INCIDENCE OF OCULAR TRAUMA IN A TERTIARY HOSPITAL IN VISAKHAPATNAM

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ABSTRACT

BACKGROUND

Ocular trauma is a major cause of preventable ocular blindness in the world. The present available data represents the tip of iceberg. The data pertaining to ocular trauma is just hospital based data which does not accurately represent the population at risk. The ocular morbidity may be disproportionate to the severity of injury. Though eyes represent only 0.21% of body surface area and 4% of facial area, they are the third most common trauma exposed areas after hands and feet.

MATERIALS AND METHODS

Our study group consisted of 341 patients who attended ophthalmology OPD with history of ocular trauma of whom 221 were males and 121 were females. The study was conducted over a period of one year. A complete anterior and posterior segment evaluation of all the patients was done. Other accessory ocular and systemic investigations wherever essential were done.

RESULTS

The ocular trauma was more common in males (64.52%) predominantly affecting patients of 20-40 years age group (36.07%). Most often the injuries were occupation related (73.90%) and the most common work related injury observed was extraocular foreign body in 134 patients (39.29%). Closed globe injuries were more common as compared to open globe injuries. Eyes with better visual acuity at presentation had better visual prognosis. Blinding trauma was observed in 29 patients (8.50%).

CONCLUSION

Ocular injuries are more commonly occupation related and mostly effect young males who are the main work force of our society. Stringent implementation of preventive norms in industries to all the workers and safety precautions during sports, driving need to be enforced.

KEYWORDS

Closed Globe Injuries, Blinding Trauma, Eye Protective Devices (EPD), Evisceration.

HOW TO CITE THIS ARTICLE: Ratna Kumari BVS, Kanukollu VM, Malladi RR. Incidence of ocular trauma in a tertiary hospital in Visakhapatnam. J. Evid. Based Med. Healthc. 2017; 4(58), 3480-3484. DOI: 10.18410/jebmh/2017/693

BACKGROUND

As many as, half a million people in the world are blind as a result of ocular injuries.[1] It is estimated that world-wide there are approximately 1.6 million blind from eye injuries.[1] Ocular trauma has an impact on the healthcare system and economy. Negrel & Thylefors reported that 1.6 million people are blind secondary to ocular injuries worldwide, 2.3 million with low visual acuity bilaterally and 19 million with unilateral decrease in visual acuity.[1] In population based surveys, the percentage of monocular blindness due to trauma ranges from 20 to 50% and bilateral blindness from 2.2% to 5.5%.[2]

Financial or Other, Competing Interest: None.
Submission 27-06-2017, Peer Review 03-07-2017,
Acceptance 17-07-2017, Published 18-07-2017.
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DOI: 10.18410/jebmh/2017/693

The estimated incidence of ocular trauma varies among populations and is dependent on the source of data. Various methods have been employed to collect data on ocular trauma, including eye trauma registers, hospital discharge data analysis, case series in emergency room settings, population based, blindness prevalence surveys. But there is a lapse on information of minor injuries from the above sources. In U.S. depending on the source of data, there is a wide variation in the incidence of ocular trauma in various studies. The incidence varied anywhere between 77/1,00,000 as reported by Morris et al[3] wherein data from eye injury registry of Alabama was considered and 490/1,00,000 wherein population based questionnaires and interviews was the source of data in Baltimore Survey by Katz and Tielsch et al.[4] An additive risk of ocular trauma occurred with age, the cumulative life time prevalence of ocular injury was nearly 15%.[4]

In developing nations the scenario is all the more empathetic. Ocular trauma as a cause of blindness does not find place in the major causes of blindness in any survey and this having been categorized under other causes/unidentified causes accounting for 31.4%.[5] The 58th round of National Sample Survey organization recorded a

high prevalence of injury related visual impairment in India in (51/1000).[6] The Andhra Pradesh Eye Disease Study (APEDS) recorded age and gender prevalence of history of eye injury in 7.5% of population, resulting in unilateral blindness in 0.6% of the population.[7] Based on this data blindness from trauma would be large. Aravind comprehensive eye survey on ocular trauma noted prevalence of ocular trauma 4.5% higher than that reported for glaucoma, ARMD or Diabetic retinopathy.[8] A study from population in urban slums in Delhi noted prevalence of ocular trauma to be 2.4%, resulting in blindness in 11% of injured eye.[9]

In present day scenario cataract and glaucoma still account for major causes of blindness. In our study we estimated the prevalence of ocular trauma by collecting data from the patients attending OPD in ophthalmology department with trauma. We tried to prioritize this as one of the leading causes of avoidable blindness apart from cataract and glaucoma.

Ocular injuries vary from simple subconjunctival haemorrhage, lid laceration to orbital fracture. Ocular injuries are of two types- Open globe injuries and closed globe injuries. Ruptured globes are open globe injuries due to full thickness laceration of cornea or sclera. Wounds can be penetrating or perforating.

Aim of the Study

This was a prospective study done to evaluate the incidence of ocular trauma in patients attending outpatient department of ophthalmology in a Medical College in Visakhapatnam. The demographic, occupational profile, visual outcome after treatment of the patients in our study group were analysed.

MATERIALS AND METHODS

This study was done on 341 patients in the department of Ophthalmology, Anil Neerukonda Institute of Medical Sciences, Sangivalasa, Visakhapatnam for a period of 12 months from October 2014 to October 2015. The demographic profile, time interval between injury and presentation, professional details, circumstances leading to injury, history of any ocular surgery were documented. The socio-demographic profile of the patients was recorded. This included age, gender, occupation of all the patients. Visual acuity was recorded using Snellen's visual acuity chart. Refraction was performed if pin hole vision in the injured eye was <6/60 to arrive at the BCVA. A complete ocular examination was done using a slit lamp biomicroscope, gonioscopy was done wherever essential, posterior segment examination by 90D lens and Indirect Ophthalmoscopy was done. Ultrasonic biomicroscopy was done if essential. Corneal scrapings in cases of corneal ulcer were sent for microbiological examination. Aqueous and vitreous samples for microbiological examination in case of endophthalmitis were sent.

Statistics- Analysis of the data was done using chi-square test. Odds ratios and confidence intervals were calculated with significance level being taken as α = 0.5 at 95% CI.

RESULTS

Our study group consisted of 341 patients. In this group, the number of males were 220 (64.52%), females 121 (35.48%). The mean age of male patients was 39.45 years with standard deviation of 18.52 and that of female patients was 43.22 years ± 28.8. While the age ranged from 6 years to 74 years, 65 patients (19.06%) were below 20 years of age. Majority of the patients 123 (36.07%) were between 20-40 years of age. The association between age of patients and history of ocular trauma was not statistically significance P >0.05. In our study group 272 patients (79.76%) were from rural areas and 69 patients (20.23%) were from urban areas. There was no statistical significance between demographic location and prevalence of ocular trauma.

Category		Traumatic Group (n_1=341)	95% Confidence Intervals	X_2 Test Value, & P Value
Sex	Male	220 (64.52%)	(59.18 %- 69.60 %)	X^2 = 1.83. P > 0.05
	Female	121 (35.48%)	(30.40 % - 40.82 %)	
Age group	0-20 yrs.	65 (19.06%)	(15.03%-23.64%)	P < 0.001
	21-40 yrs.	123 (36.07%)	(30.97%-41.42%)	
	41-60 yrs.	101 (29.62%)	((24.82%-34.77%)	
	61 yrs. & above	52 (15.25%)	(11.60%-19.51%)	
Geographical distribution	Rural	272 (79.76%)	(75.10%-83.90%)	X^2 = 0.3034 P > 0.05
	Urban	069 (20.23%)	(16.10%-24.90%	

Table 1. Demographic Profile

Types of injuries are summarized in Table-II. Ocular injuries were most commonly caused by ocular metallic foreign bodies in 160 patients (46.92%). Open globe injuries which included corneal and sclera lacerations were documented in 25 patients (7.33%). Closed globe injuries were recorded in 68 patients (19.94%) which were second most common trauma documented. Chemical injuries in 40 patients (11.73%), lid injuries in 36 patients (10.56%), thermal injuries in 12 patients (3.52%) were the other injuries observed in our study group.

The cause of injury was recorded in all the patients. This is summarized in table-3. In about 252 patients (73.90%) ocular injuries were related to occupation. About 19.06% (65 eyes) were injured due to road traffic accidents. Of the work related injuries fall of foreign body during welding was implicated as cause of injury in 39.29% (134 patients), chemical injuries in 40 eyes (11.73%), thermal injuries in 12

eyes (3.51%) and in 46 eyes (13.48%) due to vegetative material. Out of 12 patients who presented with thermal injuries 6 of them were occupation related. The association between occupation and trauma was statistically significant P<0.0001. Uniocular trauma was more common than binocular involvement. Bilateral eye injuries were found in 11 (3.22%) patients. Bilateral involvement was seen more often in RTA and chemical injuries.

Sl. No.	Findings	Number (%)	95% Confidence Intervals
Mechanical injuries			
1.	Extra ocular Foreign Bodies	160 (46.92%)	± 5.3 (41.62 - 52.22)
2.	Lid Injuries (LI)	36 (10.56%)	± 3.26 (7.3 - 13.82)
3.	Open Globe Injuries (OGI)	25 (7.33%)	± 2.77 (4.56 - 10.1)
4.	Closed Globe Injuries (CGI)	68 (19.94%)	± 4.24 (15.7 - 24.18)
Non-mechanical injuries			
5.	Chemical Injuries	40 (11.73%)	± 3.42 (8.31 - 15.15)
6.	Thermal injuries	12 (3.52%)	± 1.96 (1.56 - 5.48)

Table 2. Types of Injuries (N=341)

Road Traffic Accident	65 (19.06%)
Assault	12 (3.51%)
Work related (Occupational) a. Grinding b. Welding c. Vegetative material d. Chemical	 26 (7.62%) 134 (39.29%) 46 (13.48%) 40 (11.73%)
Sports	6 (1.75%)
Thermal	12 (3.51%)

Table 3. Causes of Injury

Blindness defined as BCVA <3/60 in the affected eye, was seen in 29 patients (8.50%). Blinding trauma was sustained during recreational or sports activity in 2 eyes, at home in 3 eyes, in 18 eyes at work place and in 6 eyes due to RTA. A significant statistical association was observed between blindness and occupation (P <0.0001).

In our study 36.36% of patients had visual acuity >6/18 at presentation, 41.05% had visual acuity between 6/24 to 6/60 and 15.54% had visual acuity 6/60-3/60 and <3/60 in 7.04% of patients. Visual acuity after treatment was >6/18 in 45.75% (156) of eyes and 6/24 to 6/60 in 111 (32.55%) eyes and 6/60-3/60 in 45 (13.19%) eyes. Blinding trauma was seen in 29 (8.50%) eyes. Visual outcome depends on the type, extent and severity of injury, posterior segment involvement and presence of complications. Complications like vitreous haemorrhage, retinal detachment and uveal tissue prolapse were associated with poor visual prognosis. Penetrating injuries were associated with poor visual prognosis than closed globe injuries. Visual acuity improved after treatment in 215 (63.05%) eyes and worsened in 36 eyes (10.56%). Decreased visual acuity was defined as decrease in two lines in Snellen's visual acuity chart. The worsening of vision was either due to delayed presentation to the hospital, severe trauma, development of some complication like corneal ulcer resulting in leucomatous corneal opacity, phthisis bulbi. The causes of decrease in vision in penetrating injuries were retinal detachment, vitreous haemorrhage, macular hole, traumatic optic neuropathy, subluxated or dislocated lens, traumatic cataract, traumatic uveitis.

Visual Acuity	At Presentation	After Treatment
6/6 – 6/18	124 (36.36%)	156 (45.75%)
6/24 – 6/60	140 (41.05%)	111 (32.55%)
6/60 - 3/60	53 (15.54%)	45 (13.19%)
< 3/60	24 (7.04%)	29 (8.50%)

Table 4. Visual Acuity

In our study group most of the patients 181 (53%) presented within 1 day after injury to the hospital. Only 9 patients (2.63%), presented after 7 days after infliction of injury to the hospital. It was observed the time of presentation to the hospital after injury did not have any effect on the visual outcome. No statistical significance was found between visual outcome and time interval between trauma and first consultation (Chi-square = 10.937, P >0.05).

< 1 day	181 (53.07%)
1-3 day	129 (37.82)
4-6 days	22 (6.45%)
> 7 day	9 (2.63%)

Table 5. Time of Presentation After Injury (N=341)

All patients were managed either medically or surgically. The commonest surgery was reconstruction of globe integrity with either reposition or excision of ocular contents. Of 341 patients 65 patients (19.06%) required surgical intervention and 276 patients (80.93%) were managed medically. The commonest surgical intervention was lid repair done in 31 eyes (9.09%), followed by corneal repair in 13 eyes (3.81%), sclerocorneal repair in 7 eyes (2.05%), sclera repair in 5 eyes (1.46%), miscellaneous procedures in 9 eyes (2.63%).

Clinical findings in blunt ocular trauma are summarized in table-6. The commonest clinical presentation was subconjunctival haemorrhage seen in 42 patients (35%). There were no cases of globe rupture in our study.

Ecchymosis	15 (12.5%)
Subconjunctival haemorrhage	42 (35%)
Conjunctival tears	9 (7.5%)
Corneal abrasion	20 (16.66%)
Traumatic uveitis	16 (13.33%)
Hyphaema	3 (2.5%)
Iridodialysis	2(1.66%)
Angle recession glaucoma	2 (1.66%)
Increased I.O.P.	3 (2.5%)
Traumatic cataract	3 (2.5%)
Hypotony	6 (0.83%)
Retinal Detachment	2 (1.66%)
Subluxated lens	2 (1.66%)
Vitreous haemorrhage	3 (2.5%)
Macular hole	1 (1.66%)
Optic neuropathy	2 (1.66%)

Table 6. Clinical Findings in Eyes with Blunt Trauma

DISCUSSION

Ocular emergencies constitute an important cause of ocular morbidity resulting in visual impairment and blindness. Our study included patients who attended the OPD in the department of ophthalmology with history of ocular trauma. Though this hospital data doesn't represent the total number of patients with eye trauma because less severe injuries do not present to the hospital, but would provide data regarding sight threatening injuries which are of greater concern.

A review of 10 population based, cross-sectional studies on ocular trauma in non-industrialised countries showed an estimated prevalence of blindness due to eye injury of 0 to 15/1,00,000 people.[10] Bilateral vision loss per 1,00,000 people was estimated in the range of 30 to 137, with unilateral visual impairment between 0 to 490/100000 population.[10]

The prevalence of ocular trauma in our study was 3.55% which was similar to other studies done by Dandona L et al (3.97%).[11] Review of studies conducted in United States document predominance of ocular trauma in males under 30 year of age. In some developed countries ocular trauma often shows bimodal peak with second peak in old age. This increased incidence of ocular trauma in old age would be due to poor vision, due to cataract, ARMD, glaucoma which indirectly would result in trauma. In our study ocular injuries were common in the age group of 20-40 years. This correlates with studies done by Dhasmana R et al[12], Vats S et al.[9] But in one study done by D.V. Singh et al,[13] the incidence of ocular trauma was higher in <15 year age group. Trauma was more often reported in males 64.52% which correlates with studies done by Vats S et al[9] (55.6%), D.V. Singh et al[13] (88.55%). The higher risk in younger men reflects a combination of higher risk of work, assault, sport and RTA associated injuries.

In our study majority of patients 252 pts (73.90%) sustained injuries at work place. Most of the patients reported to us with metallic foreign bodies (39.29%) followed by vegetative material causing corneal ulcer in 46 patients (13.48%), chemical injuries in 40 pts. (11.43%) In recent times sports injuries and injuries at home have been recognized as the common location for ocular injury in USA and developed countries. However, other studies still show that workplace is the most commonest place of trauma. In a study in Korean population by Oum et al[14], work place injuries account for 34.9% of all penetrating eye injuries. The lower incidence of work place related ocular trauma in Western countries compared to other studies was associated with greater use of protective devices and education in industrial environment. Since the majority of our work force are employed in unorganized sectors without a system of reporting injuries, we do not have national data on cause of work related injuries in India as reported by Jha KN et al.[15] Population based studies give some insight into this problem. In the APEDS, workplace related injuries constituted 55.9% of eye injuries.[7] Eye injuries during agricultural labour accounted for 46.9% of injuries in Aravind comprehensive eye survey on ocular trauma.[8] In a hospital based prospective study from Singapore by Voon et al[16] work related injuries accounted for 71.4% of eye injuries.

The proportion of ocular trauma at work varies between studies, with figures ranging as low as 15% of all ocular trauma cases at an urban centre in Los Angeles as reported by Zagelbaum.[17] where the common aetiology was due to assault, to as high as 70% in U.K. in a study by Macewan CJ et al.[18] A perturbing fact is that only 20% of patients with work related eye injuries use EPD. This low prevalence of EPD use has been a consistent finding in almost every ocular trauma survey in different settings. Most work related injuries occur in well defined, predictable and consistent settings and activities. For example grinding, welding, drilling, cutting metal were the specific activities in 62% of work related injuries in Singapore study.[16] and more than 75% of work related injuries in U.S. study by Klopfer J, Tielsch J M et al.[19] The vast majority of work related ocular injuries are minor (foreign body, Corneal abrasion) and are therefore amenable to prevention with EPD.

In our study Road Traffic Accidents accounted for 17.89% of injuries. RTI related ocular trauma constitute between 5% to 13% of all ocular trauma.[16] We have limited information on injury patterns, nature and outcome of RTI related injuries in India. Majority of studies under estimate the magnitude of RTI associated eye injuries since blinding ocular injuries are often associated with multiple organ injuries with high case fatality.

Bilateral ocular involvement was seen more often RTI and chemical injuries. Most patients presented early to the hospital. In the current series incidence of closed globe injuries was higher seen in 68 eyes (19.94%) as compared to open globe injuries seen in 25 eyes (7.33%). This was a similar observation in studies by Dhasmana et al[12] (53.39%) Oum et al[14] (53.9%). Of the open globe injuries corneal laceration was the commonest injury reported (13/25) followed by sclera corneal laceration. The incidence of complications was higher in patients with Open Globe Injuries as compared to closed globe injuries.

CONCLUSION

In conclusion our present study showed that ocular trauma involves predominantly young men, is work related and occurs in association with well-defined activities and is preventable. In the present scenario it is just not work related injuries that predominate ocular trauma, other causes like home, sports, assault, road traffic accidents, consumer product related (like contact lens), war related injuries are cropping up. In our study we tried to estimate the prevalence of ocular trauma using data based on OPD in the hospital which is definitely a limitation but still with this study we would like to insist upon more epidemiological surveys to be conducted on traumatic and non-traumatic ocular emergencies Ocular trauma needs to be given importance at par with cataract and glaucoma as avoidable cause of blindness because this definitely has social and psychological impact on young generation which is the future of the society. Public education and awareness programmes with focus on improving ocular hygiene thereby reducing the risk of infections and inflammation, wearing EPDs, initiation of appropriate treatment in emergency department and timely referral of patient to an ophthalmologist may decrease ocular morbidity. Industries need to conduct periodic, in house safety audit of work place. Provision of EPDs for the workers in industries and personnel in armed forces is mandatory. Current preventive strategies which have been documented need effective implementation.

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