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Original Article

A Clinical Study of Anterior Segment Ocular Manifestations in Blunt Trauma to the Eye

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ABSTRACT:

Background: Blunt trauma forms a chief part of ocular trauma. Cricket balls, Road traffic accidents, Assault, elastic luggage straps, falls and animal tail or horn are the most common causes of blunt ocular trauma. **Aim of the study:** To study the anterior segment ocular manifestations in blunt trauma to the eye its relationship with age and sex and clinical profile of the patients in Kolhapur region of Maharashtra. **Materials and methods:** The study was conducted in the Department of Ophthalmology of D.Y. Patil Medical College, Hospital and research institute, Kolhapur. It was a two year prospective observational study from July 2015-July 2017. In the study, we included a total of 100 ocular blunt trauma patients attending our OPD or casualty in which only anterior segment was involved. All ocular blunt trauma patients in which only anterior segment is involved are eligible, each case was examined on emergency basis and underwent, Torch light examination – for external examination of cornea, foreign body, sub-conjunctival haemorrhage and conjunctival and scleral tear. **Results:** Males were more commonly affected than female (81 males compare to 19 females). Occupational hazards were most common cause in 39 cases, followed by road traffic accident in 26 cases, followed by sports (12), domestic (11), fall (6) assault (4) and blast (2). Right eye affected more commonly than left eye (right eye 64 and left eye 36). Out of 100 patients 38 patients had <6/60 vision on day of presentation out of which 18 improved, 17 remain static and 2 have worsened their vision. **Conclusion:** Several human and environmental risk factors were found to be associated with increased risk of occupational trauma e.g. not following proper working guidelines, not having safety equipment's on, especially safety goggles improved machinery and helmet, unawareness among people regarding job safety.

Key words: Ocular manifestations, anterior segment, ocular blunt trauma.

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INTRODUCTION:

Ocular blunt trauma is one of the major yet avoidable cause of monocular blindness throughout the world^{1,2}. As seen from study data, the people of the most active and productive age groups were involved in occupational hazards and RTA, which leads to visual impairment, cosmetic disfigurement and serious economic loss to the community. Males are commonly injured in RTA which is probably related to both exposure and risk-taking behavior. In developing countries, activities such as agriculture, hammering and carpentry are responsible for many eye injuries.³ Blunt trauma forms a chief part of ocular trauma. Cricket balls, Road traffic accidents, Assault, elastic luggage straps, falls and animal tail or horn are the most common causes of blunt ocular trauma. It causes ocular damage by the coup and contrecoup mechanism or by ocular compression. Concept of coup and contrecoup injury was first introduced to explain brain damage caused by blunt

trauma to the head by Courville.^{4,5} This was later used by Wolter to explain eye injuries during blunt trauma.⁶ Corneal abrasions, subconjunctival haemorrhages, commotio retinae, choroidal haemorrhages, and retinal necrosis are few examples of a contrecoup injury. The basic patho-physiology is that the volume of eye globe doesn't change and therefore, when the eye is compressed along its anterior-posterior axis, it either expand in its equatorial plane or rupture. Hence, the extent of injury suffered is determined by:⁷

1. Total energy shifted to globe and orbit.
2. The physical characteristics of the object.
3. Impact area location.

Hence, the present study was planned to study the anterior segment ocular manifestations in blunt trauma to the eye; its relationship with age and sex and clinical profile of the patients in Kolhapur region of Maharashtra.

MATERIALS AND METHODS:

The study was conducted in the Department of Ophthalmology of D.Y. Patil Medical College, Hospital and research institute, Kolhapur. It was a two year prospective observational study from July 2015-July 2017. In the study, we included a total of 100 ocular blunt trauma patients attending our OPD or casualty in which only anterior segment was involved.

All ocular blunt trauma patients in which only anterior segment is involved are eligible, each case was examined on emergency basis and underwent, Torch light examination – for external examination of cornea, foreign body, sub-conjunctival haemorrhage and conjunctival and scleral tear. Visual acuity on Snellen’s chart. Slit lamp examination – for anterior segment evaluation, along with to confirm any foreign body and tear. Fluorescein staining of the cornea where corneal abrasion was suspected. Dilated funduscopy (wherever possible) - using topical Tropicamide and Phenylephrine combination dilating drops for retinal defects.

Tonometry- applanation tonometer was used to measure intraocular pressure. B scan of the affected eyeball was

done to differentiate penetrating trauma, intraocular foreign body cases and cases where posterior segment findings were suspected CT scan was done in cases of ocular trauma along with head injury.

RESULTS:

Study was conducted on 100 patients maximum of 26 patients were from age group of 31-40, followed by age group of 21-30 with 25 cases. Males were more commonly affected than female (81 males compare to 19 females). Occupational hazards were most common cause in 39 cases, followed by road traffic accident in 26 cases, followed by sports (12), domestic (11), fall (6) assault (4) and blast (2). Right eye affected more commonly than left eye (right eye 64 and left eye 36). Out of 100 patients 38 patients had <6/60 vision on day of presentation out of which 18 improved, 17 remain static and 2 have worsened their vision. 40 patients had vision between 6/36 to 6/18 out of which 19 improved and 21 remained static. 24 patients had vision between 6/12 to 6/6 out of which 14 improved and 10 remained static.

Chart 1 – Age wise distribution of patients

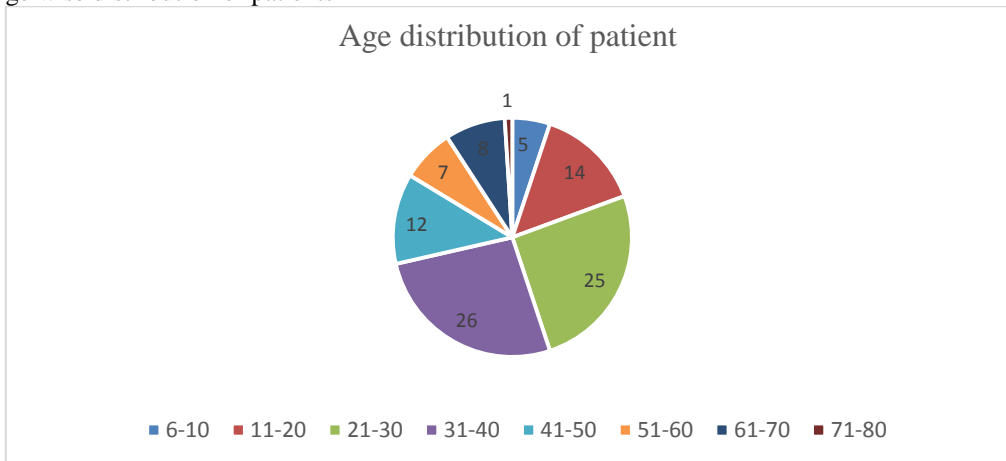


Chart 2 - Sex distribution

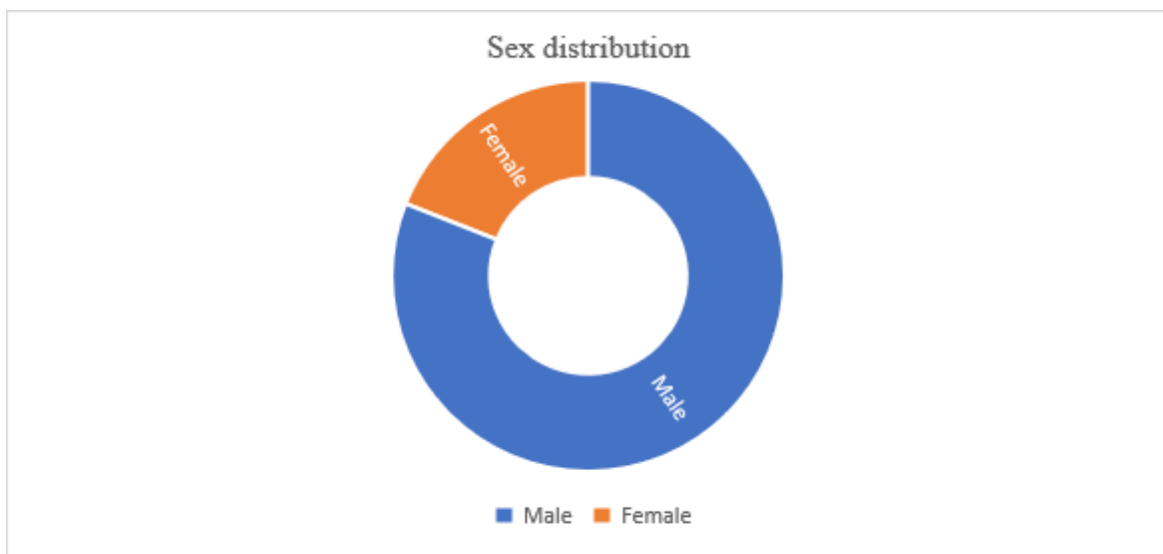


Table 1 – Mode of trauma

Mode of trauma	Number of patients	Percentage
Road Traffic Accident	26	26%
Occupational (Industrial and agricultural)	39	39%
Fall	6	6%
Sport	12	12%
Domestic	11	11%
Assault	4	4%
Blast	2	2%
Total	100	100%

Table 2 – Eye affected

Eye affected	Number of patients	Percentage
Right eye	64	64%
Left eye	36	36%
Total	100	100%

Table 3 – Visual Acuity

Visual Acuity on presentation	Patients	Outcome at 3 months		
		Improvement	Static	Worsened
Gr 1 ($\leq 6/60$)	36	18	16	2
Gr 2 (6/36, 6/24, 6/18)	40	19	21	0
Gr 3 (6/12, 6/9, 6/6)	24	14	10	0
Total	100	51	47	2

DISCUSSION:

The patients with blunt ocular trauma were included in study, with proper consent. Patients with history of intraocular surgery of injured eye, eyes with previous impaired vision, unconscious patients, trauma in new-born and patients with posterior segment involvement are not included in studies.

At time of presentation detailed history of each patient is recorded. A complete general and ophthalmic examination of each patient is done which include vision recording, slit lamp examination, pupillary reaction, funduscopy and B-scan in required cases are done. Follow up of patient depending on type of injury is done and final visual outcome recorded in 3 months follow up. The results obtained were analysed using appropriate statistical method.

Age and Sex

The mean age of patients was found to be 50.5 years. Maximum patients 26(26%) were in the age group of 31-40 years and minimum patients 3(3%) belonged to the age group of 71-80 years. 81 (81%) patients were males and 19 (19%) patients were females.

According to a study conducted by Parul Desai et al⁸, a bimodal peak occurs in the older age groups. They also reported higher rates of injury in the age group of 15-64 years and lower rates for the age group of 0-14 years and 65 years and older age group. Males were affected in 80% (32 patients) cases and females in 20% cases (8 patients), which is consistent with other studies.

This is well supported by a study conducted by V K Gothwal⁹ in Hyderabad where males were involved in 86.8% of cases of ocular trauma. The most likely cause for a higher number of males being affected could be attributed to the fact that males are more likely to be involved in outdoor activities.

Table 4 – Comparison of sex ratio between different studies

Study	Male	Female
Present	81%	19%
Parul Desai	80%	20%
V K Gothwal	86.8%	13.2%

Mode of trauma

In our study, most common cause of ocular trauma was Occupational hazards (agricultural and industrial) (39%), followed by RTA (26%) and sports (12%). Domestic traumas include (11%) Other causes which were responsible for of injuries included assault (4%), firecracker and blast injury (2%).

According to Guly C M et al¹⁰, 57.3% of ocular injuries were caused due to road traffic accidents (RTAs). In a study conducted by Vats S et al¹¹, they found out that majority of the ocular injuries were sustained at work and home, and blunt trauma (41.7%) was more commonly implicated than sharp objects (19.6%). In the Beaver Dam Eye Study¹², it was found that the most common cause of injury was trauma resulting from sharp objects which occurred in 54.1% of the participants.

Table 5 – Comparison of mode of trauma between different studies

Study	Common cause of injury	Percentage
Present study	Occupational	39%
Guly C M	RTA	53.7%
Vats S	Domestic	41.7%
Beaver Dam Eye Study	Sharp objects (Occupational, RTA and Domestic)	54.1%

Eye laterality

In our study, right eye was involved in 64(64%) patients and the left eye in 36 (36%). Right eye is most commonly affected because majority of the population is right handed and perform right side to do majority of work especially in occupational and daily works, hence more prone to trauma.

According to The Beaver Dam Eye Study¹³ where, both eyes were involved in 15.4%, right eye in 30.5% and the left eye in 27.8% of participants. Rest 26.3% participants couldn't remember which eye was involved.

Vision

Out of 100 patients 38 (38%) patients have Gr 1 (\leq 6/60) vision on day of presentation out of which 18 (50%) improved 17 (44.44%) remain static and 2 (5.5%) had their vision worsened.

40 (40%) patients have Gr 2 (6/36, 6/24, 6/18) vision on day of presentation out of which 19 (47.5%) improved 21 (52.2%) remain static and none had their vision worsened.

24 (24%) patients have Gr 3 (6/12, 6/9, 6/6) vision on day of presentation out of which 14 (58.33%) improved 10 (41.66%) remain static and none had their vision worsened.

In the Andhra Pradesh Eye Disease Study¹⁴, 4.61% patients presented blind (best corrected distance visual acuity less than 6/60 in the better eye) due to trauma and another 3.4% had visual impairment worse than 6/12 to 6/60 in one eye due to trauma. According to The Aravind Comprehensive Eye Survey¹⁵ identified trauma as the underlying cause for vision impairment (vision between 6/18 and 3/60 after best correction for that eye) in 27.2% eyes including 15.2% of these eyes that were blind (vision worse than 3/60 after best correction for that eye). In a study conducted by McCarty et al¹⁶, out of the 1197 injures eyes, 6.3% eyes had visual acuity less than 6/18.

CONCLUSION:

Several human and environmental risk factors were found to be associated with increased risk of occupational trauma e.g. not following proper working guidelines, not having safety equipment's on, especially safety goggles improved machinery and helmet, unawareness among people regarding job safety. Several factors also associated with RTA e.g. lack of awareness of traffic rules, inadequate enforcement of existing laws, easy accessibility to license and driving under the influence of alcohol. If we control the factors appropriately, ocular morbidity can be prevented. Despite its health importance, there is relatively less data available on magnitude and risk factor of ocular blunt trauma, specially from developing countries^{17,18}. The lifetime prevalence of ocular blunt trauma is higher than for diseases like glaucoma, age-related macular degeneration, or diabetic retinopathy. Public health education aimed at increasing awareness among parents, guardians and school teachers regarding the need for supervision of

children, and institution of prevention programs, especially for vulnerable groups, is urgently needed to reduce ocular morbidity due to ocular trauma. Hence with the data of this study, preventive and management strategies can be formulated to reduce ocular morbidity rate and manage ocular trauma in a better way.

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