

Fireworks Eye Injury: Seasonal Intervention Is an Important form of Prevention

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Abstract

Purpose: Prospective study of fireworks related eye injuries in India *Methods:* Patients admitted during 2009-2013.

Results: Total: 82 eyes from 66 patients, 40/66 (60%) by Rockets. Mean age 14 years. Male predominance (47, 70%), 50% minors (< 16 yrs), Most common: lids, corneal erosions and abrasions (25/82, 30%). Severe: 8/82 eyes (10%) mostly due to falling rocket stick and unexploded crackers (UXC). Visual impairment was seen in 25% mainly due to secondary glaucoma. Severity index: 1.0 ± 0.8 . (Minors 1.2 ± 1.0 , adults 1.0 ± 0.5 ; $p = 0.013$). Seasonal intervention reduced ocular morbidity.

Conclusion: Injuries in minors, unexploded crackers, falling rockets had poorest visual outcome. Seasonal intervention was most effective.

Keywords: Injury; Firework, Intervention, Effects; Seasonal

Abbreviation: Some local festivities mentioned in this article are:

Diwali: Festival of lights marking return of King Rama from 14 years of exile; Dussera: Festival Celebrating the end of Ravana; Ram Navami: Celebrating birth of Rama, the sacred king/God; Chhat: State festival of an Indian state (Bihar) worshipping the setting Sun;

Introduction

Ocular trauma is often blinding, life changing and thought to be largely preventable. This is not only the most important cause of unilateral loss of vision in developing countries but up to 5% of all bilateral blindness is a direct result of trauma [1]. There are at least 2.5 million eye injuries in the United States yearly causing some 40 to 60 thousand cases of permanent visual impairment annually. According to the USEIR database, the majority of eye injuries occur at home. One third of all serious eye injuries occur in children age 18 years and younger. In the US, 5% all injuries are due to fireworks, 65% occurs at home and 3.5% cases lose vision permanently in one or both eyes [2].

Population based data is scarce in India but hospital based studies indicate fireworks related eye injury is important cause of ocular morbidity in our country, especially during festivals. Ban and guided supervision is logistically not suitable in India for many reasons. One of the most important reasons is the involvement of a huge population in the fireworks industry which is mostly unorganized and employs many minors. In our district (Bokaro district in Jharkhand state of India with a population of 2 million), we tried seasonal intervention (like Eye Safety Awareness Week") to reduce the morbidity rate. No systematic study on fireworks is available in India. Indian Eye injury registry (IEIR) is mentioned at our AIOS website. But there is no substantial database available [3].

Our aim is to prospectively study mechanisms and injury characteristics of ocular firework burns and their effective preventive measures in a township with good healthcare infrastructure

Material and Methods

A prospective analysis of all patients with firework injuries attending Bokaro general hospital during last five years (2009-2013) were looked for types of fireworks and mechanisms of injuries. The nature and severity was classified according to BETT. Every year different preventative measures were adopted after brain storming sessions organized by parents (both affected and none affected), students, teacher doctors and town services and public relations department. A questionnaire was also distributed among the workers of the plant to find out any history of fireworks related eye inquiries [4].

Results

During this 5 year period, 1500 eye injury cases were recorded.66 patients had fireworks related injury 8 cases were bilateral (Fig.1). Mean age was 14 years with a range of 4 years to 61 years. 47cases (70%) were male and 50% of the affected population was below 16 years of age. Commonest type of injury was skin and corneal erosions and abrasions, 25 cases (n = 82) had superficial injuries like burns of lids and corneal abrasions.8 cases had severe injuries (Vision at presentation below 6/60). None were blind but visual impairment was seen in 25% mainly due to corneal or retinal pathology. In all patients, the severity index was 1.0 ± 0.8 . In minors the severity index was 1.2 ± 1.0 , in adults 1.0 ± 0.5 ($p = 0.013$).

90% cases occurred during Diwali, Dussera, Ram Navami, Chat festivals. The preventive measure included extensive public awareness through school, cable local newspapers, “Bokaro darpan”–print and video. These were done monthly throughout the year but during the third quarter or festive season almost daily. Oath taking was organized in schools. There was a gradual decline in incidence. During this five years period, injury rate was reduced from the highest level of 18 to 08, almost 12% decline and on average 2.5% per year. Falling rocket injury occurred during Ram Navami and Chhat. Unexploded crackers were important cause of ocular morbidity among the rag pickers following Diwali night. This group had highest ocular morbidity. Sound bombs were less damaging to eyes. Washing the premises after the festivity helped in reducing fire cracker injuries. 100 questionnaire s were distributed which gave a history of eye injuries in 28 cases. 8 had lost vision during fireworks occurring in villages [5].

Discussion

In this prospective study we had 1500 cases of eye injury during last five years of which 66 cases (4.5%) fireworks related. US studies have similar incidences of fireworks as a cause of eye injury (5%). 70% cases of our cases occurred at home which is slightly higher than US data (60%). Severity was less in our cases as compared to other studies; this could be due to high literacy rate [6]. Visual outcome was good as nobody had less than 6/60 final vision. We had gradual decline in incidence of fireworks related eye injuries (Figure 2)

2009	2010	2011	2012	2013	Total
N 18	N 14	N 14	N 12	N 8	N82
Routine statutory warning	Extensive campaign in chat and dussera	Washing of place of fireworks to diffuse all unexploded crackers	Oath taking in schools	Distribution of packets with oath	

Table 1: Tabular presentation of reducing trend in Fireworks injuries.

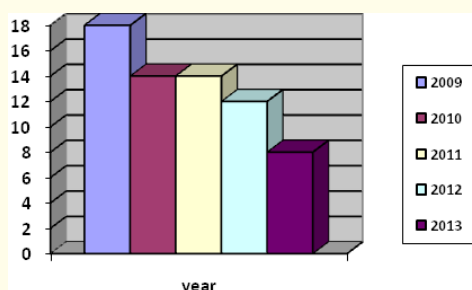
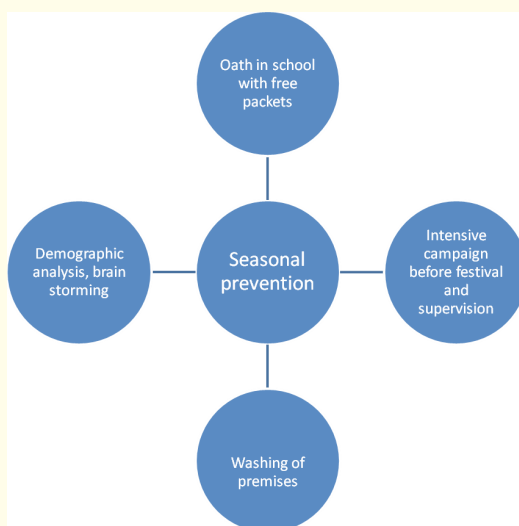


Figure 1: Graphical year wise reducing trends in Fireworks injury.



Approximately 60-percent of the fireworks injuries are burns followed by contusions and lacerations. Sparklers account for most injuries to children under 5-years-old. Treatment of burns from fireworks can be more complicated than first previously thought since tetanus spores can be present in the exploding device casings and gunpowder residue, cardboard fibers, and ash are often tattooed by found in the burnt area. No studies have stressed on unexploded crackers. Our study has found this as an important cause of ocular injuries in poor children, thus understandably having poorer outcome

Our approach of seasonal intervention showed impressive decline of ocular injuries. Drawback of the study is small single hospital based data. Statistical evaluation was no significant due to sample size.



Conclusion

As most injuries had seasonal preponderance, preventive activity should be intensified during these periods. School activities should include preventive measures like oath taking with free distribution of crackers. Due caution, though, will help avoid a lifetime disability for a child or loved one.

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