Ocular injuries and the associated clinical patterns

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ABSTRACT

Purpose: To determine the frequency of ocular injuries and associated clinical patterns and to determine the association between gender and causative agent.

Methodology: It was a descriptive cross-sectional study conducted at the Department of Ophthalmology, MTI-Hayatabad Medical complex in Peshawar from 16th December 2022 to 16th June 2023. We collected data from patients that presented with a history of trauma to the eye. Data collected included age, gender, laterality, occupation, agent of injury, place of injury, time since injury, and visual acuity. In those with open globe injuries data regarding zone of injury and ocular trauma score (OTS) was also collected. We also determined the frequency of open globe injuries among trauma patients presenting to our department.

Result: A total of 121 patients were recruited during the study period with their mean age as 28.85±13.28 years. The frequency of open globe injury was found to be four (3.3%). In patients with open globe injuries, the majority (50%) sustained Zone I injuries, while Zone II and Zone III injuries each accounted for 25% of cases. Although males constituted the majority of cases 75 (62%), no statistically significant association was found between gender and the type of causative agent ($p = 0.96$).

Conclusion: This study has identified the population at risk and provided an overview of the causes and clinical features found in cases of ocular trauma. Armed with this knowledge, targeted interventions can be implemented, including awareness campaigns, advocacy for workplace eye protection, and legislative reforms to enhance traffic safety and mitigate RTA-related ocular trauma. The insights gained from this study can guide both clinical practice and public health policies, ultimately reducing the incidence and improving outcomes for affected individuals.

Keywords: Open globe injury, Ocular trauma score, Ruptured globe, Sharp object, Trauma.

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INTRODUCTION

Ocular trauma is among the most common causes of preventable visual impairment[1]. According to the World Health Organisation, ocular trauma has an estimated yearly incidence of around 55 million.[2] The resulting visual deterioration not only affects the quality of life, productivity, and mental health of an individual but also has serious socio-economic consequences.[3,4]

According to the Birmingham Eye Trauma Terminology system (BETT), ocular trauma can be classified into closed globe and open globe injuries. An open globe injury (OGI) is defined as ocular trauma involving full-thickness damage of the cornea, sclera, or both.[5] The estimated annual rate of OGIs is approximately 3.5 per 100,000 individuals, leading to an overall global incidence of 200,000 OGI's per year. A study published in 2020 by the Pusan National University Hospital (PNUH) in Korea showed a 4% incidence of OGIs and concluded that they were often associated with poor visual outcomes. Open globe injuries are usually more severe than closed globe injuries often requiring a longer hospital stay and prompt surgical intervention. In addition, they lead to a higher rate of complications with unfavourable prognoses.[5-7]

Studies have shown that about 90% of ocular trauma injuries are preventable.[8] The first step towards prevention is to identify high risk individuals. In order to do so, a detailed understanding of the epidemiological factors such as age, gender, socio-economic status and occupation is vital as these aspects vary depending on the population and place where the study is being conducted.[4] Furthermore, an evaluation of the mechanisms of injury, causative agents, clinical characteristics on presentation, interventions taken, and visual outcomes is also necessary as it will aide us in better management of such patients in the future. The clinical characteristics we will be focusing on include the classification of the open globe injury on the basis of zone of injury and the ocular trauma score (OTS)

The aim of this study is to determine the frequency of ocular injuries and associated clinical patterns in and to determine the association between gender and causative agent.. This will help us to identify the high-risk individuals. Once the population at risk is determined, targeted preventive measures can be taken for their protection and awareness programs can be arranged.

METHODOLOGY

A descriptive cross-sectional study was conducted at the Department of Ophthalmology, MTI-Hayatabad Medical complex in Peshawar from 16th December 2022 to 16th June 2023. Ethical approval was obtained from the hospital ethical committee prior to initiating the research. Patients aged between six to 50 years that presented with a history of trauma to the eye were included in the study. Individuals that had significant previous ocular comorbidities or have undergone previous surgeries in the affected eye were excluded as it may confound study results. Data was collected from the recruited participants on predesigned proformas and included age, gender, laterality, occupation, agent of injury, place of injury, time since injury, and visual acuity. Data was analysed using latest SPSS version 24. The frequency of open globe injuries among ocular trauma patients was calculated. In those with open globe injuries data regarding zone of injury and Ocular trauma score (OTS) was also collected. Chi-square test was applied to determine the association of gender and causative agent. A p-value of less than 0.05 was considerded significant.

RESULTS

This study recruited 121 patients, and the mean age was 28.85±13.28 years. Mean visual acuity was 0.82±0.32 LogMAR. Mean time since injury was 7.02±3.17 hours. Table 1 shows the demographic features and other details of the study population.

Table 1: Demographics of the study participants

Parameters	Frequency (percentage)
Gender	Male: 75 (62) Female: 46 (38)
Laterality	Right eye, 68 (56.2) Left eye, 42 (34.7) Both eyes, 11 (9.1)
Age distribution (years)	6 to 30, 65 (53.7) 31 to 45, 40 (33.1) 46 to 60, 16 (13.2)
Agent of injury	Blunt object, 71(58.7) Sharp object, 32 (26.4) Other, 18 (14.9)
Place on injury	Market, 41 (33.9) Workplace, 39 (32.2) Main road, 41 (33.9)
Occupation status	Employed, 69 (57) Unemployed, 52 (43)

Most ocular injuries were closed globe injury 117 (96.7%). In patients with open globe injuries, the majority (50%) sustained Zone I injuries, while Zone II and Zone III injuries each accounted for 25% of cases (Table 2). Table 2 also shows the ocular trauma score among those patients that suffered open globe injuries.

Table 2: Characteristics of ocular injuries and ocular trauma score.

Characteristics (N = 121)		Frequency	Percent
Type of injury	Open globe injury	4	3.3
	Closed globe injury	117	96.7
Zone of injury (in OGI)	Zone I	2	50
	Zone II	1	25
	Zone III	1	25
OTS category (in OGI)	1	4	100
	2	0	0
	3	0	0
	4	0	0
	5	0	0

N=total sample, OTS=ocular trauma score, OGI=open globe injury

A cross-tabulation of gender and agent of injury is shown in Table 3. Although a higher number of males sustained injuries across all agent categories, the distribution did not differ significantly between genders. A Chi-square test revealed no statistically significant association between gender and type of agent ($p = 0.96$).

Table 3: Association Between Gender and Agent of Injury (N = 121)

Gender	Blunt Object	Sharp Object	Other	p-vlaue*
Male	44 (61.9%)	20 (62.5%)	11 (61.1%)	0.96
Female	27 (38.1%)	12 (37.5%)	7 (38.9%)	
Total	71 (100%)	32 (100%)	18 (100%)	

*chi-square test was applied

DISCUSSION

Open globe injuries represent a significant area of concern in ophthalmology due to their impact on visual acuity, quality of life and the considerable healthcare resources needed for treatment and rehabilitation. We have selected this topic because understanding the epidemiology and clinical patterns of ocular injuries is vital for creating effective management and prevention strategies that reduce the incidence and impact of these injuries. In our study there was a total of 121 patients, among which 75 (62%) were male while 46 (38%) were female. Open globe injuries accounted for 3.3% of cases in our patient population. Our findings regarding the incidence of OGIs are consistent with those published by the trauma centre of Pusan National University Hospital (PNUH) in Korea, which reported an OGI frequency of 4.3%.[1] Zone I injuries were the most common clinical pattern in our study, affecting 50% of patients, while zone II and III injuries each accounted for 25%. These results align with Al Mahmoud et al's observation that zone I injuries are the most frequent type of OGI.[9] A study conducted in southwest china has a similar incidence, reporting zone I injuries in 58.3% of their patients, while zone II and zone III injuries were 21.3% and 20.4% respectively.[10]

In this study the incidence of ocular trauma was found to be higher in males which is in agreement to

what has been previously reported in studies conducted across different regions such as Nepal,[11] Bangladesh,[12] and Portugal.[13] The higher predominance in males may be because they have a greater risk of being exposed to dangerous situations in the workplace or during outdoor activities, as well as their tendency to engage in risk-taking and aggressive behaviour, increasing their vulnerability to injury.

Our study found that ocular injuries occurred most frequently in the following settings: occupational environments (50%), at the market (25%) and on roads mainly due to road traffic accidents (25%). Previous studies have shown that occupational ocular trauma is quite common.[3,9,14] Occupational trauma is often the result of not having any safety regulations in place and not providing proper protective equipment to the workers. The high incidence of occupational eye trauma reported in our study and in previous literature reinforces the importance of implementing preventive measures, including the use of protective eyewear and spreading awareness among workers regarding eye injury prevention Thevi et al confirmed that road accidents were responsible for 32.7% of the ocular injuries in his study which is close to what we have noted in our study.[15] The high incidence of ocular injuries following road traffic accidents in our region may be attributed to the inadequate enforcement of traffic regulations, resulting in a greater number of accidents and subsequent ocular trauma.

The mean age reported in our study was 28.85 years. An observational study conducted in Al-Ain Hospital of UAE also had a similar mean age (25 years age).[9] In our study there were 53.7% patients in the range of 6 to 30 years and 33.1% patients in the 31 to 45 age range. The heightened risk of ocular trauma among adults is likely because of increased exposure to hazardous activities, both occupationally and recreationally, while in children it is often the result of accidental injury in the playground or while playing unsupervised with sharp objects.

The agent of injury in 58.7% of the cases was a blunt object, while in 26.4% of the cases the ocular injury was caused by a sharp object. These findings are consistent with a similar study done in Pakistan[16] which reported blunt trauma in 45.2% of their cases and a study conducted in Lithuania[17] in which blunt trauma was noted in 40.3% of the cases. However opposed to this, a study conducted in China reported sharp objects as the most common causative agent in their patients (72.7%).[10]

This study found that most OGIs were unilateral. There are reports of being left eye involved more than right in ocular trauma cases.18 In our study, there was a higher incidence in the right eye (56.2%) involvement as compared to the left eye which is in concordance with what has been reported in previous literature.[19] Similarly, another study reported more involvement of right eye (55.1%) in ocular trauma cases.20 This may be due to the dominant use of the right hand when handling tools or instruments, leading to increased vulnerability on the same side.

The strengths of this study were the large sample size and inclusion of patients of both genders and different age groups, which thus provided a good overview of the various features of patients presenting with ocular trauma in Peshawar. A possible limitation may be the fact that there are several other public and private sector hospitals that provide emergency services in cases of ocular trauma, this may have led to an underestimation of the incidence of open globe injuries. We suggest that future studies adopt a multicenter approach, engaging multiple eye care institutions to provide a more detailed insight into ocular trauma patterns and a more precise estimate of the frequency of OGIs in our region.

CONCLUSION

This study has identified the population at risk and provided an overview of the causes and clinical features found in cases of ocular trauma. Armed with this knowledge, targeted interventions can be implemented, including awareness campaigns,

advocacy for workplace eye protection, and legislative reforms to enhance traffic safety and mitigate RTA-related ocular trauma. The insights gained from study can guide both clinical practice and public health policies, ultimately reducing the incidence and improving outcomes for affected individuals.

Conflict Of Interest: None to declare

Ethical Approval: The study was approved by the Institutional Review Board / Ethical Review Board HMC/QAD/F-00 dated 06.09.2022.

Authors' Contributions:

Anam Khan: Concept, Design, Literature search, Data acquisition, Manuscript preparation, Manuscript editing, Manuscript review.

Yousaf Jamal Mahsood: Concept, Design, Literature search, Data analysis, Statistical analysis, Manuscript preparation, Manuscript editing, Manuscript review.

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