Original Article

Journal of Plastic Surgery and Transplantation
Volume 1 Number 2, July – December 2019

Firecracker Burst Injuries During Diwali: Our Experience

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Received on 12.10.2019; **Accepted on** 20.11.2019

How to cite this article:
Chirra Likhitha Reddy, Ravi Kumar Chittoria, Abhinav Agarwal, *et al*. Firecracker Burst Injuries During Diwali – Our Experience. Journal of Plastic Surgery and Transplantation. 2019;1(2):53–56.

Abstract

Aim: To emphasize on the burden of firecracker burst injuries during Diwali festival in a tertiary care center in India.

Methods: It's a retrospective study done during the period of Diwali 2018, which included all the patients who attended our emergency services with firecracker burst injuries.

Results: 23 patients presented with varying types of injuries ranging from burns to eye injuries to hand injuries with simple lacerations, fractures to mutilated hands.

Conclusion: Much larger epidemiological studies are essential to know the burden of injuries and the disability the patients develop and for strict enforcement to ban usage of fire crackers.

Keywords: Diwali; Burns; Firecrackers.

Introduction

In India during various festivals, ceremonies and social events, firecrackers are frequently used. During Diwali, "the festival of lights"[1] which is an annual festival marking an important Hindu mythological event, firecrackers are used extravagantly. Firecrackers are freely available to common public in India and anyone can light the crackers wherever he/she desires. It is commonly known that bursting firecrackers carries a risk of burn and injury.

Firecrackers are classified according to the material used and the amount of each material present in them.[2]

The U.S. Consumer Product Safety Commission (CPSC) estimates that 8500 persons in the United States are treated in emergency departments each year for fireworks-related injuries.[3]

There are no large scale studies in India to give the statistics, but in one study based in New Delhi it was noted that the hospital received approximately one patient with firecracker-related injury per 100,000 population of the city during Diwali festival.[3]

There is a predominance of the hand involvement in such injuries due to accidental blast during handling a cracker as well as the injury sustained when a person tries to shield himself from a cracker blast with his hands.[4]

Bursting firecrackers has been under scrutiny in our country for the past few years due to the increased environmental pollution and noise pollution. Unrestricted, unsupervised bursting of firecrackers leads to various injuries. The epidemiology of firework injuries is necessary for constituting further laws.

We have noticed an increase in the number of fire-cracker burst injuries during the Diwali period,

however, there has been no study done in our center regarding the same. We would like to present our experience with firecracker burst injuries during Diwali period.

Materials and methods

It is a retrospective hospital-based study involving data from 1–15th of November 2018, one week prior to one week after Diwali festival which was on 6/11/18. All the patients who attended our emergency services with firecracker injuries during this period were included in the study. The details of the patients are added in **Table 1**.

The treatment was given based on the type of injury and inter-departmental consultations were obtained as per the type and severity of the injury.

Table 1: Details of the patients

S. No	Age	Sex	Region invovled	Complications
1	7	Male	Left hand and face and left leg	Burns
2	11	Male	Left hand	Distal phalanx loss
3	13	Male	Left hand	Multiple fractures
4	17	Male	Right hand	Multiple lacerations
5	10	Male	Left hand	CMC joint dislocation
6	20	Male	Left hand	Multiple fractures with soft tissue loss
7	11	Male	Right hand and chest	Burns
8	10	Male	Face and corneal injury	Corneal injury
9	7	Male	Right hand	Loss of distal phalanx
10	11	Male	Left hand	Loss of ring and little finger at the level of Middle phalanx
11	9	Male	Left hand and chest	Loss of middle and ring finger atdistal phalanx
12	18	Male	Right hand	Loss of Distal phalanx of thumb
13	10	Male	Right hand	Multiple lacerations
14	35	Male	Left hand	Near total amputation of thumb
15	37	Male	Left hand and chest	Mutilated hand
16	14	Male	Right hand and face	Near total amputation of thumb
17	25	Male	Left hand	Open Fracture of 1st metacarpal
18	18	Male	Right hand and face	Nil
19	10	Male	Left hand	Nil
20	30	Male	Right hand	Loss of Distal phalanx of thumb, middle phalanx of index and middle finger
21	21	Male	Right hand	Fracture Second third Metacarpals
22	13	Male	Left hand	Open carpometacarpal dislocation
23	28	Male	Face, Chest and left leg	Burns

Results

23 patients attended our emergency services one week prior to and one week after Diwali with 17 patients on the day of Diwali with cracker burst injuries.

The injuries ranged from lacerations to mutilated hands with loss of fingers (Fig. 1-4). The age of the patients ranged from 7–37 years. Majority of patients were in the age groups of 8–13 years.

All the patients were males.

Of the patients who came, 4 patients had loss of

at least one phalanx. 4 patients had avulsion of soft tissue over the fingers.

Two patients had mutilated hands with loss of multiple fingers.

Three of the patients had additional injury to face and one had to lower limb.

One of the patients with facial burns with corneal injury and was admitted under ophthalmology.

The injuries were either due to burning crackers by themselves or due to others bursting firecrackers, but the patient was injured accidentally

No statistical analysis is done as this is a descriptive study and the sample size is small.

Fig. 1: Lacerations with loss of soft tissue over distal phalanx of finger.

Fig. 2: Loss of soft tissue over the middle and ring finger.

Fig. 3: Deep lacerations at base of thumb.

Fig. 4: Mutilated hand.

Discussion

Firecrackers are commonly used all over the world during celebrations for expressing the festive joyous mood because of their sound, sparkle and sudden burst of colors.In India, with a huge diversity in culture and social events fire crackers are used in festivals and more so during Diwali. The epidemiology and pattern of firecracker injuries also differs from place to place.

Our centre received 23 patients during our study period of which 17 were on the day of Diwali. In spite of the efforts taken government to formlegislation, amendments, prohibitive orders, educational programs, etc. to prevent firecracker-related injuries there were still a significant number of injuries noted. This is probably due to poor implementation of the legislation. Our hospital

received patients from far distances for primary care.

Blast injuries are classified into 5 categories.[5] Primary, secondary, tertiary, quaternary and quintenary. Primary blast injuries are due to the supersonic over-pressurization blast wave. Secondary blast injury explosions are injuries resulting from flying debris, bomb fragments and projectiles causing blunt and penetrating trauma known as secondary blast injury. Tertiary blast injury results from the human body actually being thrown by the blast wind and may manifest as fractures, traumatic amputations and brain injuries. Quaternary blast injury is everything else not caused by primary, secondary or tertiary mechanisms.[5]

Fire cracker injuries are usually qualified as primary, secondary and quaternary blast injuries. The various injuries include tympanic membrane rupture, deposition of cracker particles in the eyes causing chemical eye injuries and loss of vision, second to third degree burns including the face chest and upper limbs commonly, hand injuries ranging from lacerations to mutilated hands. Lower limb injuries though rare may also be seen.

Firework-related injuries are preventable, many countries have formulated legislation to decrease these disasters. This year in our centre we reported 23 patients presenting with multiple types of injuries with various degrees of severity despite the ban on firecrackers burst and restricted availability of firecrackers to the public.

In a recent publication from Bangalore, India, the authors presented 51 patients of firework-related ocular injuries and concluded that firework-related injuries result in significant morbidity and it was emphasized that public education is to reduce them.[6]

The analysis of epidemiology is thus important to formulate further plan of how well the ban on crackers and the effect of Indian legislation is working and the future modifications that are required to further improve the outcome in achieving minimal injuries and disability with firecracker injury.

The limitation of this study is that we have done a retrospective analysis of the injuries, over a period of two weeks during the Diwali festival. Also, we have not compared it with the previous years, thus the trend of injuries if they are raising or not cannot be assessed. Many nationwide statistics are required to find the burden of injuries and the post-operative rehabilitation and follow up should be done to know the extent of disability these patients suffer.

Conclusion

Firecracker injuries cause not only grievous injuries and physical impairment but can also have severe social and financial consequences

A longer duration of study for epidemiology and survey needs to be conducted to assess the present effect of the firecracker ban and also the effective ways to prevent firecracker burst injuries

Declarations

Authors' contributions: All the authors have contibuted to the article

Availability of data and materials: The data is taken retrospectively from hospital records

Financial support and sponsorship: No financial support or sponsorship has been obtained.

Conflicts of interest: No conflict of interest

Ethical approval and consent to participate: Departmental ethical committee approval was obtained.

Consent for publication: Obtained

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