

A Study on Hospital Admissions For Eye Trauma in Kashan, Iran

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Abstract

Background: Eye trauma is among the most common reasons for referral to hospital emergency departments and ophthalmologists' offices. It also is a common cause of vision loss worldwide. However, few studies are available on the changes in the epidemiology of eye trauma in Iran in recent years.

Objectives: This study aimed to investigate the characteristics of hospital admissions for eye trauma in Kashan from August 2011 to February 2014.

Patients and Methods: A cross-sectional study was carried out on the hospital records of all patients with eye trauma who were admitted to Kashan's Matini hospital between August 2011 and February 2014. Having an eye trauma and being hospitalized for at least one day was selected as the criteria for inclusion in the study. The data were then recorded on a checklist devised by the researcher. After entering the data into the SPSS software, descriptive statistics (i.e., percentage, frequency, mean, and standard deviation) were calculated for all variables. Chi-square, Fisher's exact test, and Mann-Whitney U test were used to analyze the data.

Results: In total, 200 patients with eye trauma had been hospitalized in Matini Hospital between August 2011 and February 2014. Of these patients, 86% were males, 40% were in the age range of 20-39 years, 68% lived in urban areas, and 21% of those in employment were manual and industrial workers. Approximately 38.5% of eye traumas had occurred in the work place; 72.5% of patients had penetrating injuries and 98% of cases were injured in one eye. More injuries occurred in the cornea (25.5%) than elsewhere in the eye, and 75.5% of patients were treated surgically. Among all variables, only the type of trauma ($P = 0.009$) and cause of trauma ($P = 0.004$) were significantly related to the patients' gender.

Conclusions: Eye trauma was prevalent among males, young people, urban residents, and manual and industrial workers. As the eyes play a vital role in daily life, communication, and work activities, and eye health is so important for individuals to attain high educational status and productivity, the public should be thoroughly educated about eye protection and the use of safety measures, especially in occupational activities.

Keywords: Eye Injuries, Iran, Epidemiology

1. Background

Eye trauma is among the most common reasons for referral to hospital emergency departments and ophthalmologists' offices (1). According to the Birmingham eye trauma terminology (BETT), eye trauma falls into two categories: penetrating (sharp) and non-penetrating (blunt) trauma. A penetrating trauma involves injury through the whole thickness of the eye wall, whereas a non-penetrating trauma involves injury through part of the thickness of the eye wall (2).

Eighteen million people worldwide suffer from blindness caused by trauma. These injuries are preventable in the majority of cases (3). Annually, 55 million people around the world have their activity limited by eye trauma for more than a day each year. Of these, 1.6 million cases have unilateral blindness and 2.3 million suffer bilateral

loss of vision (4). A study in Singapore found that one in every 20 people had a history of eye trauma. Moreover, people's occupation, gender, age, social economic status, alcohol consumption, smoking, and the type of housing were among the risk factors for eye trauma (5).

These injuries are more common in males. A study in New Zealand found that most ocular trauma occurred outdoors, in males, and while engaged in occupational activities (6). A study in Iran also reported that most eye injuries were related to foreign bodies, such as metal particles or stones, blunt trauma, and penetrating injuries (7). In an earlier study in Kashan, penetrating and blunt eye trauma was the most common causes of severe vision loss among patients referred to the eye care emergency department (7). This report suggests that the severity of injury, along with the lack of timely and effective care after ocular trauma, may lead to vision loss that reduces the pa-

tient's quality of life. Moreover, patient hospitalizations and surgery increase the burden of eye trauma on the healthcare system, as well as to the patients and families. The risk of blindness and the possibility of needing enucleation also impose severe tension and stress on patients with eye trauma.

Sporadic studies have investigated the epidemiology and causes of eye trauma. In a study on ocular traumas in Kashan, conducted about two decades ago, the cornea was found to be the most common site of injury (7). However, a study in Tehran found that the eyelid and the conjunctiva were the most common sites of injury after eye trauma (8). The question therefore arises whether there have been any changes in the characteristics of eye trauma after two decades. This is an important question to be answered, especially for the authorities, if appropriate preventive strategies are to be adopted and if the right health care services are to be provided in cases of eye trauma.

2. Objectives

This study aimed to investigate the characteristics of eye trauma hospital admissions in Kashan from August 2011 to February 2014.

3. Patients and Methods

This cross-sectional study was carried out using a census method. After the required permissions had been obtained, the hospital records of all patients with eye trauma who were admitted to Kashan's Matini Hospital from August 2011 to February 2014 were assessed. This hospital is a specialized referral center for eye, nose, and throat patients and the only specialist ophthalmology center in the city of Kashan. Having an eye trauma and being hospitalized for at least one day was selected as the criteria for inclusion in the study. However, burn and chemical injuries were excluded. The data were then recorded on a checklist devised by the researcher. The content validity of the checklist was confirmed by four nursing faculty members and five ophthalmologists at Kashan University of Medical Sciences. The reliability of the checklist was also confirmed through inter-rater reliability. For this purpose, the second and the third authors of this manuscript extracted the data from records of 10 patients separately. The Kappa agreement was then calculated as 0.9.

The checklist included 12 questions on patient demographics and clinical variables, such as the patient's identification code, age, gender, occupation, place of residence, cause of trauma, type of trauma (blunt/penetrating), the

injured eye (left/right), the site of injury (eyelid, conjunctiva, cornea, sclera), the number of injured eyes, treatments performed (medical/surgery), type of surgery (if performed), and the length of hospital stay. If a patient's record was incomplete, it was excluded from the study. Finally, 200 records were enrolled in the study.

3.1. Ethical Considerations

This study was approved by the research council and the research ethics committee of Kashan university of medical sciences, Kashan, Iran (grant no. 92185). The authorities in Matini Hospital gave the necessary permissions and the researchers committed themselves to maintain the confidentiality of the patients' personal information.

3.2. Data Analysis

Statistical analysis was performed using the SPSS version 11.5 software. Descriptive statistics (i.e., percentage, frequency) were calculated for all variables. Mean and standard deviation were calculated for age and length of hospitalization. To assess the relationship between the patient's age and the trauma characteristics, the patient's age was categorized as either '20-years-old or lower' or '21-years-old and over.' Chi-square and Fisher's exact tests were used to compare the categorical variables between males and females and also between the two age groups. The Mann-Whitney U test was used to examine the differences between mean age and the mean hospitalization of males and females and also between mean hospitalizations of the two age groups. $P < 0.05$ was considered as significant.

4. Results

In total, 200 patients with eye trauma had been admitted to Matini Hospital between August 2011 and February 2014. Of these patients, 86% (172 cases) were males and 14% (28 cases) were females. The mean age of the patients was 27.24 ± 17.98 years and the largest proportion (40%) was in the age range of 20 to 39-years-old, while only 8.5% were aged over 65-years-old. Moreover, 68% of patients were living in urban areas and 36% were rural residents. Of employed patients, 26.5% were manual and industrial workers and only 3% were in white-collar jobs. Most of the eye traumas had occurred at the place of work (38.5%), while playing or doing sport (29%), or in road accidents (20.5%). Moreover, the majority of eye traumas were penetrating (72.5%) and unilateral (98%) (Table 1).

Of the 200 cases of eye trauma, 149 cases (74.5%) were treated surgically and only 51 (25.5%) were treated through

Table 1. Baseline Characteristics of The Study Population

Characteristic	Frequency	Percent
Gender		
Male	172	86.0
Female	28	14.0
Age groups, y		
1-6, child	27	13.5
7-19, school age	45	22.5
20-39, young	80	40.0
40-65, middle-aged	31	15.5
> 65, old	17	8.5
Occupation		
Child	28	14.0
Student	37	18.5
Manual worker	53	26.5
Office worker	6	3.0
Homemaker	12	6.0
Other job	42	21.0
Retired	13	6.5
College student	9	4.5
Life location		
City	128	64.0
Village	72	36.0
Type of trauma		
Sharp	145	72.5
Blunt	55	27.5
Cause of trauma		
During work	77	38.5
During a game or sport	58	29.0
Road accident	41	20.5
Quarrel	10	5.0
Other	14	7.0
Side of trauma		
One eye	196	98.0
Two eyes	4	2.0

conservative medical management. In terms of the duration of hospital stay, 65.5% of the patients were hospitalized for 1-3 days, but 31.5% of cases needed to be hospitalized for more than 7 days (Table 2).

Most injuries were in the cornea (33%), eyelids (17%), and sclera (15.5%), while the lachrymal ducts and retina suffered the least frequent damage (0.5%) (Figure 1).

Table 2. Treatment Characteristic in Eye Trauma Patients

Treatment Characteristic	Frequency	Percent
Type of treatment		
Medical	51	25.5
Surgical	149	74.5
Duration of hospitalization, d		
1-3	131	65.5
4-7	63	31.5
> 7	6	3.0

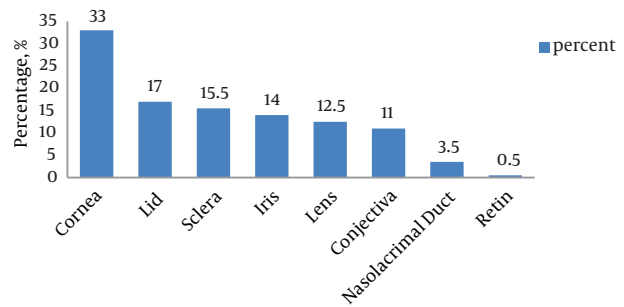


Figure 1. Location of Trauma in Eye

Surgical repair of corneal laceration (18%) and blepharoplasty (13%) were among the most frequently used surgeries (Figure 2).

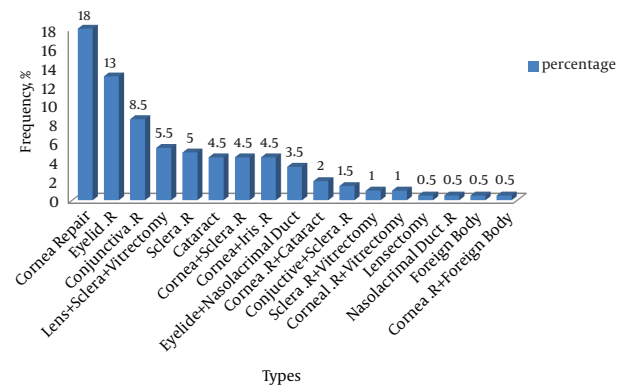


Figure 2. Frequency of Surgery Types on Patients

As Table 3 shown, only the type of trauma ($P = 0.009$) and the cause of trauma ($P = 0.004$) were significantly related to the patients' gender; thus, 92.9% of eye traumas in females were of the penetrating type, compared with 69.2% in males. Also, 29.1% of eye traumas in males had occurred in accidents, compared with 3.6% in females. No signifi-

cant relationships were found between gender and other variables such as age, number of injured eyes, side of injury, and length of hospitalization.

Table 4 shows that the two age categories were only different in terms of cause of trauma ($P = 0.001$); thus, at ages 20 and less, 67.9% of traumas occurred while playing. However, at age 21 and over, the majority of traumas occurred at work (55.7%) or in accidents (24.6%). No significant relationships were found between the age and other variables, such as cause of trauma, type of trauma, number of injured eyes, side of injury, and length of hospitalization.

5. Discussion

Eye trauma is an important but preventable cause of blindness or visual morbidity worldwide. In the present study, the mean age of patients with eye trauma was 27.24 years and most of the patients were in the age range of 20 to 39-years-old. No difference was observed between males and females in this regard. The higher prevalence of eye traumas among young people is consistent with most of the previous studies on the epidemiology of eye trauma in China (9, 10), India (11), and Turkey (12), in which the mean age of 30-years-old was reported for patients with eye trauma. This finding reflects the lack of self-protection precautions taken by individuals in this age group. Young people are usually very active and involved in physical activities such as games. Studies also showed that young people tend to engage in risky activities without supervision (13), which predisposes them to a higher possibility of traumas, including eye traumas. Many eye traumas result in a loss of vision, which can not only cause severe psychological, behavioral, and economic problems in the victims and their families but can also decrease productivity in the public sphere. This is an important issue that requires special preventive strategies to be implemented and public education by local and national authorities to prevent or decrease the incidence of eye injuries, especially among the young. Measures such as these should be implemented in schools, colleges, factories, and industrial sites.

In the present study, the male to female ratio of eye trauma was 6: 1. Another significant difference was observed between males and females in terms of type and cause of eye trauma. The difference was especially evident in the fact that the rate of eye traumas due to accidents and quarrels was significantly higher among males than females. Similarly, a recent study in Kashan also reported that traumas were not only more prevalent among males than females but also mostly occurred in accidents (14). Our findings are in line with a study by Cao et al. in China, in which the male to female ratio of eye trauma was 5.2:

1. However, in the study by Cao et al. only 8% of eye traumas had occurred in accidents (9). Another study in India also reported that the male to female ratio of eye trauma was 10: 1 and that traumas mostly occurred in traffic accidents (11). The same finding was reported by Maurya et al. (15) and Al-Mahdi et al. (13), who studied the clinical pattern of pediatric ocular trauma. The higher rate of eye trauma among males may be attributed to the propensity of males to choose hazardous technical jobs and also of young males to participate in risk-taking and aggressive activities, all of which puts them at greater risk of injury (9). On other hand, as Titiyal et al. reported, in almost all societies, males have better access to health services and are more likely to be referred to specialized medical centers for their traumas (11). In addition, males tend to drive with less care than females and to be less observant of the rules of motoring; these are major causes of accidents to men. Public and healthcare authorities, the mass media, the police, and road traffic authorities can all play their part in preventing accidents by educating people about safety issues at work, at play, and on the roads.

The present study found that most eye traumas occurred in the work place, followed by injuries caused by play and traffic accidents. Moreover, a significant difference was found in the causes of eye trauma between the younger and older age groups. Most injuries under the age of 21 occurred while playing, whereas the majority of traumas after the age of 21 occurred while working. A previous study on the epidemiology of patients with multiple trauma in Kashan also reported that traumas mostly occurred in traffic accidents and in work and industrial settings (14). However, a study by Rahnamaei et al. (16) in Tabriz reported that most of eye traumas occurred during personal quarrels. Mowatt et al. (17) also studied the patterns of eye trauma in Jamaica and reported that accidents at home and in motor vehicles were the most common causes, whereas work-related traumas were third in the ranking and only 2.5% of eye traumas occurred in the course of recreational activities. However, in a study in India, road traffic accidents accounted for the maximum number of eye trauma cases, followed by sports, play, and recreational activities (11). Although work and traffic-related accidents are the most common causes of eye trauma in many societies, the ranking of the causes seems to differ according to life style and cultural factors. The causes of eye trauma and their rankings were found, in our study, to be significantly different among the two age groups, suggesting a general lack of safety and risk awareness among the population. In the current study, eye trauma was more prevalent in urban people and among manual and industrial workers. A previous study on the epidemiology of patients with multiple trauma in Kashan

Table 3. Comparison of Eye Trauma Characteristics in Males and Females

Variables	Gender ^a		P value ^b
	Male	Female	
Age, y	26.93 ± 16.91	29.17 ± 23.82	0.862
Type of trauma			0.009
Penetrating	119 (69.2)	26 (92.9)	
Blunt	53 (30.8)	2 (7.1)	
Cause of trauma			0.004
At work	68 (39.5)	9 (32.1)	
While playing/doing sport	45 (26.2)	13 (46.4)	
Accident	40 (23.3)	1 (3.6)	
Violence	10 (5.8)	0	
Other	9 (5.2)	5 (17.9)	
Number of injured eyes			0.99 ^c
One	168 (97.7)	28 (100)	
Two	4 (2.3)	0	
Side of injury			0.507 ^c
Right	99 (57.6)	13 (46.4)	
Left	70 (40.7)	15 (53.6)	
Both	3 (1.7)	0	
Length of Hospitalization, d			0.371
1-3	114 (66.3)	17 (60.7)	
4-7	54 (31.4)	9 (32.1)	
> 7	4 (2.3)	2 (7.1)	
Mean ± SD	3.07 ± 1.95	3.64 ± 1.98	0.098 ^d

^aDate are expressed as No. (%) or mean ± SD.

^bChi square.

^cFisher's Exact Test.

^dMann-Whitney U test.

reported similar findings (14). Our findings were also in agreement with most previous studies in Iran and abroad (6, 18-21). The high prevalence of eye traumas among industrial workers may indicate that industrial workers did not use proper eye protection when carrying out hazardous tasks. Further investigations are necessary to better understand poor compliance with protective eyewear regulations. However, it is the responsibility of the industry managers to provide appropriate safety facilities and not only encourage but also strictly monitor their workers to ensure appropriate use of such facilities. On the other hand, the greater prevalence of eye traumas in the urban areas is consistent with the fact that most industries are located in or near urban areas and that most traffic accidents occur in such areas, as confirmed in a previous study (14).

In the present study, sharp trauma and one-eye injuries

had the highest frequencies. A similar pattern was reported in a study in Jamaica (17). In a previous study, Adib-Hajbaghery et al. (14) also investigated the epidemiology of trauma in Kashan and reported that 60% of the trauma patients had injuries to the head and neck and that the majority of patients had sharp injuries or a mix of sharp and blunt injuries. However, our finding is inconsistent with two studies conducted in Vats et al. (22) and Stat-eva et al. (23), in which blunt trauma was more prevalent. Such differences may arise from variations in people's living and working conditions or differences in observance of the safety rules in daily activities or in work settings.

In the current study, most eye traumas occurred in the right eye. Cao et al. did not find a significant difference in the frequency of right vs. left eye injuries (9). Titiyal et al. (11) reported that left eye injuries were more common than

Table 4. Comparison of Eye Trauma Characteristics in Individuals Under and Over the Age of 21 Years

Variables	Age, y ^a		P value
	1-20	21 <	
Cause of trauma			0.001 ^b
At work	9 (11.5)	68 (55.7)	
While playing/doing sport	53 (67.9)	5 (4.1)	
Accident	11 (14.1)	30 (24.6)	
Violence	3 (3.8)	7 (5.7)	
Other	2 (2.6)	12 (9.8)	
Type of trauma			0.072 ^b
Sharp	51 (65.4)	94 (77.0)	
Blunt	27 (34.6)	28 (23.0)	
Numbers of injured eyes			0.158 ^c
One	78 (100)	118 (96.7)	
Two	0	4 (3.3)	
Side of injury			0.224 ^c
Right	48 (61.5)	64 (52.5)	
Left	30 (38.5)	55 (45.1)	
Both	0	3 (2.5)	
Length of Hospitalization, y			0.96 ^c
1-3	52 (66.7)	79 (64.8)	
4-7	24 (30.8)	39 (32.0)	
> 7	2 (2.6)	4 (3.3)	
Mean ± SD	3.14 ± 1.82	3.16 ± 2.05	0.758 ^d

^aData are expressed as No. (%).

^bChi square.

^cFisher's Exact Test.

^dMann-Whitney U test.

right eye injuries, whereas Al-Mahdi et al. (13) reported the opposite. Studies with more left side eye traumas attributed this phenomenon to the fact that most people are right-handed and the left eye of the victim is the one that is more vulnerable to an attack from a right-handed person (11). However, in the context of the present study we cannot confirm this explanation, because only 10 patients had been injured during violent confrontations with another person. Therefore, the reason why more injuries occur in the right eye needs more investigation.

In the current study, most injuries were in the cornea. A previous study in Kashan two decades ago reported the same finding (7), showing that the pattern of eye injuries has not changed in two decades. This may suggest an urgent need for public education on eye protection; however, it also alerts us to the need for further investigation of this phenomenon.

In the current study, the majority of patients were treated surgically. These findings were in agreement with studies conducted by Cillino et al. (20) and Nili-Ahmadabadi et al. (8). However, in a study of eye traumas in Indian university students, the majority of students were managed by conservative treatment without hospitalization (15). The type of treatment depends strongly on the type and severity of the trauma. The majority of traumas in the present study was related to work and accidents and accordingly was mostly penetrating, from which it can be predicted that they tended to need surgical interventions.

Most of the patients in the present study were hospitalized for 1-3 days for post trauma care. The mean period of hospitalization due to eye traumas was 6 days in Jamaica (17). Such differences may reflect the type and severity of trauma, as well as the nature of the facilities and treat-

ments available in different areas. As intensive eye care and surgery are among the most sophisticated methods, they are usually more expensive.

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Footnotes

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