

Original Research Article

Survey of the patients with fireworks burn in the ceremony of last Wednesday of the year during 16 years

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Abstract

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The ceremony of the last Wednesday in our country almost always had resulted in severe burn injuries and severe traumatic patients and requires great and careful attention. We surveyed the epidemiology and outcome of these patients during 16 years. Retrospectively we surveyed the data of fireworks burn patients in the ceremony of last Wednesday of the year during 16 years from march 1998 to march 2014. We had 987 out –patients and 102 in-patients. 922 (84.6%) patients were male and 167 (15.3%) were female. The most frequent age group was young adolescence and young adults. The most prevalent site of injury were hand, head and face, trunk and lower extremity. During following years 41% cases came for reconstructive surgery of burn injuries. Among them patients need 1 to 11 sessions of reconstructive surgery. Three cases had blindness and 7 cases died. one of them died due to explosion trauma. Fireworks burns are severe, deep and required several sessions of treatments for burn itself and for complications. Multi media training and special educational programs are needed for prevention of such injuries.

Keywords: Burns, Fireworks, Last Wednesday Eve, Red Wednesday, Trauma

INTRODUCTION

Injuries of the fireworks in the last wednesday of the year in our country always were severe and specially resulted in severe burns and ophthalmological injuries.

These accident always had casualty and severe morbidities such as blindness, limb or finger amputations, face disfigurement and several other disabilities (American Academy of Pediatrics, 2001; Fogarty and Gordon, 1999).

Burns are occurred due to heat and blast injuries. Fire from the blast injury would lead to extensive deep degree burns. Un-standard fireworks usage and explosions would produce numerous high velocity small hot metallic objects that traumatize the people in nearby and would lead to eye injury, severe and extensive 3rd degree burns, fractures, limb amputations, invasive abdominal trauma with severe bleeding and bowel perforation.

Occurance of firework injuries before the new year holiday lead to great suffering of the patients and their families. The objectives of the present study were to

survey epidemiology, incidence and outcomes of these type of injuries during last 16 years in our country.

MATERIALS AND METHODS

This is descriptive retrograde study of fireworks burn patients who seek medical attention during ceremony of last wednesday of the year.

Inclusion criteria were all of the patients who had fire and fireworks explosion trauma. Epidemiology, age, sex, and other demographic data were gathered from hospital files and inserted in a special questionnaire.

The patients were admitted to the hospital according to ABA (American Burn Association) criteria. The out-patients were followed every week to one month, every month to 3 months, then every other month for at least one year.

The in-patients after discharge were followed as out-

Table 1. Frequency of patients in last Wednesday ceremony from 1999 to 2014

Year	Out-patient No.	In-patient No.	Referral No.	Mortality	Total
1999	86	7	0	0	93
2000	57	12	0	1	70
2001	34	4	0	0	38
2002	23	1	0	0	24
2003	19	5	2	0	26
2004	79	4	0	3	83
2005	138	8	0	0	146
2006	62	5	0	0	67
2007	50	6	10	1	66
2008	63	2	10	0	75
2009	68	7	0	1	70
2010	70	8	3	1	77
2011	55	9	0	0	59
2012	58	7	0	0	61
2013	65	8	1	0	69
2014	60	9	1	0	65
Total	987	102	27	7	1089

Table 2. Frequency of burn patients during 16 years according to age and TBSA

TBSA	<10%	10-19%	20-29%	30-39%	40-49%	50-59%	60-69%	70-100%	Total
< 5 years old	5	2							2
6-11 years old		2	2					1	5
12-19 years old	4	23	16	11	4		2	2	62
20-29 years old	6	8	6	3	2		2		27
30-49 years old				6					6
>50 years old									0
Total	12	33	24	20	6	0	4	3	102

patients. Statistical analysis was performed using SPSS 20. *p* value less than 0.05% was considered significant.

RESULTS

During 16 years we had 1089 patients, of them 987 patients were treated as out-patient and 102 patients admitted to the hospital. 35 patients were referred to other hospitals for further treatment in other specialty medical care centers, and 7 patients died.

922 (84.6%) patients were male and 167 (15.3%) were female. Of 102 patients who were admitted, 81.3% were male and 18.7% female. The most frequent age group was 12-19 years old or young adolescence and young adults. The most prevalent site of injury were hand, head and face, trunk and lower extremity.

Patients with severe eye or head injuries were referred to other specialized centers. And after completion of

treatment were followed in our center because of burn injury.

During 16 years the least number of patients in our emergency dept. was in year 2003 with 19 patients (1.73%) and the highest number was in year 2005 with 138 patients (12.6%).

The least number of admitted patients to our hospital was in year 2002 with one admitted patient (1%) and the most prevalent admission was in year 1999 with 13 patients (13.7%).

The highest mortality was in year 2004 with 3 patients dead (42.8% out of 7 death). One of our out-patients died due to fireworks explosion trauma. We had 7 mortality and 3 blindness among our patients.

During following years 455 cases of out-patients came to our center for reconstructive surgery of burn injuries. Among them patients need 1 to 11 sessions of reconstructive surgery.

The frequency of patients in each year are summarized in table 1. Table 2 shows the age of patients

in different TBSA groups.

DISCUSSION

On the last Wednesday of Iranian year, people celebrate the sanctity of fire in the annual festival of Chaharshanbeh Soori. They use fireworks, firecrackers and wood open fire (bonfire) in the streets and outdoors to celebrate the ending of the year and beginning of the new year. Each year several cases of fireworks-related injuries happens during the last Wednesday festival. The word 'Chaharshanbeh' means Wednesday and the word 'Soori' means Red (Red Wednesday). They celebrate the fire eve, wishing away disease and disasters and wishing for health and good luck for the upcoming year). The fire in the perspective of Iranians is a symbol of something clear, clean, refreshing, and healthy. In past, people celebrate that night with chanting, dressing up and enjoying sweets and nuts and wishing each other a healthy, happy and successful year. The event includes several traditions such as setting up bonfires and jumping over them. Red refers to fire, itself symbolizing brightness, purity, life, and health in ancient Persia. The origin of the festivity goes back to a Zoroastrian tradition circa 1725 BC.

Now a days, the ceremony has been mixed with using fireworks by children and young adolescence who are mostly unprofessional. They are not familiar with safety features of using fireworks and by using them, many unwanted accident would happened to people who are present out-doors and in nearby.

In other countries there are some celebrations with firecrackers such as; christmas and new year ceremony, the Fourth of July (the United States' Independence Day), the New Year in China, Halloween and Guy Fawkes Night in the UK, Diwali in India, Hari Raya Festival in Malaysia, and Prophet Mohammad's Birthday in Libya (Fogarty and Gordon, 1999; Isa and Moe, 1991; Jing et al., 2010; Zohar et al., 2004; Mohammad et al., 2009; See and Lo, 1994). Tihar in Nepal, Ashura day in Morocco, Hari Raya in Malaysia, Bastille Day in France, Spanish Fallas and New Year's Day in Guatemala (Isa and Moe, 1991; Jing et al., 2010; Zohar et al., 2004; Mohammad et al., 2009; See and Lo, 1994; Sheller et al., 1995; Newell and Vail, 1972; Puri et al., 2009).

But in these event usually professional ones used fireworks and people are there for only watching and celebrating the festival. The fireworks are in a safe place and will be used by safety precusions. Normally people are in a safe distance from the firecrackers and if any explosion happens no injury would result to the ordinary population.

In the years 1980 to 1989 approximately 10000 individuals from the United States suffered injuries resulting from fireworks; while the United States of America during the years 1990 to 2003 alone had 85800

injuries resulting from firecrackers (American Academy of Pediatrics, 2001). In the UK, the most of injuries were reported during Halloween night (Fogarty and Gordon, 1999). Totally 4447 patients with firecracker-related injuries seeked medical care during the two days around the New Year celebrations in Denmark (Puri et al., 2009). In Greece, in each year from every 1000 child, 7 face these injuries, 70% of them were in the age group of 10 to 14 years old (Vassilia et al., 2004).

On the contrary, in Red Wednesday eve in our country, small children and young adolescences use the un-standard and hand-made unsafe firework and if anything goes wrong, there are lot of people who are in the vicinity of the site of explosion and most of the injured patients are young people. Most of the victims are young fellows who used them carelessly and also elder people who by chance are near to the site of explosion (accidental burn trauma). The elder fellows can not run easily from the scene of the fire and explosions and would be injured accidentally (unintentionally) as it was reported in other previous papers.

In 2007 it was reported that out of 197 patients most them were young and male (Tavakoli et al., 2011).

In other report from 2009, Abbas et al reported 1817 patients that 83% were male and 19% were admitted due to extend of injury (Abbas et al., 2012).

Mohammadi et al also commented on fireworks injury in the last Wednesday of the year and repoted up to 53% hand injury and 27% eye injuries. More the 10% of the patients need hospitalization and unfortunately 1% lead to eye enucleation and blindness. They reported a wide range of injury in eyes due to penetrating, blunt and burn injuries including; superficial and deep (the eyelids to the optic nerve) and from relatively simple entities like corneal foreign body and abrasion to full-thickness globe lacerations, hyphema, vitreous hemorrhage, and posttraumatic endophthalmitis and blindness (Mohammadi et al., 2011).

Burn injuries also include a wide range from simple first degree and small size burn to extensive third and forth degree burns accompanying the trauma to head and body, fractures of bones and sometimes amputations. Mortality of these extensive burn patients are very high as has been found in our study up to 10%.

The other problem is major disabilities that would happened to victims, from a small finger amputation to multiple limb amputation with burn scar ugly disfigurements and ugly scar specially in the face (Mansouri et al., 2007; Saadat et al., 2010; Hatamabadi et al., 2013; Vaghardoost et al., 2013).

These are young patients and have to live with their disfigurement for life. An even uglier aspect is that the injury affects bystanders or passersby too.

Hands were the main sites of injury in previous studies and reports from Saudi Arabia, Ireland, Denmark, Australia and England. There are several other studies which emphasize that the eyes are the main body part

injured by fireworks. They also reported some amputations and blindness among injured patients. In our study we had 3 blindness and 7 mortalities due to extensive burns. Iranian people has celebrated the last Wednesday of the year for thousands of years and it has become a famous tradition of our country. Traditional costumes of this celebration expresses the rich culture of Iranians, but the open fire and fireworks will always create heavy problems for people using them and innocent bystanders .

Our results showed that most these patients are young and between 12-19 years old and most of them had severe burn injury more than 20% of TBSA.

Burns mostly occurred in hands, head and face and eyes. The burns are mostly of 3rd and 4th degree and intensity of explosion sometimes lead to amputations of limbs and enucleation of the eyes.

Fortunately the mortality of these patients was not found to be high, anyhow death for a young healthy person with long life expectancy is a disaster for the family and relatives, specially during holidays of the new year.

Morbidity is more frequent and severe in type, disfunction and disability in limbs, blindness and severe deformities due to extensive burns are among the numerous features that one can see in these patients.

Post traumatic burn hypertrophic scars and ugly disfigurements and also post traumatic stress disorders are some of the long term problem of these patients.

The patients were young and would have a long life with severe disabilities which need different kinds of support from family, society, insurance companies, NGOs, charity organizations and government. Some of these patients can not perform their simple needs and during the rest of their life needs complete support.

Most of these patients are adolescent and young adults who want to use these un-standard fireworks extensively. Therefore mortality and morbidity of the young patients have high economical burden on families, insurance companies, NGO organs and government.

Not only The price of medical treatment of these patients are very high, but also the expenses for further treatment and maintenance charges for temporary and permanent disable persons are huge too.

The long hospital stay for acute care, need for multiple operations, further several reconstructive surgeries, presence and development of hypertrophic scars and keloids and complications such as amputations and blindness result in financial burden on the patients and economical status of the country.

More than 41% of patients seek plastic and reconstructive treatment during following years which has a huge economic insult for the patients and families. For conducting these reconstructive surgeries government and insurance companies have great responsibility and have to help people for having a better and scar-free life.

Several efforts has been done by the government and special authorities to prevent and reduce of such damages, but there are still many victims who suffer from burns and multiple trauma. Educational and training programs specially in medias and increasing the knowledge of people particularly for the vulnerable groups is the most important way to prevent the unfortunate events of Red Wednesday. The public media, especially television, radio and newspapers and social networks can play an important role in the training of preventive measures to prevent and reduce these incidents, train the best way of emergency treatments and medical care for such patients, education of the best ways for transferring of the patients and training for prevention of complications.

Some authors postulated that one of the effective ways to avoid injuries of the last Wednesday of the year may be banning the delivery of explosive materials to the ordinary people, preventing availability of un-standard materials, and laying strict preventing laws for using them.

CONCLUSION

It is suggested that educating the safety features of using firework would result in reducing firecrackers and fire injuries. Training and education of fire safety equipments should be promoted in our country and specially to the community. Considering the impaired safety preparedness of community for fireworks festivals, people should be encouraged to attend public fireworks displays conducted by professionals rather than engage in personal use of fireworks. Restriction of the use of un-standard fireworks and hand made firecrackers without considering safety instructions are other ways that should be considered.

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