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# A CROSS-SECTIONAL RESEARCH TO DETERMINE VARIOUS REASONS OF OCULAR INJURIES AMONG SECURITY TROOPS OF LEAs (LAW ENFORCING AGENCIES)

**[1]Hafiz Mirza Muhammad Zeshan, [2]Mishaim Bakhtawar, [3]Muzayyian Fatima**

[1]Services Hospital Lahore

[2]Sheikh Zayed Hospital Rahim Yar Khan

[3]Mayo Hospital Lahore

**Abstract:**

***Objective:*** *The research objective is the determination of the severity and etiology of different types of ocular injuries occurred during war against terrorism.*

***Methods:*** *The method of this study is cross-sectional, carried out at Services Hospital, Lahore (Ophthalmology Department) from July 2016 to September 2017. A number of 210 personnel with ocular injuries were included in the study. Informed consent was taken from each patient. To record a patient's details of demography, side, cause, severity, and type of injury, a pre-designed Performa was used. The score of ocular trauma was noted down at presentation.*

***Results:*** *All patients were male with age as mean (29.30 ± 05.30) years. IED blast was the most frequented cause (54.3%, n=114) with the involvement of the left side at a higher frequency (60%, n=126). Injuries of the closed globe were found among 57.10% (120) patients. After the assignment of Ocular Trauma Score, the following frequencies (descending order) were recorded in terms of Grades: Grade-V, Grade-I, Grade-III, Grade-II, and Grade-IV equal to 28.60%, 25.70%, 25.7%, 11.40%, and 8.60% respectively. After the stratification of the type of injuries, patients with OGIs were recorded with highest (60%) OTS Grade-I injuries, hence prognosis is poorer, while patients with CGIs were recorded with highest (50%) (p=0.000) of OTS Grade-V injuries.*

***Conclusion:*** *Injuries to IED blast caused OWIs at the highest frequency, often among (20 – 30) years age security personnel. OGIs had a very bad presentation at the beginning with poorer prognosis as compared to CGIs.*

***Keywords:*** *Open Globe Injuries (OGI), Ocular War Injuries (OWI), Ocular Trauma Score (OTS), Improvised Explosive Device (IED) and Closed Globe Injuries (CGI).*

*** Corresponding author:**

**Hafiz Mirza Muhammad Zeshan,**

*Services Hospital,*

*Lahore*

QR code

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## INTRODUCTION:

Ocular trauma causes ocular morbidity significantly among adults and children. The common most cause for ocular trauma is road traffic accidents in general population with the number of 500,000 cases due to unilateral vision loss and one million cases due to blindness each year [1, 2]. However, vision loss is becoming a frequent result of warfare injuries among security personnel wear protective clothing provide safety to vital organs but the face is left exposed to the risk of injuries [3]. The size of eyes is 0.27% of the frontal surface of the body, but they are affected in blast injuries mostly. The expected percentage of ocular trauma was four times only, of the surface body before the 20th century. Due to higher fragmentation of the new explosives, the proportion of ocular trauma has 50 times increased than its expected percentage [4 – 6]. A gradual increase has been reported in the frequency of OWIs from 2% at WWII to 03% at Korean War and 07% at Arab-Israel conflict [6 – 8]. Because of the geographical location of Pakistan is critical, it has taken part in various operations against extremists and tribes including those involving American-Afghanistan war [9]. Throughout these operations, a large number of security personnel were referred from other centres or received directly at this hospital. Our study deals with such patients of ocular trauma through epidemiological analysis.

## METHODS:

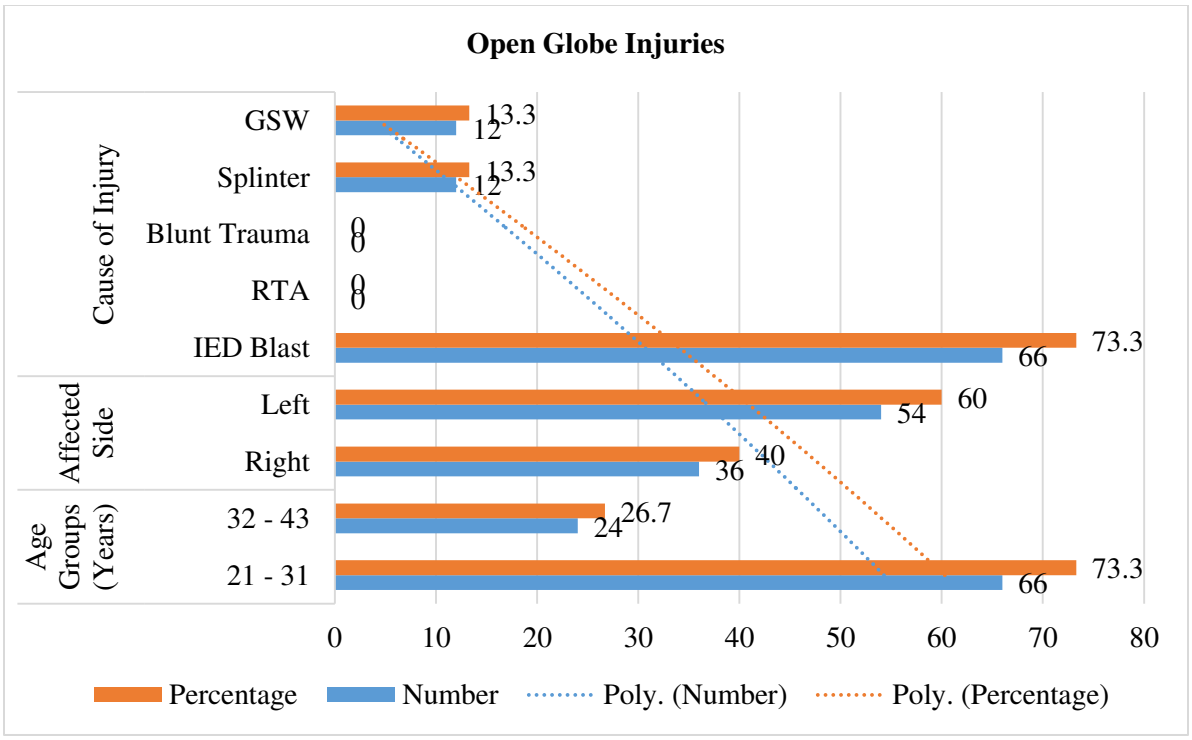
The method of this study is cross-sectional, carried out at Services Hospital, Lahore (Ophthalmology Department) from July 2016 to September 2017. A number of 210 security personnel with OWIs were a part of the study. Informed consent was taken from each patient in writing. The patients who were dead or expired with twenty-four hours at presentation were not included in the study. For the demographic details' record, a pre-designed Performa was used. This Performa included the type, side, cause, and severity of the injury. The division of injuries was created as "Open Globe Injuries" and "Closed Group Injuries" class. The severity of the injury was described and calculated with OTS Grade. To complete an unbiased study, a single ophthalmologist consultant assessed all the patients.

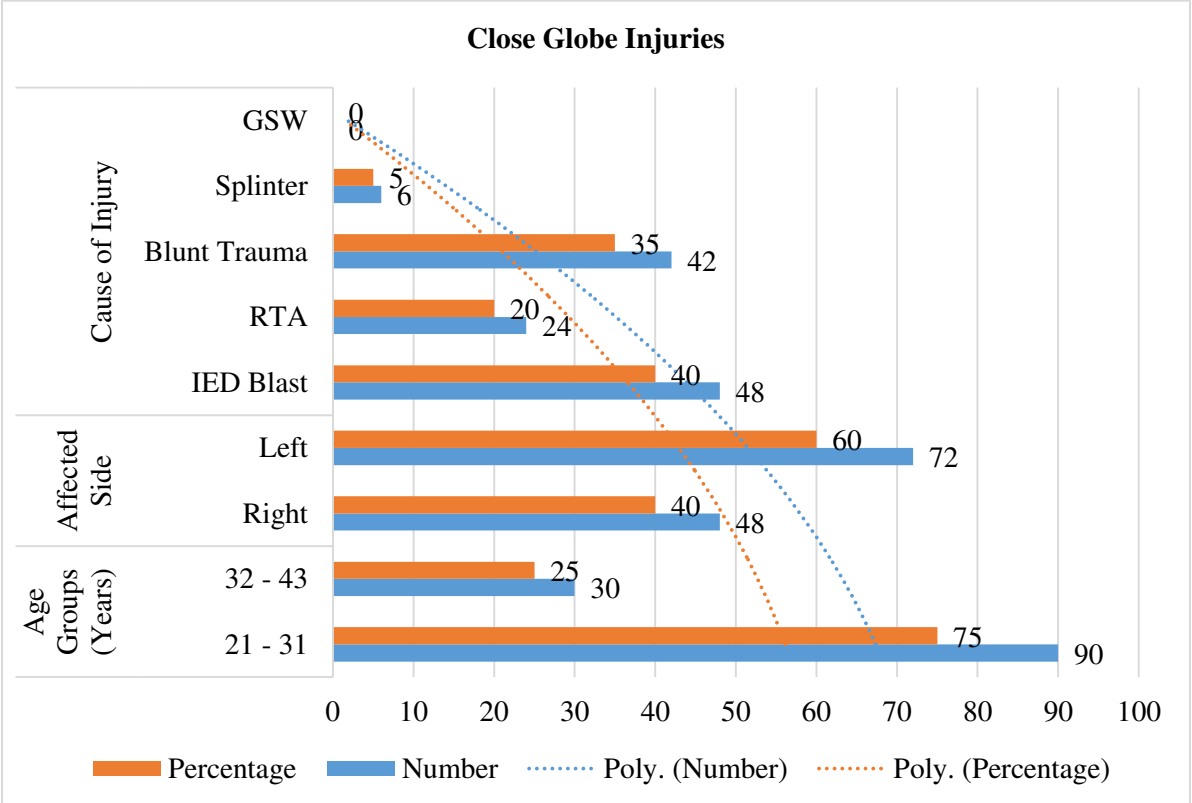
## RESULTS:

Patients with an age range of (20 – 43) years (mean of 29.3±05.3 years) were included in this research. Male patients (74.30%, n=156) with the age range of (20 – 31) years were in majority. The most frequent involvement was of the left side with 60% (n=120) patients. IED blast injury had the highest underlying cause of 54.30% (n=114) patients, followed by blunt trauma 20% (n=42), and road traffic accidents 11.40% (n=24). CGIs were recorded as most frequented with 57.10% (n=120) patients. After stratification of the nature of the injury, side involvement (p=1.000) and age (p=0.784) of the patient had no significant association. However, the frequency of causes observed with OGIs as IED blast, splinter, and GSW as 73.30%, 13.30%, and 13.30% respectively and with CGIs as IED blast, blunt trauma, and road traffic accidents as 40%, 35%, and 20% respectively. The difference observed statistically was significant (p=0.000) (Table – I).

**Table – I:** Patient's age, nature of the injury, side, and cause of injury in the stratified form

| Characteristic | | Open Globe Injuries (OGIs, 90) | | Closed Globe Injuries (CGIs, 90) | | P-Value |
|---|---|---|---|---|---|---|
| | | Number | Percentage | Number | Percentage | |
| Age Groups (Years) | 21 - 31 | 66 | 73.3 | 90 | 75 | 0.784 |
| | 32 - 43 | 24 | 26.7 | 30 | 25 | |
| Affected Side | Right | 36 | 40 | 48 | 40 | 1.00 |
| | Left | 54 | 60 | 72 | 60 | |
| Cause of Injury | IED Blast | 66 | 73.3 | 48 | 40 | 0.00 |
| | RTA | 0 | 0 | 24 | 20 | |
| | Blunt Trauma | 0 | 0 | 42 | 35 | |
| | Splinter | 12 | 13.3 | 6 | 5 | |
| | GSW | 12 | 13.3 | 0 | 0 | |

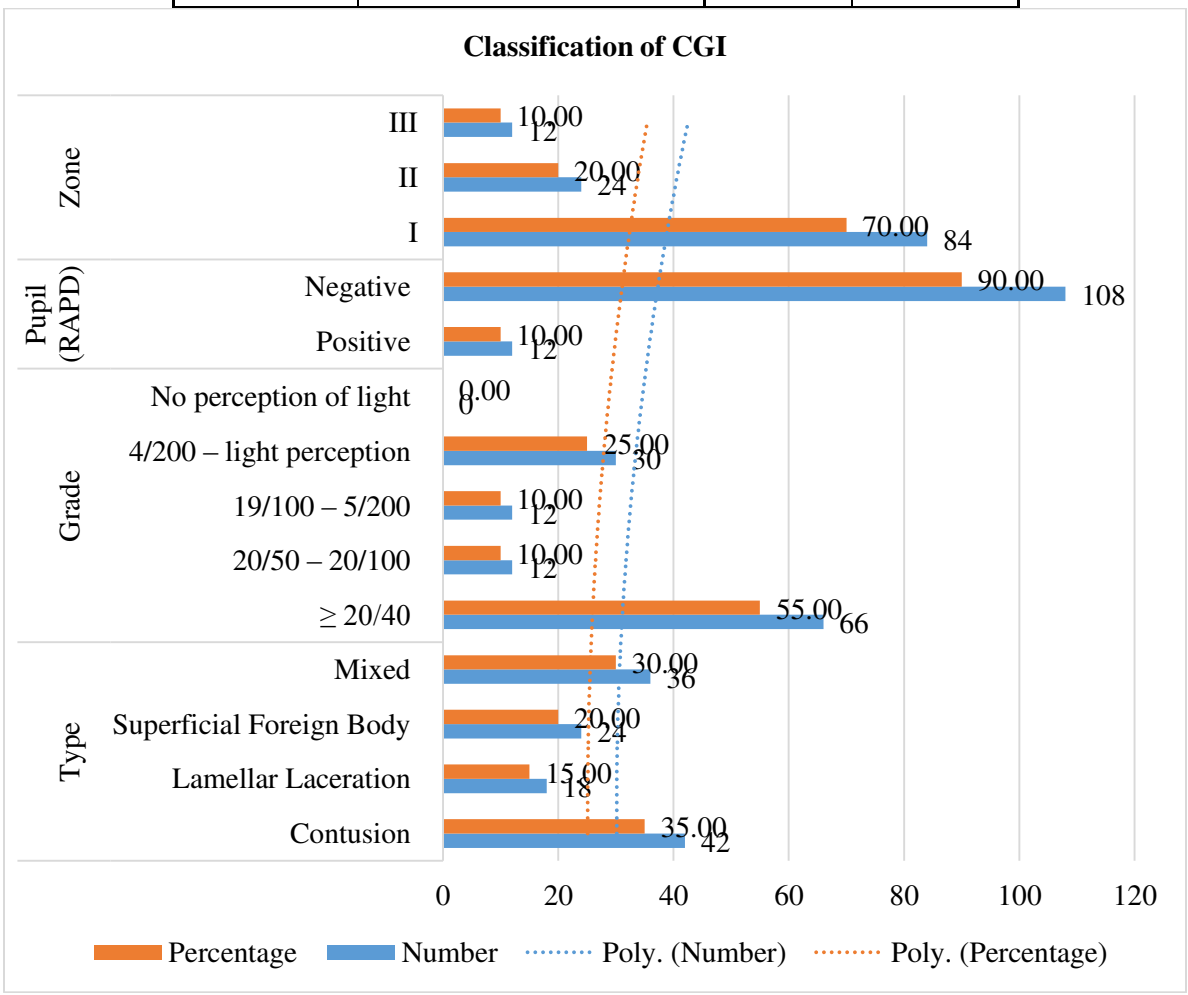



Classification of CGI shows contusion in 35% of patients (n=20) and mixed type among 30% (n=36) patients. Grade-I had a higher frequency of injury with 55% (n=66) patients followed by Grade-IV with 25% (n=30) patients. Patients with negative pupil were 90% (108) and patients involved in Zone-I injury were 70% (n=84). Findings have been mentioned summarily (Table – II).

**Table – II:** Classification of CGI

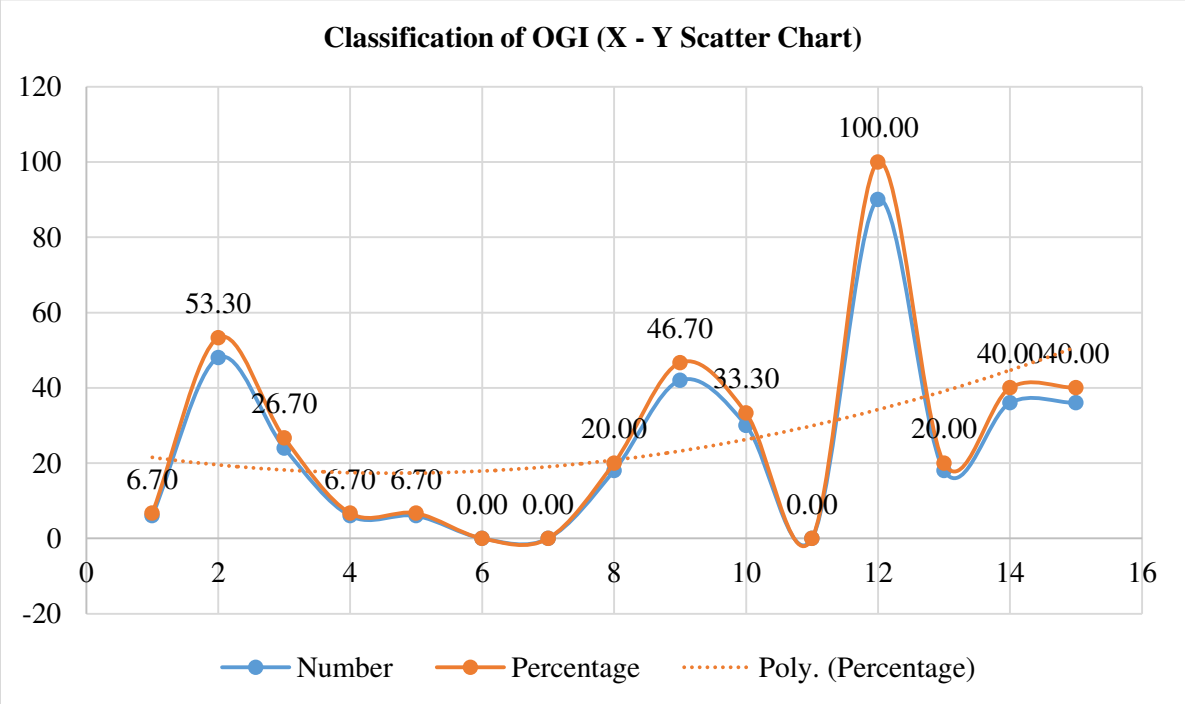
| Closed Globe Injury Classification | | Study Participant (120) | |
|---|---|---|---|
| | | Number | Percentage |
| **Type** | **Contusion** | 42 | 35.00 |
| | **Lamellar Laceration** | 18 | 15.00 |
| | **Superficial Foreign Body** | 24 | 20.00 |
| | **Mixed** | 36 | 30.00 |
| **Grade** | **≥ 20/40** | 66 | 55.00 |
| | **20/50 – 20/100** | 12 | 10.00 |
| | **19/100 – 5/200** | 12 | 10.00 |
| | **4/200 – light perception** | 30 | 25.00 |
| | **No perception of light** | 0 | 0.00 |
| **Pupil (RAPD)** | **Positive** | 12 | 10.00 |
| | **Negative** | 108 | 90.00 |
| **Zone** | **I** | 84 | 70.00 |
| | **II** | 24 | 20.00 |
| | **III** | 12 | 10.00 |



The classification of OGI showed penetrating injury among most patients (53.30%, n=48) followed by intra-ocular foreign body injury among 26.70% patients (n=24). Majority of cases had a Grade-IV injury with 46.70% patients followed by Grade-V injury among 33.30% patients. With OGI, Pupil was found negative among 100% patients. Zone-II and Zone-III was involved, both as 40% among patients with OGI (Table – III).

**Table – III:** Classification of OGI

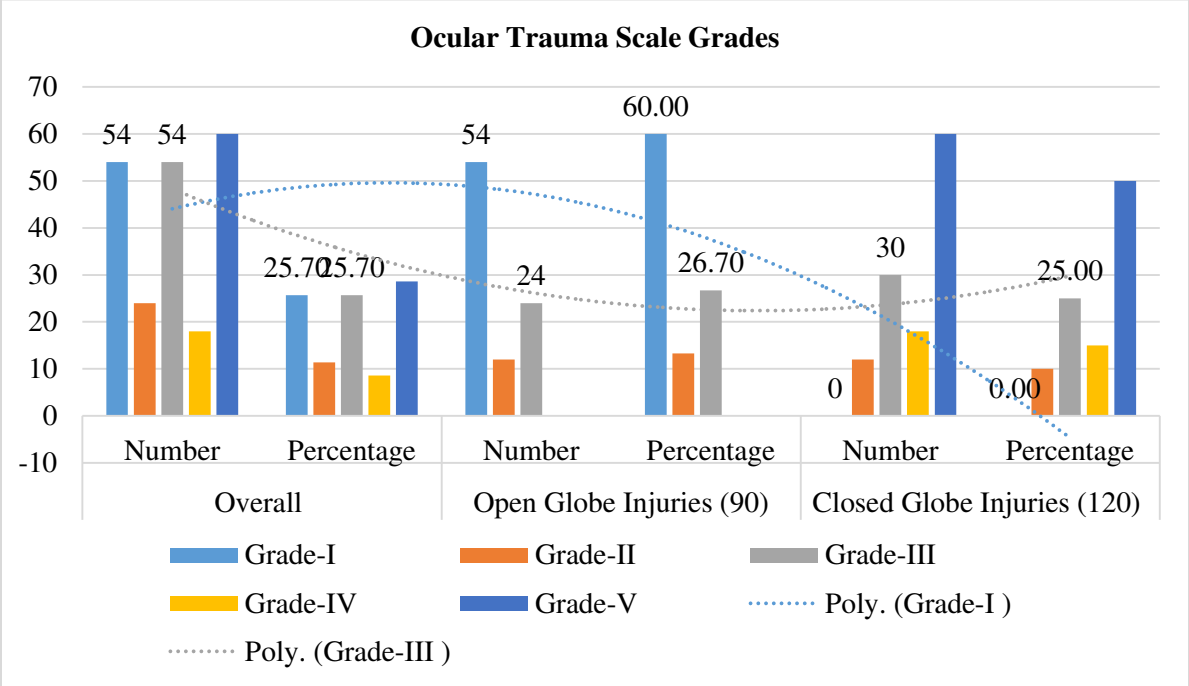
| Open Globe Injury Classification | | Study Participant (90) | |
|---|---|---|---|
| | | Number | Percentage |
| Type | Rupture | 6 | 6.70 |
| | Penetrating | 48 | 53.30 |
| | Intraocular Foreign Body | 24 | 26.70 |
| | Perforating | 6 | 6.70 |
| | Mixed | 6 | 6.70 |
| Grade | ≥ 20/40 | 0 | 0.00 |
| | 20/50 – 20/100 | 0 | 0.00 |
| | 19/100 – 5/200 | 18 | 20.00 |
| | 4/200 – light perception | 42 | 46.70 |
| | No perception of light | 30 | 33.30 |
| Pupil (RAPD) | Positive | 0 | 0.00 |
| | Negative | 90 | 100.00 |
| Zone | I | 18 | 20.00 |
| | II | 36 | 40.00 |
| | III | 36 | 40.00 |




Upon OTS, injuries of Grade-V found at higher frequency followed by Grade-I, Grade-III, Grade-II, and Grade-IV with the frequency of 28.60%, 25.70%, 25.70%, 11.40%, and 8.60% respectively. The stratification of the form of injury showed OTS Grade-I injuries having the most frequent result of 60% patients with OGI while OTS Grade-V injuries having the most frequent result of 50% patients with CGI. The difference found statistically was significant (p=0.000) (Table – IV).

**Table – IV:** OTS Grades.

| Ocular Trauma Scale Grades | Overall | | Open Globe Injuries (90) | | Closed Globe Injuries (120) | | P-Value |
|---|---|---|---|---|---|---|---|
| | Number | Percentage | Number | Percentage | Number | Percentage | |
| **Grade-I** | 54 | 25.70 | 54 | 60.00 | 0 | 0.00 | 0.00 |
| **Grade-II** | 24 | 11.40 | 12 | 13.30 | 12 | 10.00 | |
| **Grade-III** | 54 | 25.70 | 24 | 26.70 | 30 | 25.00 | |
| **Grade-IV** | 18 | 8.60 | 0 | 0.00 | 18 | 15.00 | |
| **Grade-V** | 60 | 28.60 | 0 | 0.00 | 60 | 50.00 | |




## DISCUSSION:

Ocular injuries cause short and long-term socio-economic burden on society. These can be caused by the blast wave, blast fragments, structural collapse or burns [10]. This study shows IED blast grading the most frequent cause followed by blunt trauma and road traffic accidents. CGI were frequent which fell under OTS Grade-V. Most frequent type of injuries among patients was OTS Grade-I with OGI and having a poorer prognosis, while patients with CGI had OTS Grade-V injuries having a relatively better prognosis. The difference observed was significant statistically (p=0.000). A local study shows similar male predominance having age as the mean of (23.30 ± 17.30) years and a male-to-female ratio of 4.9:01 among patients of ocular injuries at Department of Ophthalmology at Fuaji Foundation Hospital, Rawalpindi (Nadeem et al.). In this study, the right eye had a higher frequency (63.90%) of involvement [11]. Unlike this present study, they involved all kind of ocular injuries instead of including only warfare kind. Shashikala et al. observed in her study at India that CGI was most frequented among (20 – 30) year age group mostly with 94.40% patients at a hospital of an industry [12]. Another study by Boparai et al. reported IED blast as the most frequent cause of injury, which gradually increased from 71% to 76% in 1967 and 1971, respectively [4]. According to Mader et al. research, OGI is the most frequented with 63.77% having IED blast as the major underlying cause resulting 51% injuries among all OWIs [13]. A study conducted by Weichel et al. on the Iraq war that OWI is 96% with male predominance reporting its major cause to be IED blast in 79% injury cases [3]. We find similarities of mechanism, severity, and pattern of OWI among the present study and studies carried out previously by other authors. These observations guide us about that

security personnel who reported with injuries caused during skirmishes and live action that they can be assured of having a common form of OWI and can be anticipated by doctors in a better way. This will help in decreasing morbidity at an early stage, and preventing long-term consequences. Moreover, the prevention from ocular injuries using protective eyewear during the warlike situations as well as in normal circumstances must be emphasized.

## CONCLUSION:

IED blast is the major cause of OWIs. OGIs were reported with poorer prognosis and worst clinical presentation at the time of treatment than CGIs. Prevention of eyes with protective eyewear is of utmost importance.

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