

Ocular Surface Foreign Body: Its Incidence and Correlation with Specific Occupations

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Abstract :

Background : Ocular injuries are the leading cause of monocular blindness. The most common injury to the eye is due to ocular surface foreign body (OSFB). These foreign body (FB) particles impinge upon the cornea or conjunctiva and cause redness, watering, FB sensation and pain in the eye. Even though the severity of these injuries are graded as mild as per ocular trauma classification, immense discomfort felt by the patients accounts for the visits to ophthalmic consultant.

Objective : To find out the incidence and demographic pattern of OSFB injuries and to identify the occupations prone to it. **Method :** A case based study was conducted as ophthalmology department of one of the medical colleges of Gujarat from April- 2012 to March- 2013. All cases of OSFB attending ophthalmic OPD were included in the study. After collecting detailed history, ocular examination was done under slit lamp biomicroscope to identify the FB and the site of injury. **Results :** OSFBs are commonly seen in males belonging to 21 – 40 years of age. The most common FB particle causing this injury was metallic followed by dust particle. The industrial workers and agricultural worker are more prone to these injuries. These injuries due to domestic reasons are seen more during the festive seasons of October and November. 78.4% of these OSFB injury could have been prevented with the use of protective eye wears (PEW). **Conclusion :** The industrial and agricultural workers are prone to OSFB injuries at their work places. These injuries are preventable and there is a need to generate public awareness programmes to educate the people about various precautions to prevent such injuries and the use of PEWs at work places.

Key Words : Ocular surface foreign body, Superficial foreign body, Ocular injury.

Introduction :

The leading cause of unilateral loss of vision is Ocular trauma.⁽¹⁾ It is classified into various types and the most common is the trauma caused by superficial foreign body.⁽²⁾ This type of injury often occurs at work place, home, other accidents, while participating in sports⁽³⁾ or even when outside on windy day.⁽⁴⁾

Ocular Surface Foreign Bodies (OSFB) or Superficial foreign bodies are basically small particles that impinge upon the conjunctiva or cornea.⁽⁵⁾ According to the Classification of Ocular Trauma based on severity of the trauma, the injuries caused by superficial foreign bodies (FBs) are graded as mild.⁽⁶⁾ Yet they tend to be very uncomfortable causing red, watery, gritty eye with pain that increases every time the eye opens or closes.⁽⁴⁾

These FBs may range from occasional eye lashes, to dust, sand, paint or metal particles, etc and the severity of the symptoms depend on what the foreign body is and how the injury occurred.⁽³⁾ It can amount to either serious complications as seen in high speed missile impact metal particles or it may go unnoticed without any long term

problem as in case of lodged eye lash. Some particles of steel or emery fly straight onto the cornea and penetrate the epithelium and / or substantia propia. While some FB particle sticks to the palpebral conjunctiva, and is liable to get dragged across the cornea leading to corneal abrasions. The FB can also get lodged in the upper fornix or upper sulcus subtarsalis from where it can irritate the cornea.⁽⁵⁾ Such FB causes immense pain, watering, irritation, photophobia, redness and foreign body sensation.⁽⁷⁾ On the contrary some fairly large FB e.g. a grain of corn may be retained in the upper fornix for a long time and lead to just irritation and discharge. These generally get embedded in a mass of granulation tissue and simulate the cockscomb type of tuberculosis. Occasionally the FB may also get embedded in the bulbar conjunctiva. Other FB like wing cases of insects and husks of seeds may adhere to the cornea by their concave surfaces, usually at the limbus for several weeks without causing much discomfort.⁽⁵⁾

The foreign body if ignored may lead to ocular complications like conjunctivitis, keratitis, corneal ulceration and even ocular penetration.⁽⁷⁾ Some iron FBs lead to formation of rust ring.⁽⁸⁾ These foreign bodies are usually not serious and they do not cause threat to sight. However recurrent episodes can lead to scarring which causes impairment of vision.⁽⁴⁾

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These FBs are a common occupational hazard causing ocular morbidity and loss of time of work.⁽⁸⁾ At work places due to modernization, the utilization of high speed drills and other mechanical devices, there is increase in the frequency of such injuries despite the use of safety precautions.⁽⁹⁾ Whereas in some developing countries, the occurrence of superficial corneal trauma is still commonly seen in agricultural work, which rapidly progresses to corneal ulcer and thereby leads to visual loss.⁽¹⁾ These injuries are most common preventable cause of monocular blindness⁽¹⁰⁾ and mostly occur in the active years of life. If untreated they can lead to serious economic and vocational consequences.⁽¹¹⁾

Aims and Objectives :

The aim of the study was to know the Incidence and Demographic pattern of the injury caused by OSFB and to identify the occupations more prone to it.

Patients and Methods :

A case based study was conducted in Ophthalmology department of the Shri M.P.Shah Government Medical College, Jamnagar, Gujarat. All the cases of OSFB coming to ophthalmology outpatient department (OPD) were included over a period of 1 year from April 2012 to March

2013. A detailed history was noted with special reference to occupation of the patient, place of injury and how the injury occurred. The cases were also asked whether they were wearing any protective eye wears (PEW) at the time of injury or not. A complete anterior segment examination was carried under slit lamp biomicroscope to identify the FB and the site of trauma.

Results :

A total of 445 patients who presented in ophthalmology OPD of Shri M.P.Shah Government Medical College, Jamnagar, Gujarat, with OSFB were studied, for period of 1 year from 01/04/2012 to 31/03/2013. The annual incidence of OSFB cases was 1.25% (n= 445) out of total annual OPD of 35405. The incidence of OSFB cases was more in the month of October (n = 42) and November (n = 40) whereas in other months it ranged from 35 to 38. The affected cases mostly belonged to age group of 31 – 40 years (31.9%, n = 142) and 21 – 30 years (30.1%, n = 134). This was followed by adults between 41 – 50 years (13.7%, n = 61). The mean age was found to be 31. There were 87.9% (n = 391) males and 12.1% (n = 54) females and Male: Female ratio was 7.25:1. Majority of patients presented with FB in cornea 73.5% (n = 327) and rest 26.5% (n = 118) had FB lodged in various other sites like conjunctiva, fornices etc.

Table 1: Incidence of OSFB categorized as per various occupations

Occupation	Apr*	May*	June*	July*	Aug*	Sept*	Oct*	Nov*	Dec *	Jan**	Feb**	Mar **	Total
Painter	6	5	4	4	3	5	7	5	3	3	4	5	54
In. worker	20	18	20	23	22	21	22	22	24	21	20	19	252
Farmer	5	6	5	4	5	4	4	4	4	4	6	6	57
Domestic	3	2	3	3	2	3	5	5	2	3	2	2	34
Other	4	4	4	4	5	1	4	4	5	3	5	4	48
Total	38	35	36	38	37	34	42	40	38	34	37	36	445

(* = Year 2012, ** = Year 2013)

The industrial workers (In. worker) were most commonly affected amounting to 56.6% (n = 252), followed by farmers 12.8% (n = 57) and painters 12.1% (n = 54). OSFB trauma due to domestic work was 7.7 % (n = 34) and other professions amounted to 10.8% (n = 48).

Table 2: Various FBs found in the eye

Foreign Body Material	Frequency (%)
Metal particle	155 (34.8)
Dust particle	148 (33.3)
Glass particle	12 (2.7)
Wooden splinter	36 (8.1)
Vegetative material	33 (7.4)
Insect	15 (3.4)
Other	46 (10.3)
Total	445 (100)

The most common FB material was metal particle, followed by dust particle. Other particles like chalk dust, soot particle, plastic particle, eyelashes etc accounted for 10.3%.

Table 3 : Distribution of cases on basis of injury preventable by the use of Protective Eye Wears (PEW)

Preventable by use of PEW	No. of patients (%)
Yes	349 (78.4)
No	28 (6.3)
Uncertain	68 (15.3)
Total	445 (100)

A total of 78.4% (n = 349) injuries due to OSFB could have been prevented by the use of PEW. 15.3% (n = 68) injuries had doubtful prevention with protection and only 6.3% (n = 28) injuries could not have been prevented even with the use of PEW.

Discussion :

The most common ocular injuries are the ones caused by OSFB or superficial FBs and they usually do not lead to visual impairment.⁽¹²⁾ Yet the discomfort and pain associated these injuries is estimated to be the most common reason for attending the ophthalmic clinic.⁽¹⁰⁾ These injuries are also common cause of ophthalmic emergency visits in US.⁽⁸⁾ Our study showed the annual incidence of OSFB cases to be 1.25% with an average of 1.24 OSFB being removed every day. More of these cases were seen during the month of October and November, probably due to the festive season wherein colouring, cleaning & renovations of offices and houses are usually done.

There was male preponderance with male: female ratio being 7.25: 1. Multiple reports from the literature indicate a higher incidence of ocular trauma in males. The male to female ratio ranged in other studies from 3:1 as per Jahangir Tehmina et al.⁽¹³⁾ to 14:1 in study of Guerra García RA et al.⁽¹⁴⁾ 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.⁽¹⁴⁾

The age commonly affected by OSFB injury in our study, ranged from 21 years to 50 years in which there was predominance of this injury during 31 – 40 years. The mean age was found to be 31. Reports of Guerra García RA et al. also indicate mean ages ranging from 29 to 35 years.⁽¹⁴⁾ In most reports, injuries occurred in men under 50 with higher incidences in the 3rd and 4th decades of life⁽¹⁴⁾ which is consistent to our findings.

OSFB are superficial FBs lodged in the outer coats of the eye. Our findings showed that in 73.5% cases cornea was more frequently involved, rest 26.5% showed involvement of conjunctiva, fornices etc. The study of Yiğit Özlem et al.⁽¹²⁾ 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. The cases most prone to assaults by the metal FBs were industrial workers.⁽¹²⁾ Our study revealed similar results. These injuries occurred at work while cutting and welding metals.⁽¹²⁾ The second common occupation exposed to OSFB was agricultural work, more common in developing countries.

The farmers mostly get injured by vegetative particles which if not treated leads to corneal ulcers as per Thylefors B.⁽¹⁾ The findings of our study revealed that majority of injuries occurred as the workers were not using PEW. The PEWs were either not provided, or were broken or the cases were not aware. Our study showed that only 6.3 % injuries were not preventable, rest 78.4% OSFB injuries could have been prevented by the use of PEW. Similarly, in the study of Jahangir Tehmina et al. over 3/4th of the injuries were preventable by protective devices.⁽¹³⁾ These figures reflect vast opportunity for introduction of preventive measures and generating public awareness for PEW.⁽¹³⁾

Conclusion :

OSFBs are commonly seen ocular injury in day to day life. The industrial workers get injured by metallic FB due to the use of high speed grinding and drilling machines at work place. At the same time farmers are exposed to various FBs like dust or vegetative particles. Thus, industrial work and agricultural work are the occupations wherein workers are more prone to OSFB injury.

There was an incidence of 1.24 OSFB per day in our study and these injuries were seen to be more during October and November. These were primarily domestic injuries resulting from vigorous house/office cleaning and renovation work as October and November are festive months. These injuries are superficial, usually without visual disability so they don't affect the patient's quality of life. Yet the ocular morbidity caused results in loss of working hours which has adverse economic impact.

It was observed that most of these OSFB injuries could have been prevented if proper precautions and PEWs were used. Most of the cases were not aware of various safety precautions and the use of PEWs at work places. Therefore there is need to generate public awareness programmes to educate people on how to protect eyes from injuries especially at work places. There should also be supervision of workers to ensure that they are using the PEWs during work.

References :

1. B Thylefors. Epidemiological patterns of ocular trauma. Australian and New Zealand Journal of Ophthalmol 1992;20(2):95-8
2. 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
3. emedicinehealth (homepage on the Internet).certified 05/2011;cited 2013 Aug28; (About 1 screen). Available from:

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- http://www.emedicinehealth.com/foreign_body_eye/article_em.htm#eye_foreign_body_overview
4. Netdoctor(homepage on the internet), Foreign body in the eye-reviewed 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
 5. Injuries to the eye. Sihota and Tandon, editors. Parsons' diseases of the eye. 20th edition. New Delhi: Elsevier;2007.p.362-4
 6. Clinical Career in Ophthalmology and Optometry (homepage on the internet), classification of ocular trauma.(updated 21.06.2011: cited 28. 08.2013): (about 1 screen). Available from <http://vodvos.com/classification-of-ocular-trauma/>
 7. 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/pages/Eye_injuries_foreign_body_in_the_eye
 8. 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/foreign-body-cornea>
 9. Bernad D, Zuckerman M.D., Theodore W, Liberman M.D. Corneal rust ring, etiology and histology. *AMA arch Ophthalmol* 1960;63(2):254-265
 10. Hany E El-Mekawey, Khaled G Abu El Einen, Mohammad Abdelmaboud, Amr Khafagy, Eman M Eltahlawy. Epidemiology of ocular emergencies in the Egyptian population: a five-year retrospective study. *Clin Ophthalmol* 2011;5:955-60
 11. B Fiebai, EA Awoyesuku. Ocular injuries among industrial welders in Port Harcourt, Nigeria. *Clin Ophthalmol* 2011;5:1261-3
 12. Özlem YİĞİT, Aslıhan YÜRÜKTÜMEN, Sava 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
 13. 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
 14. Guerra García RA, García D, Martínez FE, Columbié Garbey YE, Martínez RR. The Cuban Ocular Trauma Registry. *J Clin Exp Ophthalmol* 2013; 4(2):276