



Original article

Status of ocular trauma in hospitalized patients in Kashan, 2011: As a sample of industrial city

Mehdi Shaeri^a, Alireza Moravveji^a, Mohammad Reza Fazel^a, Fatemeh Rangraz Jeddi^{b,*}^a Trauma Research Centre (TRUMS), Kashan University of Medical Sciences and Health Services, Kashan, Isfahan, Iran^b Health Information Management Research Center, Kashan University of Medical Sciences and Health Services, Kashan, Isfahan, Iran

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ABSTRACT

Purpose: Ocular trauma is the third leading cause of hospitalization in ophthalmology patients, imposing direct and indirect physical and psychological costs on society. This study aims to investigate the status of ocular trauma in hospitalized patients in the industrialized city of Kashan in 2011.

Methods: This cross-sectional descriptive applied study was conducted in 2012 on patients hospitalized for ocular trauma. Data, including age, gender, occupation, education, timing of admission following accident, location of accident, type of injury, damaging instrument, and type of trauma, were collected using a questionnaire designed by a trained nurse, and analyzed using SPSS-16 software by means of means \pm standard deviation, frequency, and percentage for descriptive data and *t*-test, one-way analysis of variance, Chi-square and Fisher exact test for analysis at significance level of $p < 0.05$.

Results: In total, 82 patients were hospitalized due to ocular traumas. The majority of patients were male (65 patients, 79.3%). Their mean age was (25.4 ± 21.4) years, with an age range of 20–40 years (30 patients, 36.6%). Hyphema was the most common injury (26 patients, 25.5%), home was the most frequent incident location (32 patients, 39%), and knife or other cutting tools were mostly responsible for injuries (18 patients, 21.9%). Patients were hospitalized for 1–6 days, and the average length of stay in hospital was 2.63 days. Frequency distribution of injuries based on whether or not ruptures differed significantly among different age groups.

Conclusion: The majority of ocular trauma occurred in young males. Knife was the principle culprit for eye injuries, followed by vehicles. To reduce such incidents, it is recommended that people be trained to avoid high-risk behaviors when using knives and to better heed driving rules and regulations.

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Introduction

Ocular trauma is the leading cause of visual impairment in the world.^{1–3} Such traumas are often debilitating and have huge socioeconomic costs for the community.⁴ Studies estimated that the annual incidence rate of hospitalized eye injury is between 6.5 and 27.7 per 100,000 population.^{5,6} In a study in Pakistan, men between 18 and 45 years of age (80%) were most exposed to the risk of ocular trauma; home was the most common location for such trauma, followed by industrial sites; blunt trauma was the most frequent type; 57% of patients suffered corneal wounds; and injuries were

most frequently caused by a sharp tools (32%).⁷ Studies on this subject have also been conducted in Australia, Ireland, Egypt, and Singapore.^{8–11} Studies conducted in Iran yield different results. In a study conducted by Aghadoost et al,¹² there were 221 patients with ocular trauma, in which 84.2% were male, the mean age of patients was (22 ± 14) years, the most common type of injury was eyelid laceration (39.8%), and the most common location was the workplace (32.6%). In a study conducted in Mashhad on 28,312 patients presenting to emergency departments with eye complaints, the most common diagnosis was injuries (61%), the male:female ratio was 2.5:1, most patients were in their third decade of life, and a large proportion of cases that led to hospitalization were caused by injury outcomes, particularly lacerations of sclera (38%).¹³ In a study conducted in Tehran, of 1,950 referred eye trauma patients, 172 of them were hospitalized. In total, 1,709 (87.6%) were male and 241 (12.4%) were female, rendering the male:female ratio of 8.09:1. The

* Corresponding author. Fax: +98 361 55548883.

E-mail address: rangrazejeddi_f@kaums.ac.ir (F. Rangraz Jeddi).

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mean age of patients was (28.8 ± 12.8) years. The most frequent ocular injury was globe injury (95.6%), including mechanical (77.6% closed and 5.9% open), chemical (7.6%), photic (2.3%), and thermal (2.2%) injuries.¹⁴ Although greater attention is now paid to ocular trauma and its prevention as compared to in the past, these injuries are still considered the main cause of diseases. The results of these studies suggest that the problem persists and the incidence of ocular trauma has not decreased. Moreover, given the contradictory results and importance of ocular trauma, and as Kashan is an industrial city, the present study was conducted with the aim of investigating the status of various ocular traumas in hospitalized patients in Kashan in 2011. It is hoped that the results will benefit Kashan University of Medical Sciences in better planning and managing ocular traumas.

Materials and methods

This cross-sectional applied study was conducted in 2011. Kashan is one of the cities in Isfahan Province with an area of 200,000 square kilometers and a population of approximately 500,000 people. It is known as an industrial city, and particularly for its density of carpet weaving and car companies. Participants were all patients hospitalized for ocular traumas at Matini Hospital. This is the only eye hospital in Kashan County, including that in the townships of Aran and Bidgel. The inclusion criterion was that patients had to have been admitted to and hospitalized in Matini Hospital. Patients who received emergency services but were not hospitalized were excluded. Informed consent was obtained from all patients. Patient details, including age, gender, occupation, education, timing of admission following accident, location of accident, type of injury, damaging tool, and type of trauma were collected using a questionnaire designed by a trained nurse, and analyzed using SPSS-16 software. Descriptive statistics including means ± standard deviations, frequencies, and percentages were calculated. Furthermore, inferential statistical techniques, including independent *t*-tests, one-way analysis of variance (ANOVA), Chi-square, and Fisher exact test for analysis were performed. Results were significant at a level of $p < 0.05$.

Results

All 82 patients hospitalized with eye injuries consented to participate in the research. Most were men (65 patients, 79.3%), in the age range of 20–40 years (30 patients, 36.6%), and illiterate (29 patients, 35.4%). The highest frequency of trauma was observed in self-employed people (29 patients, 35.4%), and most patients were admitted to hospital within the first 24 h of injury (78 patients, 95.1%). Home was the most common injury location (32 cases, 39%, Table 1). Hyphema with 26 cases (24.4%) and eyelid laceration with 26 cases (25.5%) were the most frequent types of injury (Table 2). Knife or other cutting tools caused the majority of traumas, which was the cause of injury in 18 cases (21.9%, Table 3).

Of the 82 patients, 41 (50%) sustained trauma to the left eye, 41 (50%) to the right, and one to both eyes. Patients were hospitalized for 1–6 days, with the average length of stay in hospital of 2.63 days. The mean age of patients was (25.4 ± 21.4) years. The average age of men (26.5 ± 19.5) with eye injuries was more than that of women (20.1 ± 28.1) although this difference was not statistically significant ($p = 0.355$). The mean age of patients with traumatic rupture was less than those without rupture (24.8 ± 23.6 and 26.3 ± 17.4, respectively); this finding was not statistically significant ($p = 0.771$). Table 4 presents the frequency distribution of injuries based on tear or no tear in patients according to gender, age, and occupation. As can be seen, in both sexes, tear trauma occurred to a similar extent ($p = 0.564$). Injury distribution by tear

differed significantly among age groups. There were no significant differences among occupational groups ($p = 0.774$). Blunt trauma was the most frequent type (25 patients, 30.6%).

Discussion

Ocular trauma is a serious problem for health systems and economies internationally. From an injury prevention perspective, current information on eye injury rates is needed to develop effective plans for disseminating eye injury. Despite ocular trauma being an important cause of blindness worldwide, information on various aspects of its epidemiology is insufficient. The present study was conducted to investigate the status of various ocular traumas in hospitalized patients in Kashan in 2011.

The findings of the current study indicate that the highest frequency of ocular trauma occurred in 20–40 year old (30 patients, 36.6%) men (65 patients, 79.27%). The mean age of patients was (25.4 ± 21.4) years. In a study conducted in 2013, of the 70 participating patients, 58 (82%) were men and 12 (17%) were women. The mean age of patients was (24.01 ± 16.04) years, and the highest frequency of trauma occurred in 21–30 year old patients (in their third decade of life).¹⁵ In a study conducted between 2001 and 2010, Cao et al⁵ reported that the majority of traumas occurred in the 15–44 year age group, with a mean age of 29 years. In a study by Sethi¹⁶ in Pakistan, the mean age of patients was under 30 years. In another study in Pakistan, men, particularly those between 18 and 40 years old, were most exposed (80%) to ocular trauma,⁷ consistent with other studies.^{1,17–22} This may have been due to the fact that most high-risk jobs are performed by men, and also because other incidents, such as brawls and driving accidents, are reported more in men. The male predominance could be

Table 1
Frequency distribution of demographic status of ocular trauma.

Demographic status	<i>n</i>	%
Gender		
Female	17	20.7
Male	65	79.3
Age (yr)		
0–7	17	20.7
7–20	22	26.8
20–40	30	36.6
40–60	4	4.9
<60	9	11.0
Admission time		
First 24 h of incident	78	95.1
After 24 h of incident	4	4.9
Education		
Illiterate	29	35.4
Child	13	15.8
Under diploma	11	13.4
Diploma	8	9.8
Assistant and bachelor	15	18.3
Master and higher	6	7.3
Occupation		
Child	13	15.9
Employee	2	2.4
Worker	18	22.0
Farmer	1	1.2
House wives	2	2.4
Student	17	20.7
Self employed	29	35.4
Location of accident		
Work	15	18.3
Home	32	39.0
Sport fields	11	13.4
Transport	17	20.7
Others	7	8.6
Total	82	100

Table 2
Frequency distribution of injury type on ocular trauma.

Injury type	n	%
Eyelid laceration	25	24.5
Conjunctive laceration	8	7.8
Intracranial foreign body	23	22.5
Intraocular foreign body	15	14.7
Hyphema	26	25.6
Orbital cellulites	1	1.0
Corneal laceration	4	3.9
Total	102	100

Table 3
Frequency distribution of type of damaging means and ocular trauma type.

Type	n	%
Damaging means		
Transport vehicle	13	15.9
Gun	5	6.1
Explosives events	5	6.1
Stick	13	15.9
Knife and other cutting tools	18	21.9
Fist	5	6.1
Contact with earth	6	7.3
Industrial tools	6	7.3
Stone	6	7.3
Ball	4	4.9
Dog	1	1.2
Type of ocular trauma		
Penetrating	22	26.8
Blunt	25	30.5
Explosive	3	3.7
Biting by	1	1.2
Falling	4	4.9
Unspecified	27	32.9
Total	82	100

Table 4
Frequency distribution of injuries based on tear or no tear in group's gender, age and occupation.

Patients	Tear n (%)	No tear n (%)	Total n (%)	p value
Sex				
Men	39 (60.9)	25 (39.1)	64 (100)	0.564
Women	11 (68.8)	5 (32.2)	16 (100)	
Age (yr)				
<7	15 (93.8)	1 (6.2)	16 (100)	0.021
7–20	12 (54.5)	10 (45.5)	22 (100)	
20–40	14 (48.3)	15 (51.7)	29 (100)	
40–60	3 (75.0)	1 (25.0)	4 (100)	
>60	6 (66.7)	3 (33.3)	9 (100)	
Occupation				
Worker	10 (55.6)	8 (44.4)	18 (100)	0.774
Child, student	19 (63.3)	11 (36.7)	30 (100)	
Employee, self employed, etc	21 (65.6)	11 (34.4)	32 (100)	

due to the greater exposure of men to trauma risk owing to the predominance of manual labor in Kashan, which is known as an industrial city. Further research is recommended to better investigate the rates of protective eyewear use, and compliance with laws and regulations.

Home was found to be the most common location where trauma occurred (32 patients, 39%), followed by in the street (17 patients, 20.7%), consistent with other studies.^{2,15,18} Some studies indicated that a large proportion of injuries were work-related.¹⁹ Studies conducted in Pakistan and China reveal that the most common location for the occurrence of trauma was home, followed by industrial sites,^{5,7} consistent with some previous works.^{17,23} Safety issues appear to be less well observed at home. Most traumas in women and children occurred at home, which supports this

rationale. In this city, many of the women and, in some cases, the men, weave carpets in their own home. It may be the case that most traumas occur at home. In addition, preventive activities are likely to be practiced at work, reducing occupational accidents. Further research is required to support this idea. Using mass media to raise people's awareness and to encourage them to respect safety more at home is recommended.

The results showed that blunt trauma was the most frequent type (25 patients, 30.6%), consistent with the results of Cillino et al.²⁴ However, in some studies,^{7,15} penetrating traumas were more frequent than blunt ones, inconsistent with the results of the current study. In trauma patients who were hospitalized, sharp object trauma was more frequent. Blunt trauma patients were treated as outpatients and were not included in the study. Hyphema (26 patients, 25.5%) was the most common type of injury, followed by laceration of the eyelid (25 patients, 24.5%). In previous studies, the most commonly reported injury was corneal laceration (25.7%), followed by hyphema.¹⁵ Some studies conducted in Nigeria and New Zealand reported that closed-globe injuries were more common.^{25,26} Nili²⁷ reported that the eyelid and conjunctiva were most commonly injured. Cao et al⁵ reported a lower incidence of open-globe than closed-globe injuries. The results of a study conducted in Nepal showed that orbital trauma comprised 11% of all ocular injuries, of which 30% were related to eyelid lacerations and 26% to orbital fractures. The most common closed-globe injury was pulverization (44.7%), and the most common orbital trauma was ecchymosis (67.2%).⁴ In a Jahangir study, 57% of patients suffered corneal injuries.⁵ Cillino²⁴ reported that 122 of 298 patients suffered contusion of the eye and adnexa among other sites. These studies reveal a multiplicity and diversity of injuries caused by ocular trauma. Given the sensitivity of the eye, they can cause irreversible adverse effects. A possible reason for these differences is that many traumas, such as ecchymosis and laceration, occurred

in outpatient services. Another reason is the differences in the causes of accidents in different populations.

Patients were hospitalized for 1–6 days, with an average length of stay of 2.63 days. Bazzazi et al¹⁵ reported hospital durations of 1–5 days, consistent with findings in the current study.

Of the 82 patients, 41 (50%) sustained trauma to the left eye, 41 (50%) to the right, and one to both eyes. Guera Garcia² reported that 57% of affected eyes were on the right-hand side. No bilateral injuries were detected. In a study by Dehghani,²³ all traumas were implicated in one eye. Jahangir⁷ reported that 3% of trauma cases were bilateral, consistent with the present study results. In Nili's study,²⁷ trauma was reported in the right eye more than in the left, indicating an equal likelihood of trauma to both eyes. Knife and other cutting instruments were responsible for most traumas

(22%). In the Jahangir et al. study,⁷ the highest frequency of trauma was reported to be sharp objects (32%). Nili et al.²⁷ however, reported punches as the most frequent cause of ocular trauma (65.4%). Hammering on metal and sharp objects was the most frequent sources of trauma in a Cuban study.² The difference between these and the results of the present study are attributable to the difference in study populations. Nili et al. investigated traumas sustained in brawls. Thus, in most societies, knives or sharp objects may be considered the most frequent cause of trauma.

To sum up, the majority of ocular trauma occurs in young males, and is typically caused by knives, followed by transport accidents. The fact of relatively young population in Kashan, the employment of many housewives and some men weaving carpets at home, and the high incidence of accidents at home, indicates that it is essential to pay attention to the following groups: women and children, as they are more vulnerable; people <40 years of age, who constitute a large proportion of the workforce, by monitoring relevant government departments, such as Occupational Health and Legislation and monitoring small workshops. Ocular trauma, similar to other trauma, imposes many health, economic, and social costs on patients' families and the government, and thus must be addressed. To reduce ocular trauma, it is recommended that people receive training to avoid high-risk behaviors, use knives correctly especially at home, and comply with driving rules and regulations.

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