



## Ocular manifestations of head injury a clinical study

### KEYWORDS

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**ABSTRACT** *OBJECTIVE: Primary objective: To describe various ocular manifestations in selected patients with craniocerebral injuries.*

*Secondary objective: To find out if any relationship exists between different ocular manifestations in regard to nature and severity of injury.*

*PATIENTS AND METHODS: Hospital based prospective study comprised of 106 patients of 2 years duration Participants of the study-*

- o inpatients of the ophthalmology and surgery and neurosurgery wards*
- o out patients from the ophthalmology, surgery, neurosurgery and casualty departments*

*RESULTS: Among 106 patients only 18 patients were female ( 16.98 %) and rest 88 were males ( 83.02 %). The age of the patients in study ranges from 3 years to 69 years. Majority of the cases belonged to 21 to 30 years followed by 31 to 40 years. Among the various causes of head trauma, road traffic accident (RTA) was found to be the commonest cause (66.98%) followed by Assault (16.98%). From the road traffic accidents majority were associated with two wheeler accidents followed by four wheelers and pedestrians.*

*CONCLUSION: soft tissue injuries to globe and adnexa are most common ocular manifestations in craniocerebral injuries. Neurophthalmic manifestations were less commonly found. Bony injury to the orbit was even less commonly found.*

### INTRODUCTION

Head trauma is common in our modern era of motorized transportation. There has been rising trend in the incidence of head trauma as a result of increasing number of road traffic accidents. A head injury occurs every 15seconds and a patient dies of it every 12minutes<sup>1</sup>.

Head injuries are frequently associated with ophthalmic manifestations and consequent morbidity<sup>2</sup>. 25% of head injuries requiring hospitalization are associated with ocular and visual defects. Early recognition and clinical correlation of ophthalmic manifestations is important in

- early localization of the site of injury,
- ongoing assessment
- management and prognosis

Contrary to the immense significance of the problems associated with ocular manifestations of head injury, only scanty systematic reviews of the whole spectrum are available in the literature. With this background, the present study was undertaken .

### PATIENTS AND METHODS:

The present study is a hospital based prospective clinical study.

Duration of the study was from September 2012 to Sep-

tember 2014. A total of 106 cases were included in the study. 12 cases had bilateral involvement. So total number of eyes was 118. - All the patients of head injury with ocular manifestations were included in the study. The patients were selected from inpatients of the ophthalmology and surgery and neurosurgery wards and out patients from the ophthalmology, surgery, neurosurgery and casualty departments. Detailed clinical history including duration since injury, Cause of injury, Symptoms following injury such as Loss of consciousness, Bleeding from ear/nose, vomiting. General examination including body built, level of consciousness, pulse, B.P, Respiratory rate, Glasgow coma scale. Examination of primary site including type of injury, extent of injury, soft tissue/bony injury. Examination of the eye proper including visual acuity and fundus examination.

Fundus was examined by using direct or indirect ophthalmoscope. The following signs of head injury and ocular injury were looked for specifically. Vitreous haemorrhage, Posterior vitreous detachment, Papilloedema, Optic atrophy, Retinal edema, Retinal detachment, Choroidal rupture. Neuroimaging studies including X-ray, C.T scan/MRI, if necessary B-scan.

### FLOWCHART OF STUDY DESIGN

Between September 2012 and September 2014 all the patients of head trauma with ophthalmic manifestations were included in the study

after taking proper consents

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Complete anterior and posterior segment evaluation were done and proformas were filled.

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Neuroimaging and other investigations were done if it was felt necessary

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Patient was treated according to the need.

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Results were compiled and analyzed after completion of the study.

**RESULTS:**

The total number of cases included in the study was 106. Among them 12 cases had bilateral involvement, making total number of eyes affected 118. From the total 106 patients 12 died during their first stay in the hospital.

**SEX INCIDENCE-**

Among 106 patients only 18 patients were female ( 16.98 %) and rest 88 were males ( 83.02 %). Low percentage of female patients in this study indicate that males are more prone to head trauma as well as ophthalmic involvement in patients of head trauma, because they involve more frequently in outdoor activities than females

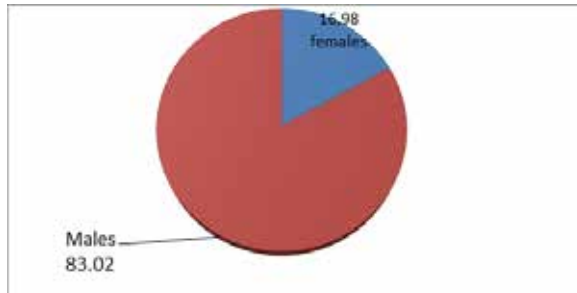


Fig1. Sex incidence

**AGE INCIDENCE**

The age of the patients in study ranges from 3 years to 69 years. Majority of the cases belonged to 21 to 30 years followed by 31 to 40 years. It was very rare in extremes of age only 3 cases below 10 years and 6 cases above 50 years were present. So incidence of ocular manifestations in head injury patients are more common in young adult population i.e. 21 to 40 years.

Table 1-Relative frequency of different age groups

Age groups	Number of patients	Frequency
0-10 years	3	2.83%
11-20 years	12	11.32%
21-30 years	36	33.96%
31-40 years	33	31.13%
41-50 years	16	15.09%
50-60 years	4	3.77%
> 60 years	2	1.88%

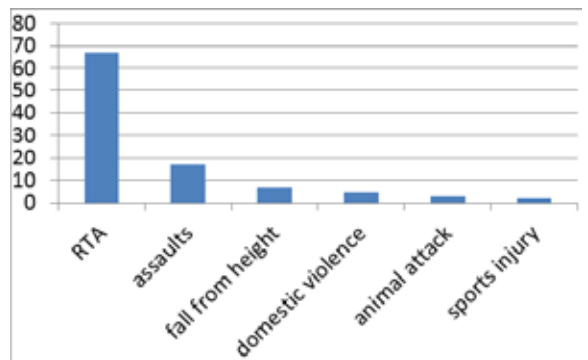
**NATURE OF INJURY:**

Among the various causes of head trauma, road traffic accident (RTA) was found to be the commonest cause (66.98%) followed by Assault (16.98%) other causes included fall from height, domestic violence, sports injury and animal attack.

Table 2-Causes of head trauma and their relative frequency

Causes of injury	Number	Percentage
Road traffic accidents	71	66.98%
Assaults	18	16.98%
Fall from height	7	6.6%
Domestic violence	5	4.71%
Animal attack	3	2.83%
Sports injury	2	1.88%

Fig 2-causes of head trauma



**Nature of RTA:**

Road traffic accident is the leading cause of head injury heading to ocular manifestations in our study. From the road traffic accidents majority were associated with two wheeler accidents followed by four wheelers and pedestrians.

Table 3-nature of RTA and their frequency

Category	Number	Percentage
Two wheeler	39	54.99
Auto taxi	5	7.04
Four wheeler	16	22.63
Pedestrians	11	15.49

Out of all cases of RTA maximum numbers were a result of two wheelers (54.99%) followed by four wheeler, (22.53%) pedestrians (15.49%), auto taxi passengers (7.04%).

**OCULAR AND ORBITAL INJURIES**

Soft tissue injuries to globe and adnexa- 98 patients  
 Bony orbit injury-19 patients  
 Neuroophthalmic injury-36 patients

Fig 3-Distribution of various orbital injuries

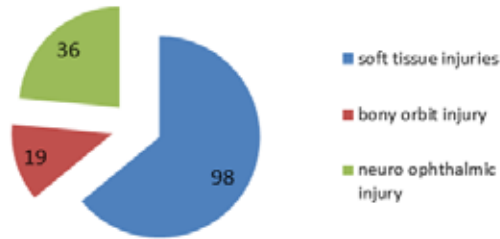


Table 4-Soft Tissue injuries to globe and adnexa

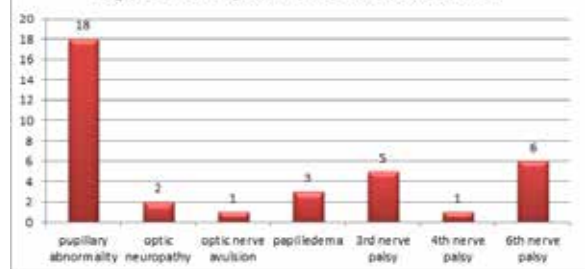
Category	Number of eyes	Percentage
Eye lids		
Oedema	72	61.01
Blepharohaematoma	41	34.74
Lacerations	28	23.72
Globe		
Proptosis	6	5.08
Globe rupture	2	1.69
Restriction of ocular movements	15	12.71
Muscle entrapment	3	2.54
Chemosis	70	59.32
Subconjunctivalhaemorrhage	81	68.64
Corneal abrasion	25	21.18
Corneal tears	10	8.47
Corneal oedema	12	10.17
Hyphaema	6	5.08
Dislocation/subluxation of lens	6	5.08
Vitreous hemorrhage	8	6.77
Retinal detachment	6	5.08

Most common involvement in the present study was soft tissue injuries of globe and adnexa. It was observed in 98 patients. Commonest finding was subconjunctivalhaemorrhage in 81 of 118 eyes, followed by lid oedema in 72 eyes, chemosis of conjunctiva in 70 eyes, ecchymosis in 41 eyes and lid lacerations in 21 eyes. Corneal abrasions were seen in 25 eyes where as corneal tears were present in 10 eyes. Corneal oedema seen in 12 eyes were suggestive of a blunt trauma. Only 6 cases presented with hyphaema. With the help of B.Scan ultrasonography of the eye, vitreous haemorrhage was detected in 8 cases, Retinal detachment in 6 cases and subluxated lens in 6 cases. All these posterior segment finding suggested of blunt trauma. The visual prognosis was poor in case of vitreous haemorrhage

and Retinal detachment.

These findings are very similar to other studies which report that soft tissue injuries are very commonly found in comparison to bony and neuroophthalmic injuries. This is illustrated in the following discussion along with figure

Fig 4-neuro ophthalmic manifestations



Of the neuroophthalmic findings pupillary abnormalities were most common seen in 18 cases. Ocular motor nerve palsies were second most common neuroophthalmic abnormalities. It accounted for 12 cases. Most common ocular motor nerve palsy observed was Abducent (6th cranial nerve) palsy in 6 cases, followed closely by oculomotor (3rd cranial nerve) palsy in 5 cases. Trochlear (4th cranial nerve) palsy was seen only in one case.

Traumatic optic neuropathy was diagnosed in 2 cases with severe visual impairment. It manifested with loss of visual acuity in one eye accompanied with the presence of an ipsilateral afferent pupillary defect. Optic nerve avulsion was observed in one case only. Papilloedema was observed in 3 cases.

Pupillary abnormality of various types were observed in 18 cases in the present study which was the most common neuroophthalmic finding in this study.

In the present study optic nerve avulsion was found only in one case which had presented with a ring haemorrhage around the optic disc on ophthalmoscope.

Traumatic optic neuropathy was found only in only 2 cases in the present study. Both of them presented with severe diminution of vision in the affected eye and showed RAPD in the same eye.

**BONY ORBIT INJURIES**

Bony injury to orbit was seen in 19 cases i.e. 17.92% of total cases.

It is the least common type of ocular manifestations in the patients of head injury in the present study.It was detected by various radioimaging procedures.

In majority of patients' fractures involving roof of orbit (42.1%), which is formed by orbital plate of the frontal bone and lesser wing of sphenoid were observed.

Out of all the roof fractures involvement of the orbital plate of frontal bone was common.

Multiple wall fracture seen in 4 patients (21.1%) was 2nd most common bony injury to orbit.

Fracture of floor, medial wall and lateral wall were seen in 3,2, and 2 cases respectively.

**Table 5-BONY ORBIT INJURY**

Type of injury	No.	Percentage .(%)
Fracture of roof	8	6.77
Fracture of Lateral Wall	2	1.69
Fracture of Medial wall	2	1.69
Fracture of floor	3	2.54
Multiple wall fracture	4	3.39

**VISUAL ACUITY**

In the present study, visual acuity at the time of presentation was 6/36-6/60 in 51 eyes(57.95%), ≤6/60 in 28 eyes(31.81%) and 6/6-6/18 in 9 eyes(10.22%). Visual acuity could not be recorded in 30 eyes(26 cases) due to seriously ill condition of the patients.

**Table 6-visual acuity at the time of presentation**

Visual acuity	No.of eyes	Percentage
6/6-6/18	9	10.22%
6/36-6/60	51	57.95%
≤6/60	28	31.81%
Total	88	100%

**GLASGOW COMA SCALE (GCS) SCORE**

All the patients of head trauma with ocular manifestations were evaluated for GCS score at the time of admission to hospital. Three groups were made according to the GCS scoring. The patients were classified into three groups

- 1.MILD HEAD INJURY- GCS [14-15]
- 2.MODERATE HEAD INJURY- GCS [9-13]
- 3.SEVERE HEAD INJURY- GCS [3-8]

**Table 7-frequency of type of head injury in relation to GCS score**

Type of injury	Gcs score	No. of patients
Mild head injury	14-15	79
Moderate head injury	9-13	17
Severe head injury	3-8	10

**DISCUSSION****SEX INCIDENCE**

A.R.Kulkarni et al <sup>4</sup>	M - 97%	F - 3%
B.Sharma et al <sup>5</sup>	M-81.6%	F-18.4%
T.O. Odebode et al <sup>6</sup>	M - 64.9%	F-35.1%
N.S.D. Raju <sup>7</sup>	M - 82.5%	F-17.5%
Present study	M- 83.02%	F-16.98%

**AGE INCIDENCE**

more common in 21 to 40 years. This finding is similar to the findings in other studies e.g.

A.R. Kulkarni et al<sup>4</sup> showed young adult males (21-30 years) were more vulnerable.

T.O. Odebode et al<sup>6</sup> showed a peak during 3rd decade (21-30 years) of life.

B.Sharma et al<sup>5</sup> showed a peak during 21-40 years.

This vulnerability of the young is due to the increased association with outdoor activities.

**NATURE OF INJURY:**

Road traffic accident (RTA) - commonest cause

This finding is in consistency with other studies

AR..Kulkarni .et al<sup>4</sup>(52.5%-due to RTA)

T.O.Odebode et al<sup>6</sup>(34.2% due to RTA)

Raju NSD<sup>7</sup>(47.5% due to RTA) and

B.Sharma et al<sup>5</sup>(70.37% due to RTA)

A relatively higher incidence of R.T.A. as the cause of head injury in our study may be due to the location of National Highway nearer to the college.

**CONCLUSION-**

soft tissue injuries to globe and adnexa are most common ocular manifestations in craniocerebral injuries. Neurophthalmic manifestations were less commonly found. Bony injury to the orbit was even less commonly found. Radio-imaging abnormality may indicate presence of neurophthalmic deficits but normal neuroimaging does not confirm the absence of neurophthalmic deficits. Both neurophthalmic manifestations and bony injury to the orbit were more common in patients with severe head injuries with low GCS scores.

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