

Original Research Article

Clinico-epidemiological profiles of patients sustaining ocular trauma due to firecrackers during the festive season of Diwali

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ABSTRACT

Background: Considerable number of cases of firecracker injuries is reported during the festive season of Diwali in India. The purpose of this study is to identify the clinico-epidemiological patterns of ocular injuries caused by firecrackers during this period.

Methods: This was a prospective case series of patients attending eye OPD with ocular trauma sustained by Firecrackers during the festive season of Diwali, 2016 in a Tertiary Care Centre in Surat. Demographic data of all the patients and type of firecracker causing injury were noted. Ocular examination of all patients was performed at the time of presentation and on follow-up. Treatment received by the patients was noted.

Results: Out of total 20 patients, 85% were male (17 out of 20). Mean age of the patients was 12.15 years and majority of patients (45%) were of 6 to 10 years' age group. Most patients (85%) sustained injury by Single shot crackers like Bijili crackers and Timing bombs. The injuries reported ranged from Eyelid burns, conjunctival or corneal burns to partial thickness corneal tear and macular scar formation with interventions ranging from ocular wash with saline to repair of partial thickness corneal tear. Many of the injuries were caused because of negligence. Corneal epithelial defect was the most frequent injury (affecting 96% of the total no. of eyes affected) followed by Eyelid burns (affecting 56% of the total no. of eyes affected). Cases having visual impairment or blindness had corneal and/or retinal involvement.

Conclusions: Ocular trauma resulting from firecrackers can lead to significant ocular morbidity and permanent blindness and is a preventable cause. All steps must be taken through public awareness and legislation to ensure that firecrackers are used in a safe manner during Diwali celebrations. The medical professionals should be adequately trained to give primary emergency care which has a key role in the visual outcome.

Keywords: Firecracker injuries, Ocular trauma, Preventable blindness

INTRODUCTION

Firecrackers form an integral part of celebrations of Diwali festival in India. Considerable number of cases of firecracker injuries is reported during the festive season. Firecrackers can cause a wide range of ocular injuries. These include anterior as well as posterior segment structure involvement.¹ Ocular trauma is an avoidable

cause of blindness. As Vision 2020 gives high priority to avoidable blindness, every effort should be made to prevent it.²

In a developing country like India, there is laxity of legislation regarding the sale execution of fireworks. With lack of public awareness, this becomes a major public health problem.

Purpose of the study

To identify the clinico-epidemiological patterns of ocular injury to determine ocular morbidities resulting from the use of firecrackers.

METHODS

A prospective case series of patients attending eye OPD with ocular trauma sustained by Firecrackers during the festive season of Diwali, 2016 in a Tertiary Care Centre in Surat.³⁻⁵ Demographic data of all the patients type of firecracker causing injury were noted. All the patients underwent detailed ocular examination. Visual acuity using Snellen’s chart or finger count, slit lamp examination fundus examination were done at the time of presentation on follow-up. Radiography B-scan Ultrasonography of orbit were done in cases sustaining open globe injury. Intraocular pressure was measured using non-contact tonometer gonioscopy was performed in selected cases. Medical Surgical treatment received by the patients were noted.

RESULTS

20 patients presented with ocular trauma due to firecrackers during the study period. Out of all the patients 85% were male (17 out of 20) (Figure 1).

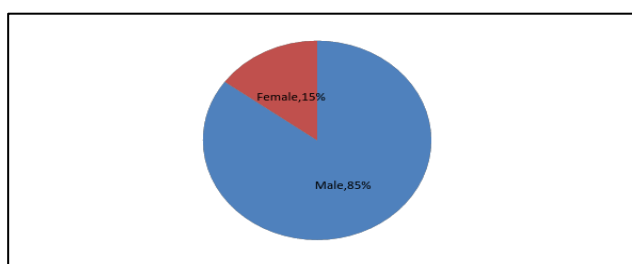


Figure 1: Gender distribution.

Mean age of the patients was 12.15 years majority of patients (45%) were of 6 to 10 years’ age group. Majority

of these children were not accompanied by elders while igniting firecrackers (Figure 2).

Most number of patients belonged to upper lower lower middle class as per Kuppuswamy scale of Socioeconomic Status.⁶ 95% (19 out of 20) patient sustained injury while igniting firecracker themselves whereas the rest were bystanders. Most patients (85%) sustained injury by Single shot crackers like Bijili crackers Timing bombs (Figure 3).

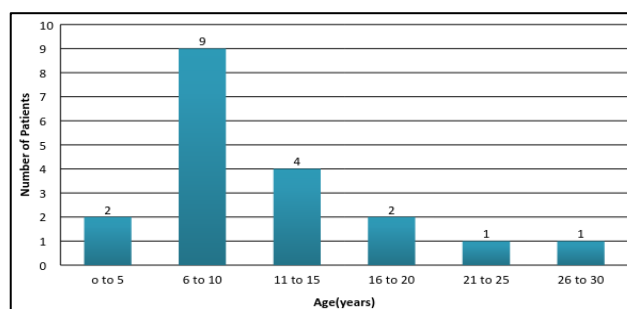


Figure 2: Age distribution.

Out of the 20 cases 25% (5 out of 20) patients had Bilateral involvement the rest had unioocular involvement. The visual acuity of these patients (affected eyes) at presentation the visual outcome were as follows (Table 1).

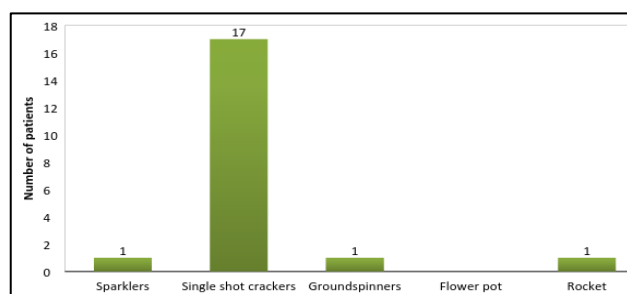


Figure 3: Types of firecrackers.

Table 1: Visual outcome.

Level of visual function according to ICD-10	Initial visual acuity (No. of eyes)	Final visual acuity (No. of eyes)
Normal	>6/9	5
Visual impairment	6/9-6/18	13
	6/24-6/60	2
	5/60-3/60	4
	3/60-PL	0
Blindness	No PL	1
		0
Not recorded*		3
Total (No. of Eyes)		4
		25

*Visual acuity of was not recorded in very young aged patients who were not co-operating. One patient did not turn up for follow-up.

Majority of the cases having visual impairment or blindness had corneal /or retinal involvement (Table 2). Corneal epithelial defect was the most frequent injury (affecting 96% of the total no. of eyes affected) followed by Eyelid burns (affecting 56% of the total no. of eyes affected).

Table 2: Distribution of cases as per site of injury.

Site of Injury		Number of eyes affected	
Lid adnexa	Eyelid burns	14	
	Lid tear	0	
	Ectropion	1	
Anterior Segment	Conjunctival tear	2	
	Corneal epithelial defect	24	
	Corneal foreign bodies	5	
	Corneal edema	4	
	Corneal tear (partial thickness)	1	
	Hyphaema	3	
	Iridodialysis	1	
	Lens subluxation	0	
	Traumatic cataract	1	
	Angle recession	1	
	posterior segment	Berlin's edema	2
		Macular hole/scar	1
		Vitreous hemorrhage	1
Intraocular foreign body		0	



Figure 4: Patient with corneal epithelial defect (fluorescein stain positive) sustained by a firecracker. Visual acuity on presentation was 6/12. Patient received medical treatment on OPD basis. Visual outcome was 6/6.

Out of the 20 cases 3 (15%) required Indoor treatment the rest were treated on Outdoor basis. One patient requiring indoor treatment refused admission. One patient was lost to follow-up. Mean duration of hospital stay of those admitted (3 out of 20) was 1 week. Mean duration of follow-up was 1 month. 2 patients required surgical intervention in the form of Partial thickness corneal tear

repair surgery corneal foreign body removal under General anaesthesia, the rest received topical as well as systemic medications.

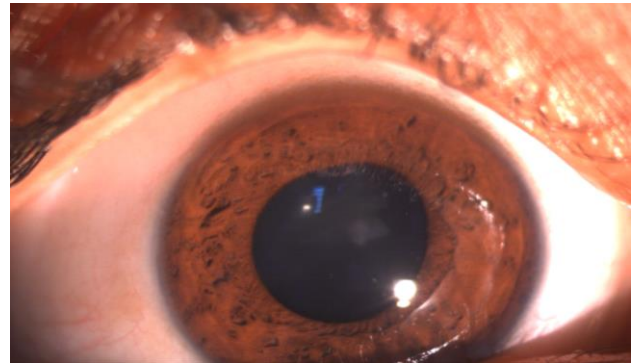


Figure 5: Patient having N-M corneal opacity (Red arrow) as a sequelae of firecracker injury. The visual acuity on presentation was PLPR4 patient had corneal epithelial defect, stromal oedema Descemet folds with hyphaema. Post-treatment visual outcome on 1 month follow-up was 6/9.

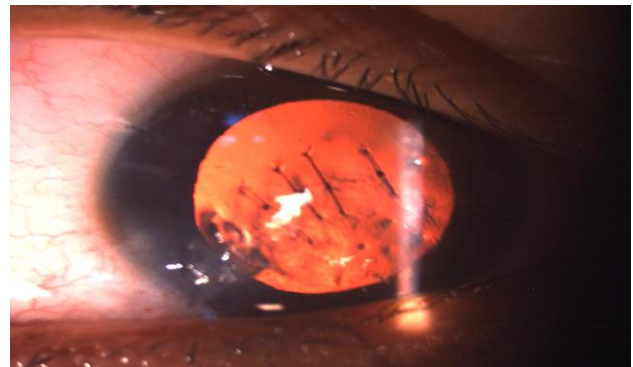


Figure 6: Post-surgery photograph of a patient with partial thickness corneal tear. Patient developed macular scar cataractous changes in lens. Post-treatment visual outcome at 1 month follow-up was finger count at 1 metre.

DISCUSSION

This study was a hospital-based, single-centre, prospective case series of firecracker injuries.

The injuries reported ranged from Eyelid burns, conjunctival or corneal burns to partial thickness corneal tear macular scar formation with interventions ranging from ocular wash with saline to repair of partial thickness corneal tear. One patient required corneal foreign body removal under General anaesthesia. Topical treatment included antibiotic, lubricating cycloplegic eye drops and/or ointment per need. Most patients with corneal epithelial defect required eye-pad application several times to aid epithelial healing. Systemic antibiotics, anti-inflammatory drugs Vitamin supplements were given as required. Three patients developed hyphaema. One

patient developed cataractous changes in lens is to be operated for the same. One patient had severe facial burns developed unilateral ectropion subsequently as noted on follow-up.

Most of the patients were below the age of 10 years. Similar to the findings in some studies, victims were mostly those who were actively involved in igniting the firecracker, rather than bystander injuries occurred more frequently in males.^{4,7,8,10} The most common firecrackers causing injury in our study were Single shot crackers.

Many of the injuries were caused as a result of negligence of those igniting the firecracker. One patient sustained injury by a misfired bottle-rocket while riding a bike on the road. Some of the patients reported device malfunction as the cause of their injury. In several cases, patients sustained injury while trying to check or re-ignite a failed firecracker. Majority of the children that suffered injury were not accompanied by elders.

Majority of the patients had good visual outcome without any sequelae. Most of these patients had eyelid superficial corneal burns.¹⁰ One patient developed unilateral visual loss (finger count at 1 metre). This was as a result of macular scar formation, cataractous changes in lens as well as due to astigmatism developed as a result of partial thickness corneal tear. One patient developed small N-M corneal opacity as sequelae.

Visual outcome was less than expected in at least three cases despite the trauma not being severe enough. The factors contributing to this were delay in consulting a doctor as well as not following the medical advice properly. Many countries have strict laws to regulate use of fireworks.^{12,13} There are huge penalties for violating these rules. In India, implementing similar strict legislative measures stipulating safety measures to execute fireworks in a safe manner is required to reduce the firecracker related injuries.

One drawback of this study is that the cases were recorded only during the festive season that too at a single centre. Including multiple centres or including cases reported during festive season for more than one season would have demonstrated the range of ocular involvement social impact of firecracker injuries in a better way.¹⁴

CONCLUSION

Ocular trauma resulting from firecrackers can lead to significant ocular morbidity permanent blindness is a preventable cause. All steps must be taken through public awareness legislation to ensure that firecrackers are used in a safe manner during Diwali celebrations. In this modern era of technology, newer modalities can be utilized to spread awareness i.e. spreading audio-visual messages through social media internet can be very impactful. This, along with conventional modalities of

awareness campaigning can cover larger masses of population. Informative pamphlets can be distributed right at the site of firecracker sale. Use of protective eyewear should be promoted parental supervision of children while lighting firecrackers is recommended. The importance of seeking medical treatment promptly should be stressed as majority of the cases had superficial eyelid corneal involvement visual outcome were good. The medical professionals at the small centres in the peripheral areas should be adequately trained to give primary emergency care which has a key role in the visual outcome.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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