

CHARACTERISTICS OF ALCOHOLIC FLAME INDUCED BURN AT THE NATIONAL BURN HOSPITAL FROM 2017 TO 2019

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ABSTRACT

Objective: *Research on the characteristics of burn caused by alcoholic flame for 3 years.*

Subjects methods: *This is a descriptive retrospective study of clinical data of burn caused by alcoholic flame admitted from 2017 to 2019 including 968 patients in the ICU, Adult, pediatric departments.*

Results: *Average age was 26.4 ± 15.7 and most patients were male of 62.9% and living in rural of 53.5%. The average TBSA was 13%. Regarding the position of wounds, wound on limbs where the highest proportion. Pregnant women of 2.2% were mostly combination factors. Most patients were burned in the summer of 35.4% and 129 patients in July and 43 patients on the 1st of a month. The least patients were burned in winter and 30 patients in December and 17 patients on the 31st in a month.*

Treatment method: *For pediatric, there were 52.6% of parenteral feeding in the first 24 hours after burned while adult patients were 29.5%. Two times of surgery were mostly for pediatric and adult patients.*

The length of hospital stay of pediatric patients was 23.7 days while adult patients were 16 days. The general portion of mortality was 0.7% including pediatric of 7.4% and adults of 7.2%. The trend of burn accidents decreased from 2017 of 36.7% to 2019 of 26.9%.

Conclusion: *Burn caused by an alcoholic flame in Vietnam have great consequences and leaving many serious sequelae. From the above features to plan to reduce the burn rate and complications caused by alcohol flame.*

1. OVERVIEW

Vietnam is a developing country, there are many burn patients caused by alcoholic flame. The main reason due to alcohol is circulating and using common. Aims of this study describe characteristics of burn caused by alcoholic flame and the trend of the number of burn patients.

Burn injuries cause severe damage and many complications. Burns represents one of the leading causes of death worldwide, representing a higher incidence than tuberculosis and HIV put together [1], patients that suffer from burns can have physical, emotional, socioeconomic, and functional consequences that, in many cases, can be devastating. The worldwide incidence of fire-related burns was estimated to be 1.1 per 100.000 population [1].

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Globally, fire-related burns are responsible for about 265.000 deaths annually and over 90% of fatal fire-related burns occur in developing or low and middle-income countries, with Asia alone accounting for over half of the fire-related deaths [2].

Meanwhile, alcohol is a common cause of fire-related burns. In the case of alcohol-based burns, smoking was the most predominant reason. Ethyl alcohol, more commonly known as ethanol, is identical in composition to potable alcohol. Alcohol is a transparent, colorless liquid with a density of 0.789kg/m³ and a boiling temperature of 79°C.

If the fire has a satisfactory concentration of oxygen (O₂), carbon dioxide (CO₂) and water (H₂O) are released. If the fire has not a satisfactory concentration of oxygen, the combustion is "incomplete" some carbon atoms only combine with one oxygen atom, which

produces carbon monoxide (CO). Carbon monoxide is highly toxic to humans as once in the blood [3].

In developing countries, alcohol is often easily traded and it can be used to grill squid, fish, fuel, burn the garbage, disinfection even using alcohol for suicide [4].

2. SUBJECTS AND METHODS

Burn patients caused by alcoholic flame, hospitalized in the National Burn Hospital from 2017 to 2019 for all ages. Collected data included data on age, gender, total body surface area, deep burns, outcomes, length of hospital stay, the number of operations and mortality.

Research methodology: In a retrospective study, the data was analyzed by Epi info software 7.2.2.1. Statistical significance with $p < 0.005$.

3. RESULTS

3.1. General characteristics

Table 3.1. Characteristics of the research group n = 968

Characteristics		N	%	$\bar{X} \pm SD$
Age	0 - 17	272	28.1	26.4 ± 15.7 (0.17 - 84)
	18 - 60	664	68.6	
	> 60	32	3.3	
Gender	Male	609	62.9	
	Female	359	37.1	
Total body surface area (TBSA)				13 ± 11.3 (0.0063 - 80)

Comment: The main patients were adults (> 17 years old) accounted for 696 patients (71.9%), The most patient was male accounted for 62.9%. The main TBSA was 13%.

Table 3.2. Causes

Causes	N	%
Grill squid, fish	803	83
Disinfection (equipment, burn the garbage...)	106	11
Other (fire, cooking by alcohol, suicide...)	59	6

Comment: The main cause was grilling squid and fish.

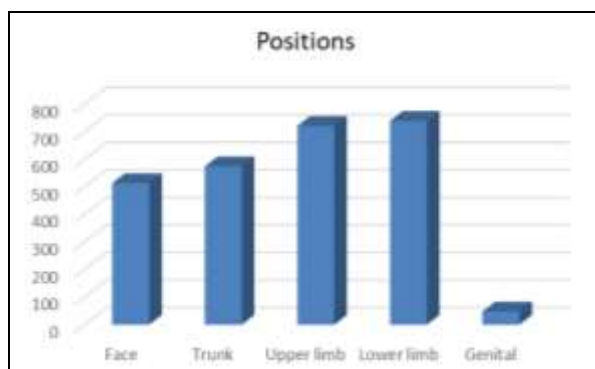


Figure 3.1. Distribution of burn location

Comment: The main burn positions were limbs (upper limbs of 74.6% patients, lower limbs of 76% patients), the least positions were genital occupy of 5. There were only 149 patients (15.4%) of one position burn and the patients mostly suffer burns from multiple positions.

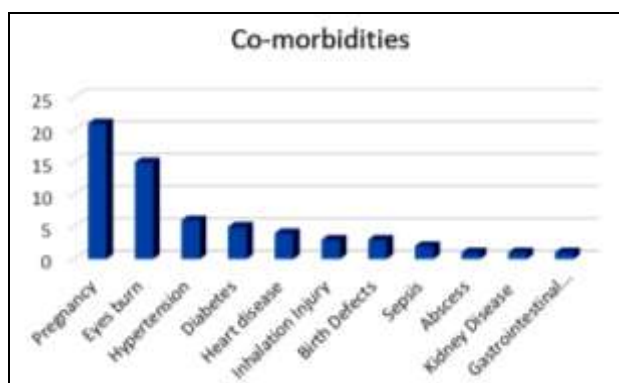


Figure 3.2. Co-morbidities

Comment: The most common co-morbidities were pregnant women of 2.2%, eyes burns occupy 1.5%

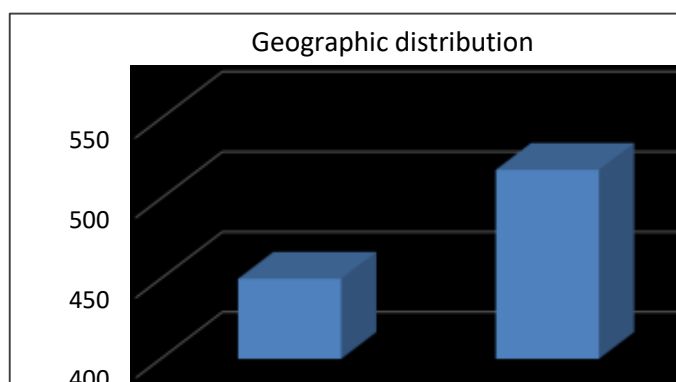


Figure 3.3: Geographic distribution of burn patients

Comment: Most patients in rural areas accounted for 518 patients (53.5%)

Table 3.3. The time distribution

Quantity Time		N	%
Year	2017	355	36.7
	2018	353	36.5
	2019	260	26.9
Season	Spring	188	19.4
	Summer	343	35.4
	Autumn	277	28.6
	Winter	160	16.5
Month	First week	267	27.6
	Second week	234	24.2
	Third week	244	25.2
	Fourth week	223	23
Day	1 st	43	4.4
	31 th	17	1.8

Comments: Most patients in 2017 accounted for 36.7%, the trend of burn caused by alcoholic flame was decreased. The most patient in July in summer, accounted for 35.4%, the least patient in December in winter accounted for 16.5%.

The most patient admitted to the hospital on the first week of the month accounted for 27.6%, especially the most admitted on the first day of the month accounted for 43 patients.

3.2. Some characteristics of the patient's treatment

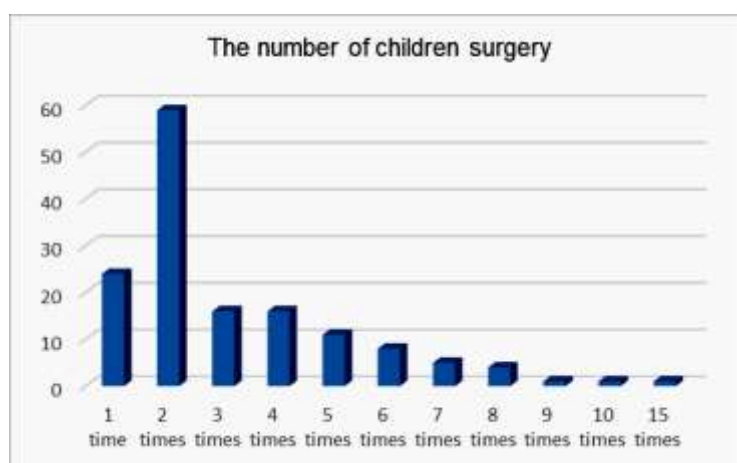
Table 3.4: Treatment methods

Object Therapy	Children (n = 272)	Adult (n = 696)	Sum
Parenteral for first 24 hour (n)	143 (52.6%)	205 (29.5%)	348
Surgery	146 (53.7%)	216 (31%)	362

Comments:

- The number of patients treated with parenteral in the first 24 hours of children was 143 patients (52.6%) and adults were 205 patients (29.5%).

- Number of patients requiring surgery: There were 146 children (53.7%) and 216 adult patients who had surgery (31%).

**Figure 3.4. The number of surgeries in pediatric patients**

Comments: Two surgeries were mainly, accounting for 40.4%

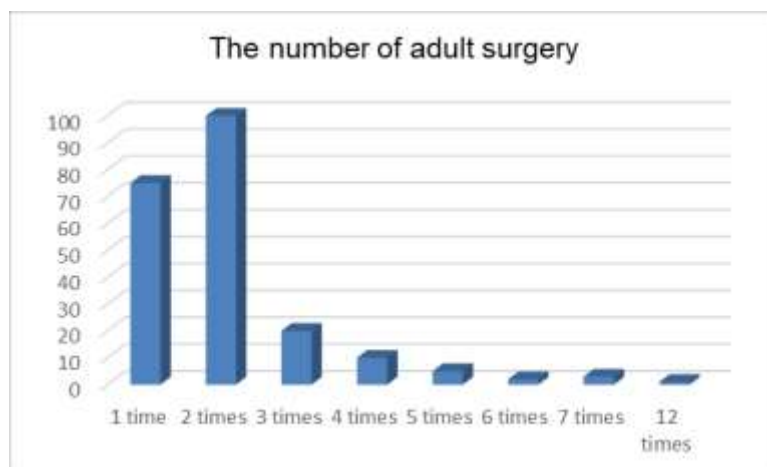


Figure 3.5. The number of surgeries in adult patients

Comments: The most patient was 2 surgery times (46.3%).

Table 3.5. The length of hospital stay, mortality

Index \ Object	Children (n = 272)	Adult (n = 696) \bar{X} (Min-Max)
The length of hospital stay \bar{X} (Min-Max)	23.7 \pm 20.7 (1 - 155)	16 \pm 12,8 (1 - 129)
Mortality (n,%)	2 (7.4%)	5 (7.2%)

Comment: The length of hospital stay was 18.1 ± 15.7 days. In which children had an average treatment time of 23.7 ± 20.7 days and adults were 16 ± 12.8 days. Mortality rate: 7 death patients were accounting for 0.7%, of which children had 2 patients and adults had 5 patients.

4. DISCUSSION

Burns caused by alcohol flame mostly only exist in developing countries because alcohol is easy to buy, cheap, and popular. The risk of burns due to alcohol flame is very high due to a lack of knowledge and rudimentary materials [4]. In Vietnam, there are many patients with burns caused by alcohol flame due to many reasons. In our study, there were 968 burn patients with an alcoholic flame for 3 years.

In the study, the mean age was 26.4 years, which was lower than Ortiz 2015 of 33 - 34 years [5]. The majority of adult patients of 72%. The ratio of male/female was 1.7:1 (Table 3.1), while the small 2017 synthesized study in 22 countries was 1.9:1 [6]. Men were burned more than women because they are the main labor force in the family, they often work so much at a company or home.

Our total body surface area average of 13% (Table 3.1) was equivalent to Karki (2018) of 15% [7].

When using alcohol, it is often used very rudimentary tools, for example pouring alcohol on a plate to grill squid or cooking an alcohol stove... the fire is wide, the risk of exploding and spread fire is very high. It is very difficult to control. That is also the

reason why the number of burn patients caused by an alcoholic flame in developing countries is still big. In the caused by alcoholic flame, burns caused by using alcohol to roast squid and fish accounted for the highest percentage of 83% (Table 3.2). There are other causes of alcoholic burns such as using alcohol to clean tools, using alcohol to trash burning, cooking hot pot, suicide...

The habit of using alcohol to roast squid and fish has been formed and maintained in Vietnam for a long time. A common situation when burn caused by alcoholic flame when the person who bakes squid or fish poured alcohol on a plate to bake, then add alcohol to the plate while the fire is burning, causing an exploding fire on a patient or the cooker was startled by an exploding fire, after that he threw the fire to the person sitting next to causing burns. Sometimes, the fire caught the alcohol bottle, the bottle will be burned without seeing it, causing the alcohol bottle to explode, making the burn area very large.

In our study, the most common position burn was the arm accounting for 74.6% and the leg accounting for 76% (Chart 3.1). This result is similar to the study of Karka (2018) when the most burned location is the limb [7]. The arms and legs are usually the most flexible positions on the body which direct and closest contact with the agents without protection, so the rate of burns in this position is highest.

In our study, during the three years of receiving alcohol burn patients from 2017 to 2019, the proportion of patients admitted to hospital was decreasing (from 36.7% to 26.9%) (Table 3.3). It is also consistent with the small 2017 study when synthesizing 26

studies from 16 countries such as Australia, Canada, China, Singapore... [6]. When the awareness of people increases and combined with effective propaganda, prevention and initial management measures. This leads to a decreasing number of patients with alcohol burns.

The patients suffering from alcoholic flame burns in summer were the highest portion accounting for 35.4% of the total number of patients, and in winter, patients are at least 16.5%. The first week of the month accounted for the largest number of patients, accounting for 27.6% (Table 3.3). This result is also consistent with author Cheng (2018) when synthesizing the results of studies from 1978 - 2016 in China, he concluded that patients suffering from burn the most in the summer [8]. In the summer, in Vietnam, there are many vacations and travel time, peoples having more free time to making party, they used more alcoholic flame causing burn rates higher than other seasons. The percentage of surgical patients in the study was 37.4%. In the children group, the length of hospital stay in our study was 23.7 days and the adult group was 16 days (Table 3.5). This result was similar to Chen X. (2010) when studying alcoholic flame burns in China, the healing time of the children group was 16.96 days and the adult group was 21.38 days [2].

When the patients were burned caused by alcoholic flame, the transparent color of alcoholic flame was difficult to know cause long flame contact-making deep burn or the incorrect first aid leading to deep burn.

also, the superficial burns of alcohol burns were very easy congestion cause deep burn, which makes the length of hospital stay significantly increased. In our

study, the number of children's surgery patients accounted for 53.7%, while the number of adult surgery patients accounted for 31%.

The overall mortality rate in our study was 0.7%, of which the pediatric group had a mortality rate of 7.4%, and the adult burn rate was 7.2%. This result was also consistent with the study of Cheng 2018 when the mortality rate is 0.3 - 7.5% [8].

5. CONCLUSION

Our research shows that patients suffering from the burn caused by an alcoholic flame in men over 18 years old and grilling squid have a high risk in Vietnam. There are many patients with deep burns, the sequelae are severe.

There should be preventive measures, raising awareness and understanding of the community about alcoholic flame burns to have appropriate first aid to reduce burn complications.

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