



The Prevalence and Epidemiological Criteria of Ocular Trauma in Duhok Governorate

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Abstract

Background and objectives: Ocular trauma is a leading cause of monocular blindness worldwide. The purpose of this study was to estimate the sociodemographic characteristics and risk factors of ocular trauma in Duhok governorate.

Methods: From October 2022 to April 2023, a retrospective cross-sectional observational study was carried out in the Duhok Emergency and Eye Research Hospitals. Each patient presented with ocular trauma underwent a thorough examination and interview. A modified Birmingham Eye Trauma Terminology System was used to record and categories demographic traits and damage specifics.

Results: A total of 231 injured patients were included, of which 179 (77.5%) were male. The group of patients between the ages of 18 and 44 had the largest percentage of ocular trauma, with an average age of 26.7 years. The majority of the patients were from the center of Duhok 133 (57.6%). Approximately (38.5%) of the injuries occurred in the workplace. Closed globe injury was found to be higher (88.3%) compared with open globe injury (11.7%). Most frequent type of ocular trauma was of corneal origin (55.8%) and caused by sharp objects (32.5%). Foreign body on the external eye was observed to be the most common diagnosis (26.4%).

Conclusion: The type of ocular damage and the implicated ocular structures are important factors in determining the visual outcome. The adult male found to have the largest percentage of cases among workers. In our community, occupational eye injuries are frequent and can be decreased with the use of eye protection equipment.

Keywords: Duhok, Occupational ocular injury, Ocular trauma, Visual impairment

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Introduction

One of the main causes of morbidity and visual impairment that drastically lowers quality of life is ocular trauma. Significant financial and psychological effects are also experienced by the patient and their family.¹ Worldwide, 285 million individuals have visual impairment, of which 246 million have poor vision and 39 million are blind, according to the World Health Organization (WHO). Remarkably, 90% of blind people reside in developing countries.² Injury to a person or a tissue or organ is defined as the interruption of tissue function due to the transfer of external energy (mechanical, thermal, radiant, nuclear, chemical, or electrical). The eyeball is generally well protected in our bodies. The lids, eyelashes, and orbital margins protect the eye from direct damage. As for physiological protection, it is protected by blink reflex, head turning reflex, and lacrimation after the entry of any irritating material. Young men are more likely than females to sustain ocular trauma, which is frequently the consequence of accidents, sports, assaults, and work-related activities. Gunshots, ocular injuries sustained during combat, and pyrotechnics in children are less frequent causes of eye injuries. The prevalence of contact lens-induced keratitis is rising as a result of contact lens use.^{3,4} The rationale for classifying ocular trauma is to determine and document severity of injury. A modified Birmingham Eye Trauma Terminology classification system (BETT) provides a standardized description and terminology for the injury. Eyeball injury is classified according to modified BETT system into closed globe injury, open globe injury and periocular injury.⁵ The closed globe injuries (CGI) were defined as no or partial thickness injury, which is sub grouped into injuries caused by blunt objects (contusion) and injuries caused by sharp edged objects (lamellar laceration). A blunt object can

cause lacerations and ruptures of the globe in open globe injuries (OGI) which also involve full thickness damage to the cornea or sclera. Lacerations are further classified as penetrating, intraocular foreign bodies, and perforating wounds.⁶ The periocular injuries include eyelid injury, orbital bone fracture with muscle injury, lacrimal laceration, orbital hematoma and extraocular foreign body. Chemical eye injuries, whether alkaline or acidic, constitute another serious emergency in ocular trauma. Frequently found in homes are substances that have the potential to cause eye damage.⁷ The aims of this study were to determine the patterns of distribution, epidemiological characteristics, clinical manifestations and management of ocular injuries, also for better understanding the mechanism of damage to ocular tissue by external factors and its effects on visual outcome depending on the type and severity of ocular trauma.

Patients and Methods

This retrospective study analyzed 231 ocular injury patients admitted to Duhok Emergency and Eye Teaching Hospitals from October 2022 to April 2023. A detailed and comprehensive ophthalmic examination was performed for all the participants and visual acuity was noted at the presentation and then classified into open, closed, and periocular globe injuries based on the modified BETT system, following consent from individuals or their families. All patients presented with ocular trauma were included in this study with no exclusion criteria. The Data was collected through a detailed questionnaire, covering patient demographics and injury details. Comprehensive eye examinations were performed using various tools, and additional imaging techniques like B-scan ultrasonography and CT scan were utilized when necessary. However, B-scan ultrasonography was contraindicated in cases of open globe injuries due to the risk of further ocular damage. Injuries were





classified using the modified BETT system, with treatment involving either medical or surgical procedures, depending on the case. All data were imported into IBM SPSS version 28 for analysis after being entered into Microsoft Excel. The statistics were presented using bar charts and frequency and frequency percentage tables. The chi square test was used to look at the link between categorical variables. P values were considered statistically significant if they were less than 0.05. This study protocol was reviewed and approved by Kurdistan Higher Council of Medical Specialties Ethics Committee, Duhok Directorate General of Health and University of Duhok.

Results

231 participants hailed from different areas were enrolled in this study. The majority were found to be from the center of Duhok 57.6% (n=133) compared to other areas from outside of Duhok 42.4% (n=98). The Distribution of participants is shown in Table (1).

Table (1): Distribution of the patients according to their residence District

Residence	No.	%
Center of Duhok	133	57.6
Outside of Duhok	98	42.4

Patients in this study ranged in age from one to over 80 years, with a mean age of 26.7. The majority of patients were in the 18–44 age range. Older patients (over 65) had the lowest number of ocular traumas. Regarding gender distribution, of the 231 patients in total, 179 (77.5%) were male and 52 (22.5%) were female; the male-to-female ratio was roughly (3.4:1). In terms of occupation, the majority of patients belonged to the working class (40.3%; n = 93), followed by students (18.2%; n = 42), as shown in Table (2).

Table (2): Distribution of the patients according to sociodemographic characteristics

Characteristic	No.	%	
Age groups	1 – 4	21	9.1
	5 – 17	55	23.8
	18 – 44	125	54.1
	45 – 64	24	10.4
	65 – 88	6	2.6
Gender	Male	179	77.5
	Female	52	22.5
Residence	Center of Duhok	133	57.6
	Outside center of Duhok	98	42.4
Job	Worker	93	40.3
	Student	42	18.2
	Child	40	17.3
	Self-employed	23	10.0
	Housewife	15	6.5
	Military	11	4.8
Retired	7	3.0	
Total	231	100.0	

Of the 231 ocular trauma cases, the right eye was implicated in 46.3% (n = 107) of the cases, the left eye in 50.2% (n = 116) of the cases, and the both eyes in 3.5% (n = 8) of the instances. There were bilateral injuries from burns, RTAs, and contact lens-related incidents. The majority of injuries were CGI 88.3% which occurred at work (38.5%) and were caused by sharp object (32.5%), of those workers, 87.1% (n = 86) did not use eye protection devices. Cornea accounted for the majority of work-related injuries (55.8%). These parameters are represented in Table (3). Surgical removal of foreign bodies from the cornea was the primary intervention carried out in our study, as the majority of patients (26.4%) presented with this condition. Of all patients, 97 (42.0%) had medical care, while 134 (58.0%) underwent surgical management. The percentage of people with mild or no vision impairment was 62.8%, compared with blindness in (10.8%), as shown in Table (4).





Table (3): Distribution of the patients by characteristics and etiology of their eye injury (n= 231)

Characteristic	No.	%
Affected eye(s)	OD	107 46.3
	OS	116 50.2
	OU	8 3.5
Place of injury	Work	89 38.5
	Home	86 37.2
	Street	42 18.2
	Farm	8 3.5
	School	6 2.6
Worker used eye protection	Yes	12 12.9
	No	86 87.1
Type of injury	Closed globe injury	204 88.3
	Open globe injury	27 11.7
Classification by anatomical site	Corneal	129 55.8
	Lid	32 13.9
	Conjunctival	23 10.0
	Anterior chamber	21 9.1
	Orbital	14 6.1
	Scleral	4 1.7
	Posterior segment	2 0.9
	Mixed	6 2.6
Cause	Sharp object	75 32.5
	Welding	58 25.1
	Blunt trauma	37 16.0
	RTA related	16 6.9
	Chemical material	13 5.6
	Wooden piece	13 5.6
	Fireworks	7 3.0
	Contact lens related	4 1.7
	Infectious causes	4 1.7
	Raised IOP	3 1.3
	Shell injury	1 0.4

	Scleral wound	4	1.7
	Acute angle closure glaucoma	3	1.3
	Periorbital hematoma	3	1.3
	Pre-septal cellulitis	3	1.3
	Orbital cellulitis	1	0.4
	Retinal detachment with vitreous hemorrhage	1	0.4
	Retinal detachment with vitreous hemorrhage and metallic intraocular F.B.	1	0.4
	Visual impairment at presentation	Mild or no visual impairment	145
	Moderate (<6/18 to 6/60)	44	19.0
	Severe (<6/60 to CF)	17	7.4
	Blindness (<CF to NLP)	25	10.8
Intervention	Medical	97	42.0
	Surgical	134	58.0
Type of anesthesia	Local	85	36.8
	General	50	21.6
	None	96	41.6
Total		231	100.0

Mild or no visual impairment was significantly associated with CGI. While in OGI, blindness has been shown to be the most common end result as shown in Figure (1).

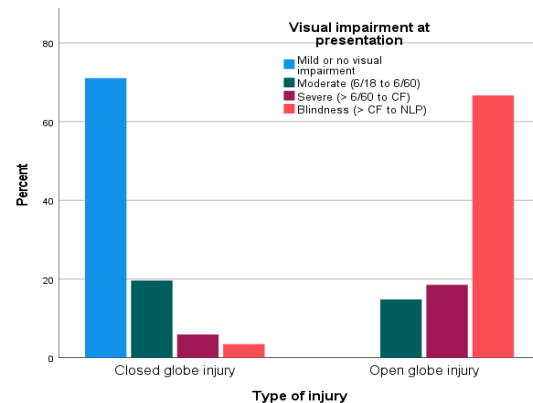


Figure (1): Visual impairment at presentation in each type of eye injury.

Discussion

According to estimates from the WHO Program for the Prevention of Blindness, 55

Table (4): Diagnosis and management of the eye injuries

Characteristic	No.	%
Diagnosis	Corneal foreign body	61 26.4
	Corneal abrasion	34 14.7
	Lid laceration	22 9.5
	Hyphema	18 7.8
	Corneal burn	17 7.4
	Penetrating corneal wound	17 7.4
	Subconjunctival hemorrhage	13 5.6
	Canalicular laceration	10 4.3
	Orbital wall fracture	7 3.0
	Conjunctival laceration	6 2.6
	Rupture globe	6 2.6
	Conjunctival foreign body	4 1.7





million people suffer from eye injuries or disabilities annually. Of them, 1.6 million have trauma-related blindness that requires hospitalization, 200,000 have open-globe injuries, 2.3 million have bilateral impaired visual acuity, and 19 million have unilateral blindness.⁸ The center of Duhok was the main source of patients, contributing 57.6% of cases. Out of the 42.4% referred from outside Duhok, Domiz accounted for 7.8%, while Sheladiz had the lowest referral rate at 0.4%. We anticipate that the limited availability of eye care facilities in Duhok's surrounding areas is the primary cause of these outcomes. Furthermore, Duhok's center has a higher concentration of industrial zones, which increases the risk of occupational eye injuries. Our findings deviate from Maiya AS's. et al. which reported that rural area affected more than urban by ocular trauma.⁹ A seasonal variation in the prevalence of ocular injury was observed, the significant increase in ocular injury was highlighted in this study as it reached its peak in December (24.68%). High rate of firework-related ocular trauma occurred during the months adjacent to the New Year Festival and Newroz celebration.¹⁰ The overwhelming majority of ocular trauma patients in the current study (54.1%) belonged to the 18–44 age range, with a mean age of 26.7 years. Poy Raiturcar et al. conducted a study among 500 patients, and they reported that the prevalence of ocular injuries was highest in the age group of 21-40 years (45%).¹¹ According to the study, there was a 3.4:1 male to female ratio among the patient population, with males making up 77.5% and females making up 22.5%. According to a study by Karve et al. men were impacted 3.7 times more than women.¹² A metallic foreign body was the most frequent reason for eye injuries, the majority of those affected were workers (n=93) (40.3%), it was found that Workers in the manufacturing industry

without pre-work safety training or simple eye protection were (n=86) (87.1 %).¹³ These findings were consistent with the studies performed by Limbu B et al. that reported over two-thirds [68.3%] of workers surveyed never wearing safety eyewear while at work.¹⁴ The results showed that out of the total 231 patients, 46.3% (n=107) had the right eye involved, while 50.2% (n=116) had the left eye involved, and only 3.5% (n=8) had both eyes involved, Bilateral injuries occurred as a result of burns, RTA and contact-lens related. Almost all injuries were unilateral; Misraet et al. study has shown that most ocular injuries are unilateral.¹⁵ In our analysis, there were 27 patients (11.7%) with open globe injuries and 204 patients (88.3%) with closed globe injuries. In an investigation by Poy Raiturcar et al. study has shown, 450 patients (90%) had closed globe injuries, whereas 26 patients (5.2%) had open globe injuries.¹¹ Our study highlighted that the most common etiology encountered was due to sharp objects (32.5%) that predominantly affects the cornea (55.8%) followed by Welding. Shell injury was the least common cause (0.4%). Workplace was the leading place of eye injury (n=89) (38.5%), followed by home (n = 86) (37.2%). Our study reached different conclusion with the 40% rate found in an ocular trauma due to RTA, study done by Kumar et al. reported that blunt objects particularly in the home were the most common activity leading to ocular trauma.¹⁶ Based on our results, corneal F.B accounted for (n=61) (26.4%) of the total diagnosis of received cases, the second most common diagnosis was corneal abrasion (n=34) (14.7%). In a study by Laishram et al. Adnexal injuries accounted for 46.15% of cases, with contusion injuries coming in second at 31.92%.¹⁷ Globe ruptures were the least prevalent kind of injury. Medical management was provided for 97 (42.0%) of all admitted patients, while





surgical management was performed in 134 (58.0%) of cases, of those surgeries (36.8%) were done under local anesthesia.¹⁸ The eyelid/adnexal injury group among 231 individuals achieved a better initial visual acuity (VA) than the opened and closed globe injury groups. Furthermore, following appropriate assessments, we found that, in contrast to (n=25 [10.8%]) whose eyesight ended in blindness (<3/60 to NLP), (n=145 [62.8%]) of subjects showed up with a slight or no visual impairment as shown in Figure (1). These findings were consistent with the study performed by Fu et al.¹⁹ A number of prognostic factors, including the kind of injury, the severity of the original trauma, preoperative visual acuity, and prompt diagnosis and treatment, are necessary to achieve or maintain usable vision.²⁰ Compared to individuals whose wounds were anterior to the recti muscle insertions or limited to the cornea, trauma patients with wounds involving the posterior pole had a 20-fold increased chance of having a final visual acuity of less than 3/60.²¹

Conclusion

Based on our findings, it has been concluded that the type of ocular damage and the implicated ocular structures are important factors in determining the visual outcome. Sharp object injuries to the cornea were the most common kind of ocular trauma. The highest proportion of cases was identified in the adult male workers within the age group of 18-44 years. Also, the worst visual impairment was associated mostly with the open globe injuries. Occupational ocular injury is common in our locality and can be reduced by the use of eye protection devices while working.

Conflicts of Interest

The author declares no conflicts of interest.

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