

# Occupational Risk Factors, Clinical Outcomes, and Patient Perceptions of Metallic Corneal Foreign Body Injuries at TRIHMS, North East India

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## Abstract

**Background:** Metallic corneal foreign body (FB) injuries are a common cause of ocular trauma among industrial and construction workers, often leading to significant visual morbidity if not promptly treated.

**Objective:** To determine the prevalence, risk factors, demographic distribution, and patient perceptions related to metallic corneal foreign body injuries.

**Methods:** A prospective observational study was conducted over one year in the Department of Ophthalmology, TRIHMS, India. Patients presenting with corneal FB injuries were enrolled after meeting inclusion criteria. Demographic details, occupational sector, mechanism of injury, use of protective eyewear, self-removal attempts, and knowledge of FB complications were recorded using a structured questionnaire. Clinical examination was performed using slit-lamp biomicroscopy. Statistical analyses were performed using SPSS v15.

**Results:** A total of 576 patients were included. The majority belonged to the 24–33 years age group (37.5%), with construction workers forming the largest occupational group (54.3%). Metal cutting (55.6%) and welding (41.7%) were the most common injury mechanisms. Most FBs were paracentral (49.1%) and central (23.3%) in location. Self-removal was frequently attempted with paper currency (39.6%) or water (30.6%).

**Conclusion:** Metallic corneal FB injuries were most common among young male construction workers. Poor use of protective eyewear and unsafe self-removal practices were observed. Workplace education and mandatory use of protective goggles could substantially reduce preventable ocular morbidity.

**Key words :** Occupational eye injuries, Corneal foreign body, Metallic ocular trauma, Protective eyewear compliance, Industrial worker safety

## Introduction

Occupational eye injuries are a major public health concern, accounting for a significant proportion of preventable vision loss worldwide. Corneal foreign body (FB) injuries, particularly metallic FBs, are among the most common forms of occupational ocular trauma, especially in industries involving metal cutting and welding(1,2,3,4,5). These injuries frequently affect young, economically productive individuals, contributing to both individual disability and socioeconomic burden(6,7,8,9). Despite being largely preventable through the use of appropriate protective eyewear, compliance remains poor in many low- and middle-income countries(10,11,12,13). Self-removal attempts are common and often increase the risk of infection or corneal scarring(14,15,16). Early and appropriate ophthalmic intervention is critical for preventing vision-threatening sequelae(17,18,19,20,21).The epidemiology and patient perceptions of these injuries in India, particularly in the northeast region, remain inadequately documented. This study analyzed the prevalence, occupational risk factors, demographic characteristics, injury mechanisms, and patient perceptions related to metallic corneal FB injuries at Tomo Riba Institute of Health and Medical Sciences, Naharlagun, Arunachal Pradesh

## Materials and Methods

This prospective observational study was conducted in the Department of Ophthalmology, Tomo Riba Institute of Health and Medical Sciences, Naharlagun, Arunachal Pradesh over a period of one year from August 2024 to July 2025.

**Study Population:** Patients presenting to the ophthalmology outpatient department with corneal foreign body injuries were

screened. Those with metallic FBs were included. Patients with other types of ocular trauma were excluded.

**Data Collection:** After informed consent, participants completed a structured questionnaire capturing demographics, occupational information, injury characteristics, protective behavior, and perception regarding FB injuries.

**Clinical Examination:** All patients underwent slit-lamp biomicroscopic examination to document FB location and the presence of corneal scarring from prior injuries.

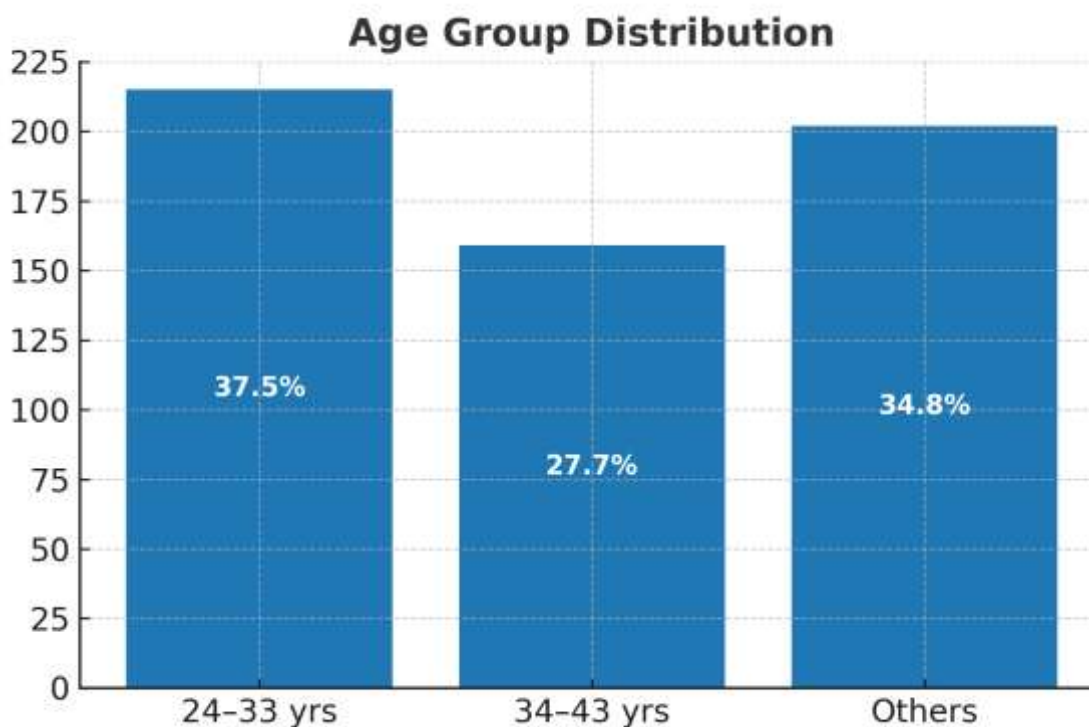
**Statistical Analysis:** Data were analyzed using SPSS v15 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for demographic and clinical variables. Chi-square tests were applied to assess associations between categorical variables. A p-value <0.05 was considered statistically significant.

## Results

**Demographic Characteristics:** A total of 576 patients were included. The highest number of injuries occurred in the 24–33 years age group (n=215, 37.5%), followed by 34–43 years (27.7%). Most patients were male construction workers.

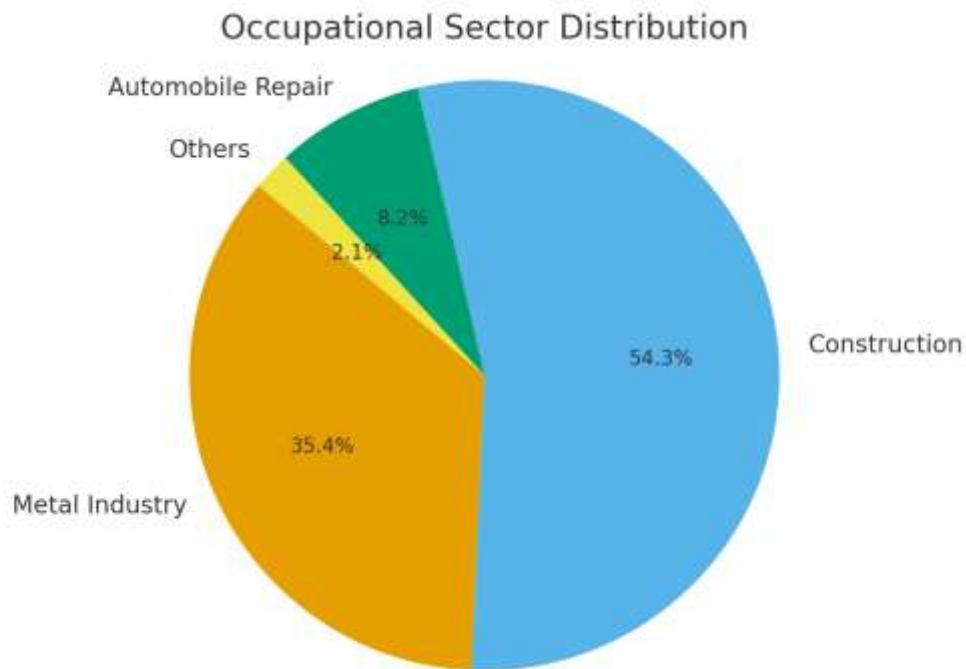
The figure 1 shows the age group distribution .

Fig 1: Age group Distribution



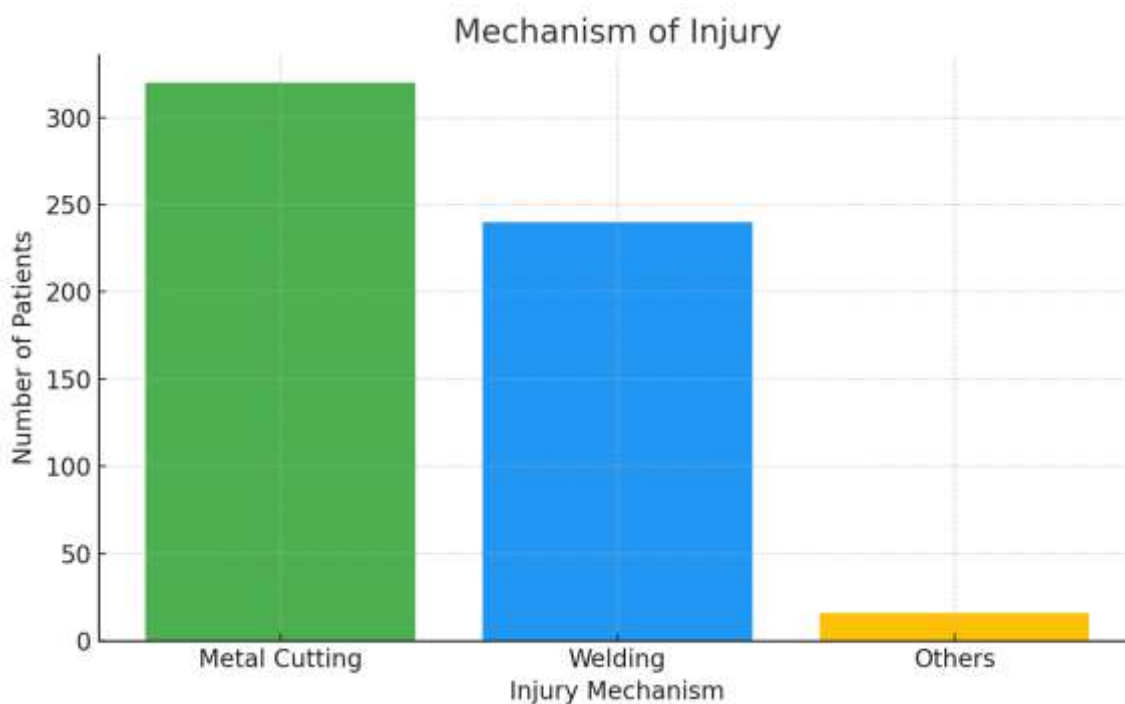
**Occupational Sector:** The majority of injuries were reported among construction workers (54.3%), followed by metal industry (35.4%) and automobile repair (8.2%).

Fig2 : Occupational sectors involved



Mechanism of Injury: Metal cutting (55.6%) and welding (41.7%) were the most common injury mechanisms. A minority (2.7%) were attributed to other causes.

Fig 3: Mechanism of injury



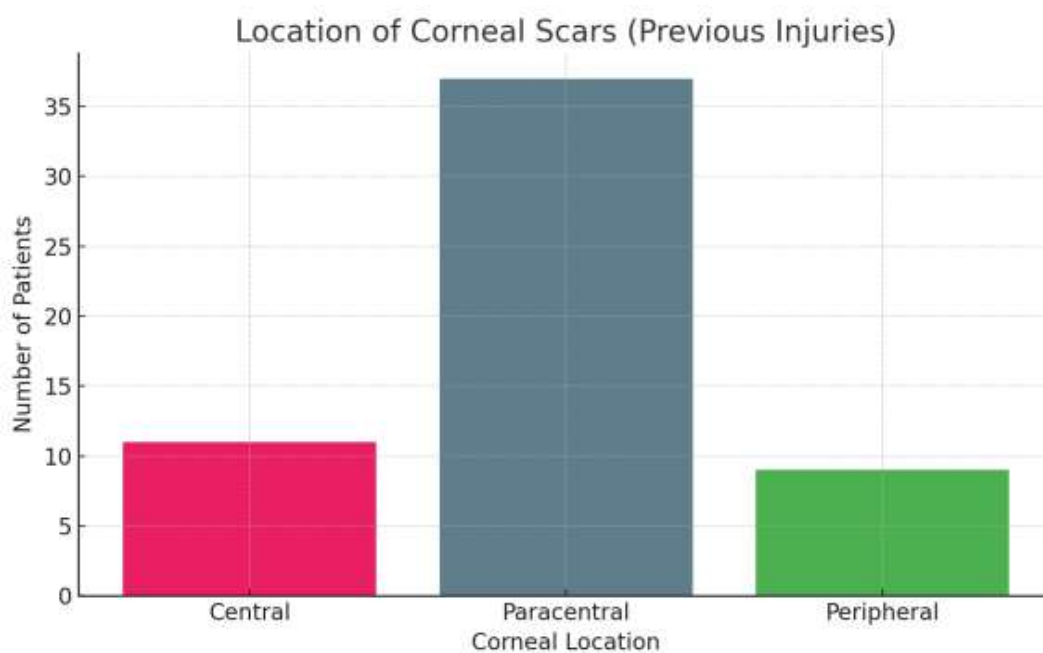
Self-Removal Practices: Self-removal was attempted by 99% of patients before presentation. The most common methods were paper currency (39.6%), water splashing (30.6%), cloth (15.6%), and tissue paper (14.2%).

Fig 4 : Self Removal Practices



Location of FB and Corneal Scars: Paracentral location was most frequent (49.1%), followed by central (23.3%) and peripheral (27.6%) cornea. Paracentral scarring was also most common among those with prior injuries.

Fig 5 : Location of FB and corneal Scars



## Discussion

This study demonstrated that metallic corneal FB injuries predominantly affected young male workers engaged in construction and metal-related occupations. These findings are consistent with previous reports indicating that the 20–40

years age group bears the highest burden of occupational ocular trauma(22–26).The predominance of construction and welding injuries reflects inadequate use of eye protection in high-risk environments(27–31).Despite awareness of the risk, most patients attempted unsafe self-removal methods, often with contaminated objects such as currency notes or cloths, increasing the likelihood of microbial keratitis and scarring().32–35 The paracentral location of FBs in this study mirrors other reports and poses a particular risk to visual acuity(24,29).Use of proper protective eyewear has been shown to reduce the risk of corneal FB injuries by over 70% in some studies(15,18,21,28).Our findings underscore the urgent need for workplace interventions, regular eye camps in high-risk sectors, and counseling of both workers and employers to promote protective practices.

## Conclusion

Metallic corneal foreign body injuries remain a preventable cause of ocular morbidity, especially among young industrial workers. Most injuries occurred during construction and metal cutting activities, with poor protective eyewear usage and unsafe self-removal practices identified as key modifiable factors. Implementation of workplace safety regulations, protective eyewear programs, and public health education may significantly reduce the burden of these injuries. Further multi-center studies are warranted to assess the impact of targeted interventions in reducing occupational ocular trauma().36–40

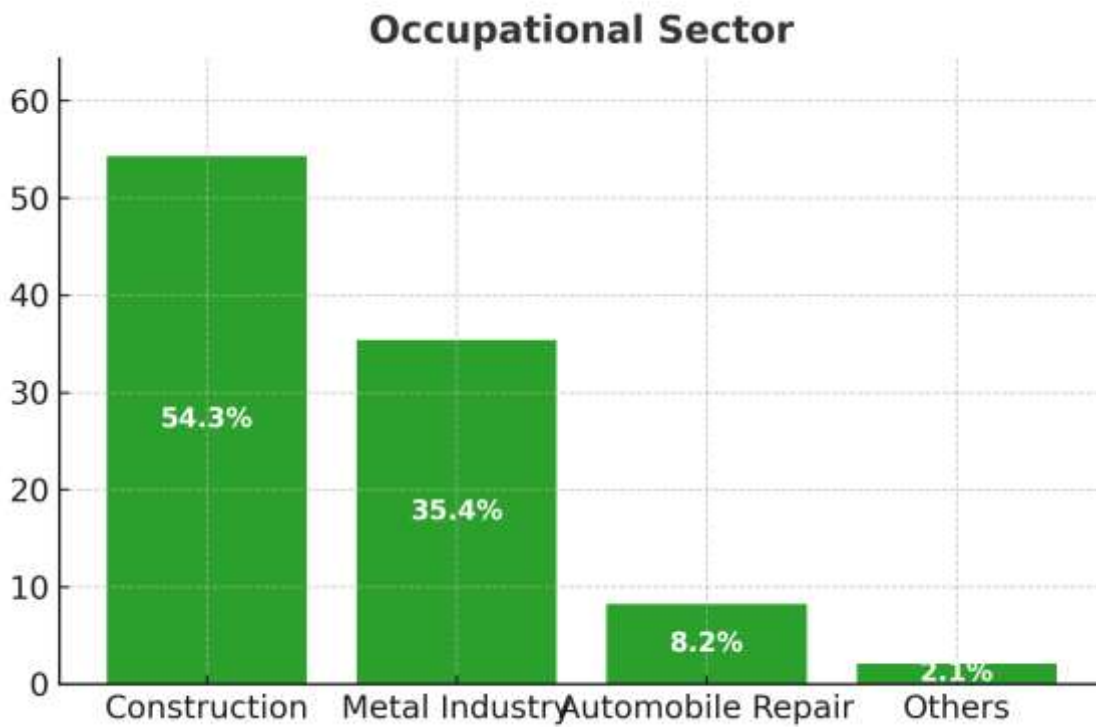
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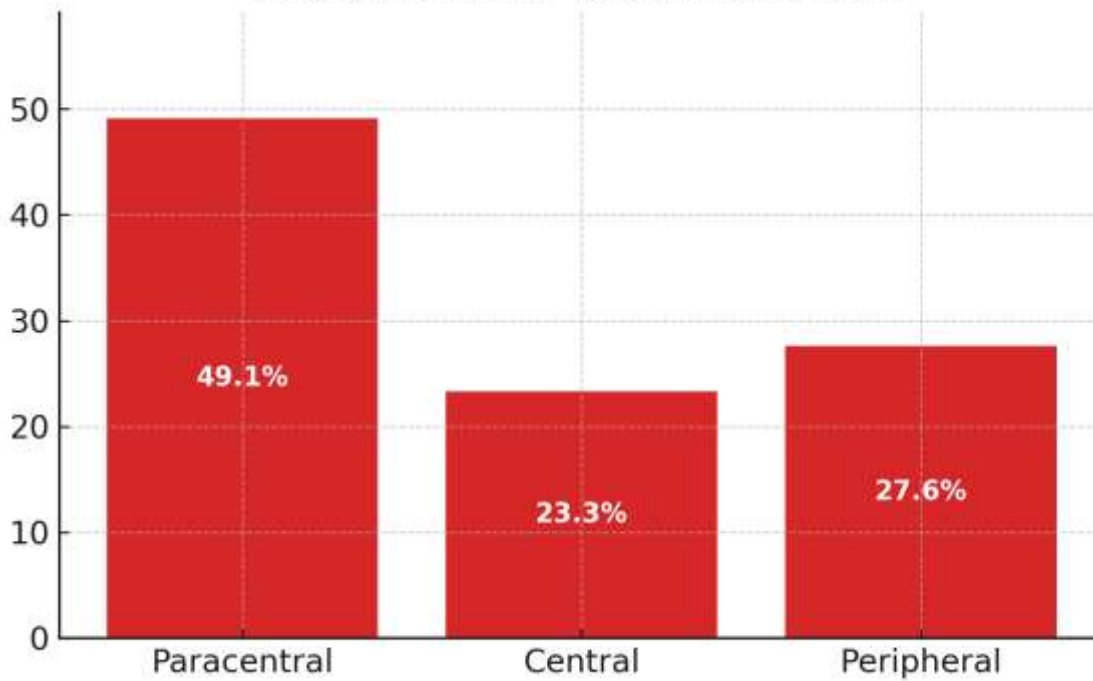
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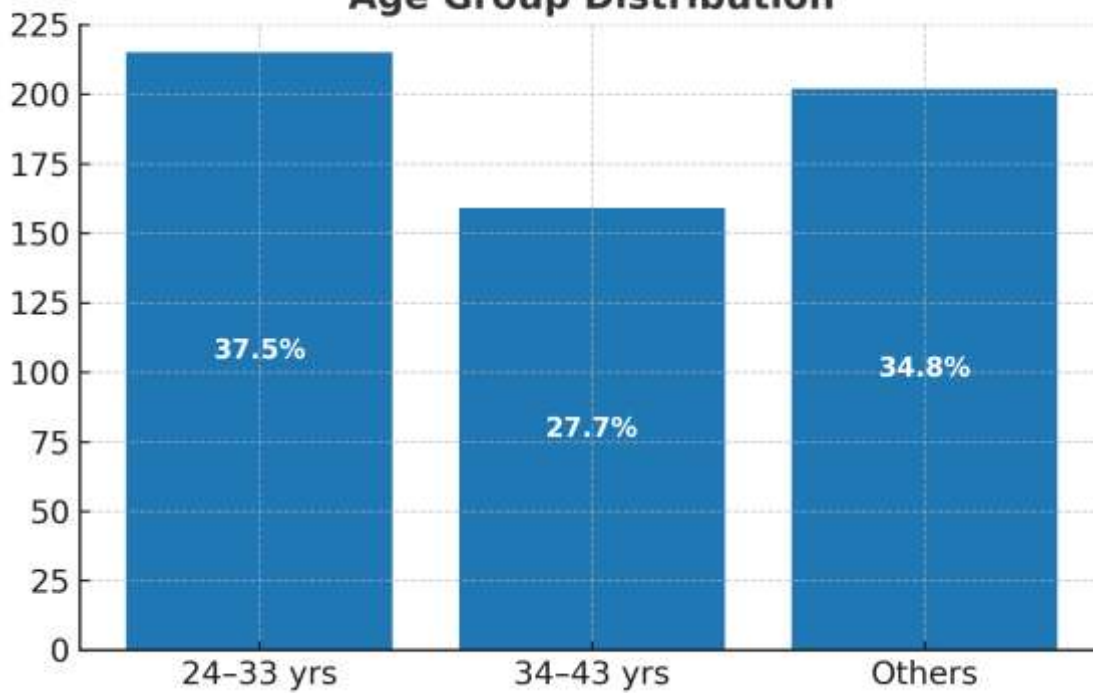
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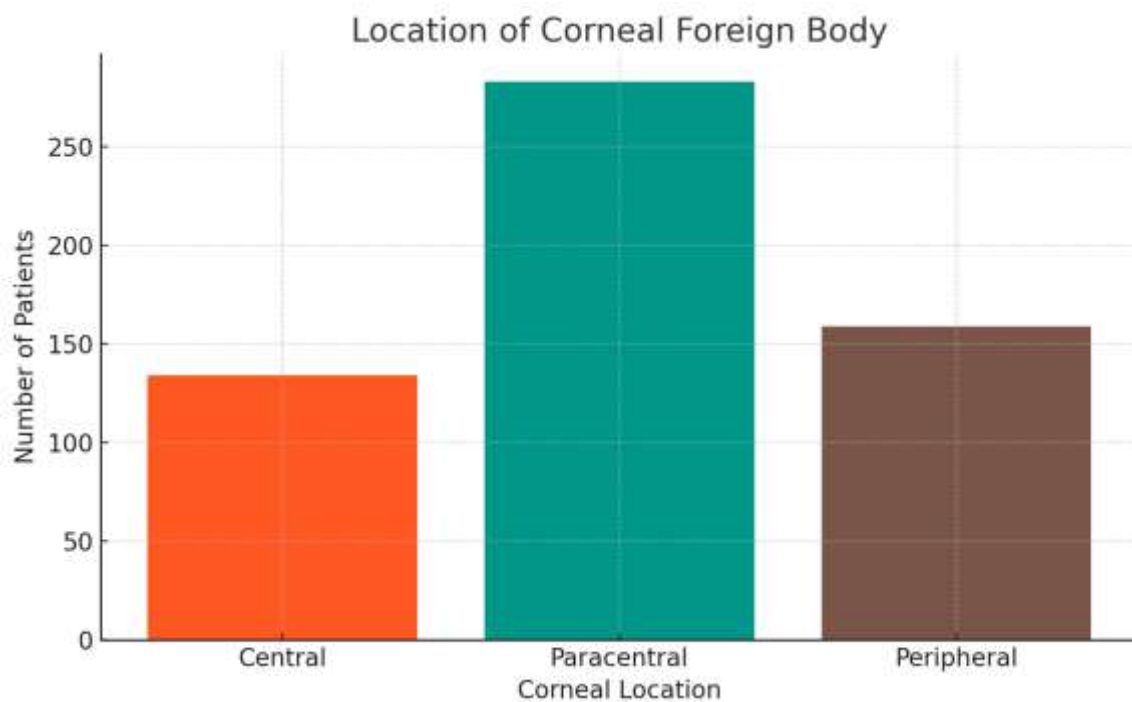
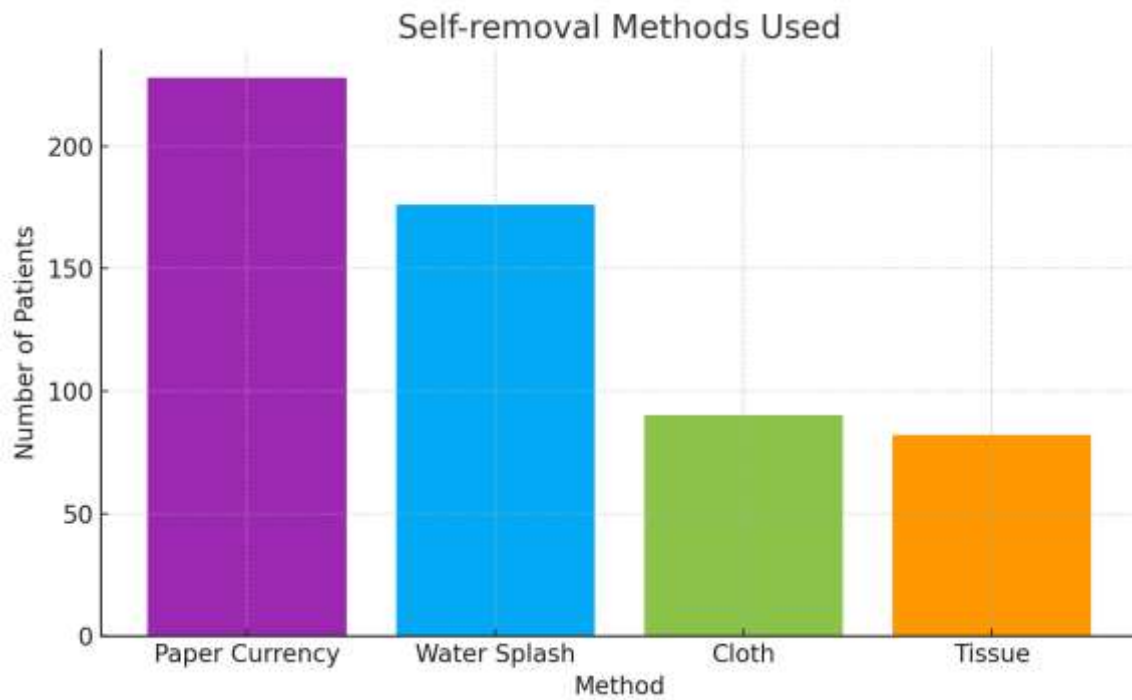
### Location of FB & Corneal Scars



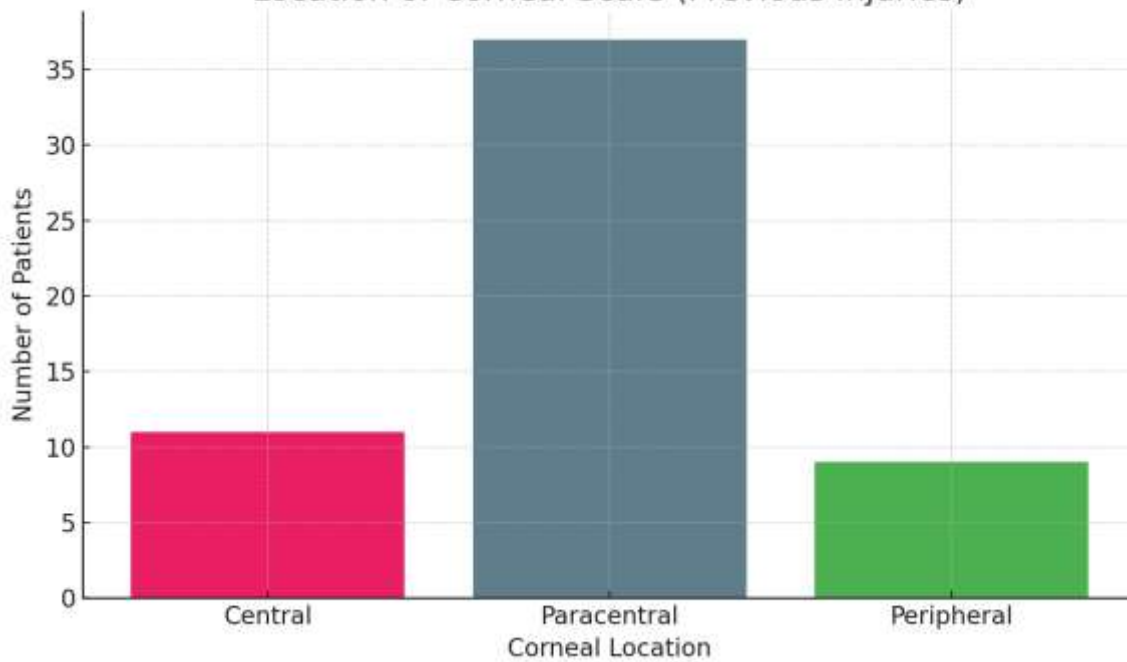
### Age Group Distribution







Location of Corneal Scars (Previous Injuries)



Age Distribution of Patients with Metallic Corneal FB

