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Original Research Article

Watch your eyes: Workplace ocular hazards presenting at a tertiary eye care centre in south India

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ABSTRACT

Introduction: Eye injuries can majorly affect individuals by reducing quality of life. In this study we report the prevalence of ocular trauma and the proportion of vision loss due to trauma presenting in tertiary care center.

Aims: To evaluate the prevalence of occupational ocular injuries and the degree of visual loss in patients attending a tertiary eye care hospital in South India.

Materials and Methods: The study was a retrospective observational study, which included patient's aged 16 years and older attending Outpatient department of a tertiary eye care hospital following ocular trauma at workplace. The study took place across a six-month duration. A detailed demographic profile and history of the patient was documented. Patient underwent comprehensive ocular examination and further orbital imaging if necessary. The ocular injuries were classified using the Birmingham Eye Trauma Terminology System.

Results: This study included 210 patients, with a mean age group of 21-30 years. Men had a more than five-times higher rate of eye injury at work than women; with the most common mode of injury being metallic foreign body (75%). The predominant ocular injuries were categorized as closed globe injuries with 83 % incidence. 67% of the patients needed surgical intervention.

Conclusion: Most work-related eye injuries often result from inadequate eye protection, with the majority of affected patients being young men, which highlights the importance of implementing preventive measures early in their careers. This study underscores the need of awareness and prevention programs for eye protection at workplace.

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1. Introduction

Ocular trauma is one of the major cause of visual impairment and vision loss, but it is largely preventable.¹ Eye injuries are a common reason for emergency ophthalmic visits and can significantly affect individuals by reducing quality of life and decreasing work productivity.² These injuries place a considerable financial burden on the healthcare system and lead to a significant loss of workdays globally.³

Here, we report the prevalence of ocular trauma and the proportion of vision loss due to trauma presenting in tertiary care center in south India.

Since nearly all work-related eye injuries are preventable, it is crucial and urgent to develop more effective and stringent preventive measures, as they could have a significant impact.⁴

2. Materials and Methods

All the cases of occupational eye injuries, seeking care in the outpatient department of a tertiary eye care hospital,

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recorded in the archive of medical records, during the period from January 2024 to June 2024 were collected and analyzed. A total of 210 patients were included in the study. Exclusion criteria were ocular injuries sustained not due to patient's profession. A detailed demographic profile and history of the patient was documented. Patient underwent comprehensive ocular examination including visual acuity, color vision, pupillary reaction assessment, anterior segment evaluation with slit lamp biomicroscopy and intraocular pressure assessment using non-contact tonometer. Fundus examination was done using indirect ophthalmoscope with +20D lens. Orbital imaging was done in cases of suspected intraocular foreign body and orbital wall fractures. The ocular injuries were classified into Open and Closed globe injury using the Birmingham Eye Trauma Terminology System.⁵

Informed consent had been obtained for all cases. For patients presenting with foreign body on the external eye, foreign body removal was done under topical anesthesia under slit lamp biomicroscopy whenever possible. Patients with open globe injuries, deep corneal intrastromal foreign body and eye lid tears underwent surgical intervention under local anesthesia following admission.

The results were analyzed and tabulated.

3. Results

3.1. Demographic characteristics

The study represents 210 patients with work related injuries. The age of the patients in the study ranged from 16 to 60 years, with mean age of 28 years. This indicates majority of the patients were among young productive age group.

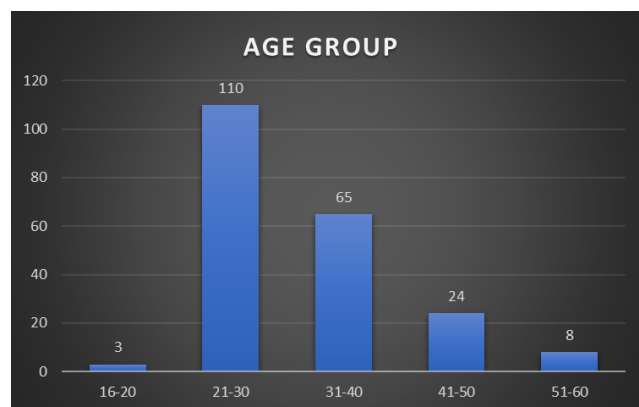


Figure 1: Graph depicting distribution of age group (Age year)

Eye injuries were significantly more prevalent in males (86.6%).

In our study, there was preponderance of patients from urban household compared to rural with 66% incidence.

Occupational distribution among the patients showed higher prevalence among construction workers like welders

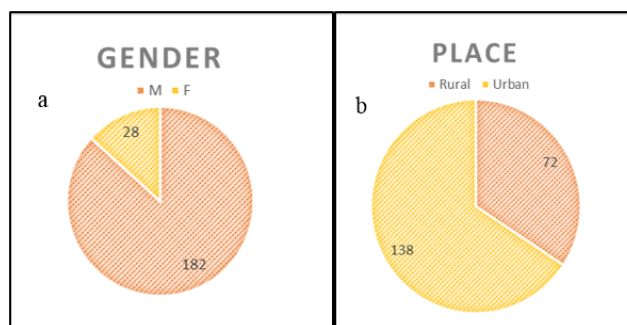


Figure 2: a & b: Distribution of gender and household

with 47% prevalence, followed by farmers 19 %, daily wage laborers 15%, factory workers 14%, food service workers with 5 % prevalence.

The large majority of injuries occurred during daytime and on weekdays.

Table 1: Depicting occupational distribution.

Occupation	Frequency (number of cases)	Percentage
Welder	98	47
Factory Worker	30	14
Farmer	40	19
Laborer	32	15
Food service workers	10	5
Total	210	100

3.2. Ocular injury details

The large majority was unilateral (87 %), only 15 cases involved both eyes. Most common mode of injury was secondary to trauma with flying metallic particles, dust encountered in construction site and heavy metallic machinery and tools (75%) followed by trauma with vegetative matter (16%) seen in farmers, followed by injury by glass, chemical and thermal burns.

Most common type was injury was open globe injury with 87% incidence. The cornea was mostly involved in these injuries.

Table 2: Depicting time of presentation

Time of presentation	Frequency (number of patients)	Percentage
<6 hours	62	29
>6 hours	148	71
Total	210	100

Only 29% of the patients presented within the crucial 6 hours period post injury. 68% of the cases required surgical intervention which included minor outpatient procedures and major procedures which required hospitalization of the

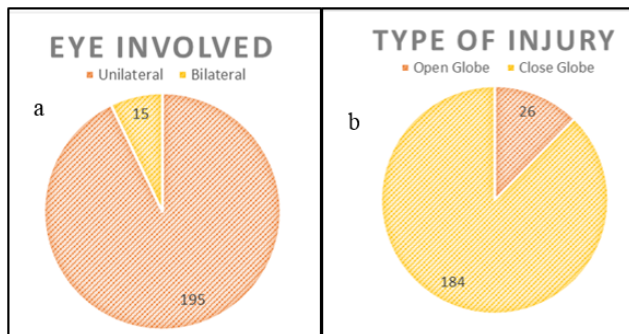


Figure 3: a & b: Depicting eye involvement & type of injury

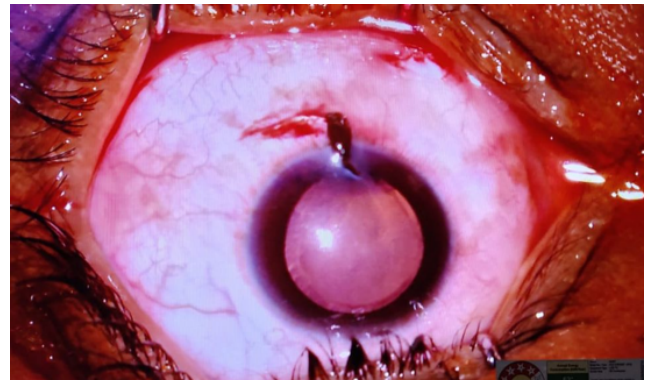


Figure 6: Corneo-scleral tear following injury with metal rod.

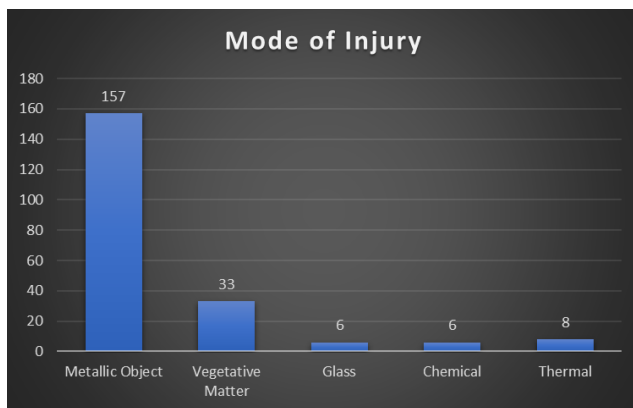


Figure 4: Distribution of mode of injury

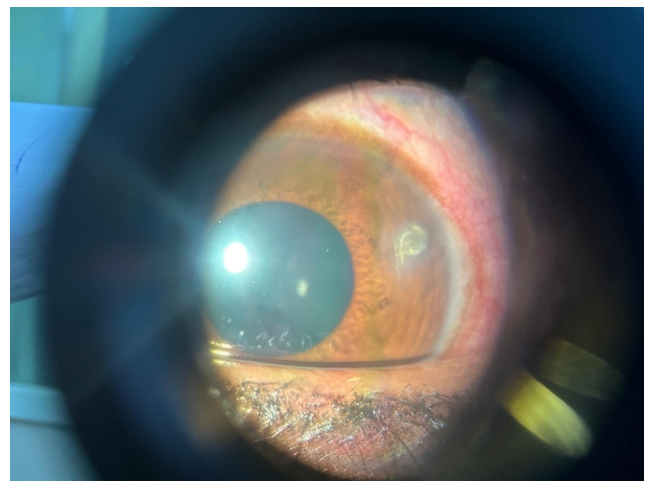


Figure 7: Metallic corneal foreign body

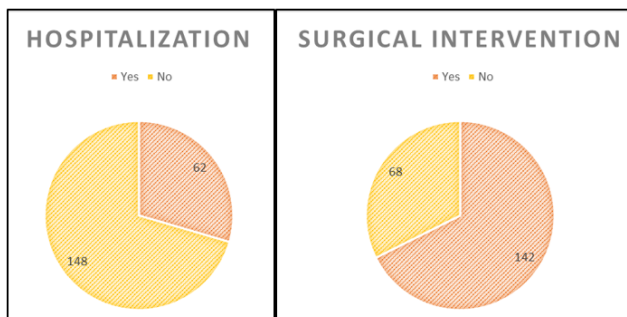


Figure 5: a & b: Distribution of hospitalization & surgical intervention

patient. 29% of the patients required hospitalization in our study.

4. Discussion

This study sheds light on the epidemiological aspects of occupational ocular trauma. It was observed that, majority of the injuries (52%) occur among productive young workers of 21 – 30 years of age, which aligns with the findings of Huiyun Xiang et al.,⁶ where more injuries treated occurred among workers 20–34 years of age. This

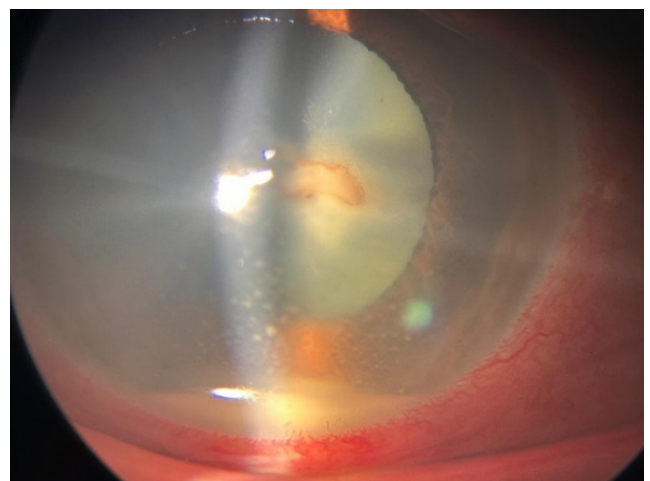


Figure 8: Corneal ulcer with anterior uveitis secondary to trauma with vegetative matter

also aligns with findings of multiple other studies.⁷ This results in financial losses for workers' family, employers and the community.

Male workers (182 cases) are most frequently involved in ocular injuries as larger proportion of male workers are traditionally engaged in high risk activities,⁸ this aligns with findings of Cai M et al and multiple other studies.^{9,10}

Largely unilateral presentation was seen (87 %), with only 15 cases having bilateral presentation, which were majorly due to contact with chemical agents or secondary to thermal burns. This finding correlates with study by Fabriziomaria Gobba, et al, where only 43 cases involved bilateral lesions, among 754 cases.¹¹

Injury by flying metallic object and heavy metal machinery formed seventy five percent of the mode of injury which aligns with the findings of Mustafa Serinken et al.,¹⁰ where the metal and machinery sectors made up most of the sample. This point out at the need for safety emphasis to use protective eye wear while working especially among welders, daily wage labourers and manufacturing industry factory workers who are prone to eye injuries either by flying small foreign bodies or direct trauma by heavy machinery. Welders make up the majority of the sample with 47 % incidence, followed by factory workers and laborers. By focusing on high-risk occupations such as construction, manufacturing, agriculture, and laboratory workers we can develop more effective strategies to prevent eye injuries.

Open globe injury was the most common type with 88% incidence. This included foreign body in external eye which was most common, followed by contusion injuries. This aligns with findings by Chang CH et al.,¹² where in the group of work-related injuries, open-globe injury was the most prevalent, accounting for 45.5%, followed by contusion injury at 33.8%. Study by Kanoff et al., also revealed intraocular foreign bodies and penetrating injuries were the most common types of occupational open globe injuries.¹³ Blunt or penetrating eye injuries can also result in vision loss due to the development of cataract or glaucoma.

68% of the cases required surgical intervention, which included minor procedures like removal of foreign body from the external eye and major procedures like primary tear repairs or globe exploration surgery under local anesthesia. 29% of the patients required hospitalization for either management of major surgical procedures like globe exploration, amniotic membrane grafting for chemical injury or medical management of thermal burn injuries, and traumatic optic neuropathies.

The majority of them did not wear any eye protection at the time of trauma; this highlights that the serious tragedy of vision loss could have been prevented with protective eye gear. The expenses associated with prevention are likely to be significantly lower than those for treatment, rehabilitation, and lost work days.

5. Conclusion

This hospital-based observational study was conducted to analyze the demographic data, nature, and characteristics of work-related eye injuries, as well as their risk factors.

The increased frequency of injuries among younger workers highlights the importance of implementing preventive measures early in their careers. To effectively enhance workplace safety culture, it is essential to involve supervisors and senior working staff and to plan preventive measures at multiple levels. Workers' attitude toward eye injuries plays a key role and implementing safety training before starting work and ensuring the use of eye protection during work are especially important.

It was observed that male workers, low education levels, low socio-economic status insufficient safety training, and absence of eye protection gear as significant risk factors for work-related eye injuries.

Increased incidence of corneal ulcer cases in agricultural sector highlights that the ophthalmology services in India, like many health services, are unevenly distributed, with most resources concentrated in urban areas. To address this, strategies should be developed to deliver care to rural areas, potentially centered around primary health care facilities, with a strong emphasis on providing adequate first aid.

The use of protective eyewear should be strongly promoted for activities with a high risk of eye injury.¹⁴ Addressing preventable blindness from ocular trauma should be a top priority for eye care programs. Key interventions include education, raising awareness, and implementing policies to promote the use of protective eyewear in the workplace.⁶

Addressing occupational eye hazards requires a multifaceted approach involving improved safety regulations, enhanced training, and better access to protective equipment.¹⁵ By implementing these strategies, the prevalence and impact of eye injuries can be reduced, leading to safer work environments and better health outcomes for workers.¹⁶ Our findings will be instrumental in shaping future preventive strategies. Top of Form

6. Source of funding

None.

7. Conflict of interest

None.

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