



FIRECRACKER INDUCED OCULAR TRAUMA: TREND DURING AND AFTER COVID – A MULTICENTRIC RETROSPECTIVE STUDY

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ABSTRACT This study analyzed the pattern of firecracker-related injuries during and after the COVID-19 lockdown by examining data from patients treated during Diwali in 2020, 2021, and 2022 at five tertiary eye care centres in South India. A total of 1005 cases were reviewed, revealing a significant male preponderance ($p < 0.001$) and a majority of victims under 20 years of age. There was a statistically significant increase in the number of firecracker ocular injuries from 2020 to 2022 ($p < 0.001$). Epithelial defects were the most common injury caused by firecrackers in the study group, while the number of open globe injuries increased post lifting of restrictions (2021, 2022). The number of patients with a presenting visual acuity below 6/60 also increased in the year 2021 and 2022. The study highlights an upsurge in injuries around Diwali and emphasizes the need for regulatory measures to prevent avoidable blindness. These observations from the lockdown period can be used to propose guidelines for the sale and use of firecrackers in India.

KEYWORDS : Firecracker, Ocular trauma, COVID impact, Cracker injury, Hyphema, Globe rupture, Needless Blindness

INTRODUCTION

Fire crackers are explosive pyrotechnic devices ignited during festive seasons across the world. Used as a means to express celebratory cheer, they are also a visual treat enjoyed by the masses. In India, firecrackers are a major element of festivals like Diwali, Durga Puja, marriages, and other traditional celebrations. The festival of Diwali is synonymous with bursting firecrackers and lighting oil lamps, signifying the triumph of good over evil. This age-old tradition comes with its set of environmental dangers like noise and air pollution.^[1,2] Also, important to notice is the fact that bursting crackers have led to many instances of mishaps on roads as well as public gatherings.^[3] Firecrackers are notorious for causing major trauma to the body if mishandled.^[4-8] It is estimated that 12–18% of injuries across the globe are fire-cracker related.^[9] Unsupervised children, substandard crackers, proximity to exploding crackers and alcohol consumption momentarily contribute to the hazardous consequences of bursting firecrackers.^[7,10] The eye is one of the most vulnerable organs to get injured in such a setting. Firecrackers can cause a plethora of ocular injuries ranging from minor lid lacerations and burns, corneal abrasions, hyphema to more consequential injuries like corneal and scleral tears, vitreous haemorrhage and retinal detachment.^[11,12]

In 2020, with the entire world reeling under the effect of the COVID 19 pandemic, strict lockdown and restrictions were implemented all over in an effort to contain the spread of the virus. Along with helping in bringing down the number of COVID 19 casualties, the lockdown saw a decrease in spread of various communicable infections, improvement in air quality index, lesser traffic on the roads and an overall cooler climate.^[13,14] The restrictions also resulted in a massive decrease in fire cracker use due to government-imposed restrictions on

public gatherings and precautions taken by the public to stay safe.^[15] However, post relaxation of these restrictions, fire cracker use has been on the rise and has subsequently led to an increase in the incidence of fire cracker related morbidity.^[16] In our study, we aim to study the impact the COVID 19 pandemic has had on fire cracker associated ocular injuries and use it to draw out guidelines to limit them.

METHODS

This study was approved by the Institutional Ethics Committee of Aravind Eye Hospital, Pondicherry, and followed the tenets of the Declaration of Helsinki. Data were collected retrospectively from five tertiary eye care hospitals located in the South Indian states of Tamil Nadu, Andhra Pradesh and Pondicherry. Records of patients presenting with fire cracker injury 2 weeks before and after the date of Diwali during the year 2020, 2021 and 2022 were reviewed.

Variables collected included demographic details, presenting vision, type of injury, need for surgical intervention and final vision. Complications like endophthalmitis/panophthalmitis, secondary glaucoma, retinal/choroidal detachment were also noted. The various injuries were classified as open and closed globe injuries in accordance with the Birmingham Eye Trauma Terminology System (BETTS) classification where, 'open' included corneal tear, corneoscleral tear/globe rupture, intra-ocular foreign body and 'closed' included conjunctival tear, epithelial defect/abrasion, corneal laceration/lamellar tear, angle recession, hyphema, corneal/conjunctival foreign body, and traumatic cataract.^[12]

RESULTS

A total of 1005 (1272 eyes) patients suffered fire-cracker related injuries through 2020 to 2022 in the 5 centres included in this study,

267 of which were bilateral injuries. There were more male patients than females (Table I) in all the centres through all 3 years ($p<0.001$). The most common age group affected was under 20 years (Figure 1) both during the COVID 19 lockdown and after lifting of restrictions. The total number of patients presenting with firecracker associated injuries showed a steady increase from 2020 to 2022 (Figure 2) in all 5 centres. The percentage increase in the total number of injuries between 2020 and 2022 was 264% in Chennai, 248.7% in Coimbatore, 141.1% in Pondicherry, 70.3% in Tirunelveli and 600% in Tirupathi and the leap in the number of injuries were statistically significant in all centres ($p<0.001$).

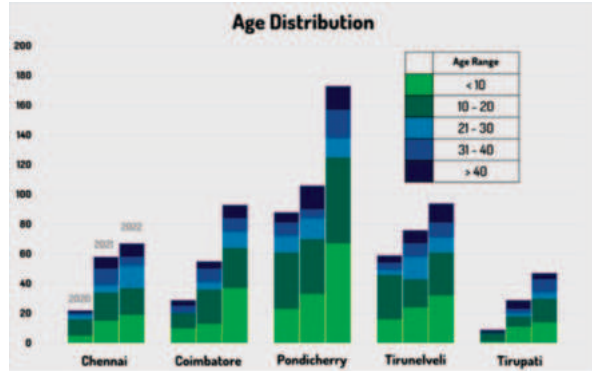


Figure 1: Bar chart depicting total number and age distribution of firecracker injury patients across the 5 study centres in 2020, 2021, and 2022

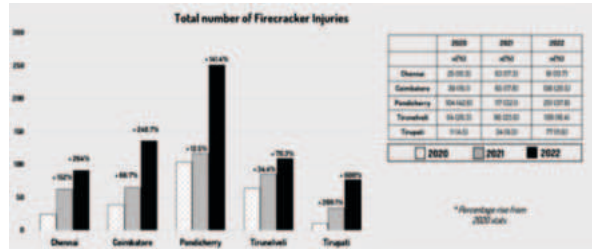


Figure 2: Bar chart depicting percentage increase in the number of firecracker injury patients in 2021 and 2022 in the 5 study centres

Table I: Summary of gender distribution among patients presenting with Fire Cracker injury during and after COVID pandemic (2020, 2021 & 2022)

	2020	2021	2022
Chennai			
Male	17(77.27)	46(79.31)	53(79.1)
Female	5(22.73)	12(20.69)	14(20.9)
P – value	0.00038*	<0.001*	<0.001*
Coimbatore			
Male	19(65.52)	42(76.36)	65(69.89)
Female	10(34.48)	13(23.64)	28(30.11)
P – value	0.018*	<0.001*	<0.001*
Pondicherry			
Male	67(76.14)	83(78.3)	135(78.03)
Female	21(23.86)	23(21.7)	38(21.97)
P – value	<0.001*	<0.001*	<0.001*
Tirunelveli			
Male	48(81.36)	58(76.32)	74(78.72)
Female	11(18.64)	18(23.68)	20(21.28)
P – value	<0.001*	<0.001*	<0.001*
Tirupathi			
Male	5(55.56)	19(65.52)	37(78.72)
Female	4(44.44)	10(34.48)	10(21.28)
P – value	0.637	0.018*	<0.001*

P value – Proportion test, * $p<0.05$ (Significant)

Closed globe injuries (CGI), though not as visually damaging as open globe injuries (OGI), were more prevalent than OGIs in all the centres over the 3 years (2051 vs. 146) (Table II). The most common injuries were epithelial defects, hyphema and periorbital injuries. (Figure 3) The number of open globe injuries saw a steep increase in the year 2022 in all centres except Tirunelveli. Since a patient can sustain more than one type of injury, the total number of injuries were more than the number of patients.

Table II: Summary of types of injuries in patients presenting with Fire Cracker injury during and after COVID pandemic (2020, 2021 & 2022)

	Chennai			Coimbatore			Pondicherry			Tirunelveli			Tirupathi		
	2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022	2020	2021	2022
	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
Grand Total	49	146	173	90	221	338	160	191	258	91	138	139	25	58	120
CLOSED GLOBE INJURY	49 (100)	140 (95.9)	165 (95.3)	81 (90)	215 (97.2)	294 (86.9)	153 (95.6)	188 (90.3)	233 (90.3)	84 (92.3)	132 (95.6)	135 (97.1)	24 (96)	49 (84.5)	109 (90.8)
Conjunctival tear	1 (2)	6 (4.3)	16 (9.7)	6 (7.4)	22 (5.6)	12 (4.1)	4 (2.6)	3 (1.6)	15 (11.3)	-	4 (3)	2 (1)	-	2 (3.4)	2 (2)
Epithelial defect	21 (42.3)	48 (34.3)	62 (37.6)	26 (32.1)	52 (24.2)	86 (29.3)	68 (56.2)	80 (42.6)	109 (46.8)	44 (48)	51 (37)	71 (51)	7 (28)	14 (24)	40 (33)
Hyphema	10 (20.4)	10 (7.1)	17 (10.3)	4 (4.9)	14 (6.5)	28 (9.5)	20 (13.1)	34 (18.1)	44 (18.9)	15 (16)	18 (13)	15 (11)	5 (20)	8 (14)	24 (20)
Corneal FB	4 (8.2)	19 (13.6)	14 (8.5)	12 (14.8)	38 (17.7)	58 (19.7)	1 (0.65)	4 (2.1)	3 (1.3)	1 (1)	28 (20)	16 (11.5)	3 (12)	5 (9)	6 (5)
Conjunctival FB	2 (4.1)	16 (11.4)	10 (6.1)	8 (9.9)	40 (18.6)	15 (5.1)	8 (5.22)	20 (10.6)	-	2 (2)	22 (16)	4 (2.9)	2 (8)	3 (5.2)	4 (3)
Traumatic Cataract (TC)	4 (8.2)	5 (3.5)	11 (6.7)	-	7 (3.3)	10 (3.4)	4 (2.61)	15 (2.1)	5 (6.4)	6 (5)	3 (4.3)	3 (2.2)	-	1 (2)	7 (6)
Angle recession	3 (6.1)	4 (2.9)	7 (4.2)	1 (1.2)	3 (1.4)	10 (3.4)	2 (1.30)	1 (0.5)	4 (1.7)	4 (4)	3 (2)	1 (0.7)	-	3 (5)	7 (6)
Orbital/ periorbital	4 (8.2)	32 (22.9)	28 (17)	24 (29.2)	39 (18.1)	75 (25.5)	46 (30.1)	42 (22.3)	43 (18.5)	13 (14)	-	23 (17)	7 (28)	13 (22)	19 (16)
OPEN GLOBE INJURY	0 (0)	6 (4.1)	8 (4.7)	9 (10)	6 (2.8)	44 (13.1)	7 (4.4)	3 (1.6)	25 (9.7)	7 (7.7)	6 (4.4)	4 (2.9)	1 (4)	9 (15.5)	11 (9.2)
Corneal tear*	-	6 (100)	8 (100)	4 (44.4)	6 (100)	25 (56.8)	6 (85.7)	2 (66.7)	25 (100)	4 (4)	5 (4)	3 (2)	1 (4)	6 (10)	8 (6.5)
Corneo-scleral tear	-	-	-	3 (33.3)	-	5 (11.4)	1 (14.3)	-	-	2 (2)	-	-	-	2 (3.4)	3 (2.5)
OGI + TC	-	-	-	2 (22.2)	-	14 (31.8)	-	1 (33.3)	-	1 (1)	1 (0.7)	1 (0.7)	-	1 (2)	-

FB – Foreign body, TC – Traumatic cataract, OGI – Open globe injury

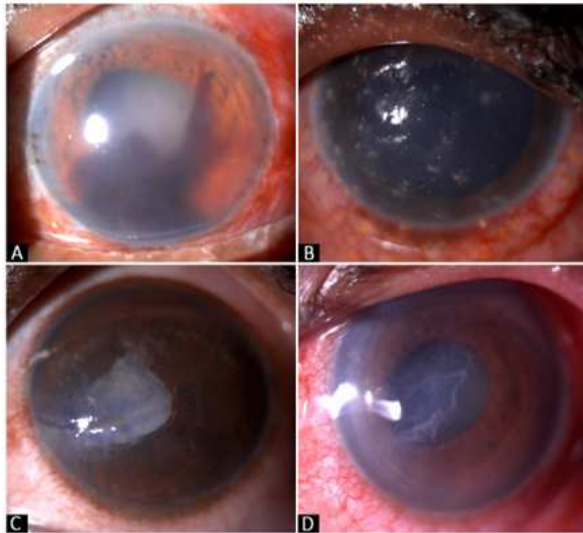


Figure 3: Diffuse slit-lamp image of A) hyphaema B) corneal and conjunctival foreign body C) corneal tear with traumatic cataract D) lamellar corneal laceration

At presentation, majority of the patients had a visual acuity better than 6/60 as measured on the Snellen 6-meter chart (Figure 4). The number of patients with visual acuity worse than 6/60 at presentation showed an increase in the year 2022 as compared to 2020 and 2021 in all centres. This number significantly decreased post treatment across all centres. A total of 21 patients ended up without light perception in the injured eye, 2 patients developed endophthalmitis and 57 patients developed secondary glaucoma as sequelae of the injury.

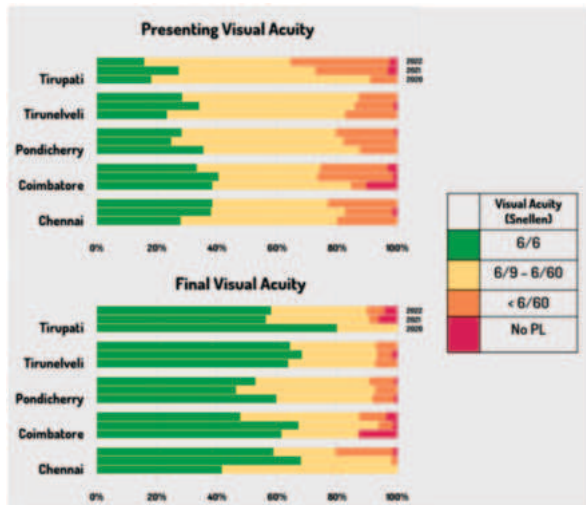


Figure 4: Bar chart depicting presenting and final visual acuity of patients presenting with firecracker injuries across the 5 study centres in 2020, 2021, and 2022

DISCUSSION

Bursting firecrackers is tantamount to celebration and festivity across countries and cultures. For centuries civilizations have used them as a sign of victory, joy and merriment. The human fascination with light and sound has led to the production of a variety of crackers ranging from handheld sparklers, roaring flower pots, sutli bombs to aerial sky rockets and the more dramatic pyrotechnics. The use of firecrackers in India is at its peak during the Diwali season. Arguably one of the most widely celebrated festival across the country, it is aptly named the Festival of Lights. Apart from adorning their homes with oil lamps, people fervently burst firecrackers to celebrate Diwali. While plenty entertaining, fireworks by virtue of their explosive property are a perpetual risk to its users. The alarming number of injuries caused by firecrackers has been well documented.^[4-6,11] Incidence of fire cracker injuries in India is nearly 1.51 per 100,000 population as of 2012.^[7] The eye is extremely susceptible to firecracker injuries, most of them being grievous in nature.^[4,11,17,18]

The COVID 19 pandemic saw the entire world retreat to shield themselves from the virus. Government imposed lockdown all over the country brought businesses to a standstill. The firecracker industry took a major hit as sales plummeted.^[15] The festival of Diwali saw quieter streets and smog free air. This had also brought down the number of firecracker related casualties in the country. With the world steadily coming out of the COVID 19 restrictions, the trend of firecracker injuries has reverted.

The total number of patients presenting with firecracker related ocular injuries steadily increased after 2020, in accord with the relaxation of restrictions. Over the 2 years following the lifting of the lockdown, an almost 3-fold increase in the number of casualties was seen in most centres. Busier streets also meant more injuries to bystanders and on lookers other than the ones bursting the crackers. Unsupervised and zealous children are the commonest victims of cracker related injuries.^[17,19,20] In our study, the most affected age group was below 20 years. This was in concurrence with observations made by various studies conducted in the country^[4,11]. Another significant demographic pattern was the number of males injured by firecrackers than females. The male gender is known to be more venturing and adventurous and this is reflected in the results of various similar studies.^[4,7,9,11,17,19] The fact that in our country, men are often the sole bread winners of the family and responsible for the livelihood of the entire family makes this statistic more alarming.

Among the various injuries caused by explosives, closed globe injuries were the most common. These ranged from lid and conjunctival burns, lacerations, corneal epithelial defects, foreign bodies, lamellar lacerations to more alarming conditions like hyphema, traumatic cataracts and angle recession, which can lead to multiple ocular sequelae. A similar finding of predominant closed globe injuries was observed in a study by Kumar et al^[11]. While closed globe injuries showed remarkable visual recovery post treatment,^[9] open globe injuries like corneal and scleral tears are more perturbing as they require surgical intervention and inherently carry a poor visual prognosis. The number of open globe injuries showed an overall increase following relaxation of restrictions. Patients with traumatic cataracts following a penetrating injury were left aphakic, which contributed to their poor visual acuity post treatment. An overall 2% of the study population had permanently lost vision as a serious damage due to firecracker injury. By far the most common sequelae was secondary glaucoma due to inflammation and deranged intraocular structures leaving the patient with a permanent ocular disorder.

India sees a large number of firecracker casualties every year due to multiple reasons. It is deeply ingrained in the country's culture to celebrate with loud firecrackers. As a result, there are numerous substandard small-scale industries that manufacture unsafe firecrackers.^[3,10] The government has in the past imposed a fire-cracker ban from 10pm to 6am, largely to curb the noise and air pollution.^[21] It is interesting to note that a ban has never been imposed to curtail the increasing firecracker related trauma. Unsurprisingly, there was no effect of government-imposed firecracker ban on the number of injuries caused by firecrackers.^[21-23] With multiple small-scale fire cracker industries mushrooming around festivals, the quality is unmonitored and there is a strong need of strict regulatory bodies for scrutiny. Quality check on commercially available firecrackers should be made mandatory. Strict guidelines on the manufacturing, sale, possession and designated areas for firecracker use are the need of the hour.

Interestingly, it was the country-wide COVID 19 lockdown that caused the decrease in the number of casualties in the year 2020 because of the quasi fire cracker restrictions.^{[15][16]} This gives a positive hope that with designed policies and legislation, the needless and completely avoidable blindness caused by firecrackers can be restrained even in a country that is profoundly aligned with culture. Many countries have exercised restraint over firecracker use to bring down the pollution and accidents caused. Singapore introduced a law called Dangerous Fireworks Act with stringent fines and punishment in 1972 following an incident of fire break-out.^[24] In 2001, Sweden banned all firecrackers except the rocket type crackers and other smaller crackers which generate less than 50 decibels of sound.^[25,26] Firecrackers are unavailable for purchase from markets in Vietnam and only firecrackers displays arranged by the government are allowed on occasions.^[26] The Vietnamese government also relocated thousands of employees in firecrackers industries and employed them in the agricultural sector. Germany has classified firecrackers to regularize

their sale and use. It does not allow sale to or use of firecrackers by unsupervised children.^[26,27] Certain classes of fire crackers are only allowed for sale with prior permission from police authorities. Many countries like Croatia, Australia and Canada warrant a permit for purchase of firecrackers.^[26,28]

As per the data in our study, firecracker injury victims are mostly children and young individuals with promising prospects. Unnecessary loss of eyesight due to an avoidable injury is a reason for remorse for the individuals as well as their families and needs immediate actions to be taken against it. Although abolishing the use of firecrackers in the country may not be the solution, a middle ground can be reached with laws tailored for our country to balance its economic and environmental effects.^[29] Widespread public education initiatives regarding safe use of firecrackers should be propagated among the public. A proper reporting system and registry of firecracker injuries can be brought into place to create awareness regarding the hazards of careless firecracker use. At an individual level, parental supervision while using firecrackers can prevent almost all injuries caused to children. A shift from the culture of celebrating with loud and dangerous crackers to holding safer firework displays to mark celebrations should be encouraged to prevent the mishaps arising due to private firecracker use. In conclusion, it might take a change as radical in nature as the COVID 19 lockdown to bring down the incidence of needless firecracker injuries.

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REFERENCES:

- Deswal S. Environmental Pollution during Deepawali: A Case Study of Delhi. *Environ Pollut Control J*. 2011 Jan 1;14:55–62.
- Ravindra K, Kumar S, Mor S. Long term assessment of firework emissions and air quality during Diwali festival and impact of 2020 fireworks ban on air quality over the states of Indo Gangetic Plains airshed in India. *Atmos Environ*. 2022 Sep 15;285:119223.
- Illiyas FT, Mani SK. Routine to Rare Risk - A Case Study of Firecracker Explosion Disaster in India. *PLoS Curr*. 2018 Sep 1;10:ecurrents.dis.d5a27e47c8decdb4263813a15c47e07e.
- Puri V, Mahendru S, Rana R, Deshpande M. Firework injuries: a ten-year study. *J Plast Reconstr Aesthetic Surg JPRAS*. 2009 Sep;62(9):1103–11.
- Sethy A, Saha S, Hazra D, Abhilash KPP. A retrospective study on clinical profile of patients with firecracker-related injury presenting to the emergency department of a tertiary care center in South India. *Curr Med Issues*. 2020 Jan 1;18(1):1.
- Gupta H, Gupta P, Tyagi R, Gupta M. Analysis of ocular trauma due to firecracker injury in oculoplasty clinic at a tertiary care hospital of North India. *IP Int J Ocul Oncol Oculoplasty*. 2019 Dec 15;5(4):251–5.
- Tandon R, Agrawal K, Narayan RP, Tiwari VK, Prakash V, Kumar S, et al. Firecracker injuries during Diwali festival: The epidemiology and impact of legislation in Delhi. *Indian J Plast Surg Off Publ Assoc Plast Surg India*. 2012;45(1):97–101.
- Kuhn F, Morris R, Witherspoon C, Mann L, Mester V, Módis L, et al. Serious fireworks-related eye injuries. *Ophthalmic Epidemiol*. 2000 Jun 1;7:139–48.
- Frimmel S, Theusinger OM, Knieseddt C. Analysis of Ocular Firework-Related Injuries and Common Eye Trauma: a 5-year Clinical Study. *Klin Monatsbl Augenheilkd*. 2017 Apr;234(4):611–6.
- R M. A Comprehensive System Study on Indian Firecracker Industry and Analysing Sustainability Gaps. 2nd Int Conf Sustain Dev Goals [Internet]. 2019 Jan 1 [cited 2023 Jul 4]; Available from: https://www.academia.edu/71080905/A_Comprehensive_System_Study_on_Indian_Firecracker_Industry_and_Analysing_Sustainability_Gaps
- Kumar R, Puttanna M, Sriprakash KS, Rathod BS, Prabhakaran VC. Firecracker eye injuries during Deepavali festival: A case series. *Indian J Ophthalmol*. 2010 Jan 3;58(2):157.
- Kuhn F, Morris R, Witherspoon CD, Mester V. The Birmingham Eye Trauma Terminology system (BETT). *J Fr Ophtalmol*. 2004 Feb;27(2):206–10.
- Mishra AK, Rajput P, Singh A, Singh CK, Mall RK. Effect of Lockdown Amid COVID-19 on Ambient Air Quality in 16 Indian Cities. *Front Sustain Cities* [Internet]. 2021 [cited 2023 Jul 2];3. Available from: <https://www.frontiersin.org/articles/10.3389/frsc.2021.705051>
- Bhat SA, Bashir O, Bilal M, Ishaq A, Din Dar MU, Kumar R, et al. Impact of COVID-related lockdowns on environmental and climate change scenarios. *Environ Res*. 2021 Apr;195:110839.
- C S D. Impact Of Covid -19 On Fire Crackers' Manufacturers In Sivakasi, Tamilnadu. In 2022.
- Capitelli-McMahon H, Magness C, McCrossan S, Austin O. After freedom comes pain: Increasing firework injuries at a regional burns centre following the lifting of COVID-19 restrictions. *J Plast Reconstr Aesthet Surg*. 2022 May;75(5):1765–79.
- Bagri N, Saha A, Chandelia S, Dubey NK, Bhatt A, Rai A, et al. Fireworks injuries in children: A prospective study during the festival of lights. *Emerg Med Australas EMA*. 2013 Oct;25(5):452–6.
- Mehta DR, Suri MP, Patel CK, Agrawal AB, Vora HJ, Raibagkar SC. Fireworks injuries - epidemiology and prevention. *Indian J Burns*. 2004 Jan 1;12(1):48.
- Jeyabal P, Davies L, Rousselot A, Agrawal R. Fireworks: boon or bane to our eyes? *Int Ophthalmol*. 2019 Oct;39(10):2407–11.

- Madan AH, Joshi RS, Wadekar PD. Ocular Trauma in Pediatric Age Group at a Tertiary Eye Care Center in Central Maharashtra, India. *Clin Ophthalmol Auckl NZ*. 2020 Apr 1;14:1003–9.
- Dhiman R, Mahalingam K, Balakrishnan N, Kumar A, Saxena R, Sihota R. Effect of legislation and changing trends of Diwali ocular firecracker injuries in Northern India. *Oman J Ophthalmol*. 2022;15(1):61–8.
- 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 Jun;66(6):837–40.
- Babu N, Kohli P, Arthur D, Mishra C, Ramasamy K. Fireworks-related Legislatures: Are They Actually Followed? - An Ophthalmological Perspective. *Indian J Community Med Off Publ Indian Assoc Prev Soc Med*. 2021;46(1):161–2.
- Dangerous Fireworks Act 1972 - Singapore Statutes Online [Internet]. [cited 2023 Jul 4]. Available from: <https://sso.ace.gov.sg:5443/Act/DFA1972>
- Sundelin K, Norrsell K. Eye injuries from fireworks in Western Sweden. *Acta Ophthalmol Scand*. 2000 Feb;78(1):61–4.
- Bhaskar SD Sonia. Regularising And Restricting Sales And Usage Of Firecrackers, What India Can Learn From These Countries [Internet]. NDTV-Dettol Banega Swasth Swachh India. 2017 [cited 2023 Jul 4]. Available from: <https://swachhindia.ndtv.com/regularising-and-restricting-sales-and-usage-of-firecrackers-what-india-can-learn-from-these-countries-13501/>
- Lenglinger MA, Zorn M, Pilger D, von Sonnenleithner C, Rossel M, Salchow DJ, et al. Firework-inflicted ocular trauma in children and adults in an urban German setting. *Eur J Ophthalmol*. 2021 Mar 1;31(2):709–15.
- Wisse RPL, Bijlsma WR, Stijima JS. Ocular firework trauma: a systematic review on incidence, severity, outcome and prevention. *Br J Ophthalmol*. 2010 Dec 1;94(12):1586–91.
- Nair AV. Exploring the Possibility of a Firecracker Free India. 1(3).