ISSN 2515-8260 Volume 10 Issue 04, 2023

# CLINICAL PROFILE AND VISUAL PROGNOSIS OF OCULAR TRAUMA IN A TERTIARY CARE CENTRE IN NORTH INDIA

**Dr. Talvir Sidhu[1], Dr. Sonakshi Verma[2], Dr. Harsimran Singh[3], Dr. Chiman Lal[4], Dr. Manpreet Walia[5*]**

1. Assistant Professor, Department of Ophthalmology, Government Medical College and Rajindra Hospital, Patiala, Punjab-147001, India.
2. Junior Resident, Department of Ophthalmology, Government Medical College and Rajindra Hospital, Patiala, Punjab-147001, India.
3. Professor, Department of Ophthalmology, Government Medical College and Rajindra Hospital, Patiala, Punjab-147001, India.
4. Assistant Professor, Department of Ophthalmology, Government Medical College and Rajindra Hospital, Patiala, Punjab-147001, India.
5. Assistant Professor, Department of Ophthalmology, Government Medical College and Rajindra Hospital, Patiala, Punjab-147001, India.

***Corresponding author:**

**Dr. Manpreet Walia,** Assistant Professor, Department of Ophthalmology, Government Medical College, Patiala, Punjab -147001, India.

Email: manpreetkaur73gc@gmail.com

## ABSTRACT

**Aims**: To study clinical and demographic profile and visual prognosis of ocular trauma patients visiting ophthalmology department in a tertiary care centre of Punjab for a span of one year.

**Materials And Methods**: This prospective study was conducted on the patients of ocular trauma visiting Department of Ophthalmology, in Government medical college,

Patiala during a span of 1st April 2021 to 31st March 2022. 152 ocular trauma patients of all age groups reported to our institute and continued follow up for 2 months were included in the study. Data obtained was tabulated and analysed statistically.

**Results:** Out of 152 patients, 48.68% were between 31- 45 years of age. Males (74.34%) were predominantly affected. Road side accident (42.76%) was found to be the most common cause of injury. Closed globe injury (59.24%) was more common than open globe. Eyelids (36.51%) were the most involved ocular structure followed by conjunctiva (26.37%). The visual acuity observed in the affected eye at the time of admission was between 6/6 - 6/18 in 54.78% of patients. After treatment the 78.80% of the cases had final BCVA between 6/6 - 6/18.

**Conclusion**: Road side accident was the most common cause of ocular trauma. Younger age group and males are predominantly affected. Closed globe was the common type of injury and eyelids were the mostly affected ocular structure.

**Keywords:** ocular trauma, road side accident, globe injury

## INTRODUCTION

Ocular trauma is an important cause of ophthalmic morbidity and preventable blindness throughout the world.(1) It has been found that ocular trauma has a significant impact on individuals and society in terms of medical cost and loss of productivity.(2)

ISSN 2515-8260 Volume 10 Issue 04, 2023

According to a research conducted by World Health Organisation program for the prevention of blindness, it was found that globally 55 million ocular injuries occur annually.(3) Due to eye injuries, 1.6 million people are blinded and 2.3 million people are left with bilateral low vision and around 19 million people suffer from unilateral blindness or low vision worldwide.(4)

Various classification systems have been devised to classify ocular trauma, such as the Birmingham Eye Trauma Terminology (BETT).(5) It divides ocular injuries into those involving blunt force which results in contusion (closed globe injury) or rupture (open globe injury) and those involving sharp force, resulting in lamellar laceration (closed globe injury) or penetrating, perforating, and intraocular foreign body laceration (open globe injury).(6) Kuhn et al. in 2002 described a trauma score called Ocular Trauma Score (OTS) which is a simplified predictive tool for classifying cases of ocular trauma.(7,8) OTS is a reliable predictive tool to predict the visual outcome of patients after open-globe ocular trauma which usually results into blindness.(9)

In India, there are more than 50 million blind people and this number increases by about 3.8 million per year. Amongst the total number of blindness cases, 1.2 percent are preventable injuries.(10) Most of the injuries can be prevented by adopting relatively simple measures.(11)

This study was conducted to clinical, demographic profile including the causative agents and risk factors and visual prognosis of ocular trauma patients visiting ophthalmology department in a tertiary care centre of Punjab. The visual prognosis of various ocular injuries was also noted.

## MATERIALS AND METHOD

This was a prospective study on 152 ocular trauma patients of rural as well as urban community attending ophthalmology department, presenting to the Government Medical College and Rajindra Hospital, Patiala, for a span of one year. The patients were studied regarding mode, type, severity of injury. The study was conducted after approval from thesis and ethical committee. Informed consent was taken. Patients of ocular trauma of all age groups, who were willing to participate in study were included. Patients with poor hemodynamic conditions, not willing to participate in the study and non-adherence to follow up were excluded. A written and informed consent was taken from the subjects after explaining the study details.

When a patient presented with history of ocular trauma, a detailed history of traumatic event was taken including mode of injury and place of injury. The recording of presenting vision was done using Snellen's chart for visual acuity at six meters distance. The ocular adnexa and extraocular movements were examined. The intraocular pressure was measured by Goldmann applanation tonometer, only in close globe injury and was avoided in open globe injury. A detailed Slit lamp examination was done to note the extent of injury and zones of injury. A dilated fundus examination was done in patients with clear media. Additional

diagnostic tests were used when required which included plain x-ray or ultrasound B/A-scan, and or computed tomography scan.

Patient was managed medically or surgically as required. Patients were followed up on day 1 week, 2 weeks, 1 month and at 2 months and final visual acuity was recorded and all data was compiled in excel form. Final best corrected visual acuity was recorded using Snellen's chart following the treatment.

***Biostatistical Analysis***: Data entry was done into Microsoft excel. STATA software version 12.1 (Stata Corp LP, College Station, TX) was used for data analysis. A p-value less than 0.05 was considered statistically significant.

Ethical clearance: The study protocol was approved by the Institutional Ethics committee vide letter no- BFUHS/2K21p-TH/14833, dated:15/12/2021. The study details were explained to the participants and a written informed consent was taken voluntarily before participating into the study.

**RESULTS**

Out of 152 patients, 113 (74.34%) were males and 39 (25.66%) were females. The mean age at presentation was 33.16±14.51 years while the median age was 33 years. The mean age of the male participants was 30.69±13.54 and female participants was 40.33±15.03 ($p<0.001$).

Table 1 shows the age and gender distribution of the participants. Most of the patients 89 (58.55%) belonged to rural area, and 63 (41.45%) patients were from urban area.

**Table 1- Age and gender distribution**

| Age Group (Years) | Female | Male | Total |
|---|---|---|---|
| | Patients Percentage | Patients Percentage | Patients Percentage |
| **1-15** | 2 (5.13%) | 18 (17.53%) | 20 (13.16%) |
| **16-30** | 6 (15.38%) | 31 (23.71%) | 37 (24.34%) |
| **31-45** | 21 (53.85%) | 53 (48.45%) | 74 (48.68%) |
| **46-60** | 4 (10.23%) | 7 (6.19%) | 11 (7.24%) |
| **≥61** | 6 (15.38%) | 4 (4.12%) | 10 (6.58%) |
| **Total** | 39 (100%) | 113 (100%) | 152 (100%) |

In our study, we found that majority of the patients, i.e., 81(53.29%) presented between 6 to 24 hours, 55 (36.18%) presented to the hospital within <6 hours after the injury and 16(10.53%) presented after 24 hours. The most common place of injury was Roadside in 65 (42.76% ) of patients, followed by occupation/ work related injury in 33 (21.71%) , play related in 17( 11.18%) and assault in 13(8.55%) Table-2 The mode of injury was Road Side Accidents (RSA) in 65 (42.76%), 13 (8.5%) had injuries due to assault, 9 (5.9%) were injured due to fall, 8 (5.2%) had an injury with wood/ tree branch, 7 (4.6%) had injury due to ball , 6 (3.9%) each with nail chip and metal wire, etc. (Table-3)

**Table 2- Place of Injury**

| Cause of Injury | Patients | Percentage |
|---|---|---|
| **RTA** | 65 | 42.76% |

| | | |
|---|---|---|
| **Occupation related** | 33 | 21.71% |
| **Play** | 17 | 11.18% |
| **Assault** | 13 | 8.55% |
| **Domestic** | 11 | 7.24% |
| **Fall** | 9 | 5.92% |
| **Others** | 4 | 2.63% |
| **Total** | 152 | 100% |

**Table 3-Mode of Injury**

| Cause of Injury | Patients | Percentage |
|---|---|---|
| **RTA** | 65 | 42.76% |
| **Assault** | 13 | 8.55% |
| **Fall** | 9 | 5.92% |
| **Tree Branch/Twig** | 8 | 5.26% |
| **Ball** | 7 | 4.61% |
| **Metal/Nail Chip** | 6 | 3.95% |
| **Metal Wire** | 6 | 3.95% |
| **Chemical** | 5 | 3.29% |
| **Firecracker** | 4 | 2.63% |
| **Metallic Foreign Body** | 4 | 2.63% |
| **Cattle Tail** | 3 | 1.97% |
| **Buffalo Horn** | 3 | 1.97% |
| **Fingernail** | 3 | 1.97% |
| **Sharp Plastic** | 2 | 1.32% |
| **Needle** | 2 | 1.32% |
| **Pen** | 2 | 1.32% |
| **Stone** | 2 | 1.32% |
| **Welding** | 2 | 1.32% |
| **Burst Tire** | 1 | 0.66% |
| **Foreign Body** | 1 | 0.66% |
| **Iron Wire** | 1 | 0.66% |
| **Pencil Tip** | 1 | 0.66% |
| **Plastic Bat** | 1 | 0.66% |
| **Fevi Quick** | 1 | 0.66% |
| **Dog Bite** | 1 | 0.66% |
| **Total** | 152 | 100% |

Out of 152 patients, 93 (59.2%) had closed globe injuries, whereas 50 (32.8%) had open globe injuries. Out of 93 (59.2%) eyes having closed globe injuries, 82 (52.3%) cases had contusion, 7(4.46%) cases had lamellar laceration and 4 (2.55%) cases had superficial foreign bodies. In cases of open globe injuries, penetrating injury was the most common type as it

was seen in 44 (28.03%) cases, 4 (2.55%) cases had IOFB and globe rupture were seen in 2 (1.2%) cases. 7 patients had chemical injuries , 6 had burn injuries, while 1 patient had combined chemical and burn injury and thus accounted for 8.92% of the total injuries. (Table 4) 7 patients (4.61%) were using eye protection at the time of injury while 95.39% (145) of the cases were not using any eye protection devices such as PPE / goggles etc. Among 45 patients of RSA travelling by 2 wheelers, 37 patients (82.22%) did not wear a helmet. While, only 10 cases (17.78 %) wore a helmet.

**Table 4- Type of Injury**

| **Type of Injury** | | | Eyes (N=157) | Percentage |
|---|---|---|---|---|
| **Mechanical Injury** | **Closed Globe (N=93)** | **Contusion** | 82 | 52.23% |
| | | **Lamellar Laceration** | 7 | 4.46% |
| | | **Superficial foreign body** | 4 | 2.55% |
| | **Open Globe (N=50)** | **Penetrating** | 44 | 28.03% |
| | | **IOFB** | 4 | 2.55% |
| | | **Globe rupture** | 2 | 1.27% |
| **Chemical/ Burn Injury** | | | 14 | 8.92% |

The most frequently involved ocular structure in ocular trauma were eyelids (36.51%), including laceration in 36 cases (7.65%), 7 cases (1.49%) with canalicular tear and 0.64% with burn injuries. This was followed by conjunctival injuries (26.37%) and corneal injuries (18.05%). In our study, anterior segment was more commonly involved than posterior segment. Anterior segment injuries included injuries to cornea (18.05%), AC (4.46%), iris (4.06%), lens (2.43%) and pupil (1.62%). In cases of corneal involvement (18.05%), corneal tears or perforations were most common findings and were seen in 88 eyes (10.19%). We found that 18 cases of corneal or scleral tear presented with iris prolapse (3.82%). Iridodialysis was seen in one case. IOFB on the surface of iris was also seen in one case which was removed surgically. Five cases presented with relative afferent pupillary defect in the eye involved in trauma. Also, traumatic mydriasis was seen in 3 patients at the time of presentation.

**Lenticular involvement** after ocular injuries was seen in 12 eyes (2.43%), out of which, 7 cases developed cataract after ocular trauma, 4 cases had subluxation of the lens and one case presented with ruptured lens.

While, posterior segment injuries corresponded to 4.46% of the total ocular injuries. Posterior segment eye injuries consisted of injuries to optic nerve (1.62%) vitreous (1.01%), retina (1.01%) and choroid (0.81%).

Orbital fractures were seen in 17 cases, out of which, floor fracture was most common and seen in 7 cases, medial wall fracture was seen in 5 cases, lateral wall fracture in 3 cases and roof fracture was seen in 2 cases.

ISSN 2515-8260 Volume 10 Issue 04, 2023

**Table 5- Trauma to Ocular Structures**

| Ocular Structures | Injuries (N=493) | Percentage |
|---|---|---|
| **Lid** | 180 | 36.51% |
| **Conjunctiva** | 130 | 26.37% |
| **Cornea** | 89 | 18.05% |
| **Sclera** | 10 | 2.03% |
| **AC** | 22 | 4.46% |
| **Iris** | 20 | 4.06% |
| **Pupil** | 8 | 1.62% |
| **Lens** | 12 | 2.43% |
| **Vitreous** | 5 | 1.01% |
| **Choroid** | 4 | 0.81% |
| **Optic Nerve** | 8 | 1.62% |
| **Retina** | 5 | 1.01% |
| **Total** | 493 | 100% |

**Mode of treatment**- 52.23% (82 eyes) of the cases were treated surgically. This included corneal or conjunctival tear suturing, scleral tear suturing, lid tear suturing, evisceration and cataract extraction with or without intraocular lens implantation, trabeculectomy. 47.77% (75 eyes) of the cases received medical treatment.

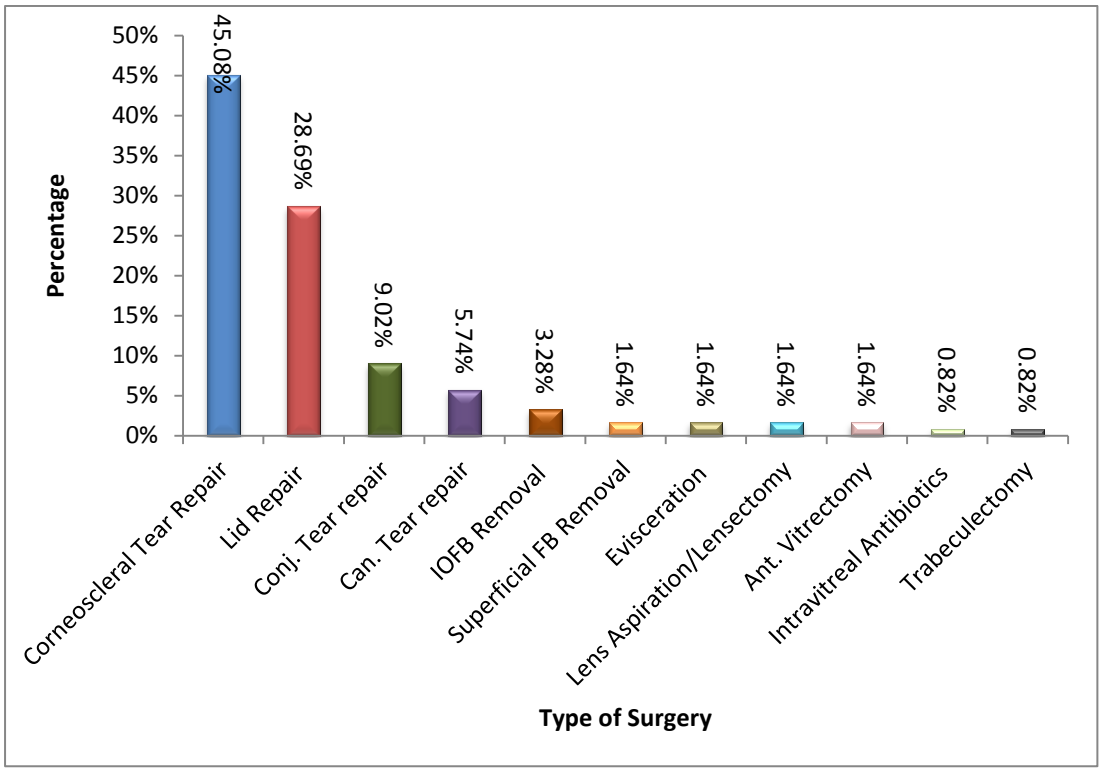


**Figure 1- Types of surgery**

Out of 157 eyes of 152 patients, at the time of presentation 86 cases (54.78%) had VA between 6/6 - 6/18, 22 cases (14.01%) had VA between 6/24 - 6/60, 45 cases (28.66%) had VA between 5/60 to PL and 4 cases (2.55%) presented with no PL. However, after treatment the 119 cases (78.80%) had final BCVA between 6/6 - 6/18, 17 cases (10.83%) had VA

ISSN 2515-8260 Volume 10 Issue 04, 2023

between 6/24 - 6/60, 17 cases (10.83%) had VA between 5/60 to PL and 4 cases (2.55%) had no PL. This shows that that there was a significant improvement **(p- value<0.05)** in VA at the final visit.

**Table 6-Comparison of VA at Presentation and on Final visit**

| VA | At Presentation | | Final | | $X^2$ | p value |
|---|---|---|---|---|---|---|
| | Eyes | Percentage | Eyes | Percentage | | |
| 6/6-6/18 | 86 | 54.78% | 119 | 78.80% | 36.543 | 0.001 *(HS) |
| 6/24-6/60 | 22 | 14.01% | 17 | 10.83% | | |
| 5/60 to PL | 45 | 28.66% | 17 | 10.83% | | |
| No PL | 4 | 2.55% | 4 | 2.55% | | |
| Total | 157 | 100% | 157 | 100% | | |

***p-value <0.05 is taken as significant**

## DISCUSSION

Ocular trauma is a potential preventable cause of ocular morbidity. Ocular injuries can occur in almost any setting. These mainly include rural agricultural farms, occupational work places, homes, recreational and sports centres and road accidents. This data is helpful in defining target population and accordingly, preventive measures can be taken.

In our study there was increased incidence of ocular injuries in younger age group that is 48.68% of the cases belonged to 31-45 years age group. The working-class population was more affected by trauma, due to various possible reasons such as exposure during travelling, at work place and risk-taking behaviour. Our results are consistent with studies conducted by Misra et al. (10) and Dhasmana et al. (12) who also reported that most of the ocular injuries occur in the age group of 15 to 45 years, which is the working class population .

Males were more commonly involved constituting 74.34% of the total cases. Male preponderance is seen, because they are more frequently exposed to outdoor work compared to females. This was in correlation with Balaghafari A et al. (13) and Sharma et al. (14) The most common cause of injury was road traffic accident (42.76%) followed by occupational injuries(21.71%) and 11.18% of the cases were injured due to play and sports. This was consistent with studies by Enock et al.(15) and Mowatt et al. (3) who reported that motorcycle-related road traffic accident was the most common cause of ocular injury.

In our study 36.18% presented to the hospital within six hours of the injury, while 53.29% of the patients presented within 6 to 24 hours and only 10.53% of the cases presented after 24 hours of the injury. This was correlated with Mishra et al. (16) Patients who came late after injury usually did not suffer from significant symptoms and signs at the time of injury or had received treatment elsewhere and were presenting now with sequelae or complications.

In our study, 59.24% of the cases had closed globe injuries, whereas 31.85% of the cases presented with open globe injuries. This was in close correlation with studies conducted by Kaur et al. (17) and Syal et al. (18)

In our study, anterior segment was more commonly involved than posterior segment. Our findings are consistent with similar studies conducted earlier. (18, 19) In our study, lid injuries constituted major fraction of the injuries sustained during ocular trauma (36.51%), followed by conjunctival injuries (26.37%).

Eyelid injuries included edema (18.90%) followed by ecchymosis (9.55%) and eyelid lacerations (7.65%). In our study, anterior segment injuries included injuries to cornea (18.05%), AC (4.46%), iris (4.06%), lens (2.43%) and pupil (1.62%). Majority of corneal injuries were corneal tears followed by epithelial defects and corneal edema. Iris and pupil injuries such as iridodialysis and traumatic mydriasis. Injuries to the lens comprised 2.43% of all ocular injuries, which included traumatic cataracts, subluxated, and ruptured lens.

Out of the cases with posterior segment injuries (4.46%), 1.01% had injuries to the retina including retinal detachment/tear and purtscher retinopathy, 1.62% had optic nerve injuries including traumatic optic neuropathy, pale disc and disc edema, and 0.6% had vitreous haemorrhage. Our results are in consistence with study conducted by Enock et al. (12) who reported that the conjunctiva, lids and cornea were the mostly commonly affected structures during ocular trauma. Meanwhile, Kaur et al. (17) reported that conjunctiva (79%) was the most common involved structure in ocular trauma followed by trauma to eyelid (66.0%) and cornea (43%).

In our study, bony injuries were seen 17 cases. Floor fracture was most common, followed by medial wall and roof fracture was least common. Hwang et al. (20) also reported the floor fractures as most common isolated orbital fracture.

Out of 152 patients studied, in our study at the time of presentation, 54.78% of the cases had VA between 6/6 - 6/18, 14.01% of the cases had VA between 6/24 - 6/60, 28.66% of the cases had VA between 5/60 to PL and 2.55% presented with no PL. After treatment, 78.80% of the cases had BCVA between 6/6 - 6/18, 10.83% had VA between 6/24 - 6/60, 10.83% had between 5/60 to PL and 2.55% had no PL. We also observed that a better initial VA usually reflects milder ocular tissue damage, which ensures a better visual outcome. Our findings are consistent with a study done by Kaur et al. (17) who found that 45% cases had VA between 6/18 - 6/6, 19% had between 6/24 - 6/60, 11% had between 5/60 - 3/60 and 25% had < 3/60 at the time of presentation. However, after treatment, 69% had VA between 6/18 - 6/6, 18 had between 6/24 - 6/60, 5 had between 5/60 - 3/60 and 8 had < 3/60. Also, in a study by Qi et al. (21), it was reported that 65.5% of the patients achieved VA at > 20/60.

## CONCLUSION

From this study, we conclude that ocular trauma is more common in males of younger age group and the road traffic accidents were the most common cause. Closed globe injuries were more common than open globe. Eyelids were the most frequently injured structure followed

by conjunctiva. Thus, strict implementation of traffic rules, health education and preventive strategies may help to decrease the occurrence of ocular injuries. Prompt transfer to a good eye facility, early investigations, and management are key features to prevent permanent visual loss, thus reducing both social and economic burden on the society.

***Acknowledgments***: We thank the participants for being a part of the study.

***Conflict of interest***: None

## BIBLIOGRAPHY

1. Katz J, Tielsch JM. Lifetime prevalence of ocular injuries from the Baltimore Eye Survey. Arch Ophthalmol Chic Ill 1960. 1993 Nov;111(11):1564–8.
2. Omar R, Anan NS, Azri IA, Majumder C, Knight VF. Characteristics of eye injuries, medical cost and return-to-work status among industrial workers: a retrospective study. BMJ Open. 2022 Jan 1;12(1):e048965.
3. Mowatt L, McDonald A, Ferron-Boothe D. Hospitalization trends in adult ocular trauma at the University Hospital of the West Indies. West Indian Med J. 2012 Sep;61(6):605–9.
4. Négrel AD, Thylefors B. The global impact of eye injuries. Ophthalmic Epidemiol. 1998 Sep;5(3):143–69.
5. Beshay N, Keay L, Dunn H, Kamalden TA, Hoskin AK, Watson SL. The epidemiology of Open Globe Injuries presenting to a tertiary referral eye hospital in Australia. Injury. 2017 Jul;48(7):1348–54.
6. Kuhn F, Morris R, Witherspoon CD, Mester V. The Birmingham Eye Trauma Terminology system (BETT). J Fr Ophtalmol. 2004 Feb;27(2):206–10.
7. Kuhn F, Maisiak R, Mann L, Mester V, Morris R, Witherspoon CD.The Ocular Trauma Score (OTS). Ophthalmol Clin North Am. 2002Jun;15(2):163-5.
8. Yu Wai Man C, Steel D. Visual outcome after open globe injury: a comparison of two prognostic models--the Ocular Trauma Score and the Classification and Regression Tree. Eye (Lond). 2010 Jan;24(1):84-9.
9. Fujikawa A, Mohamed YH, Kinoshita H, Matsumoto M, Uematsu M, Tsuiki E et al. Visual outcomes and prognostic factors in openglobe injuries. BMC Ophthalmol. 2018 Jun 8;18(1):138.
10. Misra S, Nandwani R, Gogri P, Misra N. Clinical profile and visual outcome of ocular injuries in a rural area of western India. Australas Med J. 2013;6(11):560–4.
11. Canavan YM, O'Flaherty MJ, Archer DB, Elwood JH. A 10-year survey of eye injuries in Northern Ireland, 1967-76. Br J Ophthalmol. 1980 Aug;64(8):618–25.
12. Dhasmana R, Bahadur H, Jain K. Profile of ocular trauma in Uttarakhand, A hospital based study. Indian journal of community health. 2012 Dec 31;24(4):297-303.
13. Balaghafari A, Siamian H, Aligolbandi K. Ocular trauma: 2 years retrospective study in sari, iran. Mater Socio-Medica. 2013 Dec;25(4):230–2.
14. Sharma AK, Aslami AN, Srivastava JP, Iqbal J. Visual Outcome of Traumatic Cataract at a Tertiary Eye Care Centre in North India: A Prospective Study. J Clin Diagn Res JCDR. 2016 Jan;10(1):NC05-08.

15. Enock ME, Omoti AE, Alikah AA. Risk factors identification for ocular trauma in patients who presented in a suburban tertiary care hospital in Nigeria. Saudi Med J. 2007 Sep;28(9):1385–8.
16. Mishra A, Verma AK, Baranwal VK, Aggarwal S, Bhargava N, Parihar JK. The pattern and visual outcomes of ocular trauma in a large zonal hospital in a non-operational role: A 36 months retrospective analysis. Journal of Clinical Ophthalmology and Research. 2014 Sep 1;2(3):141.
17. Kaur I, Pal Kaur P, Pradhan A, Karan Singh Bal B, Goyal P, Bajaj N. Study of clinical and demographic profile of ocular trauma and its effect on visual outcome. J Evol Med Dent Sci. 2017 May 8;6(37):3038–45.
18. Syal E, Dhawan M, Singh SP. To study the epidemiological and clinical profile of ocular trauma at a tertiary health-care facility. Delta Journal of Ophthalmology. 2018 Oct 1;19(4):259.
19. Shukla B, Agrawal R, Shukla D, Seen S. Systematic analysis of ocular trauma by a new proposed ocular trauma classification. Indian J Ophthalmol. 2017 Aug;65(8):719–22.
20. Hwang K, You SH, Sohn IA. Analysis of orbital bone fractures: a 12-year study of 391 patients. J Craniofac Surg. 2009 Jul;20(4):1218–23.
21. Qi Y, Zhang YF, Zhu Y, Wan MG, Du SS, Yue ZZ. Prognostic Factors for Visual Outcome in Traumatic Cataract Patients. J Ophthalmol. 2016;2016:1748583.