Original Research Paper Opthalmology

Incidence of Ocular Surface Foreign Body and its Correlation with Specific Occupation and Preventive Measures

Dr.P.Subba Reddy	Associate Professor,Department of Ophthalmology,ACS Medical College,Chennai
Dr.K.Nirmala	Senior Resident, Department of Ophthalmology,Medical College,Chennai
Dr.S.Radhika	Senior Resident, Department of Ophthalmology,Medical College,Chennai
Dr.S.Ravi	Professor,Department of Ophthalmology,ACS Medical College,Chennai
Dr.Christina Mary P Paul	Associate Professor,Department of Community Medicine,ACS Medical College,Chennai

ABSTRACT

Background: *Ocular surface foreign body (OSFB) is the most common cause of injury to eye. Even though OSFB is a trivial injury to eye it causes immense discomfort to patients and the reason for them to attend ophthalmic outpatient department.*

Aim: *To determine incidence and aetiology of OSFB and to identify the occupations prone to it and the preventive measures to be taken.*

Materials and Methods: *A hospital based prospective study was conducted at ophthalmology department in ACS Medical College during the period of January 2016 to October 2016 (10 months).*

Results: *Main finding of this study was found to be OSFB seen in males belonging to 31 to 40 years working in industrial atmosphere. 80% could have been prevented with the use of protective eye wears.*

Conclusion: *Public should be educated and preventive measures to be taken.*

KEYWORDS : Ocular Surface Foreign Body, Ocular trauma, Visual Impairment

INTRODUCTION:

A superficial foreign body or ocular surface foreign body(OSFB) is the most common[1] and preventable eye injury[2]. Ocular trauma is the leading cause of unilateral loss of vision[3] and is a considerable cause of visual impairment and utilization of ophthalmic service resources[4]. This type of injury often occurs at work,domestic and leisure activity (home,garden,playing), sports[5] or windy day[6].

Ocular trauma though largely preventable causes immense discomfort to patients and reason for them to attend ophthalmic outpatient department[7,8]. OSFB's are graded as mild[9] according to ocular trauma classification based on the severity of the injury.

Ocular surface foreign bodies are small particles that impinge upon conjunctiva,cornea[10]. may get dislodged in the fornices and cause redness, watering, foreign body sensation and pain in the eye[11]. Some may enter at high speed missile impact (eg: grinding, hammering or blow by wind) and can cause corneal opacity, rust ring[12] or even cause scarring on the visual axis and secondary infections from bacterial conjunctivitis, keratitis to endophthalmitis[13] and can cause severe visual impairment[3].

These OSFB's are a common occupational hazard and cause ocular morbidity and loss of time of work[14] despite the use of safety precautions[15]. In some developing countries this is seen in agricultural workers with a considerable visual loss[1].

AIM AND OBJECTIVE:

The aim of the study was to determine the incidence and aetiology of Ocular surface foreign body (OSFB) and demographic pattern of the injury caused by ocular surface foreign body and to identify the occupations prone to it and the preventive measures to be taken considering health and socio economic status of the patients.

INCLUSION CRITERIA:

Age group 15 to 60 years, male and female, working and non working were included in the study.

MATERIALS AND METHODS:

A hospital based prospective study was conducted at ophthalmology department in ACS Medical College during the period of January 2016 to October 2016 (10 months). All cases of Ocular surface foreign body attending Ophthalmic opd were included in the study. This study was approved by the hospital ethical committee. Verbal consent was obtained from the patient before completing the questionnaire.

We recorded demographic information from each patient which includes – Age,Gender, Education, Occupation at the time of incident, activity at the time of injury (at work, during leisure and domestic activities),time between the injury and patient's visit to ophthalmic opd, previous similar eye injuries, availability of protective eyewear at work, whether eyewear were used during the injury.

Thorough slit lamp bio microscopic evaluation was done which includes instillation of fluorescein dye. This stain is taken up by damaged epithelial cells and helps to delineate foreign body and residual abrasion. Superficial foreign body and rust ring were removed using a 26 guage needle under topical anaesthesia. Topical antibiotic treatment was prescribed. Location of the removed foreign body, rust marks and any existing corneal scars from previous foreign bodies were noted. Statistical analyses were performed with statistical programme for social services (SPSS version). The data are presented as mean ± standard deviation.

RESULTS:

A total of 321 patients who presented in ophthalmology outpatient department of ACS Medical College,Chennai,Tamil Nadu with Oc-

ualr Surface Foreign Body(OSFB) were studied for a period of 10 months from 01/01/2016 to 31/10/2016. Table1 shows the annual incidence of OSFB cases was 6.66% (n=321) out of total outpatient cases of 4818. The incidence of OSFB cases was more in the month of April(n=40) and May(n=42) whereas in other months it ranges from 25-42.

TABLE 1 MONTH WISE INCIDENCE OF OCCULAR SURFACE FOREIGN BODY

Month	Frequency of foreign body	Total number of OP Cases	Incidence
Jan	34	562	6.05
Feb	28	386	7.25
Mar	36	490	7.35
Apr	40	410	9.76
May	42	580	7.24
Jun	24	515	4.66
Jul	28	546	5.13
Aug	33	476	6.93
Sep	26	432	6.02
Oct	30	421	7.13
Total	321	4818	6.66

FIGURE 1: MONTH- WISE FREQUENCY OF FOREIGN BODIES

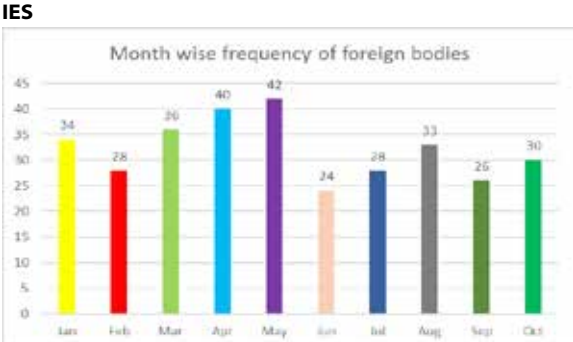

Table 2 shows the affected patients mostly belong to age group of 31 to 40 – 50.1% (n=161) and 41 to 50 years 20.87% (n=67). This was followed by adults between 21 to 30 years – 16.2% (n=52). The main age was found to be 35. There were 71.3% males (n=229) and 28.66% females (n=92). Male : Female ratio was found to be 2.48:1.

TABLE 2: SOCIO – DEMOGRAPHIC PROFILE OF THE SUBJECTS WITH FOREIGN BODY

Variable	Frequency (out of 321)	Percentage
Gender Male Female	 229 92	 71.34 28.66
Age < 21 years 21 – 30 years 31 – 40 years 41 – 50 > 50 years	 17 52 161 67 24	 5.30 16.20 50.16 20.87 7.47
Side Right eye Left eye	 187 144	 58.26 41.74

Majority of the patients presented with foreign body in cornea 71.9% (n=231) and 28.03% (n=90) lodged in various sites like conjunctiva, fornices etc. OSFB's were common in right eye 58.26% (n=187) compared to left eye 41.74% (n=144). Table 3 shows Industrial workers were most commonly affected accounting to 53.27% (n=171) followed by construction workers 15.26% (n=42), domestic work 12.77% (n=41). OSFB trauma due to agricultural work was 9.03% (n=29) and other occupations account to 9.65% (n=31).

TABLE 3: DISTRIBUTION OF FOREIGN BODIES AS PER THE OCCUPATIONS

Occupation	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	Total
Industrial work	16	15	18	22	24	14	18	15	12	17	171
Construction work	6	5	7	6	5	4	3	6	4	3	49
Agricultural work	4	3	3	4	2	3	2	3	2	3	29
Domestic	5	3	4	2	8	2	4	5	4	4	41
Others	3	2	4	6	3	1	1	4	4	3	31
Total	34	28	36	40	42	24	28	33	26	30	321

Table 4 shows the most common foreign body material was metallic iron particles 51.09% (n=164) followed by dust particles 18.07%(n=58). Other particles like vegetable matter 7.79% (n=25), wooden splinter 11.21% (n=36), glass 2.08% (n=9), insects 3.74% (n=12). Other plastic sand particles etc were 5.3% (n=17).

TABLE 4: VARIOUS FB S FOUND IN THE EYE

Foreign body Material	Frequency (%)
Metallic fb	164 (51.09)
Dust fb	58 (18.07)
Wooden fb	36 (11.21)
Veg fb	25 (7.79)
Glass fb	9 (2.80)
Insect fb	12 (3.74)
Others fb	17 (5.30)
Total	321 (100)

Location of corneal foreign body was central 16% paracentral 61% and peripheral 23%. Rust mark was present in 25% after FB removed. Corneal scars due to previous FB injuries were in 55% patients. Table 5 shows a total of 73.83 (n=237) injury of OSFB could have been prevented by use of protective eye wear, 17.76% injury has doubtful prevention with protection and only 8.4% could not have been prevented with the use of protective eye wear.

TABLE 5: DISTRIBUTION OF CASES ON BASIS OF INJURY PREVENTABLE BY THE USE OF PROTECTIVE EYE WEARS (PEW)

Preventable by use of PEW	Frequency (%)
Yes	237 (73.83)
No	27 (8.41)
Uncertain	57 (17.76)
Total	321 (100)

DISCUSSION:

The most common ocular injury are caused by OSFB not causing much visual impairment[16] but they are common reasons for ophthalmic clinic presentation. Our study showed annual incidence of OSFB cases to be 1.05 with an average 1.05 foreign bodies being removed everyday. Most of the cases were seen during the month of April and May. These may be primarily due to hot sunny climate where more industrial, construction and agricultural work are undertaken due to long effective day light along with dry areas more prone to dusty atmosphere.

Male preponderance with male to female ratio of 2.48:1 was seen in our study. The male to female ratio ranged in other studies from 3:1 as per Jahangir Tehmina[17] et al. to 14:1 in study of Guerra Garcia RA[18] et al. The male predominance might be due to the greater exposure

of men to risks such as heavy work, contact sports, altercations, traffic accidents and alcohol intake[18]. The age commonly affected by OSFB injury in our study, ranged from below 20 to above 60 years in which there was predominance of this injury during 31 – 40 years. The mean age was found to be 35. Reports of Guerra GarciaRA[17] et also indicate mean ages ranging from 29 to 35years. In most reports, injuries occurred in men under 50 with higher incidences in the 3rd and 4th decades of life which is consistent to our findings.

Our findings showed that in 71.9% cases cornea was more frequently involved, rest 28.03% showed involvement of conjunctiva, fornices etc. The study of Yiğit Ozlem et al[16].

showed comparable results with involvement of cornea to be 72.6%, the same study found the majority of FB to be metal fragments followed by dust particle. Most of them were metallic iron foreign bodies. Our study revealed similar results. Occupational injury corneal foreign body comprises 35% of all ocular trauma[19,20] and more affects men in the active lifetime[21]. In similar study 70% corneal foreign body injuries occurred in metal cutting industry[22]. In a Canadian study 21% eye injury occurred during welding[23]. The second most common occupation exposed to OSFB was construction workers which includes metal, dust, cement, paint particles. The agricultural workers mostly get injured by vegetative matter. Our study showed right eye was more involved compared to left eye. This may be due to blinking more in the left eye which may prevent foreign body entering the eye.

The finding of our study revealed that majority of injury occurred as the workers were not using protective eye wear eventhough this was available. Reasons given for not wearing were discomfort, inability to see the task being performed, forgot wearing, did not feel it was necessary. Our study showed that only 8.4% injury was not preventable, 73.83 could have been prevented by PEW. Similarly, in the study of Jahangir Tehmina[16] et al. over 3/4 of the injuries were preventable by protective devices[24]. Despite wearing PEW 45% patients sustained eye injury by wearing some form of eye protection[25]. Workplace standards should be adjusted to increase the protective capacity of PEW[24].

Most of the injury are superficial, but they account for significant amount of time taken off work to attend OPD and follow up. The healthcare cost for these injuries are another problem as they create an economic burden.

CONCLUSION:

The main finding of this study is that ocular trauma is the common cause of presentation to eye department with occupational incident accounting for majority of injuries. The industrial, construction and agricultural workers are the occupations who are prone to ocular surface foreign body injury. There was an incidence of 1.05 OSFB per day in our study and these were seen more in the month of April and May. These injuries are mostly superficial without much visual impairment and not affecting patient's quality of life.

As most of these OSFB injuries could have been prevented by the use of preventive measures-Protective eye wear. Workplaces with high risk should be identified and workers should be educated about such eye injuries and steps should be taken to initiate public awareness programme on large scale and so expedite appropriate measures taking into consideration health and social economic status of the patients reducing their economic burden.

Acknowledgements: Nil

Conflict of Interest : Nil

REFERENCES:

1. Li Wern Voon, Jovina See, Tien Yin Wong. The epidemiology of ocular trauma in Singapore: Perspective from the emergency service of a large tertiary hospital. Clinical Study Eye 2001;15:75–81
2. Woo JH, Sundar G. Eye injuries in Singapore-Don't risk it. Do more. A prospective study. Ann Acad Med Singapore. 2006;35(10):706-18.
3. National Society to Prevent Blindness: Fact Sheet. New York: National Society to Prevent Blindness, 1980
4. Schein OD, Hibberd PL, Shingleton BJ, et al. Spectrum and burden of ocular injury. Ophthalmology 1986; 95: 300-5.
5. emedicinehealth (homepage on the Internet).certified 05/2011;cited 2013 Aug28; (About 1 screen). Available from: http:// www.emedicinehealth .com/foreign_body_eye/article_em.htm#eye_foreign_body_overview
6. Netdoctor(homepage on the internet), Foreign body in the eyereviewed by MacEwan C.(updated 30.09.2009: cited 28.08.2013) : (about 1 screen) . Available from http://m.netdoctor.co.uk / health_advice/facts/foreignbodyintheeye.htm
7. Karlson TA, Klein BEK. The incidence of acute hospital treated eye injuries. Arch Ophthalmol 1986; 104: 2473-6.
8. National Society to Prevent Blindness: Fact Sheet. New York: National Society to Prevent Blindness, 1980.
9. MD Guidelines (homepage on the internet)Reed Group, Medicl Disability Advisors. c1991-2013(cited 28. 08.2013): (about 1screen).Available from http://www.mdguidelines.com/foreignbody-cornea.
10. Injuries to the eye. Sihota and Tandon, editors. Parsons' diseases of the eye. 20 edition. New Delhi: Elsevier;2007.p.362-4.
11. Better Health Channel(homepage on the internet).c2013 State Government of Victoria(updated 13.08.2013: cited 28.08 . 2013) : (about 1 screen) . Available from http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/page s/Eye_injuries_foreign_body_in_the_eye.
12. MD Guidelines (homepage on the internet)Reed Group, Medicl Disability Advisors. c1991-2013(cited 28. 08.2013): (about 1 screen).Available from http://www.mdguidelines.com/foreignbody- cornea
13. DeBroff BM, Donahue SP, Caputo BJ, Azar MJ, Kowalski RP, Karenchak LM. Clinical characteristics of corneal foreign bodies and their associated culture results. CLAO J. 1994; 20(2):128-30.
14. MD Guidelines (homepage on the internet)Reed Group, Medicl Disability Advisors. c1991-2013(cited 28. 08.2013): (about 1 screen).Available from http://www.mdguidelines.com/foreignbody- cornea
15. Bernad D, Zuckerman M.D., Theodore W, Liberman M.D. Corneal rust ring, etiology and histology. AMA arch Ophthalmol 1960;63(2):254-265
16. Ozlem , YURUKTUMEN, Savaş ARSLAN. Foreign body traumas of the eye managed in an emergency department of a single-institution. Turkish Journal of Trauma & Emergency-Surgery 2012;18 (1):75-9
17. Tehmina Jahangir, Nadeem Hafeez Butt, Uzma Hamza, Haroon Tayyab, Samina Jahangir. Pattern of Presentation and Factors Leading to Ocular. Trauma Pak J Ophthalmol 2011; 27(2):96-102
18. Guerra Garcia RA, Garcia D, Martinez FE, Columbie Garbey YE, Martinez RR. The Cuban Ocular Trauma Registry. J Clin Exp Ophthalmol 2013; 4(2):276
19. Nicaeus T, Erb C, Rohrbach M, Thiel HJ. [An analysis of 148 outpatient treated occupational accidents]. Klin Monatsbl Augenheilkd. 1996;209(4):A7-11. German.
20. Voon LW, See J, Wong TY. The epidemiology of ocular trauma in Singapore: perspective from the emergency service. Eye (Lond). 2001;15(Pt 1):75-81.
21. Nepp J, Rainer G, Krepler K, Stolba U, Wedrich A. [Etiology of non-penetrating corneal injuries]. Klin Monatsbl Augenheilkd. 1999;215(6):334-7. German
22. Dufresne RM, Suggett D, Alleyne BC. Welder eye injuries. J Occup Med. 1989;31(12):1003-6.
23. Gumus K, Karakucuk S, Mirza E. Corneal injury from a metallic foreign body: an occupational hazard. Eye Contact Lens. 2007;33(5):259-60.
24. Ramakrishnan T, Constantinou M, Jhanji V, Vajpayee RB. Corneal metallic foreign body injuries due to suboptimal ocular protection. Arch Environ Occup Health. 2012;67(1):48-50.
25. Welch LS, Hunting KL, Mawudeku A. Injury surveillance in construction: eye injuries. Appl Occup Environ Hyg. 2001;16(7):755-62.