

Demographic Characteristics of Pediatric Burn in Shahid Motahhari Hospital from 2007-2011

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ABSTRACT

Background: Severe burn is one of the major causes of morbidity and mortality in children and adolescents and is third most common cause of death among this age group. The aim of this study was to evaluate demographic characteristics of pediatric burn over a period of 5 years and the relationship between cause mortality in patients with burns.

Method: In this cross sectional study, documents of children under 15 years, in Shahid Motahhari hospital between 2007 and 2011 was evaluated. Variables such as age, sex, stay duration in hospital, burn cause, severity, accident cause burns and outcome of patients finally entered in SPSS v.16 and were analyzed.

Results: In this study, 416 patients (34/8%) were female and 780 (65/2%) were male. Factors for burns in children include boiling water in 674 cases (56/4%), flame in 190 patients (15/9%), burns with flammable materials in 131 cases (11%), burns with a hot meal for 113 people (9/4%) and other hot bodies in 30 patients (2/5) and steam burns in 3 (0/3%). Increasing in burned body surface was significantly associated with mortality (P value= < 0.001). Burn severity in children who died was more than other children (P value= < 0.001). Also burn etiology was significantly different in patients who died and patients were discharged (P Value= 0.003).

Conclusion: Based of the results of this study, burn in boys was more than girls and was common inpatients under 2 years of age. Thermal burns were the most common type of burns in children (95/4%) and hot water were also the most important cause in thermal burns in children (56/4%). Burn extent in the majority of children (75%), was less than 30% of the body surface and burns between 50 to 100% occurred in 6/3% of cases. Average stay duration in the hospital was 12/8 days and mortality rate was 7/2%. Area and depth of the burn injury were the most important determinants of mortality.

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► *Implication for health policy/practice/research/medical education:*
Demographic Characteristics of Pediatric Burn

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1. Introduction:

Burn is the third largest cause of death after accidents and drowning in the United States; and is the sixth leading cause of death in our country (1). About 2/5million people are burned annually in United States, out of them two hundred thousand are outpatient and a hundred thousand patients require admission to hospital (2). In Iran about 725 thousand burns occur every year (3). Iran has young population among the countries and burn leaves the consequences of social, psychological and economic in these people (4). About 30 to 40 percent of the burn patients are children and teens (5). In many cases in the first two decades of life, burn is due to accidents and can be prevented. However, burn is an important cause of morbidity and mortality in children and teens, and is the third most common cause of death in this age group (6). Frequency of thermal burn injury (with hot water) in children and teens is 85% and is the most common type of burns in children under 4 years (7). Based on Hadian *et al* Study in 1381, the most common cause of injury among children and adolescents less than 15years is thermal burns (98/5 percent), and electrical burns and chemical burns was seen in order in 1/3% and 0/2% of patients (5). In another study by Rafiee *et al* in 1386 which was done in our country, the most common cause of burns in children was introduced hot water and steam (51/8%) and other causes of injury in this group were: fire and flames (34/3%), hot liquids (10/3%), and electricity (1/5%) (8). In our country, the rate of mortality due to burns was reported as 4/8% that this rate is associated with increase in total body surface area (5). Another epidemiological study that has been conducted in Rasht was reported that greatly increasing degrees of burns in children, is directly associated without come and mortality (9).

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But regardless of this verity of the burn, it is not clear that which factors cause most of the deaths in children in this age group. Studies have shown that detecting the risk factors of burn, such as lifestyle, social class, age distribution, sex, cause of injury, extent of injury, duration of hospitalization and death among children can be useful. This information can be used to develop educational programs to prevent patient's injuries (10). So this study was conducted to evaluate demographic characteristics of pediatric burn over a period of 5 years and the relationship between cause mortality in patients with burns.

2. Materials and Methods:

In this Routine data base study, the population of children under age 15 who were admitted to Shahid Motahari hospital due to burn injuries was evaluated. Documents of these patients were reviewed retrospectively from 2007 to 2011. All cases were selected for study but documents were excluded, if more than 20percent of the required data were incomplete. The variables in this study included: age, gender, duration of hospitalization, cause of burn, severity of burn, percentage of burn, and outcome of patients. This information was extracted from documents and entered in prepared checklist. Finally, collected data were analyzed by the software SPSS version 16. For describing data, the frequency, the central statistical indices such as mean and scattering parameters such as standard deviation was calculated. Student T test was used to comparison of quantitative variables and Chi² test was used for qualitative variables. Odd's ratio was calculated.

3. Results:

In this study, a total of 1,196 children and teens less than 15 years due to burn injury who were hospitalized in Motahari Hospital over a period of 5 years, were evaluated. 416patients (34/8%) of these patients were female and 780 (65/2%) were male. The mean age of these patients

Table 1: Demographic and clinical characteristics of twogroups of patients.

Variable		Discharged group	Non survived group	P Value
Sex	Female	385 (34.7%)	31 (36%)	0.79
	Male	725 (65.3%)	55 (64%)	
Age		4/7±4/2	4/0 ± 3.6	0.07
Type of burn	Thermal	1059 (95.4%)	82 (95.3%)	0.003
	Electrical	40 (3.6%)	·	
	Chemical	11 (1%)	4 (4.7%)	
	Boiling water	725 (71%)	38 (46.3%)	
Cause of thermal burns	Flammable materials	112 (10.6%)	19 (23.2%)	<0.001
	Flame	166 (15.7%)	24 (29.3%)	
	Hot body	29 (2.7%)	1 (1.2%)	
Percent of burn	< 50%	1085 (97.7%)	35 (40.7%)	<0.001
	50% <	25 (2.3%)	51 (59.3%)	
Severity of burn	Grade II	883 (79.5%)	19 (22.1%)	<0.001
	Grade III	227 (20.5%)	67 (77.9%)	

was 4 years (SD= 3/7) (range 1 to 14 years). 579 patients (49/9%) were under 2 years, 283 patients (23/7%) were between 2 to 5 years, 194 patients (16/2%) were between 6 to 10 years, and 122 patients (10/2%) were between 11 to 15 years. Based on the classification of cause of burn in our patients, 1141 patients (95/4%) suffered from thermal burns, 40 (3/3%) electrical injuries, and 15 patients (1/3%) suffered from chemical burns. Main causes of thermal burns in children who were studied were: boiling water in 674 cases (56/4%), flame in 190 patients (15/9%), burns with non-flammable materials such as oil, gasoline, diesel and alcohol in 131 cases (11%), hot food burns in 113 cases (9/4%) and other hot bodies in 30 patients (2/5%) and water vapor burns in 3 (0/3%). In most cases, the cause of the incident was random (99/4%), but in 5 (0/4%) cases were self-immolation, 1 (0/1%) was other-immolation and 1 case (0/1%) was acid sprayed.

Percent of body surface burn in patients was as follows: between 1 to 10% burn in 120 patients (10%), 10 to 19% burn in 467 patients (39%), 20 to 29% burn in 311 patients (26%), 30 and 49% burn in 222 patients (18/6%), and between 50 to

100% burn in 76 patients (6/3%) patients. Second-degree burn was occurred in 902 patients (75/4%) and third degree burns occurred in 294 (24/6%) patients.

The mean duration of hospitalization was calculated 12/8 days (SD= 9/7) (range 1 to 81 days). 278 patients (23/2%) were hospitalized 1 to 5 days, 299 patients (25%) 6 to 10 days, 412 patients (34/4%) 11 to 20 days and 154 (12/9%) 21 to 30 days. Duration of hospital stay in 50 patients (4/2%) was between 31 to 60 days and in 3 patients (0/3%) was between 61 to 81 days. Finally, 932 patients (77/9%) patients were discharged from the hospital with complete remission, 124 patients (10/4%) were discharged with partial remission, and 44 patients (3/7%) were discharged with personal satisfaction. 10 patients (0/8%) were suffered from an exacerbation and 86 patients (7/2%) died of burns.

Based on the univariate analysis, gender was not associated with mortality in children with burns (*P* value= 0/79). Also, age was not significantly associated with mortality (*P* value=0/7). Increasing percent of burn was significantly associated with mortality (*P* value<0/001). Burn severity (degree of burn) in children who died was higher than other children (*P*

Table 2: Relationship between cause of burn and mortality with eliminating confounding factors.

Variable		Odd's Ratio	CI	P Value
Etiology of burn	Boiling water	0.55	4.4 – 0.06	0.57
	Oil and gas	0.47	4.1 – 0.05	0.50
	Flame	0.68	5.8 – 0.08	0.73
Confounding factor	Percent of burn	0.13	0.07 – 0.25	<0.001
	Severity of burn	0.03	0.06 – 0.01	<0.001

value<0.001). Length of hospital stay were not significantly different in the two groups of patients (P value= 0.12). The cause of burn was accidental in both groups of patients and did not differ with each other (P value=0.7).

Although the etiology of burn in patients who died and patients who were discharged was significantly different from each other (P value= 0.003); 95.3% of the patients died of thermal burns but 4.6% of them died due to chemical burns. But among discharged patients, electrical burns was seen in 3.6%, chemical burns was seen in 1%, and thermal burns was seen in 94.4% of patients (P value=0.003). Thermal burns of boiling water in the group of patients who died were lower and burns with flames or flammable materials were higher than discharged patients (P value<0.001). The results are shown in Table 1.

But in multi variant analysis, eliminating the confounding factors, the percentage and severity of burns in patients, it was found that the mortality of burn patients is not related to cause of burn (P value> 0.05). The results of this analysis are shown in Table 2.

4. Discussion:

Children are the most common age group for burn patients (7). Although complications in children are associated with high morbidity and even life-threatening, but these injuries can be prevented mainly with necessary training and care (11). In this study 1, 196 children aged under the age of 15 years who had suffered burn injury were evaluated in

Tehran. The male to female ratio in this study was 1.8. Other studies also have noted a higher incidence in male's burns. For example at Rafii *et al* study, 610 male and 404 female children under the age of 15 years were burned (7). Also in Samimi *et al* study, the ratio of male to female was calculated 1.9 (12). Due to the higher incidence of burns in boys, more attention is required in this group.

In our study, half of the children who were burned were under 2 years of age and in total, about 75% of children and adolescents burns were seen in children less than 5 years of age. In other similar study, the most common injury (72%) was seen in children with the age of 1 to 3years, and the mean age of them was 3/2 years (12). This age distribution reflects the need to more care for young children. The most common cause of burn in children with this age group is usually hot water (12).

In the present study, thermal burns were the most common injury in children (95.4%), and electrical and chemical burns in children were very uncommon. Also hot water was the main cause of thermal burns in children. In study Rafii *et al* study, similar results were reported that the most common cause of burns in children under the age of 15 years is hot water (51.8%) (13). Also in Hadian Jazi study, among hospitalized patients, 97.6% had suffered from thermal burn, 2.4% had suffered from electrical burns, but no one had chemical burns. In our patients, thermal burn was seen in 98.8%, electrical burn was seen in 0.9% and chemical burn was seen in 0.3% (5).

In our study, the extent of injury in the majority of children (75%) was less than 30% of the surface of the body and burn between 50 to 100% was occurred in 6.3% of cases. Most of the burns were grade II (75.4%), but compared with other studies, the extent of the burn in our patients was higher, for example, in Samimi study, extent of burn in 58% of the burn injuries was less than 21% and in 10% of patients was reported 44% to 65% (12). Also in Hadian Jazi study, most patients had burns of less than 10% (5). In another study, 75% of children had burned less than 6% (9). The cause of these differences can be studied center. Motahari hospital was the place of this study that is burn referral center in our country, so patients with severe burns and more threatening factors are referred to this hospital. This could be cause of higher extent of burns in children in this study compared to other studies.

The mean duration of hospitalization was 12.8 day and mortality rate was 7.2%. Mortality in other studies has been reported between 4.8% to 5.5% (5, 13). Due to the higher extent of the burn in our study, the mortality rate is desirable.

Increasing the level of burns is significantly associated without comes in patients (9). In our study, mortality was associated with age and gender, and the extent and depth of the burn injury were the most important determinants of mortality. Among the etiology of the burns, flames and flammable materials were associated with higher mortality, although eliminating the confounding factors, the level and depth of burn; it was not seen any relationship between cause of burn and mortality.

Based on the results of this study, burn is more common in boys less than 2 years. Thermal burns are the most common type of burns in children (95.4%) and hot water is also the most important factor in thermal burns in children (56.4%). Burn extent in the majority of children (75%) was less than 30% of the body surface area and burns between 50 to 100% were occurred in 6.3% of cases. Average length of stay in

the hospital was 12.8 day and mortality rate was 7.2%. Extent and depth of the burn injury was the most important determinants of mortality.

It is suggested that socio-economic factors and other factors associated with pediatric burns will be reviewed in future studies. Also, It is better that investigated causes of death in children with burns, including different types of infections to find the important causes of them and do interventions needed to be reduced their mortality.

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