



A Study Of Fire Cracker Related Ocular Injury Presenting In Emergency Department At Tertiary Centre In North India

Mukesh Prakash MS, Ankita Singh MS, Aditi Saroj MBBS, Namrata Patel MS,

Surbhi Agrawal MS, Shalini Mohan MS, DNB, MNAMS

Department of Ophthalmology, GSVM Medical College, Kanpur

ABSTRACT

Purpose: The purpose of this study was to describe the clinical profile and assess the severity of the ocular injuries sustained from fireworks in Northern India during festive season of Diwali.

Methods: This was a retrospective, hospital based study of patients with ocular injuries sustained from fireworks during Diwali. The study was conducted at a tertiary hospital in Northern India. Demographic details, type of injury, management and visual status was recorded.

Result: There were 23 participants with ocular injuries from firecrackers who presented during the Diwali festival. Majority of the cases were males (n = 21 91.30%). Majority of them were from urban area (n = 13, 56.52%). Majority of the cases (19, 82.60%) had unilateral ocular involvement. There were closed globe injuries in 21 (77.77%) eyes and open globe injuries in 06 (22.22%) eyes. Most of the injuries sustained were confined to the anterior segment in 19(70.37%) eyes. hyphema 8 eyes (29.62%). The posterior segment involvement was observed in 03 cases (13.04%).

Conclusion: Ocular injuries from fireworks remain a public health problem. To bring down the incidence of fire work related ocular injuries and morbidity, public awareness, appropriate preventive measures, and government legislation should be properly implemented.

Correspondence:

namrata.patel375@gmail.com

Dr Namrata Patel

Assistant Professor,

Department of Ophthalmology,

GSVM Medical College, Kanpur.

Dates:

Received : 30 Oct. 2024

Accepted : 15 Nov. 2024

Published : 25 Nov. 2024

Key Words

Fire Crackers,

Ocular Injuries,

Globe Rupture

How to Cite:

Prakash M.,

Singh A., Saroj A., Patel N.,

Agrawal S., Mohan S.

A Study Of Fire Cracker

Related Ocular

Injury Presenting

In Emergency Department At

Tertiary Centre In North India

UPJO 2024; 12(3):13-16

INTRODUCTION

India is known for its diverse culture and varied festival. Diwali is one of its major festival associated with light and firecracker, but injury related to these firework is another aspect of this festival. Firecracker related injury is a known cause of preventable blindness.¹ injury related to firecracker often involve eyes² resulting in irreparable damage and often blindness. Firework injuries are responsible for about 2% of all reported ocular injuries³, which shows surge during this festive period

Although there are various papers in the literature documenting the firework injuries from different parts of the world^{4,5,6}, only a few studies are available from Northern India.

We intended to conduct this retrospective study to document and evaluate the clinical profile, visual outcome, and extend of firework-related ocular injuries in a tertiary care hospital in tertiary centre of northern India. The purpose of this study was to create awareness about the consequences of such injury among the general population and preventive measures to be followed during this period.

MATERIAL & METHODS:

This was a retrospective case study. All patients with firecracker injuries who attended the emergency eye care services of a tertiary eye care hospital in North India, during the 'Deepavali' festival were included in this study.

Informed consent was taken from patients and legal guardians where applicable.

The detailed history and examination was retrospectively reviewed from the records and entered in the excel sheet. Slit lamp examination was done for the patients. Best corrected visual acuity was recorded where ever feasible. Tonometry was recorded only in patients with intact globe. Fundus evaluation was recorded for limited number of patients.

The management was also analysed as per data in the records.

RESULT:

There were 23 participants with ocular injuries from firecrackers who presented during the Diwali festival. The age and sex distribution are shown in Table 1. Majority of the cases were males (n = 21 91.30%). Majority of them were from urban area shown in Figure 1 (n = 13, 56.52%).

Table1 Age and sex distribution of participants

Age distribution	Total	Male	Female
1-5	1	1	0
6-10	9	7	2
11-15	8	8	0
>15	5	5	0

Figure- 1
Demographic distribution

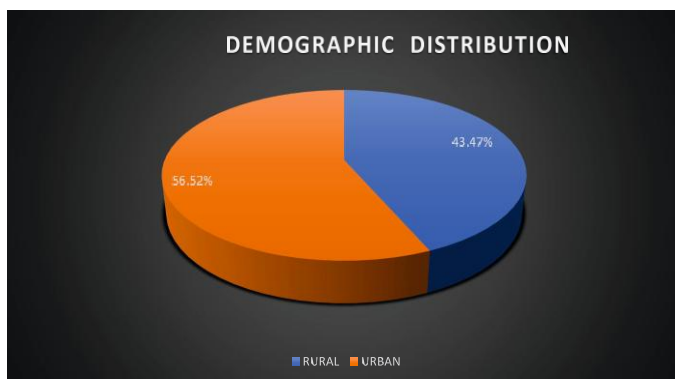


Figure 2 : Showing time taken to seek medical consultation following injury in hours Time lag

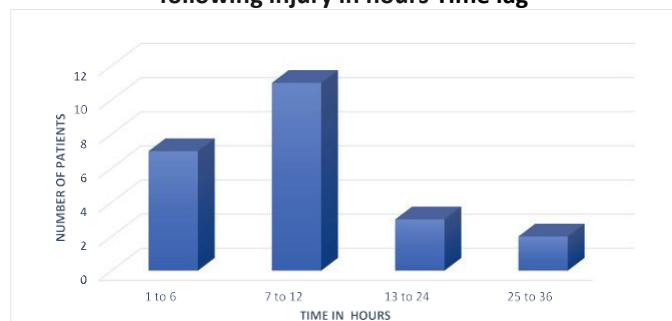


Figure 3 Laterality of study participants

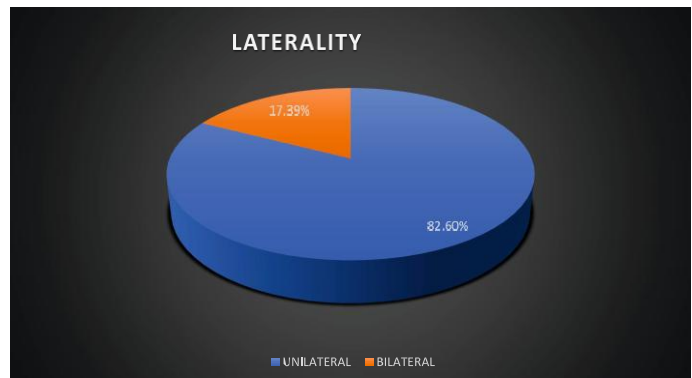


Figure 4: Type of fireworks causing injury

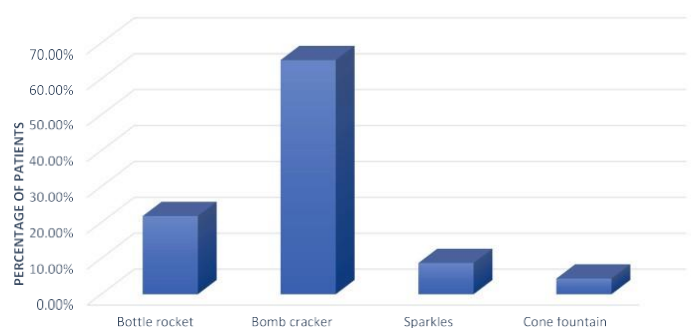


Table 2 Showing spectrum of ocular injuries following fire cracker injury in percentage (%).

Clinical characteristics	Number (n)	Percentage
Type of injury		
Close globe injuries	21	77.77%
Open globe injuries	6	22.22%
Close globe injuries		
Periocular burns	19	70.37%
Lid injury	7	25.92%
Conjunctival Injury	22	81.48%
Superficial foreign bodies	7	25.92%
Corneal abrasions	9	33.33%
HypHEMA	8	29.62%
Traumatic cataract	4	14.81%
Vitreous haemorrhage	3	11.11%
Open globe injuries		
Corneal perforation	4	14.81%
Limbal perforation	2	7.40%

Treatment modalities		
Medical management	12	44.44%
Surgical management	15	55.55%
Type of surgical intervention		
HypHEMA wash	5	18.51%
Corneal repair	4	14.81%
Iris reposition + limbal repair	2	7.40%
Lens extraction + PCIOL implantation	4	14.81%

Table-4 Initial visual acuity of the patients attending ocular emergency department; CF - counting finger, HM - Hand movement, PL - Perception of light

Vision	At admission (Number of eyes)	Out-come (numbers of eyes)
>20/40	2	4
20/40-20/200	1	6
<20/200 - CF	4	4
HM+	16	10
PL+	3	2
PL-	1	1

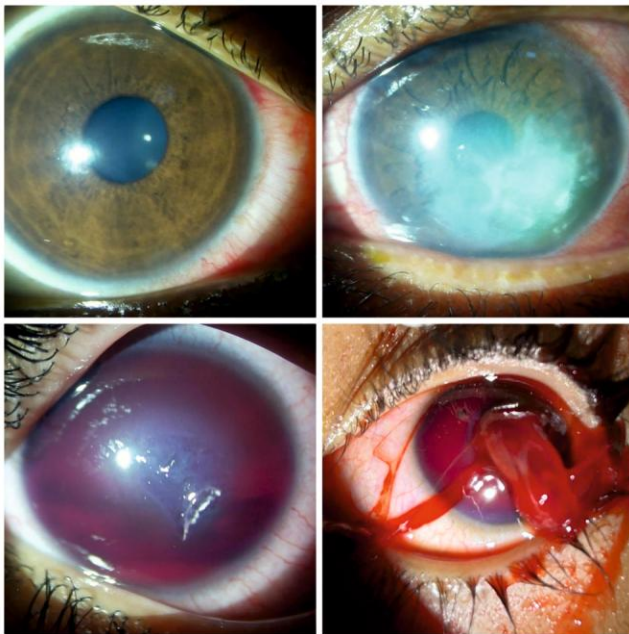


Figure: Clinical photographs showing different types of firecracker injuries. (a) subconjunctival haemorrhage; (b) corneal burn, (c) lamellar tear with hyphema (d) central corneal perforation with vitreous prolapse.

In this study, 18 (78.26%) patients reported early to the hospital, within 12 hours of injury, as shown in [Figure 2]. Most of them had no associated injuries other than in the eye. Majority of the cases (19, 82.60%) had unilateral ocular involvement. There were closed globe injuries in 21 (77.77%) eyes and open globe injuries in 06 (22.22%) eyes as described in [Table 2]. Most of the injuries sustained were confined to the anterior segment in 19(70.37%) eyes. as described in [Table 2]. Hyphema 8 eyes (29.62%). Traumatic cataract was seen in 4 eyes (14.81%). Corneal perforation was seen in 4 eye (14.81%) and limbal perforation was seen in 2 eyes

(7.14%). The posterior segment involvement was observed in 03 cases (13.04%).

Most common type of firecracker injury sustained was due to bomb crackers (n = 15, 65.21%), followed by bottle rocket (n = 05, 21.76%), sparkles (n = 02, 8.69%), and cone fountain (n = 01, 4.34%), as shown in figure 4. About 13 cases (56.52%) occurred among bystanders and (n = 10, 43.47%) were actively involved with the firecrackers.

According to the initial assessment of vision at the time of presentation to the hospital one eyes of one patient had no perception of light (PL negative), 13 eyes had visual acuity of hand movement to perception of light (PL positive) while 4 eye had counting fingers to 20/200 vision [table-4]. while following management visual acuity less than 3/60 to PL was present in only 8 patients (12.3%). Visual improvement was seen in all eyes except in 3 eyes (4.6%) who had visual acuity of NPL (no perception of light) at the time of presentation (Table 5).

Out of total 27 eyes, Surgical management was needed in 15 eyes. Hyphema wash was done in 5 (18.51%), corneal repair in 4 (14.81%), iris reposition and limbal repair in 2 (7.40%), lens extraction with post chamber intraocular lens implantation (IOL) in 4 (14.81%), (Table 3). Conservative management was done in 12 (44.4%) patients. Standard treatment protocol for ocular burns and chemical injuries were followed. Out of 23 patients one patients ended up with no PL and most had a moderate visual recovery (Table 5).

DISCUSSION:

This study was a hospital-based, single-center, retrospective case series^{7,8-11} of firecracker injuries during the festive season of deepavali. The nature of injury ranged from mild periorcular burns to corneal perforation. This led to severe ocular morbidity and in some of cases even blindness. Majority of patient ranged between 5-15 years implying that young population who were directly involved in lighting of firecracker were more at risk. Few of the patients injury was also due to device malfunction. There was increase preponderance in male patient, owing to more outgoing nature. Most of patients had very poor vision at time of presentation, indicating the severity of injury.

These incidences can be attributed to negligence of parents, no appropriate knowledge about safety.¹²

One interesting finding in our study was that when compared to previous years, there was marked reduction in incidence of patient presenting with ocular trauma owing to firecracker injury. Pujari et al¹³ in similar study reported a reduction of

59.5% in firecracker related ocular injury. This shift may be attributed to improved vigilance amongst general population. It can also be due to increase in number and easy accessibility of health services being provided.

Despite these findings it is still of utmost importance that we thoroughly educate general population regarding safety measures, use of firecracker under parental supervision only. In this study we can also see a small percentage patient presented late i.e after 24 hours. General population should be made aware that it is important for seeking for early medical check up for better prognosis.

There were several limitations in our study. Sample size was very small, retrospective in nature. It was a single center study.

Clinical studies with longer follow and larger sample size up can predict long term complications.

CONCLUSION:

Trauma by firecracker results in severe ocular morbidity and also adds to economical burden. Hence it is very important to take appropriate measures, firstly to prevent the incidence, and if at all mishap occurs, patients should be aware to seek for early medical intervention. Public awareness and strict implementation of government legislation in this regard may help to decrease the incidence and severity of firework related ocular injury.

REFERENCES

1. Mohan K, Dhir SP, Munjal VP, Jain IS. Ocular fireworks injuries in children. *Afr Asian J Ophthalmol* 1984;2:162-5.
2. Dhir SP, Shishko MN, Krewi A, Mabruka S. Ocular fireworks injuries in children. *J Pediatr Ophthalmol Strabismus* 1991;28:354-5
3. Arya, S., Malhotra, S., Dhir, S., Sood, S. (2001). Ocular firework injuries-Clinical features and Visual Outcomes. *Indian Journal of Ophthalmology*, 49(3), pp. 189-190
4. Kuhn F, Morris R, Witherspoon CD, Mann L, Mester V, Módis L, et al. Serious fireworks-related eye injuries *Ophthalmic Epidemiol* 2000 7 139 48
5. Malik A, Bhala S, Arya SK, Sood S, Narang S Five-year study of ocular injuries due to fireworks in India *Int Ophthalmol* 2013 33 381 5
6. Vassilia K, Eleni P, Dimitrios T Firework-related childhood injuries in Greece: A national problem *Burns* 2004 30 151 3
7. Arya SK, Malhotra S, Dhir SP, Sood S. Ocular fireworks injuries. Clinical features and visual outcome. *Indian J Ophthalmol* 2001;49:189-190.
8. Puri V, Mahendru S, Rana R, Deshpande M. Firework injuries: A ten-year study. *J Plast Reconstr Aesthet Surg* 2008;62:1103-11.
9. Sacu S, Segur-Eitz N, Stenng K, Zehetmayer M. Ocular firework injuries at New year's eve. *Ophthalmologica* 2002;216:55-9.
10. Witsaman RJ, Comstock RD, Smith GA. Pediatric fireworks related injuries in the United States: 1990-2003. *Pediatrics* 2006;118:296-303.
11. Smith GA, Knapp JF, Barnett TM, Shields BJ. The rockets' red glare, the bombs bursting in the air: Fireworks related injuries to children. *Pediatrics* 1996;98:1-9.
12. Kumar R, Puttanna M, Sriprakash KS, Sujatha Rathod BL, Prabhakaran VC. Firecracker eye injuries during Deepavali festival: a case series. *Indian J Ophthalmol*. 2010 Mar-Apr;58(2):157-9. doi: 10.4103/0301-4738.60095. PMID: 20195044; PMCID: PMC2854452.
13. Pujari A, Kumar A, Chawla R, Khokhar S, Agarwal D, Gagrani M, et al. Impact on the pattern of ocular injuries and awareness following a ban on firecrackers in New Delhi: A tertiary eye hospital based study. *Indian J Ophthalmol* 2018;66:837-40.