Original Article

Clinical profile and etiology of ocular trauma in a rural based hospital

Khandelwal Rekha R[1], Shah Ketaki J[2], Gautam Arjun[3], Bisen Rupal[3]

Abstract:

Ocular Trauma is one of the major causes of irreversible visual loss and blindness in developing countries. Our study is aimed at determining various etiological factors responsible for ocular trauma and outline protective measures for population at risk. A hospital based case control study was done in a tertiary care rural based hospital. Patients of all age groups and either sex were included. Prospective information on trauma related to location, activity during injury and causative agent was recorded after face-to-face interviews. All interviewed subjects underwent a comprehensive ocular examination, including vision estimations, slit-lamp biomicroscopy and dilated posterior segment examinations. We reported 299 cases of ocular trauma, out of which 104 (34.8%) patients were in the age group of 30- 45 years. We found that males were 4.8 times more prone to injuries than females. 101 (33.8%) patients were affected while working in industrial area followed by 83 (27.8%) patients of household injury. Road traffic accidents accounted for 61(20.4%) patients out of all injuries. 33(9%) patients had agricultural injuries. Sports related injuries affecting younger age groups were seen in 15(18.7%) cases. The impact of ocular trauma in terms of need for medical care, loss of income and cost of rehabilitation services clearly points towards enormous economical burden on society as it affects mainly younger age group. Hence public awareness regarding use of protective measures and potential risk factors causing injury should be done on priority basis.

Keywords: Awareness, Blindness, Epidemiology, Ocular trauma, Rural.

[1]Professor and Head, [2]Senior Resident, [3]Junior Resident
Department of Ophthalmology
NKP SIMS&RC, Digdoh Hills,
Hingna Road, Nagpur -40019.
rekha.khandelwal@gmail.com

Introduction :

Ocular trauma is a major cause of preventable monocular blindness and visual impairment throughout the world (1, 2). Despite having major socioeconomic impact, very less data on magnitude and risk factors is available especially in developing countries like India (3, 4). A review suggested that at least half a million people are monocularly blind from ocular trauma worldwide (5). In India, National Program for prevention of visual impairment and control of blindness reported 1.2% blindness due to injury (6). The outcome is generally not good in patients who have grossly reduced visual acuity on presentation. Both anterior and posterior segment injuries are common in presentation but anterior portion bears direct impact of mechanical injuries.Although it affects all age groups, previous studies have indicated that young males are most affected by ocular trauma with majority below the age of 30 years (7).

Protective measures would certainly reduce its incidence to a great extent. Road traffic accidents (RTAs) are increasing nowadays while household injuries are under reported. Agricultural injuries leading to rapid corneal ulceration and vision loss is very common in developing countries.

According to a study by Gupta et al (8) it was observed that 1.16% of total blindness was due to ocular trauma while as per Dada et al (9) study in 1984, 5.55% people were totally blind due to ocular trauma. The impact of ocular trauma in terms of need for medical care, loss of income and cost of rehabilitation services clearly points towards the strengthening of preventive measures worthwhile. Mass awareness regarding potential risk factors and agents causing injury can prevent number of ocular hazards.

Previous studies on the profile and prognostic factors in ocular trauma have been carried out in more developed countries where modern facilities for managing ocular trauma are widely available but there is paucity of such studies from the less developed countries.

We conducted this study to determine causative agents and risk factors for ocular injuries and outline protective measures for patients a tertiary care rural based hospital in Nagpur, India.

Material and Methods :

We studied 299 patients of ocular trauma from 1st December 2007 to 31st July 2009 in a tertiary care rural hospital. The ethics review board approval was taken from Institutional Ethics Committee. It was hospital based case series of all ocular trauma patients attending eye out patient department and casualty. We also included referred cases from other departments who had ocular injury. Patients of both sexes and all ages were included in our data after written informed consent.

Detailed history regarding location, activity during injury, nature and cause of injury, previous treatment and other co-existing medical or ocular conditions were recorded after face to face interview with the patient or parents in cases of childhood ocular trauma.

Visual acuity (Snellen's) was recorded and anterior segment was evaluated with slit-lamp (Haag Streit). Posterior segment was evaluated using direct and indirect ophthalmoscope (Heine) with +20 D lens. Intraocular pressure was measured with Goldman Applanation Tonometer (GAT), or noted digitally. Radiological investigations like X-ray orbit, CT scan, MRI scan or B-scan were done as indicated. All the findings were recorded in case record form taking into consideration the proforma of Ocular Trauma Society of India (OTSI) and American Society of Ocular Trauma. The data collected were suitably coded and entered into pre-designed Microsoft Access software. Data analysis was done with SPSS 11.0 Package.

Results :

In our study of 299 cases, 104 (34.78%) cases were in 30-45 years of age group followed by 93 (31.10%) cases in 18-29 age group (Table I). It is observed that men were affected 4.8 times more as compared to females in overall study. The most common location of ocular injury was observed to be industrial area, found in 101(33.78%) cases, followed next by 83 (27.76%) cases in household settings. Males (99 cases, 40%) were more commonly involved in work place related ocular trauma while household injuries were common in females, 32 (61.5%).

We studied the activity being done by the injured at the time of injury and found that maximum number of injuries occurred in work related places, and industrial work is the most common cause in 102 (34.11%) patients. Sports related ocular trauma was seen in 56 (18.7%) cases and was the second most common cause and it was seen in males younger than 16 years of age. Playing in an unsupervised environment led to serious ocular morbidity in these cases (Table II). It is seen from table that potentially earning age group i.e. 17 to 44 years were more affected by trauma. The association between activity done during injury and these age categories was found to be statistically significant. (Chi Square = 166.7, df =10, $p<0.001$).

In our series, 98 (32.78%) cases had ocular injury with blunt objects like cricket ball, stone etc which had a major share leading to severe degree of ocular trauma. This was followed by sharp agents like gilli danda, metal wires, pen/pencils in 39 (13.04%) patients. Agricultural agents like vegetable matter including Jowar plants, wooden sticks had caused ocular morbidity in 21 (7.02%) patients. Iron particles or small wooden and dust particles were included in projectile objects and it accounted for 31 (10.0%) cases of all ocular injuries. Chemical injuries either due to industrial acids or alkalies or household phenyl etc. led to burns in and around eye in 20 (6.69%) cases. In 24 (8.03%) cases, causative agent could not be elicited (Table III).

A significant proportion of subjects in our study, 38 (17.73%) cases had ocular trauma due to fall or Road Traffic Accidents. It was observed that only two (5.26%) patients had used helmets or seatbelts while driving and remaining 36 (94.74%) patients gave no history of using such safety measures. Four (10%) cases were found driving under the influence of alcohol and in rest of the cases alcohol history was found to be unreliable (Table IV). It was seen that out of 102 industrial workers only four (1.34%) patients used protective eyewear.

Discussion :

Epidemiological profile of ocular trauma varies in developing and developed countries. Economical backgrounds, public awareness and availability of resources are responsible for this difference. In our study out of 299 cases, we reported that cases between 30-45 years of age group were most commonly affected by ocular injuries. This feature is of great importance as this is the most economically productive age group and has important consequences on finances of household and society (10, 11). Mean age of participants in study of urban slum population by Vats S et al (12) was 24.21 years. One population based study in Singapore found bimodal peak of age distribution in younger age group and in elderly (13).

Consistent with other studies (14-16), our study observed 4.8% male dominance of ocular trauma than females. A Study by Wong et al (13) found that male population has 4 times higher risk than females. An epidemiological study by McCarty et al (3) reported 34% overall rate of ocular trauma in male population. This male preponderance is explained on the basis that men are more commonly involved in industrial work and in outdoor activities. Children below 12 years of age are more susceptible to uniocular injuries while playing and thus are at high risk of amblyopia. In our study 22.4% of cases were below 16 years of age while a study by Saxena et al (16) in 2002 reported 65.2% boys with ocular trauma. Vats S et al (12) also observed that all injuries in children below 16 years were unsupervised leading to greater ocular damage.

The most common site for ocular trauma in our study was work place (33.8%) which was similar to data found in Indian urban slum population study (12) with higher prevalence of ocular trauma in laborers. Household injuries were more common in females and it was the second common site for ocular trauma as stated by McCarty et al (3) study. Study by Nirmalan et al (14) reported that 26.7% of all ocular trauma occurred in a domestic settings. Playgrounds or recreational centers accounted for 15% eye injuries in our study. Most of these were seen in younger age groups due to non usage of eye protection. Vats S et al (12) reported 14.7% sport related injuries while Singh DV et al (17) observed 7.6% injuries at recreational venue. Road Traffic Accidents can cause serious injuries in and around the eye. We had 17.73% (38 cases) of vehicular accidents out of which only 5.2% cases were using helmets or seatbelts. Vats S et al (12) reported 3.7% cases of RTA while Khatri S et al (15) reported 13.7% cases of

vehicular accidents. Most of the ocular injuries at workplace can be prevented by eye protection. We observed that people sustaining ocular trauma at industrial area did not use any eye protection. Krishnadas S et al (18) in 2006 reported 97.8% cases did not wear protective eye wear while working in industry. This is the target population for emphasizing recommendations for safety measures.

Various agents like cricket ball, gilli danda, wooden sticks, vegetable matter etc can cause mild to grave ocular injury. In our study blunt objects were the most common agent found in 32.8% of cases. Nirmalan PK et al (14) also observed that blunt objects were the most common agent causing ocular trauma in 54.9% of his study cases. Abraham et al (19) reported wooden stick as an offending agent for ocular injury in 21% cases. We found that rural children playing with gilli danda were more prone for perforating injuries. We had 13.04% of cases caused by sharp objects while Vats S et al (12) reported 2.5% of injuries with sharp objects. In our study we found that agricultural agents like vegetable matter led to ocular trauma in 7.02% of cases. A study by Khatry SK et al (15) reported that 25.8% cases were due to agricultural agents in Nepal. Household and industrial chemicals can lead to bilateral injuries. We had 6.69% of chemical injuries while Khatry S et al (15) reported 1.3% of chemical burns. Singh DV et al (17) reported 5 % cases of chemical injury while 12% cases were reported by Raymond S et al (20) his study.

Activity is also significantly associated with ocular injury. We reported 34% of cases of industrial work related ocular trauma. In our study association between activities being done and ocular trauma is found to be significant. (Chi Square = 166.7, df =10, p<0.001).We reported 9% cases of farm related ocular injury while Khatri S et al (15) reported 25.9% cases of agricultural work related trauma in Nepal. We reported 15.5% sports related ocular trauma which was similar to urban slum population study (12) in 2007 which reported it to be 22.7%.

Occupational hazards remain the most common cause of ocular injuries in rural population of developing countries. The patients who sustained ocular trauma at their workplace did not use any protective gear. A joint effort by the industry and agriculture experts with health professionals is the need of the hour to determine region and work specific eye protection gears. Awareness regarding the use of ocular protection and possible benefits for eyes from using such protection must be highlighted. Apart from general health concerns our focus should be on the young males who are vulnerable to ocular injuries and lead to great economical loss.

Table I: Age and sex correlation in ocular injuries

Age groups (years)	Male Number (%)	Female Number (%)	Total Number (%)
0 - 6	09 (3.64)	06 (11.54)	15 (5.02)
6 - 12	29 (11.74)	03 (5.77)	32 (10.70)
13 - 17	16 (6.48)	04 (7.69)	20 (6.69)
18 - 29	79 (31.98)	14 (26.92)	93 (31.10)
30 - 45	86 (34.82)	18 (34.62)	104 (34.78)
46 - 64	23 (9.31)	06 (11.54)	29 (9.70)
>65 Yrs	05 (2.02)	01 (1.92)	06 (2.01)
Total	247	52	299 (100)

Table II: Distribution of ocular trauma cases by activity and its correlation with different age groups

Activity	0-16 Years	17-44 Years	45 & Above	Total (n=299)	Percentage
-Industrial work	03	93	06	102	34.11
-Playing or sports related	45	10	01	56	18.73
-Slip / Fall	09	35	09	53	17.73
-Farming	00	18	11	29	9.07
-Bystander & other	10	41	08	59	19.73
-Total	67	197	35	299	100

(Chi Square = 166.7, df =10, p<0.001)

Table III: Distribution of cases based on causative agents and its relation with gender

Causative Agent	Male	Female	Total number (%)
Blunt object	**86**	**12**	98 (32.78)
Sharp object	**32**	**07**	39 (13.04)
Projectile objects	**31**	**00**	31 (10.37)
Vegetable matter	**14**	**07**	21 (7.02)
Industrial chemicals	**08**	**01**	09 (3.01)
Household chemicals	**05**	**06**	11 (3.68)
Finger /Fist/body parts	**10**	**10**	20 (6.69)
Animal body parts	**02**	**01**	03 (1.00)
Sports equipment	**09**	**01**	10 (3.34)
Fireworks	**07**	**01**	08 (2.68)
Others	**15**	**05**	20 (8.37)
Unknown	**23**	**01**	24 (8.03)
Total	**247**	**52**	299(100)

Table IV: Safety measures and Road Traffic Accident cases

Road Traffic Accident	Alcohol Consumed Number (%)	Seatbelts or helmet used Number (%)
Yes	04 (10.53)	02 (5.26)
No	34 (89.47)	36 (94.74)
Total	38 (100)	38 (100)

Original Article

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