Fireworks related injuries during Hari Raya festival in Hospital Universiti Sains Malaysia – 1986 to 1990

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Summary

A total of 38 cases of fireworks related injuries from Hospital USM over a 5-year period from 1986 to 1990 during Hari Raya festival were analysed. The majority (68.5%) of the patients were teenagers, between 10 to 19 years of age. All the cases were Malays and most of the accidents occurred before the Hari Raya Idilfitri festive seasons. Fourteen cases were caused by self-made fireworks and another 16 cases were due to modified fire-works. Twenty-four cases suffered permanent disabilities mostly finger amputations. Such injuries could be prevented by law enforcement coupled with public health education to modify social behaviour especially when the ban against the use of fireworks is lifted on religious grounds.

Keywords Fireworks, Kelantan, injury prevention, epidemiology.

Introduction

Fireworks are defined as devices which are designed for the porpose of producing a visible or audible effects by combustion, deflagration or detonation (U.S.A. Consumer Product Safety Commission). They are widely used in many cultures to mark auspicious days or to celebrate festivals. Well known occasions where fireworks are ignited on large scales are the 4th of July Independence Day in the U.S.A. Guy Fawke's Day in U.K, Festival of lights in Myanmar and India, Chinese New Year and Spring Festival in China. In Malaysia, the Chinese New year, the Muslim Hari Raya Idilfitri to mark the end of the fasting month and the Hindu Deepavali were the 3 festivals where fireworks were widely displayed.

In the U.S.A. any device containing more than 50mg. of explosive material is banned[1]. The fireworks restriction in Malaysia is governed by the "Explosive Device Act 1957" which does not specify the explosive strength limitation but has a wide enough scope to cover any device. The penalty for causing any explosion which could be construed as to endanger life or property is imprisonment for 7 years or a fine of $10,000 or both. However the Ministry of Home Affairs reserves the right to lift the ban on certain categories of fireworks during specific festivals. Currently the display of firecrackers, sparklers, torch fireworks and fireglows are allowed during the Chinese New Year and Chap Goh Meh. These items are freely available commercially. Fireworks related injuries although preventable, has caused unnecessary human sufferings. This study describes the epidemiology of these injuries and to identify the causal factors that could lead to preventive proposals within the context of the Malaysian culture.

Materials and method

All patients who sought treatment at the emergency unit, Hospital Universiti Sains Malaysia with a history of injuries related to fireworks during the 5-year period (from one month before to one month after Hari Raya festival) between 1986 to 1990 were included in the study. Since the Hospital is a referral medical centre, the majority of cases seen were from Kelantan and the district of Besut, Terengganu. However, it is expected that minor injuries might not be referred to this Hospital.

Fireworks related injured patients include active users (persons who are using fireworks at the time of injury) and innocent bystanders (persons who are not using fireworks themselves at the time of injury). The medical officer on duty at the emergency unit collected the demographic, injury, and behaviour information on all patients. The types of fireworks used were classified as self-made (a do-it-yourself constructed illegal device), commercial (obtainable from shops), and modified (bought fireworks which were tempered in order to enhance their effects). The types of injuries were classified according to anatomical sites with a recording to indicated whether the injuries resulted in permanent disabilities or not. A patient with multiple injuries might be counted more than once depending on the anatomical sites effected.

Results

A total of 38 cases were recorded during the 5-year study period, comprising of 37 males and only 1 female. All of them were Malays and the cases were reported during the festive seasons of Muslim Idilfitri in each year.

The age distribution as presented in fig.1 showed 18 cases (47.4%) involved were children of the 10 to 14 age group. The next most vulnerable group was the 15 to 19 age category amounting to 8 (21.1%) cases. All the 36 cases were active users and only 2 cases were bystanders. The only female in this series was a 7-year old bystander.

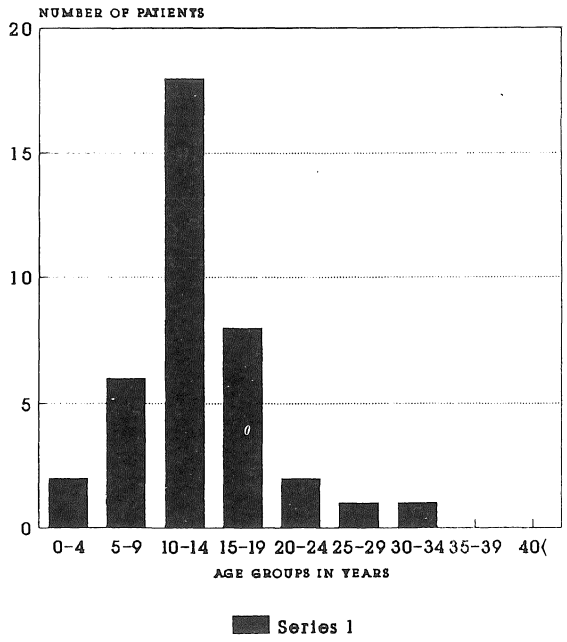

Fig. 1 Distribution of fireworks related injured cases by age in Hospital USM 1986 – 1990

The incidence per year over the 5-year period showed a random fluctuation without any definite trend. The type of fireworks that was most injurious were either self-made or modified, while the commericial type accounted for only 21.1% (table 1), although it was expected to be the most widely used.

Table 1
Distribution of fireworks related injured cases by year and types of fireworks used in Hospital USM, 1986 – 1990

YEAR	SELF-MADE	COMMERCIAL	MODIFIED	TOTAL
1986	8	0	3	11
1987	2	3	3	8
1988	0	0	5	5
1989	2	2	2	6
1990	2	3	3	8
TOTAL	14 (36.8%)	8 (21.1%)	16 (42.1%)	38

The commonest anatomical site of injury was the hands involving 28 patients. Twenty (71.4%) of these patients required finger amputation resulting in permanent disability. Eye injury was the next most common as seen in 14 victims, with 2 cases of eyesight loss. Almost all other anatomical sites were involved in this collection of cases as presented in table 2, with 22 cases (58.0%) ended up with permanent disabilities. The injury to the ear produced 2 cases of tympanic membrane perforation. The patients were lost to follow-up and the assessment for hearing loss could not be done. Of the patients seen at the emergency unit, 32 (84.0%) needed hospitalisation with an average in-patient stay of 12 days.

Table 2
Fireworks related injuries by anatomical sites in Hospital USM, 1986 – 1990

*Injury Sites	No. Injured	No. with Permanent Disability
Eye	14	2
Ear	4	2
Facial / Head	2	0
Upper limb	1	0
Hand	28	20
Chest	4	0
Abdomen	2	0
Lower limb	3	0
Foot	6	0

* *A patient may have multiple injuries*

Comments

Kelantan has a predominantly Malay population and it was not surprising to see that all the victims were all Malays. Although the ban for the use of fireworks was not lifted during the period of this study, the Malays indulged in this customary practice on a widespread scale and law enforcement was not an easy task. Unlike the Chinese for whom igniting the firecraackers helps to chase evil spirits, the Malays did it for pure fun and excitement. Banning the use of fireworks during Malay festivals would not cause any political pressure for the fireworks have no religious significance. In fact the customary practice is against Islamic tenets as wasteful and hazardous.

A particulary vulnerable group of fireworks related injuries were teenage boys who were naturally boisterous with a naive outlook. These youngsters were also capable of inventive approach to fireworks display, producing illegal self-made or modified devices which were extremely dangerous for the explosion and ignition were unpredictable. Most of the severe injuries producing permanent disabilities were the results of these types of fireworks. A noteworthy common device favoured by teenagers was the bamboo canon which needs calcium carbide and water as explosive ingredients as illustrated in fig.2. The chemical reaction releases acetylene gas which is known to be highly inflammable and explosive when ignited. Modified versions of the fireworks could be achieved by bunching together sparklers to produce burning rockets, or stuffing fireworks into an iron pipe and ignite them with a fuse to produce a bigger explosion. The excitement of enhanced fireworks display was hard to resist and the temptation made the teenagers oblivious to the potential dangers of the fireworks. McFarland et al also reported the hazardous nature of self-made and modified fireworks[2].

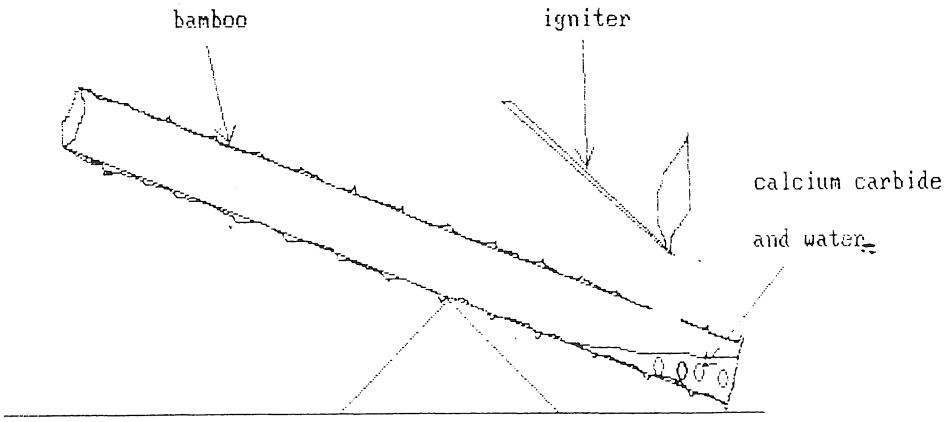

Fig. 2 : A self-made bamboo canon using calcium carbide and water

The risks of injury associated with various fireworks were also associated with lack of adult supervision and other careless behaviours such as lighting fireworks that did not ignite at first, carrying fireworks in the pockets, holding fireworks in the hand, throwing fireworks at friends to tease and bending over fireworks to light them instead of approaching them from the side[2]. Igniting sparklers in the vicinity of inflammable storage such as kerosene has occurred as reported in the news.

Among the permanent disabilities, eyesight loss in considered the most tragic as seen in 2 cases in this study. Eye trauma could occur with foreign body penetration, near firecracker explosion resulting in ocular distortion, and direct burns. Wang and Irvin reported 7 cases of retinal detachment due to firecracker injury in Beijing. The visual results of these cases after surgical treatment remained poor[3].

Legislation to control the fireworks related injuries is adequate in Malaysia but because of political pressure, the ban is lifted on specific occasions where fireworks play a signifying role in religion. At other times, law enforcement should be more serious especially against self-made and modified devices.

Since fireworks display may remain as part of the Malaysian culture, fireworks safety educational campaign should be undertaken by relevent government agencies targetted at teenagers and parents. In Kelantan the campaign could be carried out as a concerted effort with the commencement of the fasting month.

The public health education effort should emphasize the following points:

1. Do not allow younger children to play with fireworks under any circumstance.
2. If parents wish to permit older children to play with fireworks, close adult supervision must be present.
3. Ignite fireworks outdoors in a clear area away from houses and inflammable materials.
4. Never ignite fireworks in a container to avoid formation of splinters and missiles.
5. Never play with self-made or modified firewoks.

R. Krishnan provides a list of safety guidelines for those who cannot contain the urge to play with fireworks[4]. As pointed out by Wang and Irvin, prevention through legislation and public health education would be far superior to surgical care. This dual strategy is relevant in the Malaysian context to prevent fireworks related injuries.

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