



**ORIGINAL RESEARCH PAPER**

**Ophthalmology**

**STUDY OF ETIOLOGY AND CLINICAL MANIFESTATIONS OF OCULAR TRAUMA IN A TERTIARY CARE CENTRE**

**KEY WORDS:** Lid ecchymosis, traumatic iritis, hyphaema, closed globe injuries

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**ABSTRACT**

**Purpose:** To analyze the magnitude, mode of injury and the clinical manifestations of ocular trauma occurring in patients attending the out patients and emergency department of a tertiary care centre.

**Methods:** This is an observational and descriptive study of 102 patients for a period of 2 months. Patient's data, mode of injury, extent of injury, and the follow up for 1 month was noted and the outcomes analyzed.

**Results:** The magnitude of the ocular trauma was found to be 2.3% and the study reinforces that ocular trauma mainly affects the young economically productive group between 20 – 50 years mainly men (65.7%) more than women (34.3%) and most of it is due to closed globe mechanical injuries. Only 3.9% cases presented with binocular injury while the others presented with monocular injuries. Better preventive measures at home and work place would reduce the ocular morbidity significantly

Ocular trauma is an important preventable cause of visual morbidity in the younger population. Prevention and management of the ocular trauma requires a good knowledge on the causative agent of the trauma, place of trauma, pattern of ocular damage. Nearly 90% of the ocular injuries can be prevented by relatively simpler measures<sup>[1]</sup>. As many as 5 lakh people are blind as a result of ocular injuries. Studies indicate that one in every five adults have a history of ocular trauma. Reports suggest that up to 60.5% of cases of ocular injury leads to significant visual loss with higher rates among men under age of 30 years. Cost burden following ocular trauma also plays an important role as it may be high due to the requirement of hospitalization, specialist treatment, prolonged follow-up and visual rehabilitation. The secondary impact in the form of loss of work or school days or carrying out household work estimation helps us to know about the burden on the productivity of the individual<sup>[2]</sup>. Prevention and management of the ocular trauma requires a good knowledge on the causative agent of the trauma, place of trauma, pattern of ocular damage and vulnerable age group and gender<sup>[3]</sup>. The extent of injury suffered is determined by the amount of energy transferred to the globe and the orbit, the physical characteristics of the object, location of the impact area. Early diagnosis and immediate treatment of ocular trauma can reduce the visual morbidity to a greater extent<sup>[4]</sup>. Significant predictive factors of final visual acuity after penetrating trauma include visual acuity, wound location and strength, and mechanism of injury<sup>[5]</sup>. Annual direct and indirect costs for the ocular injuries are estimated conservatively at \$5 million (50 lakhs) and a loss of 60 work years. A large burden of preventable eye trauma is borne by both patients and society<sup>[6]</sup>. Eye care programs may need to consider ocular trauma as a priority in the population, because the lifetime prevalence of ocular trauma is higher than that reported for glaucoma, diabetic retinopathy or hypertensive retinopathy from the population. Simple measures such as education regarding the use of protective eyewear could possibly significantly decrease this preventable cause of visual disability<sup>[7]</sup>. In this background, we decided to do a descriptive study on the various etiological factors and clinical manifestations of the ocular trauma and the complications following the trauma and also the improvement in vision following the treatment. The research is carried out to find out the burden of the ocular trauma and it helps in defining the target groups for prevention and education on ocular trauma and also to formulate various strategies to prevent and decrease the burden due to ocular trauma.

**MATERIAL AND METHODOLOGY**

This was an observational, descriptive study conducted over a period of two months April to May 2014 in our out patients and Emergency Department with ocular trauma after obtaining ethical clearance from the college Ethics committee. Our study was conducted with an objective to analyse

- The etiological factors responsible for the ocular trauma and the clinical manifestations of the ocular trauma

- To determine the visual acuity of the injured eye at the time of clinical presentation and to assess the visual acuity during the follow-up visits
- To delineate the changes in the anterior segment and the posterior segment following the ocular trauma
- To find out the magnitude of the ocular trauma in the tertiary care centre

A total of 102 patients who came with ocular trauma during the study period were examined and a perfoema was prepared and the particulars about the subjects such as name, age, sex and occupation was noted and a complete history on the cause, nature and circumstances of the injury and whether any medications had been taken before coming to the hospital, time gap between injury and presentation to the hospital was noted. The common ocular symptoms that were present during the time of presentation had been recorded. The detailed ocular examination which included visual acuity, slit lamp examination of the anterior segment and fundus examination was done at the time of clinical presentation. The ocular examination was done during the follow-up visits in order to find out whether any changes that developed in the anterior and the posterior segments following the ocular trauma. The visual acuity was assessed during the follow-up visits in order to document on the improvement of the vision. Totally 3 follow up visits recorded at 7 days, 14 days and 1 month.

Data was entered in MS excel sheet and was analyzed using SPSS software. Data was analyzed based on frequency and proportions.

**OBSERVATIONS AND RESULTS**

A total of 102 patients were examined during a period of 2 months with history of ocular trauma and they were followed up after 7 days, 14 days and 1 month. The necessary information were tabulated in the excel sheet and the results were analysed. Figure 1 and 2 gives information on the sex distribution and the extent of injury. Large proportion of the affected patients were males (65.7%) and unilateral injury (98.1%) was more common than the bilateral injuries (3.9%). Among the unilateral eyes that were affected, right eye was more involved (56.9%) in the trauma than the left eye (39.2%)

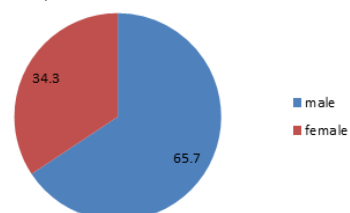


Figure 1 shows that 67 (65.7%) were male and 35 (34.3%) were females.

The mean age of male patients was 33 and the mean age of the female patients was 37. There was no age predilection for the ocular trauma in both the sexes as per the Mann Whitney U test.

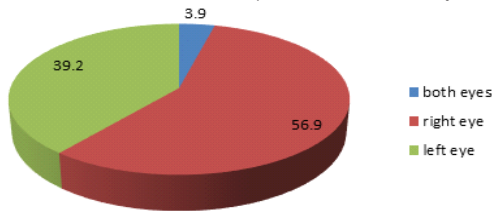


Figure 2: extent of the ocular involvement

Figure 2 shows that the monocular injury was more than the binocular injury and it was the right eye that was more affected than the left eye.

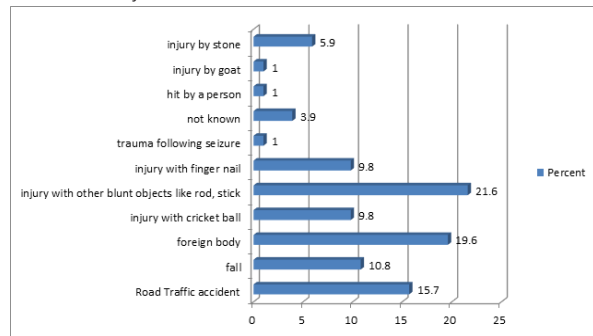


Figure 3: cause of trauma

From the figure 3, the major cause of the trauma was injury with blunt objects like rod, stick accounting for 21.6% which was followed by fall of foreign body (19.6%) and Road Traffic Accident (15.7%). The other causes included fall (10.8%), injury with finger nail (9.8%), injury with cricket ball (9.8%) and fall of stone (5.9%). Injury by goat, punch from a person and trauma following seizure each accounted for 1%. In 3.9% of people the cause was not known.

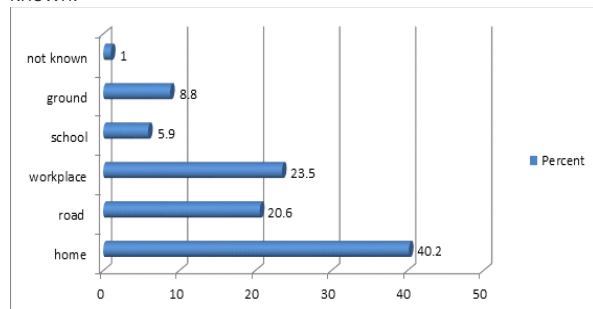


Figure 4: place of trauma

Figure 4 shows that the most common place of trauma was at home (40.2%), followed by workplace (23.5%). Others included road (20.6%), school (5.9%) and playground (8.8%). In 1% of the cases place of trauma was not known.

Figure 5: symptoms during the time of presentation

Symptoms	frequency	percent
Pain	71	69.6
Loss of vision	8	7.8
Blurring of vision	2	2
Redness	52	51
Increased tear production	20	19.6
Swelling of eyelid	22	21.6
Blackening of eyelid	1	1
Glare	2	2
Irritation	6	5.9
Photophobia	2	2

Figure 5 shows that the common presenting symptoms of the ocular trauma included pain (69.6%), redness (51%), swelling of the eyelid (21.6%) and increased tear production (19.6%). The other less common presenting symptoms included loss of vision (7.8%), irritation (5.9%), blurring of vision (2%), glare (2%), photophobia (2%) and blackening of eyelid (1%).

Figure 6: clinical findings during the time of presentation

Findings	Frequency	Percentage
Lid ecchymosis	31	29.3
Lid abrasion	6	5.7
Lid edema	4	3.8
Subconjunctival hemorrhage	35	33
Circumcorneal congestion	21	19.8
Conjunctival tear	1	0.9
Corneal epithelial defect	1	0.9
Corneal abrasion	7	6.9
Corneal edema	1	0.9
Corneal ulcer	1	0.9
Foreign body	9	8.5
Descemet membrane folds	2	1.9
Anterior chamber reaction	20	18.9
Iritis	1	0.9
Blood clot over the iris	1	0.9
Iridocyclitis	1	0.9

Figure 6 shows that the common ocular findings following the ocular trauma were subconjunctival hemorrhage (SCH) (33%), lid ecchymosis (29.3%), circumcorneal congestion (19.8%) and anterior chamber reaction (18.9%). The other findings included foreign body (8.5%) out of which 7 were in the cornea, 1 in the palpebral conjunctiva & 1 in eyelid, lid abrasion (5.7%), lid edema (3.8%) and corneal abrasion (6.9%). The other less common findings included descemet membrane fold (1.9%), conjunctival tear, corneal epithelial defect, corneal edema, corneal ulcer, iritis, iridocyclitis and blood clot over the iris each accounting for 0.9% of the cases.



Image:1 Lid edema and ecchymosis

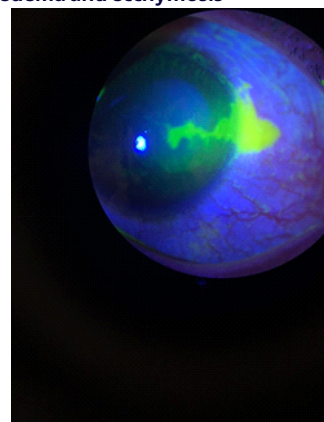


Image:2 Corneal Abrasion

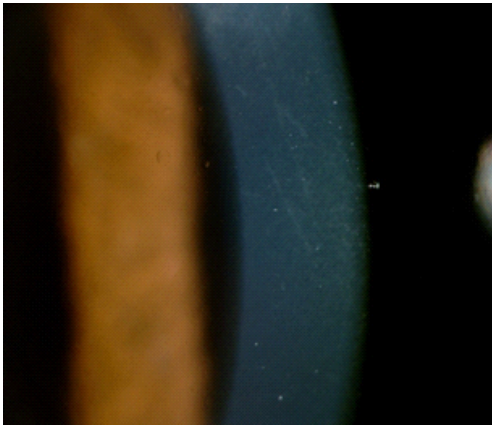


Image 3: corneal abrasion with caterpillar hair

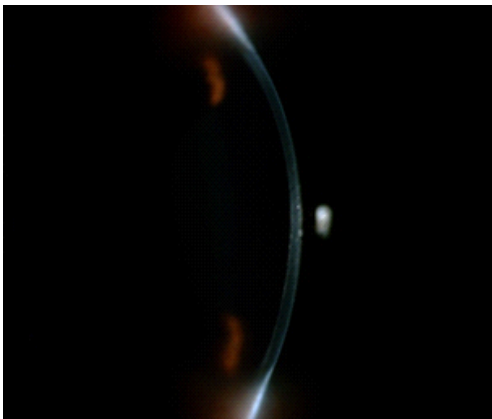


Image:4 Traumatic iritis

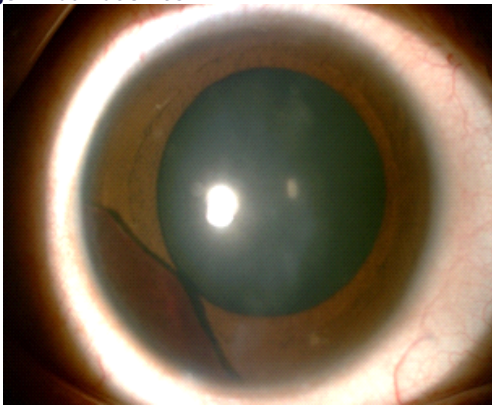


Image:5 Traumatic Hyphaema



Image:6 Peripheral Commotio retinae

The number of patients who attended the ophthalmology department during the study period was 4,435. Therefore the magnitude of the ocular trauma was 2.3%. Out of the 67 males who presented with ocular trauma, 17 were under the influence of alcohol (i.e. 25.4%). Of the 16 Road traffic accident cases, none were wearing the helmet. The mean time gap between the ocular injury and presentation to the hospital was by 67 hours in case of males and 52 hours in case of females.

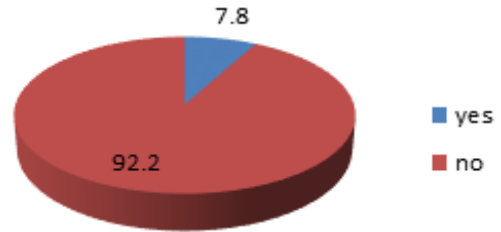


Figure 7: medications taken before coming to the hospital

Figure 7 shows that the most of the patients (92.2%) didn't take any medications before coming to the hospital.

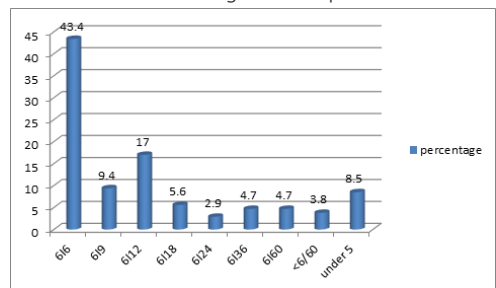


Figure 8: visual acuity at the time of presentation

From the figure 8, the visual acuity was 6/6 for major part of the patients (43.4% of patients). About 75.4% of the patients had normal vision (visual acuity of 6/6 to 6/18). About 8.5% of patients were under 5 to whom visual acuity couldn't be assessed. Rest 16.1% of the population had low vision (visual acuity less than 6/18).

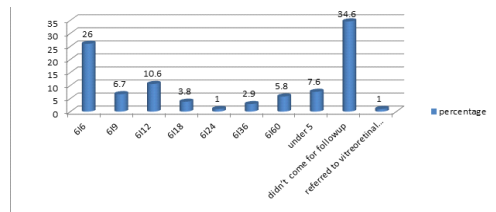


Figure 9: visual acuity during the first follow up

Figure 9 shows that majority of the patients didn't turn up for the follow up (34.6%). 1% of the patients were referred to vitreoretinal centre. Visual acuity of 6/6 was seen in 26% of the total patients. In the remaining 64.4% of the patients i.e. in the remaining 66 patients who came for the first follow up, 49 patients had normal vision (i.e. visual acuity between 6/6 and 6/18) & 8 of them were under 5 to whom the visual acuity couldn't be assessed. Rest 10 of them had low vision (i.e. visual acuity less than 6/18).

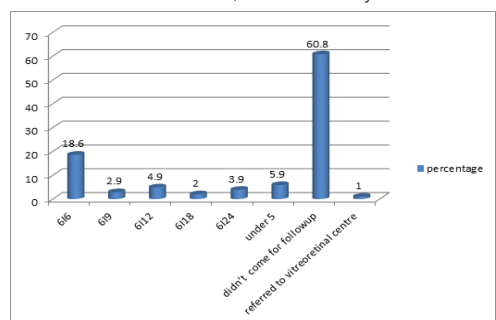


Figure 10: visual acuity during the second follow up

Figure 10 shows that 60.8% of the patients didn't come for follow up and 1% of patients were referred to vitreoretinal centre. Rest 38.2% of the patients i.e. 39 patients who came for the follow up, 29 patients had normal vision (i.e. visual acuity between 6/6 and 6/18), 6 of them were under 5 to whom visual acuity couldn't be assessed & 4 of them had low vision (visual acuity less than 6/18).

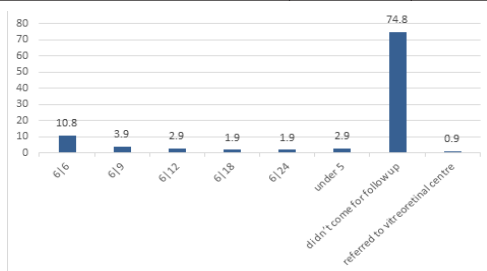
**Figure 11: findings during the first follow up**

First follow up	frequency	Percentage
Lid ecchymosis	15	14.7
Lid abrasion	5	4.9
Subconjunctivalhemorrhage	22	21.6
Circumcorneal congestion	15	14.7
Conjunctival scarring	1	1
Corneal epithelial defect	3	2.9
Corneal abrasion	3	2.9
Corneal edema	8	7.8
Corneal scarring	1	1
Corneal ulcer	1	1
Descemet membrane fold	2	2
Anterior chamber reaction	10	9.8
Traumatic mydriasis	1	1
Blood clot over the iris	1	1
Didn't come for follow up	36	34.6

Figure 11 shows that about 34.6% patients didn't come for the follow up. Out of the 66 patients who came for the follow up, SCH (22), lid ecchymosis(15), cirumcorneal congestion(15), anterior chamber reaction(10) & corneal edema(8) were the major presentations. Other findings included lid abrasion, conjunctival scarring, corneal epithelial defect, corneal ulcer, corneal abrasion, corneal scarring, descemet membrane fold, traumatic mydriasis and blood clot over the iris.

**Figure 12: findings during the second follow up**

findings in the second follow up	frequency	percentage
Resolving ecchymosis	2	2
Subconjunctivalhemorrhage	1	1
Epithelial defect	3	2.9
Conjunctival scarring	1	1
Corneal scarring	3	2.9
Anterior chamber reaction	1	1
Traumatic mydriasis	1	1
Didn't come for follow up	62	60.8



**Figure 13: visual acuity during third follow up**

Figure 13 shows that about 74.8% didn't come for the follow up visits. Out of the 25 patients 24.3%) who attended the third follow up, 20 patients had normal vision (i.e. visual acuity between 6/6 and 6/18), 3 of them were under 5 to whom visual acuity couldn't be assessed & 2 of them had low vision (visual acuity less than 6/18).

**Figure 14: findings during the third follow up**

Findings in the third follow up	Frequency	Percentage
Conjunctival scarring	1	1
Corneal scaring	3	2.9
Traumatic mydriasis	1	1
Commotio retinae	1	1
Didn't come for follow up	76	74.8

Figure 14 shows that 74.8% (76) patients didn't come for follow up. Among the 25 patients who attended the third follow up, corneal scarring (2.9%) was the major presentation. Other findings were conjunctival scarring, traumatic mydriasis and commotio retinae (1% each).

**DISCUSSION**

There are approximately 6 million people who are blind from ocular injuries worldwide and ocular trauma is one of the most leading cause of monocular blindness<sup>(8)</sup>The needless blindness due to ocular trauma is a preventable cause of blindness in the world. Despite its public health importance, the population based study and data on the magnitude, pattern of trauma and the clinical manifestations are less in the union territory. Hence a study was conducted to estimate the burden of ocular trauma.

In our study, the magnitude of the ocular trauma in our tertiary care centre was found to be 2.3%. Male patients (65.7%) contributed higher than the female counterpart which accounted for only 34.3%. The mean age of male patients presenting with ocular trauma was found to be 33 whereas the mean age of the female patients presenting with ocular trauma was found to be 37. One 3<sup>rd</sup> of our patients were in the paediatric age group. The higher incidence of males being affected was due to the increased outdoor rough jobs undertaken by men and also in almost all societies, men are able to have an increased access to health services than women. Only 3.9% cases presented with binocular injury while the others presented with monocular injuries in which the injury to the right eye (56.9%) was more common than the injury to the left eye (39.2%) indicating that trauma is the commonest cause for unilateral low vision. The mean time gapbetween the ocular injury and presentation to the hospital was by 67 hours in case of males and 52 hours in case of females.

The most common cause of the ocular trauma was injury with blunt objects like rod, stick which accounts for 21.6% followed by fall of foreign body (19.6%) and Road Traffic Accident (15.7%). The most common place of trauma was at home (40.2%), followed by workplace (23.5%). Of the 16 Road traffic accident cases, none were wearing the helmet. Out of the 67 males who presented with ocular trauma, 17 were under the influence of alcohol (i.e. 25.4%). Alcoholism is a public health issue affecting both the functional and cognisant abilities of an individual leading to physical harm and loss of functional ability. Most of the patients (92.2%) didn't take any medications before coming to the hospital as many were from the rural background with poor literacy. The common ocular symptoms following the ocular trauma were pain which accounted for 69.6% patients followed by redness (51%), swelling of the eyelid (21.6%) and increased tear production (19.6%). The common ocular findings were predominantly seen in the anterior segment like SCH (33%), lid ecchymosis (29.3%), circumcorneal congestion(19.8%) and anterior chamber reaction(18.9%). The other findings included foreign body (8.5%) out of which 7 were in the cornea, 1 in the palpebral conjunctiva & 1 in eyelid, lid abrasion (5.7%), lid edema (3.8%), corneal abrasion (6.9%) followed by, descemet membrane fold (1.9%), corneal epithelial defect, conjunctival tear, traumatic iritis, and blood clot over the iris each accounting for 0.9% of the cases. About 75.4% of the patients had normal vision (visual acuity of 6/6 to 6/18) following the ocular trauma and 16.1% had low vision (visual acuity less than 6/18). Patients with lid edema and ecchymosis was treated with cold compresses and systemic anti-inflammatories whereas patients with SCH were treated with topical antibiotic eye drops and ointments and those who had epithelial abrasions were patched and were examined the next day. Patients with corneal foreign bodies and caterpillar hairs were removed and topical antibiotic medications instituted. Patients who had traumatic iritis, hyphaema were treated with topical steroid and cycloplegic eye drops.

During the first and the second follow up visits 10 and 4 patients respectively had low vision (visual acuity less than 6/18) and during the third visit, 20 patients had regained normal visual acuity, resolved hyphaema and commotio retinae. One patient had resolving hyphaema and commotio retinae. The various changes

that were seen during the follow up visits include conjunctival scarring, traumatic mydriasis seen in 1% of the patients each and corneal scarring which is seen in 3% of the patients.

### CONCLUSION

From the above study it is clear that the males are more prone for the ocular trauma. Majority of the ocular trauma can be avoided by being alert while using blunt objects and other objects potential of causing ocular injury at home or workplace, use of helmets in case of road traffic accident and other protective goggles in case occurring at the workplace. Alcohol influence also plays an important role in the ocular injury for which a widespread public education and investigation of public attitudes can help in the avoidance of alcohol abuse. Hence strict measures have to be taken in order to avoid the ocular trauma as it is the major and the most under-recognized cause of ocular morbidity. More studies for a longer period had to be taken up in the union territory to gauge the extent of the ocular trauma

### REFERENCES

- [1] K.H. Partani, KhushbuBhattad. Study of Clinical Profile and Etiology of Ocular Trauma in Tertiary Center. Part4 APAO-AIOS 2013, Page: 610-614
- [2] R.N.Kushwala, Rashmi Rastog2, R.C.Gupta, Priyanka Gupta, Sushil Kumar. "Profile of ocular trauma in tertiary care centre". Journal of Evolution of Medical and Dental Sciences 2013; Vol2, Issue 27, July 8; Page: 4903-4914
- [3] Godar ST, Kaini KR, Amatya P, Joshi K, Singh L. Magnitude of ocular trauma in a tertiary care hospital of western Nepal. Nepal Journal of Medical Sciences 2013;2(2):140-3.
- [4] Pai SG, Kamath SJ, D'Souza S, Dudeja L. A Clinical Study of Blunt Ocular Trauma in a Tertiary Care Centre. Online J Health Allied Scs. 2013;12(2):10.
- [5] Esmaeli, Bitá, et al. "Visual outcome and ocular survival after penetrating trauma: a clinicopathologic study." Ophthalmology 102.3(1995):393-400.
- [6] Schein, Oliver D., et al. "The spectrum and burden of ocular injury." Ophthalmology 95.3(1988): 300-305.
- [7] Nirmalan, Praveen K., et al. "Ocular trauma in a rural south Indian population: the Aravind Comprehensive Eye Survey." Ophthalmology 111.9(2004): 1778-1781.
- [8] Negrel AD, Thylefors B. The global impact of eye injuries Ophthalmic Epidemiol 1998;143-69.