Fireworks Ocular Injury in Saudi Children; Profile and Management Outcomes

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Abstract

Background: To explore the demographic profiling, causes, types, complications, management outcomes, and severity of fireworks- inflicted ocular injuries and traumas in children in KSA.

Methods: This is a retrospective study of 115 cases with eye injuries managed at the Emergency Department, of our institution between 2003 and 2019. Demography, clinical features at presentation, mode of management and the Best Corrected Visual Acuity (BCVA) were evaluated at the last follow up.

Results: The study included 117 eyes of 115 children [median age: 9 years; 96 (83.5%) boys; 19(16.5%) girls]. Fifty-six (48.7%) participants were bystanders. The injuries were caused mainly due to bangers (n=47; 40.9%), rockets in bottle (n=28; 24.3%), firecrackers (n=27; 23.5%), and nonspecific reasons (n=13; 11.3%). The children had presented with various severity levels: corneal abrasion (n=52; 44.4%); cataract (n=47;40.2%); penetrating injury (n=40; 34.2%); secondary glaucoma (n=22;18.8%); subluxated lens (n=19;16.2%); limbal stem cell deficiency (n=14;12.0%); Iridodialysis (n=12;10.3%), and vitreous hemorrhage (n=11;9.4%). Management interventions of the eyes under study included: penetrating injury repair (n=40; 34.2%), lens removal plus intraocular lens implantation (n=26; 22.2%), removal of foreign body (n=9; 7.7%). The BCVA after six months was 20/20- 20/60 in 49(41%) cases; 20/70 - 20/200 in 27 (23.1%) cases; <20/200-20/400 in 7 (6%) cases, and <20/400 in 34(29.1%) of the cases. Out of 51.3% eyes with <20/200 before management, only 35% recorded severe visual impairment.

Conclusion: Fireworks-related eye injuries were mainly observed in boys primarily due to the use of bangers . Visual disability remained in one-third of the managed cases.

Introduction

Ocular injuries often lead to acquired monocular blindness in children.¹ Fireworks are employed to express rejoicement on the eve of New Year and several National Days ^{2,3} in various countries around the year. Several studies have reported damage in an average of 21.8% of ⁴ individuals: ranging from 16–45% in Europe⁵. The USA records about 31% of fireworks-related ocular injuries during Independence Day celebrations on 4th July ⁶ every year. Wisse et al.⁷ documented that in both developing and developed nations, 22% of all ocular traumas result from fireworks, thereby becoming the driving reason for permanent and/or partial visual disability.^{2,4} 47% of ocular patients were reported to result from 7000 fireworks-related injuries treated in the USA in one month.^{8,9}

Unprofessional and novice handling of fireworks may inflict severe forms of trauma, and may even lead to death, if not timely, properly, and professionally treated. Explosive physical and chemical reactions triggered during fireworks explosions may injure eyes and hands most and fatally affect these organs.³ The Public Prosecution Law and its strict implementation in KSA have warned of serious implications due to fireworks' misuse and mishandling. It stipulates that the authorized person is a natural or legal person who meets the necessary conditions and is authorized by the Ministry of Interior (MOI), KSA.

Manufacture, possession, export, import, sell, use, distribution, transportation, and storage of fireworks stand banned in KSA unless authorized by the MOI in accordance with the enabling legal provisions. The emergency department of our institution is a leading ophthalmic specialized center. All patients with isolated eye injuries and different body injuries are treated in a general hospital. Ocular injuries caused by fireworks²⁻⁹ were reported in several previous studies. However, so far little data about the epidemiology of fireworks-related ocular injuries among children and information on the type of fireworks in Saudi Arabia are on record in literature. To our knowledge, the current study is the first such study in the Kingdom of Saudi Arabia that delved deeply into fireworks-related ocular conditions in children.

The authors in this study worked assiduously to highlight clinical features, profiling, associated outcomes, management patterns of ocular trauma in children recruited due to fireworks-related injuries at an emergency department (ED) of a tertiary eye hospital from 2003 through 2019. Preventative methods and regulations to further mitigate ocular fireworks-related injuries are also elaborated in this paper.

Materials And Methods

The current retrospective study was conducted at the emergency department of our institution, Riyadh, KSA over 16 years (2003-2019). After taking approval from the Institutional Review Board of the hospital, medical records of all children under 16 years who presented to the Emergency department with ocular injuries from fireworks were evaluated. Ophthalmologists in the emergency unit having rich experience in the patient assessment and management of ocular trauma and their complications conducted the study.

The demographic profile of patients including their age, gender, laterality (right, left, or bilateral/both eyes); types of injuries sustained, and nature of fireworks employed were recorded. The status of the children as an active participant or bystanders was also ascertained. A proper regulatory written consent from the parents of children admitted to the hospital was obtained to publish images of injuries and treatments; management patterns such as types and number of operations, duration from injury to admission.

Visual Acuity at presentation and after management; anterior and posterior segment findings; and surgical interventions were noted. An elaborate ophthalmological examination was performed on all patients at the time of presentation and on follow-up, best-corrected visual acuity (BCVA) was recorded at 6 m with the participant wearing the best correction if warranted. Intraocular pressure (Goldmann applanation or rebound tonometry using ICare device in children and required palpation) was assessed. Pupillary examination and inspection of the adnexa were done; the anterior ocular segment was evaluated using slit lamp biomicroscopy, and loupes in combination with a light source in uncooperative children were employed. Indirect ophthalmoscopy was employed to study injury in the ocular fundus. In the case of obstructed or invisible/ inconspicuous image of fundus, B-scan ultrasonography was performed. In suspected cases of penetrating injury, B-scan ultrasonography was exempted.

During the investigations, an urgent computed tomography (CT) scan was ordered in suspected intraocular foreign bodies and suspected orbital trauma including bony fractures. The children were admitted to the hospital for more delicate or extensive surgery, especially those done under general anesthesia; and intraocular surgery for intravenous drug application or an intensive eye drop regimen (e.g., in alkali burns). Intravenous antibiotics were provided to children presenting with open-globe trauma to tackle endophthalmitis and in cases of the extensive eyelid or orbital injuries. Tetanus vaccination was also given. Necessary surgical interventions were conducted within 24 h of admission to the emergency department. All patients were classified based on the ocular trauma classification system.¹⁰ Lid repair, Lens removal plus intraocular lens implantation, removal of foreign body amniotic membrane graft transplantation, pars plana vitrectomy, and enucleation were recorded.

Uncorrected visual acuity (UCVA) and best-corrected Visual acuity (BCVA) were tested through Snellen charts, Cardiff visual acuity cards, or finger counting at presentation and after management. Poor visual outcome was defined as BCVA < 6/60 and unilateral blindness as BCVA < 3/60 in the injured eye. The visual impairment grades defined by the World Health Organization¹¹ were adopted in the current study.

Data were collected using Excel (Microsoft Office 2010, Redmond, Seattle, USA). Univariate analysis was performed using SPSS, version 25.0 (IBM Corp., Armonk, NY, USA). Normally distributed quantitative variables were expressed both as the mean and standard deviation (SD). Qualitative variables were presented as frequencies and percentage proportions. For subgroup analysis validation of continuous variables, a Student t-test was performed. A two-sided P-value was calculated with $P < 0.05$ considered as statistically significant.

Results

One hundred-seventeen eyes of 115 children with a median age of 9 (25% IQR: 6, range 2-14) years were investigated and treated in the current study. The higher ocular injury rate (83.5%) was recorded in 96 boys than in girls (19, 16.5%). The right eye was involved in 56 (48.7%) patients and the left eye in 57 (49.6%) patients. In only two patients (1.7%), both eyes were seen injured. (**Tabel 1**)

Fifty-six (48.7%) patients were bystanders and 59 (51.3%) had ignited the fireworks themselves while sustaining ocular injuries. Types of fireworks used by the injured patients were banger in 47 (40.9%); rockets in bottle 28 (24.3%); firecrackers in 27 (23.5%); and unspecified in 13 (11.3%) patients. Out of 115 patients, 44.4% had corneal abrasion, 40.2% had cataract, 34.2% had Penetrating injury, 18.8% had secondary glaucoma, 16.2% had the subluxated lens, 12.0% had limbal stem cell deficiency, 10.3% had iridodialysis, 8.5% had hyphema (Figure 1) and 9.4% had a vitreous hemorrhage. (Table 2)

Table 1
Profile of Saudi children with fireworks-related ocular injuries.

Qualitative variables		Number	Percentage
Age group (years)	< 5	19	16.5
	5 to 9.9	51	44.3
	10 to 14.9	45	39.1
Gender	Boys	96	83.5
	Girls	19	16.5
Eye involved	Right	56	48.7
	Left	57	49.6
	Both	2	1.7
Bystander/ Igniting fireworks	Bystander	56	48.7
	Igniting fireworks	59	51.3
Type of fireworks	Banger	47	40.9
	Rockets in bottle	28	24.3
	Firecrackers	27	23.5
	Unknown	13	11.3

Table 2. Ocular profile of Saudi children with fireworks-related injuries.

N = 117 eyes of 115 children		Number	Percentage
Presented Best corrected visual acuity BCVA*	20/ 20 to 20/60	26	22.2
	20/70 to 20/200	31	26.5
	<20/200 to 20/400	3	2.6
	<20/400	57	48.7
Damage in anterior segment of eye	Conjunctival wound/burn	5	4.3
	Corneal abrasion	52	44.4
	Corneal foreign bodies	7	6.0
	Penetrating injury	40	34.2
	Hyphema	10	8.5
	Iritis	11	9.4
	Iridodialysis	12	10.3
	Angle recession	13	11.1
	Stem cell deficiency	14	12.0
	Secondary glaucoma	22	18.8
	Cataract	47	40.2
	Subluxated lens	19	16.2
	Dislocated lens	19	16.2
	Others / unspecified	23	19.7
Damage in posterior segment of eye	Vitreous hemorrhage	11	9.4
	Retinal detachment	6	5.1
	Choroidal detachment	1	0.9
	IOFB**	9	7.7
	Optic nerve damage	1	0.9
	Extrusion of eyeball contents	1	0.9
	Traumatic macular hole	4	3.4
	Commotio retinae	1	0.9

Abbreviations: *BCVA , Best corrected visual acuity **IOFB , Intraocular foreign bodies.

Only 100 children underwent an operation. Management included penetrating injury repair (34.2%), lens removal plus intraocular lens (IOL) implantation (22.2%), removal of intraocular foreign bodies (IOFB)

(7.7%), amniotic membrane graft transplantation (9.4%), and other surgeries (3.3%). Enucleation was felt necessary in seven children (Table 3). Fifteen children needed no surgeries and were managed in the outpatient department. The average follow-up period after the presentation was six months and ranged from 1-3 years from surgical management.

Table 3
Ocular surgeries performed on eyes of Saudi children with fireworks-related injuries.

Name of surgical procedure	Number	Percentage
Lid repair	3	2.6
Penetrating injury repair	40	34.2
Lens removal with IOL *	26	22.2
Pars plana vitrectomy	2	1.7
Amniotic membrane graft	11	9.4
Ahmed valve implant	1	0.9
Trabeculectomy	1	0.9
Removal of IOFB** under GA***	9	7.7
Enucleation	7	6.0

Abbreviations: *IOL, Intraocular lens ; **IOFB , Intraocular foreign bodies; ***GA, General Anesthesia. In the 117 eyes, the initial and BCVA, at last, follow up are shown in (Table 4). The BCVA after 6 months was 20/20 to 20/60 in 49(41%) eyes; 20/70 to 20/200 in 27(23.1%); and <20/200 to 20/400 in 7(6%) and <20/400 in (34 ;29.1%) eyes, from 51.3% eyes with <20/200 before management, we could reduce severe visual impairment to 35.1%.

Table 4
Visual status before and after management of Saudi children with fireworks- related ocular injuries.

BCVA*	After management		Before management		Validation
	Eyes	Percentage	Eyes	Percentage	
20/20 to 20/60	49	41.9	26	22.2	$\chi^2 = 11$, Degree of Freedom = 3 P <0.001
20/70 to 20/200	27	23.1	31	26.5	
<20/200 to 20/400	7	6.0	3	2.6	
<20/400	34	29.1	57	48.7	

Abbreviations: **BCVA , Best Corrected Visual Acuity

Discussion

The findings indicated that young male children are predominantly affected by unilateral trauma. Bangers followed by rockets in bottle were the main types of fireworks causing ocular injuries. Corneal abrasions ruptured globes, and cataracts were the principal ocular signs. The chief cause triggering ocular injuries was the ignition of the fireworks. Nearly half of affected individuals displayed normal functional vision six months after treatment management. Prompt and standard intervention could reduce blindness by one third.

Several studies were conducted previously on ocular injuries in children and on outcomes of standard management from other parts of the globe, except on an Arab population. With strict laws preventing fireworks in KSA, availability and unsupervised usage is a matter of concern. The current study indicated that additional policies regarding fireworks' use are required to reduce the incidence of visual morbidity in children.

Ocular trauma is a key reason for causing monocular visual morbidity and blindness.¹²⁻¹³ Several studies have outlined fireworks-related ocular injuries sustained during ceremonies in different countries^{8,14-15} Al-Qattan and Al-Tamimi (2016) in their study on hand burns due to fireworks¹⁶ in KSA indicated that wherever firework-related injuries were noted, ocular injuries could also be present and needed an evaluation.

In the current study, half of the children were under 10 years of age. This indicates the vulnerability of children to ocular trauma due to fireworks. This finding was also corroborated by a few studies done in India.^{17,18} In the USA 10- to 20- year-old children comprised one-third of injured children.¹⁹ This is attributed to lack of supervision, little experience handling fireworks, more risk-taking behavior, and lower ability to respond to dangerous hazards. These observations highlight the need for greater education of children on the dangers that fireworks pose and implementation at earlier school age.

This study also showed that the majorities of the fireworks (40.9%) were bangers followed by rockets in bottle (24.3%) and firecrackers (23.5%). In 13 eyes (11.3%) unknown fireworks was employed. In an earlier study, firecrackers were shown to be the most used types of fireworks.¹² Use of bottle rockets was not remarkable. Sparklers, another type of fireworks, were found associated with corneal abrasions and burns. The 1999 US Consumer Product Safety Commission (CPSC) study documented that one-third of the fireworks-related injuries were caused by firecrackers and 20% by rockets.¹⁰

Severe trauma was reported in 34% of the patients under study, which indicated that about one-third of fireworks-related ocular injuries could cause permanent sequelae. A significant proportion of patients (85%) required surgical interventions. The most frequently performed surgeries were ruptured globe repair, traumatic cataract extraction, amniotic membrane graft, and removal of intraocular foreign bodies (IOFB) which reflect the severity of these injuries. The ocular injuries varied in presentation and severity. injuries led to a 29% resulted in permanent eyesight loss as evidenced by the mean Snellen visual acuity of >

20/400. Open globe injury, poor initial visual acuity, IOFB, and retinal detachment^{6,13} were also found associated with poor visual outcomes in previous studies.

Our finding revealed an enucleation rate of 6%. This finding is in agreement with the 3.9% enucleation rate documented by Wisse et al⁴ in their review of the literature covering 40 years span (1969-2009). This observation highlights the need to save eyes and employ ultra-advanced treatment options in the current dynamic world. Chang et al.⁶ reported an enucleation rate of 10% between 2003 and 2013 and also more open-globe injuries (17%) vs 6% in the current study. This is likely due to the fact, that Chang et al. studied the experience of the sole level I trauma center for five U.S. states.

In our study, nearly half of the injured eyes had a functional normal vision after the intervention. One-third of eyes developed unilateral blindness after the intervention compared to nearly half at presentation. Overall, children in the current study exhibited enormous improvement in their visual acuity post-treatment. However, a remarkable number of injuries triggered permanent vision loss in the patients. A better recovery to normal vision could be attributed to the absence of both retinal detachment and IOFB, better initial BCVA, and closed globe injury. Visual acuity witnessed noteworthy improvement on account of prompt interventions.

Open globe injury and IOFB were found associated with dismally poor visual outcomes. Poor visual outcomes of interventions following fireworks-inflicted ocular injuries^{11,13,15} might arise due to risk factors such as IOFB, retinal detachment, open globe injury, poor initial visual acuity, and development of endophthalmitis. Patients with open globe injuries and retained IOFB warrant a diligent prognosis.

Boys of 6 to 10 years of age in our study seemed to be more vulnerable to fireworks-related ocular injuries. This matches the findings of Malik et al.¹³ who reported that 54% of boys with fireworks-related injuries were ≤ 14 years of age. Our study indicates that boys are the major victims of eye injuries in 83.5% of cases caused by fireworks because they are actively involved in lighting fireworks this consistent with findings from previous studies^{2,6,17-22} probably reflecting the males to be more adventurous and hostile. We also observed that the active participants were 51.3% while the bystanders were 48.7% of patients. This finding contradicts findings from previous studies.^{13,22} It can be concluded that active participants are more easily injured than bystanders.

The most common injuries were corneal abrasions, ruptured globes, and cataracts. Ruptured globes occurred in 34% of patients, which is similar to previously reported rates.³ We found corneal abrasions in about 44% of patients, showing conformity with finding by Wisse et al.⁴

This study has several limitations. It is a retrospective study. All data could not be retrieved from the children's medical records. Data concerning visual acuity at presentation were especially lacking. Furthermore, children were unable to identify their injury. Due to the long-distance from the hospital, many patients could not be followed up and were lost to follow up.

Firework-related injuries are preventable to a large extent. Studies showed that that country with stricter laws had 87% fewer ocular injuries than those with relaxed rules about private use of fireworks.²³ Strict regulations concerning the use of fireworks are needed for a significant protective impact on the children since minors sustain a profound proportion of fireworks- inflicted severe injuries. Ocular fireworks-inflicted trauma could have serious repercussions for patients with ocular morbidity and visual acuity, particularly in severe trauma which affected younger patients.

Minors are undoubtedly placed at a greater risk for severe ocular trauma. The Saudi Arabian laws regulate the free distribution and ban the use of explosives for private fireworks. Pediatricians need to create awareness among parents, community leaders, children, etc. about the dangers involved in fireworks. Public sales of all fireworks should be prohibited. International trade in fireworks for private use needs to be prohibited. Spectators need to keep them away from the area where the fireworks are ignited. In case of eye injury, the eye should not be touched, or no attempt should be made to treat the wound, and emergency medical help should be sought forthwith without brooking any delay. Parents should educate minors, particularly adolescents, about the proper use of fireworks to prevent the burgeoning rates of injuries in minors.

Conclusion

Overall, this study revealed that the use of fireworks is associated with preventable ocular injuries. Although it is important to promote public awareness and education to decrease these needless and preventable injuries, stricter legislation may be required in KSA to decrease the availability of fireworks to the public. In order to significantly reduce firework-inflicted injuries, private fireworks in heavily populated areas and the vicinity of children should be banned. More elaborate studies are suggested to identify factors that contribute to the recent decline in the number of fireworks-related injuries.

Abbreviations

BCVA	Best Corrected Visual Acuity
USA	United States of America
KSA	Kingdom of Saudi Arabia
ED	Emergency Department
CT	Computed tomography
SPSS	Statistical Package for Social Sciences
IOL	

Intraocular lens
IOFB
Intraocular foreign bodies

Declarations

Statement of Ethics

The local ethics committee of the King Khaled Eye Specialist Hospital approved the protocol and it adhered to the tenets of the Declaration of Helsinki. The nature of the study and its possible consequences were explained to study participants. Informed consent was obtained from a parent and/or legal guardian to participate in this study in addition to consent to publish images .

Conflict of Interest Statement

No conflict of interest was declared by the authors and the authors declared that this study received no financial support. None of the authors reports other financial interests in terms of the presented study.

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References

1. Puodžiuvienė E, Jokūbauskienė G, Vieversytė M, et al. A five-year retrospective study of the epidemiological characteristics and visual outcomes of pediatric ocular trauma. *BMC ophthalmology*. 2018; 18(1):10.
2. Frimmel S, Theusinger OM, Kniestedt C. Analysis of ocular firework-related injuries and common eye traumata: a 5-year clinical study. *Klinische Monatsblätter für Augenheilkunde*. 2017; 234(04):611–616.
3. Lenglinger MA, Zorn M, Pilger D, et al. Firework-inflicted ocular trauma in children and adults in an urban German setting. *European journal of ophthalmology*. 2021;31(2):709–715
4. Wisse RP, Bijlsma WR, Stilma JS. Ocular firework trauma: a systematic review on incidence, severity, outcome, and prevention. *British journal of ophthalmology*. 2010; 94(12):1586–1591.

5. Wang C, Zhao R, Du WL, et al. Firework injuries at a major trauma and burn center: a five-year prospective study. *Burns*. 2014;40; 40(2):305–310.
6. Chang IT, Prendes MA, Tarbet KJ, et al. Ocular injuries from fireworks: the 11-year experience of a US level I trauma center. *Eye*. 2016; 30(10):1324–1330.
7. Frimmel S, de Faber JT, Wubbels RJ, et al. Type, severity, management and outcome of ocular and adnexal firework-related injuries: the Rotterdam experience. *Acta ophthalmologica*. 2018; 96(6):607–615.
8. Tu YL, Granados DV. Fireworks-related deaths, emergency department-treated injuries, and enforcement activities during 2014. *US Consumer Product Safety Commission Report*. 2015:10–1
9. Billock RM, Chounthirath T, Smith GA. Pediatric firework-related injuries presenting to United States Emergency Departments, 1990-2014. *Clinical pediatrics*. 2017; 56(6):535–544.
10. Myers J, Lehna C. Effect of fireworks laws on pediatric fireworks-related burn injuries. *Journal of Burn Care & Research*. 2017; 38(1): 79–82.
11. John D, Philip SS, Mittal R, et al. Spectrum of ocular firework injuries in children: A 5-year retrospective study during a festive season in Southern India. *Indian journal of ophthalmology*. 2015; 63(11):843–846.
12. Sandvall BK, Jacobson L, Miller EA, et al. Fireworks type, injury pattern, and permanent impairment following severe fireworks-related injuries. *The American journal of emergency medicine*. 2017; 35(10):1469–1473.
13. Malik A, Bhala S, Arya SK, et al. Five-year study of ocular injuries due to fireworks in India. *International ophthalmology*. 2013; 33(4):381–385.
14. Rashid RA, Heidary F, Hussein A, et al. Ocular burns and related injuries due to fireworks during the Aidil Fitri celebration on the East Coast of the Peninsular Malaysia. *Burns*. 2011; 37(1):170–173.
15. Shiuey EJ, Kolomeyer AM, Kolomeyer NN. Assessment of Firework-Related Ocular Injury in the US. *JAMA Ophthalmol*. 2020; 138(6):618–623.
16. Al-Qattan MM, Al-Tamimi AS. Localized hand burns with or without concurrent blast injuries from fireworks. *Burns*. 2009; 35(3):425–429.
17. Venkatesh R, Gurav P, Tibrewal S, et al. Appraising the spectrum of firework trauma and the related laws during Diwali in North India. *Indian journal of ophthalmology*. 2017; 65(2):140–143.
18. Qi Y, Zhu Y. Prognostic value of an ocular trauma score in ocular firecracker trauma. *Journal of Burn Care & Research*. 2013; 34(3): e183-186.
19. Moore JX, McGwin Jr G, Griffin RL. The epidemiology of firework-related injuries in the United States: 2000–2010. *Injury*. 2014; 45(11):1704–1709.
20. Bagri N, Saha A, Chandelia S, et al. Fireworks injuries in children: A prospective study during the festival of lights. *Emergency Medicine Australasia*. 2013; 25(5):452–456.
21. Jing Y, Yi-Qiao X, Yan-Ning Y, et al. Clinical analysis of firework-related ocular injuries during Spring Festival 2009. *Graefe's archive for clinical and experimental ophthalmology*. 2010; 248(3):333–338.

22. Rishi E, Rishi P, Koundanya VV, et al. Post-traumatic endophthalmitis in 143 eyes of children and adolescents from India. *Eye*. 2016;30(4):615–620.
23. Jeyabal P, Davies L, Rousselot A, et al. Fireworks: boon or bane to our eyes? *International ophthalmology*. 2019:1-5.

Figures

Figure 1

Slitlamp photo showing hyphema caused by fireworks injury.