Epidemiology of ocular trauma from Northern Rajasthan

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ABSTRACT

Background & objectives: Demographic data and visual outcome are crucial variables for effectively planning and delivering meaningful emergency services. The objective of this study was to examine the demographic and epidemiological characteristics of patients with ocular trauma and to assess the prognosis of ocular emergencies based on the time of presentation and the distance travelled to receive initial therapy. **Methods:** Detailed history of injury, information of treatment and surgery performed and follow up records were analyzed. Ocular status with presenting vision was noted. **Results:** The male to female ratio was 2.13 to 1. The age group most frequently admitted for emergency surgical repair for ocular injuries was 15 years or younger, accounting for 40.19% of all hospitalized patients. The predominant cause of damage was wooden objects (24%), with metallic objects being the second most common cause among individuals aged 30 years or younger. However, road traffic accidents (RTA) were the primary factor contributing to injuries in individuals aged over 60 years, accounting for 27.31% of cases. **Conclusion:** Eye care programs should prioritize ocular trauma due to its higher lifetime frequency compared to other chronic ocular illnesses. Providing training programs and resources to rural health care organizations for the prevention and primary care of ocular trauma emergency will greatly reduce the number of eye-related illnesses and disabilities.

Key words: Retrospective, eye care, emergency, ocular trauma

INTRODUCTION

Globally, around 1.6 million individuals experience visual impairment out of a total of 15 million eye injuries annually.[1] Ocular injuries can result in persistent disability and have permanent consequences on the victim's social and economic development. Effective financial and health resource planning is necessary to prevent blindness caused by ocular damage. To evaluate the societal burden and worldwide consequences of eye injuries, extensive epidemiological data is necessary. Demographic data and visual outcome are crucial factors in strategizing and providing effective emergency assistance. Hence, it is imperative to devise a comprehensive strategy to avert, classify, handle, and restore instances of ocular injuries.

In their study on the global impact of eye

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injuries, A D Négrel et al proposed that conducting epidemiological studies is necessary to enable more precise planning of prevention and management strategies. Implementing a globally uniform framework for documenting eye injuries, similar to the reporting system used by the US Eye Injury Registry, could be beneficial in achieving this goal.[2]

This study aimed to investigate the demographic and epidemiological characteristics of patients with ocular trauma and examine the prognosis of ocular emergencies based on the time of presentation and the distance traveled to get primary management. Additionally, the assessment and emphasis were placed on the necessity for public understanding and accessibility of primary health care resources. This study aims to discover the elements that contribute to unique patterns of ocular trauma in industrialized environments and to develop preventive techniques for reducing the occurrence of these debilitating injuries.

MATERIALS AND METHODS

This study retrospectively observed the data of all patients with ocular injuries who were admitted to the Department of Ophthalmology at a tertiary eye care hospital in Northern Rajasthan from January 2016 to March 2021. The study was authorized by the hospital administration and research committee. The study was done in accordance with the principles outlined in the Declaration of Helsinki.

Analyzed were the comprehensive records of injury history, treatment details, surgical procedures performed, and subsequent follow-up records. The visual condition and first level of vision were observed. Additional demographic factors, including the proximity of the residence to the hospital, the individual's activity at the time of injury, the object responsible for the damage, the specific anatomical location of the injury, and any related ocular disorders, were recorded. The findings were reported as a statistically significant proportion.

RESULTS

The records of 21069 individuals who presented with ocular injuries at the Ophthalmology OPD and emergency were analyzed. A total of 1025 patients, accounting for 4.86% of the total, were admitted to the hospital for intervention. Among the patients who were admitted to the hospital, 59.51% were from rural areas and they claimed a lack of access to emergency eye care services in their vicinity. (Table 1)

Table 1. Demography of hospitalized patients

Hospitalized patients	Male	Female	Urban	Rural
1025	698	327	415	610
4.6%	68.13%	31.86%	40.48%	59.51%

The male to female ratio was 2.13 to 1. The age group most frequently admitted for emergency surgical repair for ocular injuries was 15 years or younger, accounting for 40.19% of all hospitalized patients. (Table 2)

Table 2. Age wise distribution of hospitalized patients

Age group Most com	< 15 years	15 – 30 years	30-60 years	>60 years
Paediatric population	412	144	170	299
< 15 years	40.19%	14.04%	16.58%	29.17%

A total of 20,044 patients sought treatment at the Minor OT for emergency minor procedures, such as the removal of corneal foreign bodies (accounting for a maximum of 47.60% of cases), management of small lid and adnexal injuries (13.70% of cases), treatment of chemical and irritant injuries (2.03% of cases), and management of infectious eye symptoms. Approximately 2% of cases involved the need for surgical correction and hospitalization due to deeply embedded corneal bodies and intraocular foreign bodies. (Table 3)

Table 3. Distribution of patients according to the ocular involvement treated in minor OT.

Ocular involvement	Number	Percentage
Adnexal lid injury	2746	13.70%
Corneal FB Impacted iron particles	10836	54.06%
Conjunctival FB	5004	24.97%
Chemical injuries	407	2.03%
others	1051	05.24%

Dog bites were the primary cause of lid tears in children, while road traffic accidents (RTA) were the main cause in adults. A total of 59 patients, accounting for 57.6% of the cases, underwent surgery for closed globe injuries. On the other hand, 353 patients, representing 34.43% of the cases, underwent surgery for open globe injuries. Approximately 9% of all hospitalized patients underwent cataract surgery due to trauma. (Table 4)

Table 4. Distribution of Hospitalized patients according to the ocular involvement.

Ocular involvement	Number	Percentage
Adnexal in juries	59	5.7%
Open globe injuries	353	34.43%
Closed globe injuries	590	57.6%
Chemical injuries	23	2.03%
Total	1025	100%

As a result of a lack of emergency eye care services in their vicinity, 59.52% of patients had to travel a distance of more than 50 km to reach the hospital. Among them, 21.12% of the patients travelled a distance of more than 200 km for emergency consultation and hospitalization. (Table 5)

Table 5. Geographical distribution of the hospitalized patients

Distance in Km	No. of patients	Percentage
0-20 km	334	32.60%
20-50 km	79	7.69%
>50 km	237	23.07%
More than 100km	158	15.30%
Over 200 km	217	21.15%

49.99% of the patients arrived at the hospital one week after sustaining their injuries. The delayed presentation was a significant contributing element to the poor visual outcome. Only 15.30% of the patients who arrived in the emergency department were treated on the same day. (Table 6)

Table 6. Distribution of the patients according to the day of presentation after ocular trauma

Time of presentation	No. of patients	Percentage
1 day	149	15.30%
3 day	230	23.07%
5 day	138	13.46%
Over week	276	26.91%
More than 2 weeks	235	23.08%

In the age category of ≤30 years, the most prevalent cause of damage was wooden objects, accounting for 24% of cases. Metallic objects were the second most common cause of injury in this age group, as shown in Table 6. However, road traffic accidents (RTA) were the primary factor contributing to injuries in individuals aged over 60 years, accounting for 27.31% of cases. (Table 7)

Table 7. Mode of injury in the hospitalized and surgically repaired patients

Activities/objects	Less than 30 years	30-60 years	More than 60 years	Percentage
Wooden object	184	41	21	24%
Metallic object	122	31	40	18.8%
Stone	19	04		2.24%
Hit by nail self-injured	20	19	31	6.82%
Fall	02	01	07	0.97%

Animal horn others	02	16	06	2.34%
Blunt trauma	67	20	92	17.46%
RTA	140	38	102	27.31%

The annual rate of ocular trauma patients requiring surgical repair accounted for 4.86% of all inpatient hospitalizations. Although the total number of outpatient department (OPD) patients decreased from 2020 to March 2021 due to the COVID lockout, the percentage of emergency hospitalizations and surgical repairs climbed from 3.19% to 5.5% in 2020. (Table 8)

Table 8. Year wise patient distribution

Variable	**2016**	**2017**	**2018**	**2019**	**2020**	**2021 till March**
Total number of OPD	114884	104130	101711	104885	55948	14510
Total number of ocular emergencies hospitalization and surgical repair	287 6.40%	164 4.03%	258 6.67%	121 3.19%	132 5.5%	63 4.34%
Total number of minor OT	4480	4061	3868	3788	2396	1451

DISCUSSION

The publication "Comm Eye Health" was cited. "Severe ocular trauma necessitates costly hospitalization and specialized treatment, often accompanied by extended follow-up and visual rehabilitation." This incurs substantial economic expenses for both the patient and the healthcare system of any country. Hence, it is of utmost significance to have a more comprehensive comprehension of the specific occurrences of ocular injuries within the local context, achieved by meticulous data collecting, and thereafter formulate suitable methods for prevention and care.[3]

According to the World Health Organization (WHO), over 55 million eye injuries occur year, with 0.75 million individuals needing to be hospitalized.[4] Our study aims to investigate the epidemiology, clinical patterns, and impact of ocular trauma in the northern region of Rajasthan. Additionally, we will identify the shortcomings in the prevention and care of ocular emergencies.

Cillino S et al reported a hospitalization rate of 4.9% in their retrospective epidemiological study conducted in Italy.[5] The occurrence of surgical intervention and hospitalization accounted for around 5% of the overall patients seeking treatment for ocular trauma from 2016 to March 2021.[6] Our data indicates a higher prevalence of injuries among males. A study conducted by Mishra A et al in India revealed a consistent demographic trend, indicating that ocular injuries are significantly more prevalent among males (with a male to female ratio of 4:1) and occur more frequently in younger individuals (with an average age of 36).[7]

The higher frequency of rural patients requiring hospitalization indicates a lack of adequately trained people for emergency evaluation and treatment in primary healthcare centers in remote regions. The study conducted in Andaman concluded that early detection and care are crucial for trauma management and the prevention of additional problems. Annually, there are more than 2.4 million incidents of eye injuries, with a staggering 90% of these injuries being avoidable.[8] It is necessary to create targeted national programs and policies to provide adequate resources and appropriate distribution of ophthalmic care in remote regions, in order to improve visual prognosis.

Pawaiya et al[9] the incidence of ocular trauma in the pediatric age group was approximately 30.35%. Wadeai et al[10] reported that 49.7% of the Egyptian population experienced childhood trauma. The prevalence of trauma in the pediatric age group was 40.19% in our study. The pediatric age group has been identified as being more susceptible and in need of surgical intervention, highlighting the significance of incorporating pediatric ocular trauma prevention and primary eye care protocols into national child care and blindness initiatives. According to the study conducted by Shah et al, the primary activity linked to ocular damage in children was playing. Professional activities were the primary contributing factors among adults.[11]

Based on our data, almost 60% of patients traveled a distance of over 50 miles to seek medical assistance. More than 20% of the patients traveled a distance of 200 kilometers or greater to receive primary medical care for ocular trauma. This directly indicates a significant lack of eye healthcare resources in rural regions. A study conducted at Hawassa University found that 19.40% of patients traveled a distance of 20-100 kilometers to receive eye care services at Hawassa University Referral Hospital.[12] Basic training programs should be designed for designated workers in rural health care for primary assessment and management at the time of referral. In their study on ocular crises in South Asia, Tarjani Makwana et al. emphasized that ocular trauma is a critical situation that requires immediate treatment to prevent complications and long-term morbidity. Delayed presentation and usage of improper, untested items and traditional treatments often exacerbate the prognosis of any injury.[13]

According to our records, only 15.30% of patients promptly sought medical attention at the hospital for the management of ocular injuries. A significant majority of approximately 84% of patients experienced a delay of over 24 hours for the initial treatment of ocular emergencies. Alem et al. reported that the most common causes for delayed intervention, accounting for 76.12% of cases, were distance from eye care center, lack of awareness, and financial constraints. They deduced that just 1.49% of all the patients received prompt treatment during a span of 6 hours.[14] An eye trauma awareness program should be implemented to enhance community awareness. It is essential to provide training to primary health care practitioners so that they may accurately diagnose eye injuries, promptly administer first-aid, and promptly send patients with ocular emergencies.

The study found that Road Traffic Accidents (RTA) accounted for 27.3% of ocular injuries in senior individuals, whereas blunt trauma accounted for 17.46%. Rajendra P Maurya1 et al reported that the predominant kind of injury was non-occupational (82.3%), with

sports-related injuries accounting for 23.9% and road traffic accidents accounting for 23.6%. The most frequent source of injury was wooden objects (24.9%), followed by metallic objects (20.9%).[15]

The requirement for hospitalization, along with a subsequent profound visual impairment, amplifies the strain on the family, community, economy, and healthcare system. Hence, it is imperative to prioritize the implementation of eye injury prevention initiatives as a significant public health issue. The lack of availability, awareness, and comprehension in society has impeded efforts.

CONCLUSION

Eye care programs should prioritize ocular trauma due to its higher lifetime frequency compared to other chronic ocular illnesses. A clinical approach must be suggested for the prevention, evaluation, treatment, and investigation of eye injuries in distant regions, with a particular focus on the pediatric population. Providing training programs and resources to rural health care organizations for the prevention and primary care of ocular trauma emergency will greatly reduce the number of eye-related illnesses and disabilities.

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AUTHORS' CONTRIBUTION

All the authors have contributed equally.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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