



Clinical Profile of Patients Presenting with Corneal Foreign Bodies: A Cross-Sectional Study Conducted in a Tertiary Hospital in Nepal

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ABSTRACT

Introduction: Corneal foreign bodies are one of the commonest forms of ocular trauma, the majority of which occur due to occupational exposure. The aim of this study was to study the profile of patients with corneal foreign bodies.

Materials and methods: A hospital based prospective study was conducted among 60 patients presenting to the ophthalmology outpatient department in Dhulikhel Hospital-Kathmandu University Hospital (DH-KUH) over a time span of 6 months. Demographic data of patients, clinical characteristics of foreign bodies and associated complications were noted.

Results: Most of the patients were males (n=55) belonging to the 21-30 age group (n=24). Majority of them were workers in metal industries (n=26). Welding and cutting metal were implicated as the most common mode of injury (n=53).

Conclusion: By virtue of this study, we identified the high risks associated with sustaining this form of ocular trauma. The incidence and hence the prevalence of corneal foreign body can be gradually levelled down if we aware the people about the associated complications and advise them to use protective eye wears (PEW).

Key words: Corneal foreign bodies, Epidemiological analysis, Occupational health hazard, Protective eyewear.

Financial Interest : Nil

Received : 23.06.2021

Conflict of Interest : Nil

Accepted : 12.12.2021

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Access this article online

Website: www.nepjol.info/index.php/NEPJOPH

DOI: <https://doi.org/10.3126/nepjoph.v14i1.38010>

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ISSN: 2072-6805, E-ISSN: 2091-0320



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INTRODUCTION

Corneal foreign bodies may cause visual impairment ranging from mild visual obscuration to vision threatening corneal ulcers. (McCarty et al., 1999; Meek et al., 2005) Corneal foreign body can cause severe pain, discomfort and vision loss if not attended on time. (Thylefors, 1992) Most corneal foreign bodies are metallic, which results from occupational accidents seen in metal industry construction workers. (Welch et al., 2001; Voon et al., 2001)

Patients present with symptoms like foreign body sensation, pain, redness, watering of the eyes and blurred vision. History of the inciting event is almost always present. (Fraenkel et al., 2017) It reduces visual acuity if scars form on the visual axis and secondary infection ranging from keratitis to endophthalmitis. Metal foreign bodies usually leave rust in the cornea causing scarring. (DeBroff et al., 2017; Macedo et al., 2005). The appearance of a rust ring indicates embedment in the cornea for more than 24 hours. (Casser et al., 1990).

Corneal foreign bodies are one of the common occupational health hazards causing ocular morbidity. (Bernad et al., 1960; Fond, 1995). Education regarding occupational hazard in general population is a must to address this problem.

MATERIALS AND METHODS

A hospital-based cross-sectional study was conducted at the Ophthalmology Outpatient

department in Dhulikhel Hospital- Kathmandu University Hospital (DH-KUH), during the period of May 2016-October 2016 (6 months period). This study was approved by the Institutional Review Committee of Dhulikhel Hospital-Kathmandu University School of Medical Sciences (IRC-KUSMS 34/17). All cases of corneal foreign bodies attending the ophthalmology department were included in the study after obtaining a written consent. Detailed history regarding patients' demographics including age, gender, profession and education were recorded. Records regarding activity at the time of incident, duration between the incidence and patient's arrival to the outpatient department, attempted self-removal of foreign bodies, availability and use of protective eye wear at work were noted. Patient's visual acuity was taken with Snellen's chart. Slit lamp biomicroscopy (Haag-Streit 800) with fluorescent staining (Fluorostrip) was performed in all cases. Topical anaesthesia (Xylocaine 1% eye drop) was instilled in the affected eye and the corneal foreign body was removed with the help of a 26 gauge needle. Rust ring, if present, was also removed. Type of foreign body and their location, presence of rust ring and other complication like epithelial defect, stromal infiltrate, and presence of corneal scars due to previous injuries were also noted.

After removal of foreign body, eye padding was done with ointment Ciprofloxacin and eye drop Tropicamide 0.8% and phenylephrine 5% in the affected eye and asked for follow up the following day.

Statistical analysis was performed with the statistical package for social sciences (SPSS version 25).

RESULTS

Among the patients, 91.70% (n=55) were male and 8.30% were female.(Table 1) The affected patient mostly belonged to the age group of 21-30 years i.e. 40% (n=24), followed by age group of 11-20 years i.e. 16.67% (n=10). (Table 2) 80% of the patients (n=48) were found to visit the eye hospital within 3 days of the incidence whereas, 20% (n=12) visited only after 3 days. Most patients had completed the secondary level of education. (Table 3)

Table 1: Gender distribution.

Gender	Number of patients
Male	55 (91.70%)
Female	5 (8.30%)

Table 2: Age distribution.

Age	Number of patients
1-10	3 (5.00%)
11-20	10 (16.67%)
21-30	24 (40.00%)
31-40	7(11.67%)
41-50	9 (15.00%)
51-60	7 (11.67%)

Table 3: Level of education.

Level of education	Number of patients
Below lower secondary	17 (28.33%)
Secondary	15 (25.00%)
Higher Secondary	23 (38.33%)
Bachelor	4 (6.67%)
Master	1 (1.67%)

About 43.33% (n=26) of the patients were found to be working in metal industries, followed by construction workers accounting for 18.33% (n=11). (Table 4) Most common foreign body was metallic iron particle accounting for 70% (n=42) (Table 5) Most common site of foreign body was found to be at the periphery. (Table 6)

Table 4: Occupation of the subjects with corneal foreign bodies.

Occupation	Number of patients
Metal Industry	26 (43.33%)
Construction worker	11 (18.33%)
Agriculture	10 (16.67%)
Automobile repair/mechanic	5(8.33%)
Other	8 (13.33%)

Table 5: Type of corneal foreign body.

Foreign body material	Number of patients
Metal	42(70.00%)
Sand	7 (11.67%)
Insect/ caterpillar hair	5 (8.33%)
Wood	3 (5.00%)
Glue	1 (1.67%)
Thorn	1 (1.67%)
Stone	1 (1.67%)

Table 6: Location of corneal foreign body

Location	Number of patients
Peripheral	23 (38.33%)
Para-central	19 (31.67%)
Central	18 (30.00%)

Associated complications were present in 93.33% of the patients (Table 7). Patients with corneal ulcers were treated with standard care for corneal ulceration with fortified antibiotics.

When patients were inquired about the use of protective eyewear, only 11.67% (n=7) of the patients were wearing protective eyewear (Table 8).

Table 7: Effect of corneal foreign body.

Effect of foreign body	Number of patients
Rust ring	38 (63.33%)
Epithelial defect	16 (26.67%)
Corneal ulceration	2 (3.33%)
No effect	4 (6.67%)

Table 8: Use of protective eyewear (PEW).

Use of PEW	Number of patients
No	53 (88.33%)
Yes	7 (11.67%)

Table 9: Material used for self-removal of the corneal foreign body.

Materials used for self-removal	Number of patients
None	47 (78.33%)
Handkerchief	7 (11.67%)
Napkin	5 (8.33%)
Coin	1 (1.67%)

DISCUSSION

Corneal foreign body falls under the category of minor ocular trauma. If removed on time, may not lead to any complications, but if delayed or ignored, may lead to keratitis and endophthalmitis.

In our study, 91.66% of the affected patients were male. Similar findings were found in a study conducted by Ozkurt et al, (Ozkurt et al., 2014) and Macedo et al (Macedo et al., 2005). Males, being the active income generators of

the family are more likely to seek jobs in metal industries than females which explains the male predominance in the study.

Most of the affected patients (40%, n=24) belonged to the age group of 21-30 years. Similar findings were found in the study performed by Bruce-Chwatt et al, where the most common affected age group was after the second decade and before the fourth decade i.e. 21-40 years. (Bruce et al., 1991) Similarly, according to the study conducted by Reddy et al, 50.16% of those affected, belonged to the 31-40 years age group. (Reddy et al., 2016)

We found that the majority (43.33%) of the cases worked in metal industries. This is supported by the study conducted by Gumus et al, where 59% of the patients worked in metal industries. (Gumus et al., 2007) Also, in the study conducted by Nepp et al, 70% of the corneal foreign body injury was seen in patients working in metal cutting industries. (Nepp et al., 1999) In the study conducted by Reddy et al, 53.27% of the total study population were industry workers. (Reddy et al., 2016)

In our study, 70% of the corneal foreign bodies were metals, followed by sand (11.6%). In the study by Reddy et al, 51.04% of the cases had metallic corneal foreign bodies, followed by dust in 18.7% and wooden particles in 11.21%. (Gumus et al., 2007) Also, in the study conducted by MH et al, "physiological healing power of corneal foreign body", 32 patients had metallic foreign bodies, followed by sand

particles in 2 patients.(MH et al., 2009) The most common mechanism of injury was due to welding (46.66%) and then by metal cutting (36.66%) of the cases. Our findings were similar to the findings seen in the study conducted by Reesal et al, in which 65% of the injuries were sustained due to metal cutting.

The most common location of the corneal foreign body in our study was peripheral i.e. 38.33%, followed by paracentral i.e. 31.66%, and then central i.e. 30%. However, in the study conducted by Reddy et al, they found the paracentral location to be the most common i.e. 61% followed by peripheral i.e. 23% and then central i.e. 26%. (Reddy et al., 2016)

In our study, 21.67% of the cases attempted self-removal of the corneal foreign body using a handkerchief, napkin, and coin. In the study conducted by Zeynep Ozkut et al, 52% of the patients had attempted to remove the corneal foreign body using money, a napkin, and a piece of cloth. (Ozkurt et al., 2014)

Protective eyewear were not effective in preventing injuries in few cases (11.66%), while

in the rest, non-availability and non-compliance to use of protective eye wears, served as the more common problem. In the study conducted by Ramakrishnan et al, 45% of the patients sustained corneal foreign body injury, despite using protective eye wears.(Ramakrishnan et al., 2012) In the study conducted by Reddy et al, 73.83% of the cases sustained corneal foreign body, despite using protective eye wears.(Reddy et al., 2016)

CONCLUSION

Corneal foreign body occurs most commonly in male belonging to the middle age group, who also are the active income generators in the community. Although easily treatable, delay can cause various degrees of ocular morbidity ranging from simple epithelial defect to vision threatening corneal ulcer. We recommend the use of protective eyewear for all working in the vicinity of metal industry work or construction sites.



REFERENCES

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- Bernad D, Zuckerman MD Theodore W, Liberman MD Corneal rust ring, etiology and histology. *AMA arch ophthalmol* 1960; 63(2): 254-265. doi:10.1001/archoph.1960.00950020256008.
- Bruce-Chwatt RM, Hulbert MFG, Patel BCK. Efficacy of eyepad in corneal healing. *Lancet*. 1991;337(8750):1170-1. doi: 10.1016/0140-6736(91)92454-a
- Casser L, Fingeret M, Woodcome H. Atlas of primary eye care procedures. New York: Applenton Lange; 1990.
- 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. PMID: 8044979
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- Fong LP. Eye injuries in Victoria, Australia. *Med J Aust.* 1995; 162(2):64-8. doi: 10.5694/j.1326-5377.1995.tb138434.x.
- Fraenkel A, Lee LR, Lee GA. Managing corneal foreign bodies in office-based general practice. *Aust Fam Physician.* 2017;46(3):89–93. PMID: 28260265.
- Gumus K, Karakucuk S, Mirza E. Corneal injury from a metallic foreign body: An occupational hazard. *Eye Contact Lens.* 2007;33(5):259–60. doi: 10.1097/ICL.0b013e31802c140c
- Macedo Filho ET, Lago A, Duarte K, Liang SJ, Lima AL, Freitas D. Superficial corneal foreign body: laboratory and epidemiologic aspects. *Arq Bras Oftalmol.* 2005;68(6):821-3. doi: 10.1590/s0004-27492005000600019
- Macedo Filho ET, Lago A, Duarte K, Liang SJ, Lima AL, Freitas D. Superficial corneal foreign body: laboratory and epidemiologic aspects. *Arq Bras Oftalmol.* 2005;68(6):821-3.
- McCarty CA, Fu CL, Taylor HR. Epidemiology of ocular trauma in Australia. *Ophthalmology* 1999;106:1847-52.
- Meek KM, Knupp C. Corneal structure and transparency. *Prog Retin Eye Res [Internet].* 2015;49:1–16. doi: 10.1016/j.preteyeres.2015.07.001
- Mh Y, Shamma A. Physiological Healing Power Of The Cornea After Foreign Body Exposure. 2009;12:90–7.
- Nepp J, Rainer G, Krepler K, Stolba U, Wedrich A. Atiologie nicht penetrierender hornhautverletzungen. *Klin Monbl Augenheilkd.* 1999;215(6):334–7.
- Ozkurt ZG, Yuksel H, Saka G, Guclu H, Evsen S, Balsak S. Metallic corneal foreign bodies: An occupational health hazard. *Arq Bras Oftalmol.* 2014;77(2):81–3. doi: 10.5935/0004-2749.20140020.
- 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. doi: 10.1080/19338244.2011.573023.
- Reddy PS, Nirmala K, Radhika S, Ravi S, Mary C, Paul P, et al. Original Research Paper Commerce Ophthalmology Incidence of Ocular Surface Foreign Body and its Correlation with Specific Occupation and Preventive Measures Associate Professor , Department of Ophthalmology , ACS Medical College , Chennai Senior Resident. 2016;(12):56–8.
- Reesal MR, Dufresne RM, Suggett D, Alleyne BC. Welder eye injuries. *J Occup Med.* 1989;31(12):1003-6. doi: 10.1097/00043764-198912000-00014.
- Thylefors B. Epidemiological patterns of ocular trauma. *Aust NZ J Ophthalmol* 1992;20:95-8. doi: 10.1111/j.1442-9071.1992.tb00718.x
- Voon LW, See J, Wong TY. The epidemiology of ocular trauma in Singapore: Perspective from the emergency service of a large tertiary hospital. *Eye.* 2001;15(1):75–81. doi: 10.1038/eye.2001.18.
- Welch LS, Hunting KL, Mawudeku A. Injury surveillance in construction: Eye injuries. *Appl Occup Environ Hyg.* 2001;16(7):755–62. doi: 10.1080/10473220117500
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