Section: Ophthalmology

Original Research Article

CLINICAL PROFILE OF PATIENTS PRESENTING WITH HEAD INJURY WITH SPECIAL REFERENCE TO OCULAR MANIFESTATIONS AT A TERTIARY CARE CENTRE

Chandra Sekhar Perla[1], Sangeeta Das[2], Sujana Inampudi[3]

[1]Senior Resident, Department of Ophthalmology, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana, India.
[2]Professor, Department of Ophthalmology, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana, India.
[3]Assistant Professor, Department of Ophthalmology, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana, India.

Received *: 27/02/2025*
Received in revised form *: 16/04/2025*
Accepted *: 01/05/2025*

Corresponding Author:
Dr. Sujana Inampudi,
Assistant Professor, Department of Ophthalmology, Malla Reddy Institute of Medical Sciences, Suraram, Hyderabad, Telangana, India.
Email: sujanainam2@gmail.com

DOI: 10.70034/ijmedph.2025.2.183

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (2); 1006-1010

ABSTRACT

Background: Ocular manifestations are common after trauma to the head and they are often neglected. Many patients with ocular morbidity present very late after the management of head injury to the ophthalmologist. By this time, it is too late to avoid further damage to the eye. The management becomes complicated and difficult. **Objective:** To study the clinical profile of patients presenting with head injury with special reference to ocular manifestations.
Materials and Methods: Hospital-based cross-sectional study was carried in 100 cases of head injury patients. Detailed history, thorough clinical examination was carried out for all eligible and consenting cases. All the procedures like Direct ophthalmoscopy, indirect ophthalmoscopy, gonioscopy, B- Scan ultrasound, and computed tomography scan were carried out as per standard protocol and guidelines.
Results: Most commonly affected age group was 21-40 years (62%). Males were more affected than females (6:1). Road traffic accident was the most common cause of head injury. Lids were affected in 97%, conjunctiva and cornea in 75% each, sclera affected in 21% of cases. Anterior chamber was affected in 74%, iris in 80%, lens in 40%, fundus in 38%, extra ocular movements were normal in 69% of cases, orbit was affected in 55% of cases.
Conclusion: Males were more affected than females due to a greater number of outdoor activities and exposure to risk. 21-40 years of age was most commonly affected because this is the most active age group in the life and they are exposed to the risk of injuries. Ocular manifestations were found to be very common in cases with head injuries.
Key words: clinical profile, head injury, ocular manifestations.

INTRODUCTION

India is one of those countries in the world with highest incidence of head injury. Each year about 10 lakh suffer from serious head injury and among them, it has been estimated that around 10% die. The various points in the definition of head injury include concussion, brain involvement, being unconscious, fracture of the skull, posttraumatic amnesia etc.[1] The incidence of ocular manifestations in those with head injuries has been estimated to be around 25%. Among these cases, the risk of developing blindness is around 11%. Therefore, it is very important to investigate the ocular manifestations in those with head injuries.[2] Worldwide, it has been estimated that around 939 people develop traumatic brain injury for every one lakh population per year. In absolute number, it is 69 million. Ocular manifestations are more common in those with closed head injury and the incidence is 25-83%. In case the ophthalmologist is involved in the examination of such patients, then the incidence may increase owing the expertise. Hence, it is encouraged to have the multidisciplinary approach.[5]

When the patient presents with head injury in the hospital, more focus of treatment is on head injury and ophthalmic manifestations are likely to be ignored. But it is important to give similar attention for early diagnosis of ocular manifestations so that blindness can be prevented. Trauma to the eyes which can occur during head injury leads to blindness in about five lakh cases globally and more number suffer from partial loss of sight.[6]

Every year around 200-300 people develop head injuries for every one lakh population and among them, one fourth may develop ocular manifestations. Head injury creates panic and may be associated with other systemic manifestations and hence the ocular manifestations may be neglected. Eye examination in the patient of head injury is done only to see the intraocular pressure to assess the severity of the head injury and not to examine the ocular manifestations of the head injury. How exactly the ocular manifestations may develop after the head injury is not totally clear.[7] However, it is very clear that direct trauma to the eye structures will lead to its damage. The degree of damage will depend upon the nature and intensity of the trauma. Indirect injury to eye structures may result from transfer of energy from skull bones to the structures of the eye after trauma.[8]

Thus, it is clear that ocular manifestations are common after trauma to the head and they are often neglected. Many patients with ocular morbidity present very late after the management of head injury to the ophthalmologist. By this time, it is too late to avoid further damage to the eye. The management becomes complicated and difficult. Hence, there is need to carry out more research on ocular manifestations of head injury.

Therefore, present study was carried out to study the clinical profile of patients presenting with head injury with special reference to ocular manifestations.

MATERIALS AND METHODS

Present study was a single centre, hospital based cross sectional observational study carried out over a period of one year at Emergency department and ophthalmology department at Malla Reddy Institute of Medical Sciences, Hyderabad.

Institutional Ethics Committee permission was obtained vide letter number MRIMS/DHR-IEC-18/2022 dated 17-9-2022. Written informed consent was taken from all study participants. All cases were managed as per the standard treatment protocol.

Adults of age 18-65 years of age belonging to either gender presenting with head injury for first time with eye problems and those who agreed to be part of the study were included in the present study. Those with known injury to the eye in the past, previously treated for head injury, and those with congenital anomalies were excluded from the present study.

One study,[9] reported that the prevalence of ocular manifestations in patients with head injury was 3.93%. based on this, with 95% confidence level, and 5% absolute precision, the sample size came out to be 59. But we were able to include 100 cases in the present study during the study period.

Detailed history, thorough clinical examination was carried out for all eligible and consenting cases as per the pre designed, pre tested, semi structured study questionnaire. Details in the history like age, sex, mode of injury, history of head injury, ocular injury was enquired upon. Detailed ocular examination using torch light was carried out. Snellen's chart was used for assessment of the visual acuity.[10] Depending upon the condition of the patients of the head injury, the examination was carried out bedside for some patients. For detection of any restriction of the eye movements, extra ocular movements were checked. Assessment for ocular nerve palsy was carried out. Ishihara chart was used to determine the color vision. Assessment for pupillary reflexes was done. Whenever possible, slit lamp examination was carried out. Brightness scan (B scan) was performed if fundus could not be assessed because of hazy media. All the procedures like Direct ophthalmoscopy,[11] indirect ophthalmoscopy,[12] gonioscopy,[13] B- Scan ultrasound,[14] and computed tomography scan,[15] were carried out as per standard protocol and guidelines. Ocular Manifestations considered in the study were Dislocation of lens, Berlin's edema, Traumatic optic neuropathy, Subluxation of lens, Vitreous hemorrhage, Subconjunctival hemorrhage, Traumatic cataract, Retinal hemorrhage, Circumcorneal congestion, Relative afferent pupillary defect, Retinal tear, Conjunctival congestion, Iris prolapse, Papilledema, Chemosis, Sphincter tear, Periorbital oedema, Corneal Abrasion, Iridodialysis, Ecchymosis, Corneal tear, Macular hole, Lagophthalmos, Exposure Keratitis, Hyphema, and Orbital fractures.

Statistical Analysis: The data collected was coded, entered into Microsoft excel work sheet and exported to SPSS. Data was analysed using statistical package for social sciences (SPSS) version 26. Qualitative data was presented as percentage in categories and then presented as tables. Quantitative data was presented as means and standard deviations. Chi- square and risk ratio was calculated and a p- value of 0.05 was considered statistically significant for all statistical tests performed.

RESULTS

Table 1: Distribution of study participants as per different parameters

Characteristics		Frequency	%
Age (years)	< 20	9	9
	21-40	62	40
	41-60	22	22
	> 60	7	7
Gender	Male	86	86
	Female	14	14
Mode of injury	Road traffic accident	71	71
	Fall	13	13
	Assault	16	16

Most commonly affected age group was 21-40 years in 62% of the cases. Males were more commonly affected than females i.e. being six times more. Road traffic accident was the most common cause of head injury with ocular manifestations. [Table 1]

Table 2: Distribution based on involvement of different parts of eye

Different parts of eye involved		Frequency	%
side involvement	Right	30	30
	Left	64	64
	Both	6	6
Visual acuity at admission	6/6	48	48
	> 6/6	52	52
Lids	Normal	3	3
	Oedema + Ecchymosis, lid tear, ptosis, lagophthalmos, crepitus	97	97
Conjunctiva	Normal	25	25
	Subconjunctival haemorrhage, chemosis, circumcorneal congestion, conjunctival congestion	75	75
Cornea	Normal	25	25
	Exposure keratitis, edema, corneal tear, abrasions	75	75
Sclera	Tear film	21	21
	Normal	79	79

Left side of eye was mostly affected in 64% of the cases. 48% of cases had normal visual acuity. Lids were affected in 97% of the cases, conjunctiva and cornea in 75% cases each, and sclera was found to be affected by injury in 21% of the cases who had tear of sclera. [Table 2]

Table 3: Examination findings

Examination findings		Frequency	%
Anterior chamber	Normal	26	26
	Cells/flare, irregularity, vitreous, Hyphema, shallow	74	74
Iris/pupil	Normal	20	20
	Relative afferent pupillary defect, sluggishly reacting to light, not reacting to light, sphincter tear, Iridodialysis, iris prolapse	80	80
Lens	Normal	60	60
	Dislocation, subluxation, traumatic cataract, immature cataract, pseudophakia	40	40
Fundus	Normal	62	62
	Berlin's edema, retinal tear, macular hole, purtscher retinopathy	38	38
Extraocular movements	Normal	69	69
	Elevation, depression & adduction restricted, Intorsion restricted, Abduction restricted	31	31
Orbit	Normal	45	45
	Lateral wall fracture, roof fracture, floor fracture, lateral and medial fracture, frontal bone fracture, medial wall fracture	55	55

On detailed investigations with different methods, it was found that anterior chamber was affected in 74% of cases, iris in 80% of cases, lens was normal in 60% of the cases, fundus was affected in 38% of cases, extra ocular movements were normal in 69% of cases, orbit was found to be affected in 55% of the cases. [Table 3]

DISCUSSION

In the present study the mean age of the cases was 35.7±13.9 years. 86% were males and 14% were females with the sex ratio being 6.1: 1 [M: F]. These findings were similar to a study by Pattnaik S et al,[16] in which mean age was 33.8 years; 82.1% were males and the most common age group affected was 21 – 30 years. The present study findings are also in accordance with a study by Sharma B et al,[17] in which 81.6 % were males and 18.4 % were females, with a male-to-female ratio of 4:1. The most common age group affected was 21 – 40 years (67.4%). The findings in this study were consistent with a study by Rosita JH et al in which majority (37.2%) were in 21 – 30 years of age group. Around 24.4% were in the age group of 31 – 40 years. Majority were males (87.8%) and M:F

ratio was 7.02:1. Our study findings were similar to a study by Malik A et al,[19] in which 91% were males and 9% were females and mean age of study subjects was 28.68 years. This study was comparable with a study by Khan N et al,[20] in which 74.5% were males and 25.5% were females and mean age was 28.53 years. A Study by Wagh V et al 21 found that ocular trauma was highest in 31 – 40 years age group and 88.33% were males.

Parri M et al,[22] reported that 2.5% had hand movements at presentation and 2.5% had only pupillary light reflex present and 20% had visual acuity >6/9. The results we obtained were equivalent to the above study.

In this study among the 100 subjects 79% had lid oedema + ecchymosis together, 10% had ptosis, 5% had lid tear, 2% lagophthalmos, 1% had crepitus and 3% had normal lids. A study by Pattnaik S et al,[16] found that 14% had lid oedema followed by peri orbital ecchymosis in 10.6%. A study by Sharma B et al,[17] showed 51.85% having ecchymosis and 41.48% having lid edema. Rosita JH et al,[18] reported 91.5% having lid involvement. A study by Malik A et al,[19] found that 20.63% had periorbital ecchymosis, 10.58% had subconjunctival haemorrhage and 3.17% had lid laceration. A study by Wagh V et al,[21] revealed 71.67% having lid laceration. Parri M et al,[22] reported that 50% of study subjects had ecchymosis. A study by Pai et al,[23] confirmed 31.2% having lid laceration. The results we obtained were quite similar to the above study.

Maheshwari V et al,[24] reported subconjunctival haemorrhage and ecchymosis (87.5%) as most common ocular manifestations followed by lid laceration (15%). In the present study, 25% had no pathology in conjunctiva and 66% had subconjunctival haemorrhage. A study by Pattnaik S et al,[16] revealed 28% having subconjunctival haemorrhage. A study by Sharma B et al,[17] showed 44.44% having sub conjunctival haemorrhage. Rosita JH et al 18 reported conjunctival involvement in 81.1% patients. Parri M et al,[22] reported that 70% had subconjunctival hemorrhage. A study by Pai et al,[23] in found 37.5% having subconjunctival haemorrhage. The findings that we obtained resembled the findings of the above studies.

In this study, the cornea was normal in 25% and the remaining 75% subjects had various conditions like exposure keratitis (35%), corneal oedema (23%), corneal tear (11%) and 6% had corneal abrasions. A study by Sharma B et al,[17] revealed that 4.21% had exposure keratitis. Rosita JH et al 18 in their study saw 12.8% patients having involvement of cornea. Wagh V et al,[21] found that 20% had corneal penetration and 5% had corneal abrasion. A study by Pai et al,[23] showed 21.8% having corneal abrasion. Maheshwari V et al,[24] reported 10% corneal tear among study subjects. Our outcomes were comparable to the above findings.

In the present study, sclera tear was observed in 21% subjects and the remaining 79% had normal sclera. Rosita JH et al,[18] reported 1.2% scleral involvement in study subjects. A study by Malik A et al,[19] found that 3.17% had cornea-scleral laceration. Our outcomes were comparable to the above studies.

In this study, 26% had normal findings of anterior chamber, 36% had cells/flare and 8% had Hyphema. A study by Pattnaik S et al,[16] revealed anterior segment involvement in 86% of head injury patients. A study by Rosita JH et al,[18] found that 12.8% had anterior chamber involvement. Hyphaemia and traumatic uveitis were the common symptoms of anterior chamber pathology. Pai et al,[23] in found 12.5% having Hyphema. The above studies corroborated the findings of our study.

In the present study, relative afferent pupillary effect was observed in 34%, sluggish reaction to light was present in 26%, no reaction to light in 11% and sphincter tear was seen in 7%. A study by Sharma B et al,[17] reveals that 21.04% had pupillary involvement. A study by Rosita JH et al 18 found 40.2% having pupil/iris involvement. The present study findings were similar to a study by Malik A et al 19 in which 7.95% had pupillary involvement. A study by Pai et al,[23] found that 15.5% had iris injury. Present study outcomes were comparable.

In this study, lens findings were normal in 60%, 18% had dislocation of lens, 10% had subluxation of lens and 7% had traumatic cataract. A study by Pattnaik S et al,[16] in which 9.17% had Hyphema, 5.31% had traumatic cataract was comparable to our findings. Our findings were quite similar to a study by Rosita JH et al,[18] in which 4.3% had lens involvement.

In the present study, the fundus examination showed 15% had Berlin's oedema, 13% had retinal tear, 6% had macular hole and 4% had Purtscher retinopathy. A study by Pattnaik S et al,[16] showed that 5.3% had retinal haemorrhage and 6.2% had macular hole. A study by Rosita JH et al 18 revealed 12.2% having posterior segment involvement, Berlins oedema (4.3%), macular hole (1.8%), Purtscher retinopathy (0.6%) were the common reported posterior segment abnormalities. Malik A et al 19 found that 2.12% had macular edema. Our outcomes were quite comparable to the above study.

In this study, EOM were normal in 69% and elevation, depression & adduction restricted in 23%, 5% had intorsion restriction and abduction restricted in 3%. A study by Pattnaik S et al,[16] in found that 14.97% had restriction of extraocular movements. Parri M et al,[22] reported that 40% had extraocular muscle involvement. Superior and Inferior rectus muscle were involved in 20% each respectively. A study by Gahlot A et al,[25] showed 32.79% injuries were extraocular injuries. Our results were similar to the above studies.

In the present study, 45% orbit were normal and 25% had lateral wall fracture, 18% had orbital roof fracture. A study by Pattnaik S et al,[16] in showed that 8.6% had orbital fracture and 3.3% had lateral

orbital wall fracture. A study by Sharma B et al,[17] found 10.44% having orbital fractures. Rosita JH et al,[18] reported that 59.8% had orbital wall fractures. Parri M et al,[22] reported that 20% had fracture of periorbital structures like maxillary sinus and frontal bone. Maheshwari V et al,[24] reported 37.5% of orbital wall fractures. Around 20% had lateral wall fracture, 10% had medial wall fracture, 5% had orbital floor fracture and 2.5% had orbital roof fracture. The findings that we obtained were alike to the above findings.

CONCLUSION

The results of the study showed the mean age was 35.7± 13.9 years and consisted of 86% males and 14% females with the most common mode of injury being RTA. The most common ocular manifestations seen in the study were Traumatic optic neuropathy (16%), oedema+ ecchymosis of the lids (79%), subconjunctival haemorrhage (66%), exposure keratitis of the cornea (35%), sclera tear (21%), AC flare (36%), RAPD (34%), SRTL (26%) and NRTL (11%). The lens was dislocated in (18%), subluxated in (10%). Fundus showed berlin's oedema in (15%) and retinal tear in (13%). Extra ocular movements were abnormal in (31%). The orbit showed most of the patients had lateral wall fracture (25%) and orbital roof fracture (18%), III nerve Palsy (10%).

REFERENCES

1. Annegers JF, Grabow JD, Kurland LT, Laws ER Jr. The incidence, causes, and secular trends of head trauma in Olmsted County, Minnesota, 1935-1974. Neurology. 1980 Sep;30(9):912-9
2. Vats S, Murthy GV, Chandra M, Gupta SK, Vashist P, Gogoi M. Epidemiological study of ocular trauma in an urban slum population in Delhi, India. Indian J Ophthalmol. 2008 Jul-Aug;56(4):313-6.
3. Baker RS, Epstein AD. Ocular motor abnormalities from head trauma. Surv Ophthalmol. 1991 Jan-Feb;35(4):245-67
4. Dewan MC, Rattani A, Gupta S, Baticulon RE, Hung YC, Punchak M et al. Estimating the global incidence of traumatic brain injury. J Neurosurg. 2018 Apr 27;130(4):1080-1097.
5. Nehra A, Bajpai S. Effectiveness of cognitive retraining after brain trauma- case studies. Act Nerv Super. 2012; 54:139-145.
6. Kulkarni AR, Aggarwal SP, Kulkarni RR, Deshpande MD, Walimbe PB, Labhsetwar AS. Ocular manifestations of head injury: a clinical study. Eye (Lond). 2005; 19:1257-1263.
7. Odebode TO, Ademola-Popoola DS, Ojo TA, Ayanniyi AA. Ocular and visual complications of head injury. Eye (Lond). 2005; 19:561–566.
8. Malik A, Gupta A, Luthra N, Gupta V. Ocular manifestations of head injury: a clinical study. Sudanese J Ophthalmol. 2016; 8:46–50.
9. Rajendra P, Tanmay S, Virendra P, Mishra C, Abdullah Al-Mujani. The epidemiology of ocular trauma in Northern India: A teaching hospital study. Oman J Ophthalmol. 2019:12(2):78-83.
10. McMonnies CW. Chart construction and letter legibility/readability. Ophthalmic Physiol Opt. 1999; 19:498-506.
11. Pearce JM. The ophthalmoscope: Helmholtz's Augenspiegel. Eur Neurol. 2009;61((4) :):244-9.
12. Singh A, Cheyna K, Wilson G, Sime MJ, Hong SC. On the use of a new monocular indirect ophthalmoscope for retinal photography in a primary care setting. N Z Med J. 2020; 133:31-8
13. Spaeth GL. Gonioscopy: uses old and new. The inheritance of occludable angles. Ophthalmology. 1978; 85:222-32.
14. Harrie RP. The ongoing role of ophthalmic ultrasound. Review of ophthalmology. 2011. Available from: https://www.reviewofophthalmology.com/article/the-ongoing-role-of-ophthalmic-ultrasound
15. van Aarle W, Palenstijn WJ, Cant J, Janssens E, Bleichrodt F, Dabravolski A et al. Fast and flexible X-ray tomography using the ASTRA toolbox. Optics Express. 2016:24:25129–25147.
16. Pattnaik S, Panda BB, Swain SC. Spectrum of Ocular Findings in Closed Head Injuries, Correlation with Severity of Neurological Involvement, and Treatment Outcome: A Hospital-Based Cross-Sectional Study. Cureus. 2021 Jul 20;13(7): e16515.
17. Sharma B, Gupta R, Anand R, Ingle R. Ocular manifestations of head injury and incidence of post-traumatic ocular motor nerve involvement in cases of head injury: a clinical review. Int Ophthalmol. 2014;34(4):893-900.
18. Rosita JH, Amudhavadivu S, Gnanselvan J. Ophthalmic manifestations in head injury- A prospective study. Int J Ocul Oncol Oculoplasty 2021;7(2):169-172.
19. Malik A, Gupta A, Luthra N, Gupta V. Ocular manifestations of head injury: A clinical study. Sudan J Ophthalmol. 2016;8(2):46–50.
20. Khan N, Anju K, Mahendra Kumar J. Profile of ocular trauma and its visual outcome at tertiary care hospital in North-West Rajasthan. Int J Med Sci Public Health. 2017; 6:1640-1645. Page | 73
21. Wagh V, Tidake P. Clinical Study and Profile of Ocular Trauma: Findings from a Rural Hospital in Central India. Cureus. 2022;14(7): e26915.
22. Parri M, Lakshmi Chowdary N. Ocular manifestations in road traffic accidents: a study done at a medical college hospital in South India. Int J Contemp Med Res 2016;3(8):2337-2339.
23. 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 Sci. 2013; 16:10.
24. Maheshwari V, Dhurvey DK, Singh G. Association of Ocular Injuries in Patients with Head Injury: A Tertiary-Level Armed Forces Experience. Med J Dr. D.Y. Patil Vidyapeeth. 2024;17(1):199-204.
25. Gahlot A, Magdum R, Singh M, Kumari P. A study of ocular trauma profile and its visual outcome in road traffic accidents. Natl J of Med Res 2015;5(3);211 215.