharmaceutical and surgical management of the patients.

5.1. Conclusion

According to our findings, ocular trauma resulting from work equipment was one of the most important causes of visual impairment in Ahvaz, Iran. The risk factors found in this study were preventable in many situations. Therefore, prevention programs in occupational health must be implemented. In particular, preventive strategies, such as increasing societal awareness, training courses for protective eyewear use, and early intervention once an injury has happened, could decrease the burden of eye trauma in Ahvaz, Iran.

Footnote

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