

## Profile of head injuries in Road Traffic Accident cases with Ocular trauma in a rural tertiary care hospital

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### ABSTRACT

**Background:** Road traffic accidents form a major part of accident and emergency care not only in cities but also in rural places. Improved affordability, changed socio economic conditions, personality and mind set of the younger generation, etc.. have influenced the behavioral pattern directly & indirectly. Access to accident and emergency care in rural India is still limited; especially with regards to management of head injuries. This research was conducted as an arm of a study of ocular injuries, as it was felt that there was a close inter relation between ocular injuries & head injuries, the outcome of this research may help in drawing attention to head injuries and better management of the same.

### Objectives:

- To study profile and pattern of head injuries in relation to eye injury presenting to Accident and Emergency services of a tertiary care hospital, wherein ophthalmology reference was sought. Head injuries include both injuries to the brain and those to other parts of the head, such as the scalp and skull.
- It is also useful to study common ophthalmic manifestation in various types of head injury and to attempt a correlation between the neurological signs, ocular signs, GCS (Glasgow Coma Scale).
- It was a non-interventional study to analyze correlation, if any, between Ocular trauma & head injuries.
- This study aims to record incidence & various modes of injury which can cause serious eye involvement with mild head injury as well as serious head injury with minimal eye involvement.

**Materials & Methods:** 60 consecutive patients presenting to Ophthalmology outpatient department or accident and emergency department of PESIMSR, with ocular trauma from the period August 2013-April 2015 were included in the study. This was an added arm of the study of ocular injuries, approved by the hospital ethical review board. And it did not include any additional intervention or investigation.

**Results:** In our study 31 patients were associated with head injury along with associated ocular injury. Out of 31, 27 were males and only 4 were females. Out of 31, 21 were two wheelerdrivers, 2 were two wheeler passengers, 4 were four wheeler passengers, 4 were pedestrians. 25 patients had mild head injury, 2 patients had moderate head injury, 4 patients had severe head injury. Out of 31, 6 patients had traumatic optic neuropathy. Invariably all patients of skull fracture were associated with periorbital edema/ecchymosis. Out of 31, 20 patients had Ocular Trauma Score (OTS) -100. OTS between 80-100 -1 patient. 55-80 -2 patients, 45-55 -4 patients.

**Conclusion:** Those with head injury other than skull fractures had intraocular findings rather than extra ocular involvement. Thus it signifies the importance of intraocular findings in relation to head injury.

**Keyword:** Head Injury, Road Traffic Accidents.

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### INTRODUCTION

Road traffic accidents form a major part of accident & emergency care not only in cities but also in rural areas. Improved affordability, changed socio economic conditions, personality and mind set of the younger generation, etc. have influenced the behavioral pattern directly & indirectly and these have resulted in increased head injuries, which may often have

associated eye injuries. While serious injuries in the area of head and neck may present to emergency department, some of them may present to the Ophthalmology department wherein eye related injuries are prominent. It becomes mandatory for the Ophthalmologist to evaluate head injuries along with management of ocular injuries. The eye and its adnexa are innervated by one-half or 50% of the cranial nerves, and 38% of all fibers in the central nervous system are concerned with visual function<sup>1</sup>, so clinical findings of neuro-ophthalmological interest are frequently noted with head injury and vice versa. Missing a serious head injury may prove costly. Access to accident & emergency care in rural India is still limited; especially, with regards to management of head injuries. Prompt detection of head injuries by

ophthalmologist can help in timely referral. This research was conducted as an arm of a study of Ocular injuries, as it was felt that there was a close interrelation between ocular injuries & head injuries. The outcome of this research may help in drawing attention to head injuries early and better management of the same, alongside the management of ocular trauma.

- The main causes of head injury were road traffic accidents 52.5% followed by assaults 34%.<sup>2</sup>
- Alcohol may be involved in up to 65% of adult head injuries.
- Head injuries are frequently associated with ophthalmic trauma and consequent morbidity.
- Clinical correlation of ophthalmic findings is important in early localization of the site of injury, ongoing assessment, management and prognosis of the patient with head injury.

**MATERIALS AND METHODS**

A total of 60 consecutive cases of ocular injury after road traffic accidents attended to hospital were evaluated for thorough ophthalmic assessment and

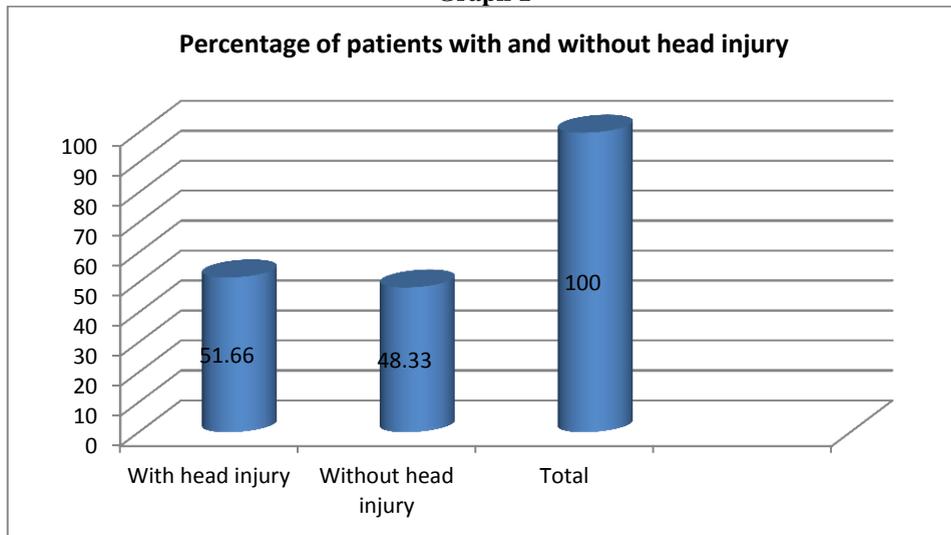
neurological evaluation. Ocular injuries were grouped as intra ocular injuries, extra ocular injuries and orbital fractures. The Glasgow Coma Scale, a tool for measuring degree of unconsciousness is a useful tool for determining severity of injury. The Glasgow coma scale (GCS) was applied to grade the severity of head injury and assess the prognosis in all cases.

OTS (Ocular Trauma Score) value is immediately available at the conclusion of the evaluation/initial surgery with reasonably reliable prognostic implication. OTS was calculated for every patient. All patients with moderate and severe head injury and those dropping two scales on the GCS underwent CT scanned as per the hospital A &E protocol. CT findings were grouped as Intracranial hemorrhage, contusion/ laceration, diffuse axonal injury, skull fracture, cerebral edema, any secondary brain injury and any other.

**RESULTS**

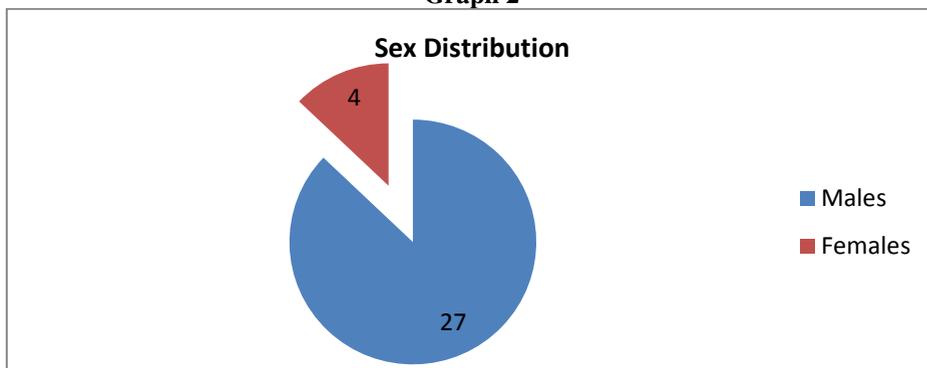
In our study out of 60, 31 patients were associated with head injury along with ocular injury.

**Graph 1**



Out of 31, 27 were males and only 4 were females.

**Graph 2**



Majority of the patients belongs to the age group in between 16 and 30.

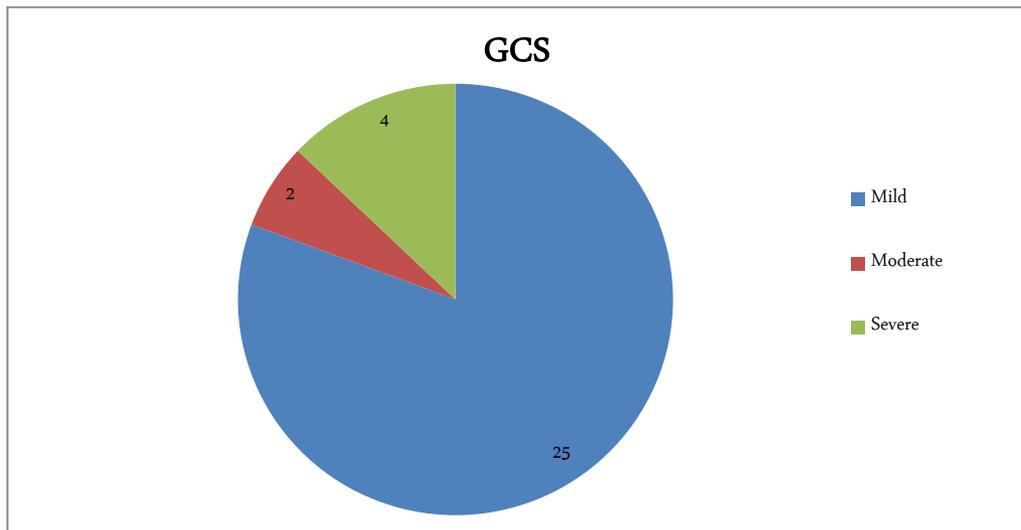
**Table 1**

AGE(Yrs)	0-15	16-30	31-45	46-60	>60	TOTAL
Males	0	18	5	3	1	27
Females	1	0	3	0	0	4
Total	1	18	8	3	1	31

**Table 2**

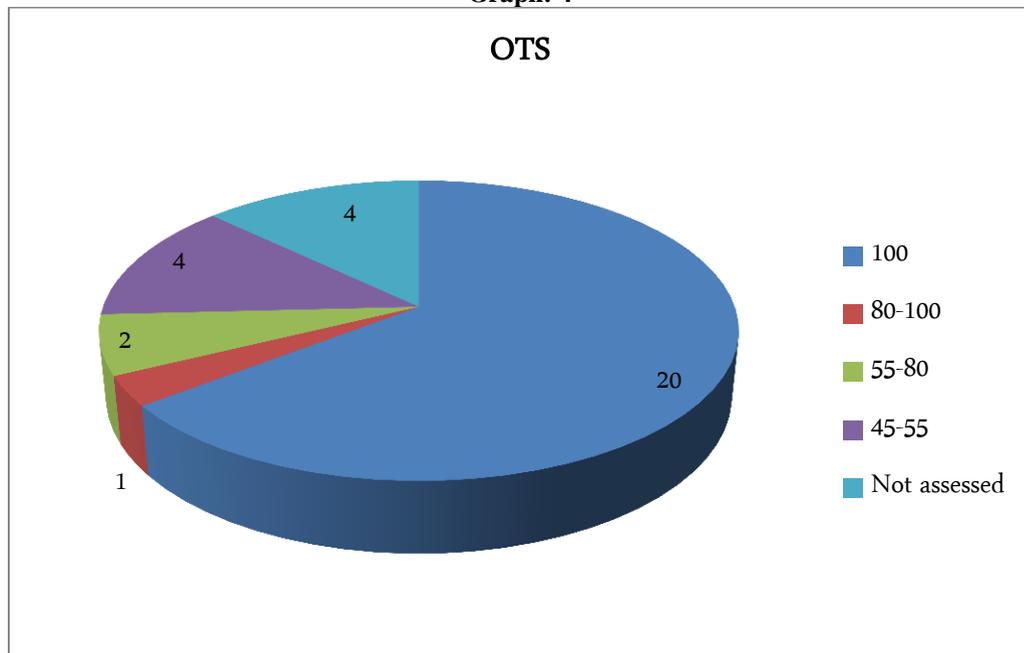
Sex	Two wheeler driver	Two wheeler passenger	Four wheeler driver	Four wheeler passenger	Pedestrian
Males	19	1	0	4	3
Females	2	1	0	0	1
Total	21	2	0	4	4

25 patients had mild head injury, 2 patients had moderate head injury, 4 patients had severe head injury. Graph 3.



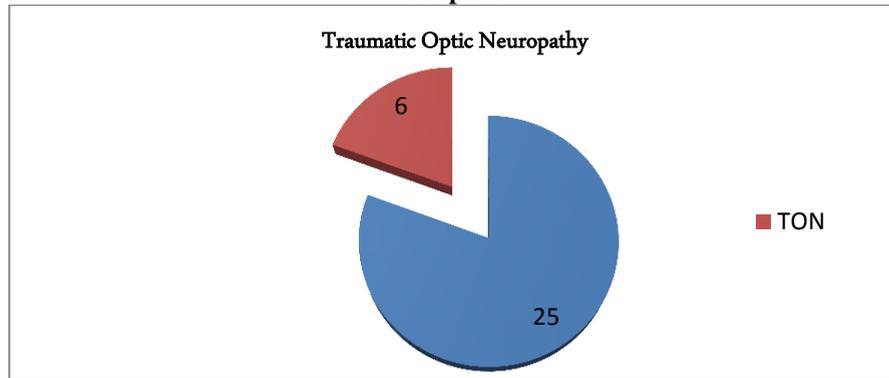
Ocular Trauma Score(OTS)

**Graph: 4**



Out of 31, 6 patients had traumatic optic neuropathy.

**Graph: 5**



Invariably all patients of skull fracture were associated with periorbital edema/ecchymosis.

**Ophthalmic signs of neurological significance**

**Table 3**

Ophthalmic signs	
Pupillary abnormalities	10
Papilloedema	0
Cranial nerve involvement	1
Neurogenic ptosis	1
Traumatic optic neuropathy	6

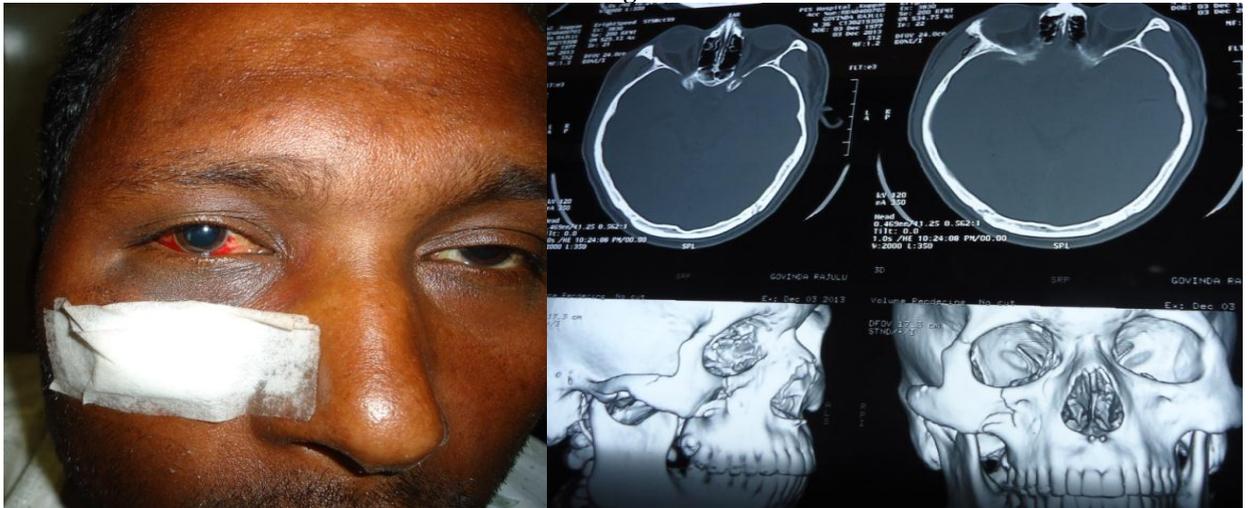
**Table 4**

CT scan findings	Male	Female	Total
Intracranial hemorrhage	7	0	7
Contusion/laceration	1	1	2
Diffuse axonal injury	1	0	1
skull fracture	22	3	25
Cerebral edema	3	0	3

**Table 5**

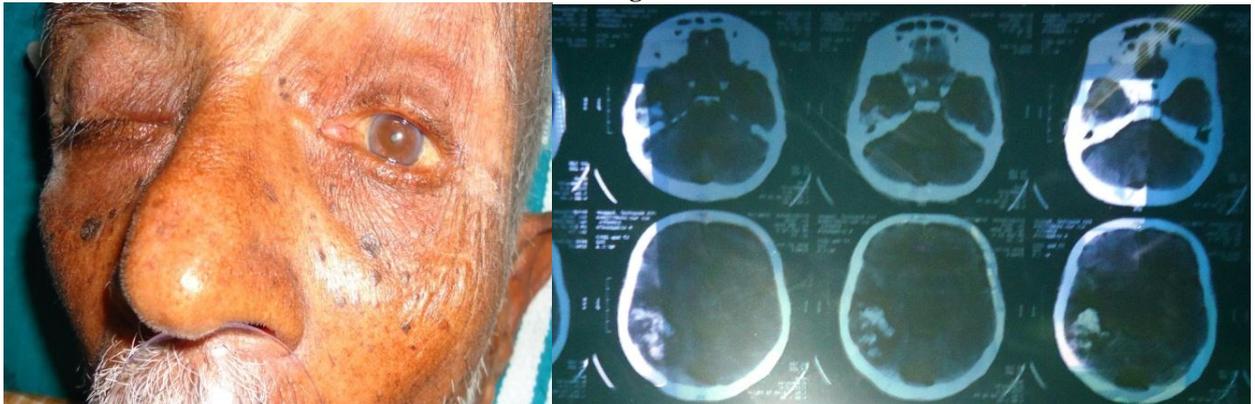
Ocular findings	Number
(a) Intraocular	
1. Optic nerve trauma	6
2. Pupillary involvement	
• Traumatic Mydriasis	1
• Hutchison's stage I	0
• Hutchison's stage II	2
• Hutchison's stage III	0
• Hutchison's stage IV	1
3. Papilledema	0
4. Macular oedema	2
5. Retinal haemorrhage	1
6. Corneal tears	0
7. Scleral tears	0
8. Hyphaema	0
9. Vitreous haemorrhage	2
(b) Extraocular	
Ecchymosis & periorbital edema	18
Cranial nerve palsy	1
Lacrimal gland injuries	1
Subconjunctival haemorrhage	8
Ptosis	1
Proptosis	1

Image 1



RE Subconjunctival Haemorrhage With Ecchymosis CT showing Tripod fracture on right side

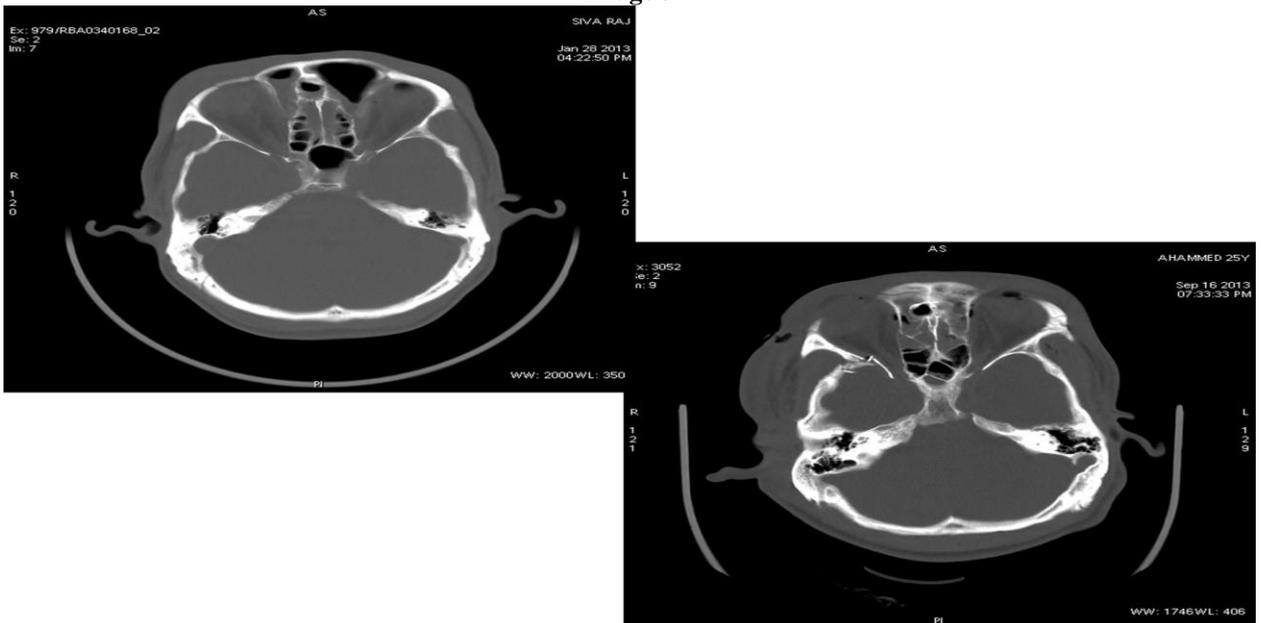
Image 2



Right side 3rd nerve palsy

CT showing intracerebral haemorrhage

Image 3



Indirect Traumatic Optic Neuropathy(TON) and direct TON (bone fragment compressing the nerve)

**DISCUSSION**

Eyes being in proximity to skull bones also have equal risk to be involved in head injury<sup>3</sup>. This study shown that more than 50% of patients had associated head injury along with ocular injuries. This highlights the significance of ocular findings in relation to the head injury. Pupillary signs are of grave importance in indicating the site and severity of injury and in the prognosis of head injury. Early signs of temporal herniation include ipsilateral miosis due to oculomotor nerve irritation, (Hutchison’s stage I) followed by paresis causing ipsilateral pupillary dilatation and a sluggish response to light (Hutchison’s stage II). Progressive dilatation of the ipsilateral pupil and miosis of the contralateral pupil (Hutchison’s stage III), heralds progressive III rd nerve palsy due to temporal lobe herniation, followed by bilateral dilation of the pupil (Hutchinson’s stage IV)<sup>4</sup>. Bilateral dilated nonreactive pupils can also be due to inadequate brain perfusion.

In pure Traumatic optic neuropathy is most threatened ocular injury, which can be reversible with early

detection and intervention. It is not possible to assess visual acuity in low GCS patients, Pupillary reactions can be useful as a key indicator of this, so we can intervene as early as possible.

Ocular Trauma score can be comparable with Glasgow coma scale as this study shown that those with low GCS invariably had low OTS. Thus the patients with low OTS should be evaluated thoroughly for associated head injury. Categorization of head injury according to GCS score.

**Categorization:**

- Coma: No eye opening, no ability to follow commands, no word verbalizations (3-8)
- Severe Head Injury-GCS score of 8 or less
- Moderate Head Injury-GCS score of 9 to 12
- Mild Head Injury-GCS score of 13 to 15<sup>5</sup>

The patients with external eye injury signs had mild form of head injury, where as those with intraocular findings had severe form of head injury.

**Glasgow Coma Score**

Eyes open	Best verbal response	Best motor response*
<input checked="" type="radio"/> Spontaneously (4) <input type="radio"/> To speech (3) <input type="radio"/> To pain (2) <input type="radio"/> None (1)	<input checked="" type="radio"/> Orientated (5) <input type="radio"/> Confused (4) <input type="radio"/> Inappropriate words (3) <input type="radio"/> Incomprehensible sounds (2) <input type="radio"/> None (1)	<input checked="" type="radio"/> Obeys commands (6) <input type="radio"/> Localizes pain (5) <input type="radio"/> Withdraws to pain (4) <input type="radio"/> Flexion (abnormal) to pain (3) <input type="radio"/> Extension to pain (2) <input type="radio"/> none(1)
Glasgow coma scale = <input style="width: 50px; height: 20px;" type="text"/>		

**Calculating the ocular trauma score (OTS): variables and raw points**

Variables	Raw points
Initial vision	
NPL/enucleation/evisceration	60
LP/HM	70
1/60–5/60	80
6/60–6/15	90
≥ 6/12	
Rupture	-23
Endophthalmitis	-17
Perforating injury	-14
Retinal detachment	-11
RAPD	-10

Raw OTS	OTS	NLP (%)	LP/HM (%)	1/200-19/200 (%)	20/200-20/50 (%)	>20/40 (%)
0-44	1					
	Study	20 (56)	6 (17)	7 (18)	2 (6)	1 (3)
	USEIR	73	17	7	2	1
45-65	2					
	Study	6 (19)	7 (23)	8 (25)	7 (23)	3 (10)
	USEIR	28	26	18	13	15
66-80	3					
	Study	1 (2)	0 (0)	10 (20)	17 (33)	23 (45)
	USEIR	2	11	15	28	44
81-91	4					
	Study	0 (0)	2 (6)	0 (0)	10 (28)	24 (67)
	USEIR	1	2	2	21	74
92-100	5					
	Study	0 (0)	0 (0)	0 (0)	2 (11)	16 (89)
	USEIR	0	1	2	5	92

OTS: Ocular trauma score, USEIR: United States eye injury registry

**CONCLUSION**

The most common ophthalmic manifestation of head injury was ecchymosis of the lids and periorbital edema(58%) followed by subconjunctival haemorrhages.

Every patient with some form ocular injury must be evaluated thoroughly for head injury with special attention to pupillary reactions and visual acuity assessment.

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