



Research Article

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Burn Injury Characteristics and Outcomes Among Hospitalized Patients in Emergency Units /Iraq, A Retrospective Cross Sectional Study

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Abstract

Burns is a global public health problem and, depending on their vulnerability. It caused nearly 180,000 deaths annually and this study aimed to assess the characteristics and outcomes of burned patients in emergency units during one year. A retrospective cross-sectional study was undertaken at emergency units in general hospitals which included burn centre of fifteen governorates in Iraq. Data were collected from the records and patient files at the department of statistics. Demographic information including the age, gender, occupation, TBSA, depth of burn, length of hospitalization, etiology of burn and outcomes. Frequency and percentage was used for summarizing the category variables. The Chi Square statistic was used to find the relationships between categorical variables.

Out of (81345) burned patients, the highest frequency 41% of burn injuries were occurred in the age group 15 to 44 years old; male cases 51.9% were more slightly than 48.1% female cases and, 50.7% of them were unemployed. More than half of them were living in rural area. Flame was the main cause of burn among them.

More than half 52.3% of them had the second degree of burn. 27.1% of burned patients had more than 75.1% of TBSA. Death is the main outcomes of burn among patients. Highly significant association has been found between age, gender, Length of hospitalization, TBSA, depth of burn and outcomes of burn by etiology of burn at p. value less than 0.00001. We need to improve the effects of preventive measures; studies are needed to investigate the epidemiology, etiology and outcome of the burn patient population.

Keyword:- Burn, Epidemiology, Outcomes, Etiology , Iraq, TBSA

Introduction

Burns is a global public health problem and, depending on their vulnerability, it caused nearly 180,000 deaths annually [1]. Non-fatal burns constitute a major cause of morbidity, including prolonged hospitalization, disfigurement and disability, resulting in stigmatization and ostracism [2]. According to the World Health Organization, the epidemiology of burns of mild degrees takes precedence over other injuries [3].

However, the emergency unit is one of the most important corners of the hospital, where all sick cases are received and, the cases vary from being simple, medium, or severe [4]. The emergency units in each hospital receive all patients who were suffering from diseases such as bowel disorders, accidents, poisoning, respiratory, circulatory and nervous diseases, wounds, fractures, RTA, burns, poisoning[5].

In America and Japan, the burn injuries are 250-300 cases per 100 thousand populations [6-9]. In Sweden, this is almost 200 cases per 100 thousand of the population, of which 30% require medical care [10]. In addition, the prevalence of burns is much more in developing countries and its damage to the skin and other organs, burns can lead to open wounds, disability, death, major economic consequences, severe emotional and psychological complications, and economic burden [11-15]. Therefore, burn patients require not only acute initial treatment but also subsequent rehabilitation, reconstruction and long-term anti-scar therapy [16].

Although more than 90% of all burns are preventable, burns are still common and a major public health problem [17]. A prospective observational study was conducted among 1498 burned patients in

Pakistan, The overall incidence of burn-related injuries per 100 000 inhabitants was 76.3 for emergency visits, 17.0 for hospitalization and 0.3 for ED deaths [18].

In Iraq, the observational cross-sectional study was conducted among 100 burned patients, the authors found that the vast majority of cases are below 30 years of age [19]. To further improve the effects of preventive measures, studies are needed to investigate the epidemiology, etiology and outcome of the burn patient. From this point, this study aimed to assess the characteristics and outcomes of burned patients in emergency units during the study period.

Materials and Methods

A retrospective cross-sectional study was undertaken at emergency units in general hospitals which included burn centers of fifteen governorates in Iraq. In each center, it has a private burn ward and operation room. Eighty-one thousand and three hundred forty-five burned cases were admitted to emergency units from the 1st of January 2020 to the end of December 2020. Before starting to collect the data, ethical clearance was obtained from the Ministry of health and from each hospital before enrolled in this study. First, all burns cases were entered into emergency wards for the initial examination, then the cases were transferred to the burn wards in the hospital that contains a burn ward or to another hospital if it does not include a burn ward within its structure. Data were collected from the records and patient files at the department of statistics. Then, we entered in the Microsoft Excel sheet daily, the information obtained from the record. Demographic information including age and it's classified into 4 categories (less than 5 years, 5-14, 15- 44, more than 45). Gender was classified as male and female. The occupation was classified into 3 groups (employed, unemployed, others (including kids, retired)). TBSA was classified to (less than 25%, 25 to 50%, and 50.1 to 75%, more than 75.1%).

Depth of burn was categorized to (1st degree, 2nd degree, 3rd degree). length of hospitalization were classified into 3 groups (0 to 15 days, 16 to 30 days, and more than 30 days). The etiology of the burn was classified as (scald, flame, chemical, electricity). An outcome of the burn was classified as (death, recovery, scar and disfigurement). If there is an empty field in the record or in the patient's file were excluded from our study. STATA version 13 was used to analyze this data, Frequency and percentage were used for summarizing the category variables. The Chi-Square statistic was used to find the relationships between categorical variables.

Results

Table 1: Shows the characteristics of participants'. Out of (81345) burned patients, the highest frequency 41% of burn injuries occurred in the age group 15 to 44 years old; followed by 29.7% in the

age 5 to 14 years old and the less frequency 14.6% in the age less than 5 years. In male cases 51.9% were more slightly than 48.1% female cases and, 50.7% of them were unemployed. The highest frequencies 58.1% were living in rural areas. The flame was the main cause of burn among them and shows in 37%.

Table 2: Shows the relationship between the independent variables with the etiology of burn. There are highly significant association has been found between age, gender, length of hospitalization, TBSA, depth of burn and outcomes of burn by etiology of burn at p. value less than 0.00001. In

Figure 1: Illustrated the length of hospitalization among patients. Out of 81345 burned patients, there is 36.9% (30011/81345) of those were stayed in the hospital for more than 30 days and it depends on the degree and etiology of burn, followed by 31.8% (25846/81345) with the range 16 to 30 days and 31.3% (25488/81345) for less than 15 days.

Figure 2: Illustrated the depth of burn among patients inwards. More than half 52.3% (42510/81345) of them had the second degree of burn; 33.1% (26945/81345) had the third degree of burn and, 14.6% (11890/81345) had the first degree of burn.

Figure 3: In this figure shows the TBSA of burned patients. 27.1% (22085/81345) of them had more than 75.1% of TBSA, followed by 25.2% (20513/81345) had less than 25% and 24.1 % (19584/81345) of them with the range 25 to 50% of TBSA.

Figure 4: Illustrated the outcomes of burn injuries. The highest frequency was 45.3% (36841/81345) of them died, 33.2% (26983/81345) of them had a complete recovery and only 21.5% (17521/81345) had scar and disfigurement.

Table 1:- Burn injuries characteristic among hospitalized patients

Variables	Frequency	%
Age groups		
Less than 5 years	11838	14.6
5-14	24208	29.7
15-44	33355	41.0
≥45	11944	14.7
Gender		

Male	42202	51.9
Female	39143	48.1
Occupation		
Employed , student	29500	36.3
Unemployed	41258	50.7
Others	10587	13.0
Residence		
Urban	34087	41.9
Rural	47258	58.1
Causes of burn		
Scald	21206	26.1
Flame	30111	37.0
Chemical	19025	23.4
Electricity	11003	13.5

Table 2:- Distribution of hospitalized burned patients according to etiology of burn

Variables	Etiology of burn				Total	P. value
	Scald	Flame	Chemical	Electricity		
	No.%	No.%	No.%	No.%	No.%	
Less than 5 years	4281	2946	2001	2610	11838	< 0.00001
	36.2	24.9	16.9	22.0	100	
5-14	7125	8895	4621	3567	24208	
	29.4	36.7	19.1	14.7	100	

15-44	8218	14523	6611	4003	33355	
	24.6	43.5	19.8	12.0	100	
≥45	1582	3747	5792	823	11944	
	13.2	31.4	48.5	6.9	100	
Gender						
Male	8319	17543	11521	4819	42202	< 0.00001
	19.7	41.6	27.3	11.4	100	
Female	12887	12568	7504	6184	39143	
	32.9	32.1	19.2	15.8	100	
Length of hospitalization						
0-15 days	7842	9584	3812	4250	25488	< 0.00001
	30.8	37.6	15.0	16.6	100	
16-30	5412	10201	6715	3518	25846	
	20.9	39.5	26.0	13.6	100	
>30	7952	10326	8498	3235	30011	
	26.5	34.4	16.3	10.8	100	
TBSA						
<25%	2587	9025	4793	4108	20513	< 0.00001
	12.6	44.0	23.4	20.0	100	
25-50%	4829	6247	6405	2103	19584	
	24.7	31.9	32.7	10.7	100	
50.1-75%	6021	5841	5404	1897	19163	
	31.4	30.5	28.2	9.9	100	
>75.1%	7769	8998	2423	2895	22085	
	35.2	40.7	11.0	13.1	100	

Depth of burn						
1 st degree	3652	4210	1052	2976	11890	< 0.00001
	30.7	35.4	8.8	25.0	100	
2 nd degree	12482	20021	6879	3128	42510	
	29.4	47.1	16.2	7.4	100	
3 rd degree	5072	5880	11094	4899	26945	
	18.8	21.8	41.2	18.2	100	
Outcomes of burn						
Death	9815	14218	7852	4956	36841	< 0.00001
	26.6	38.6	21.3	13.5	100	
Complete recovery	7821	9021	6541	3600	26983	
	29.0	33.4	24.2	13.3	100	
Scar and disfigurement	3570	6872	4632	2447	17521	
	20.4	39.2	26.4	14.0	100	

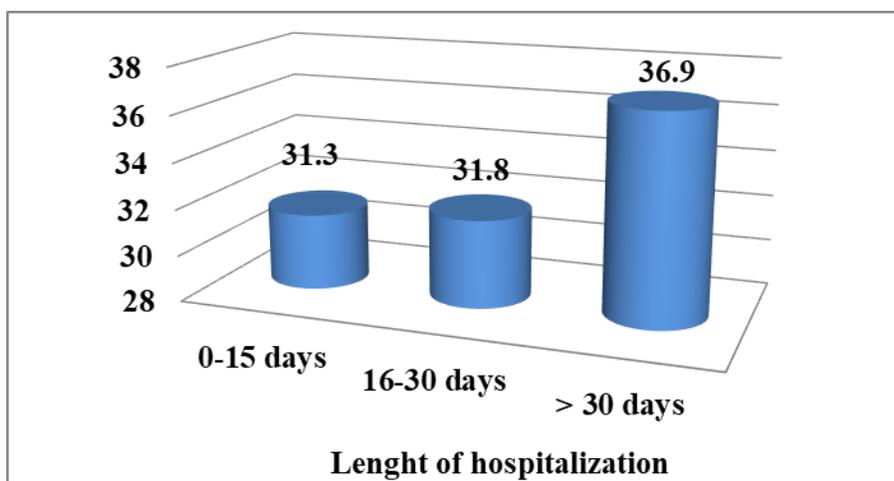


Figure 1: Length of hospitalization among patients at burning wards

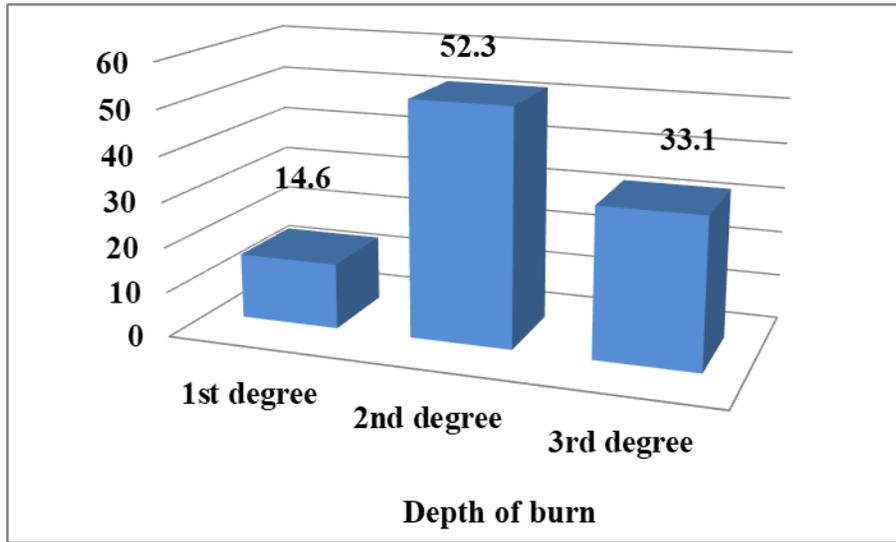


Figure 2: Depth of burn among patients

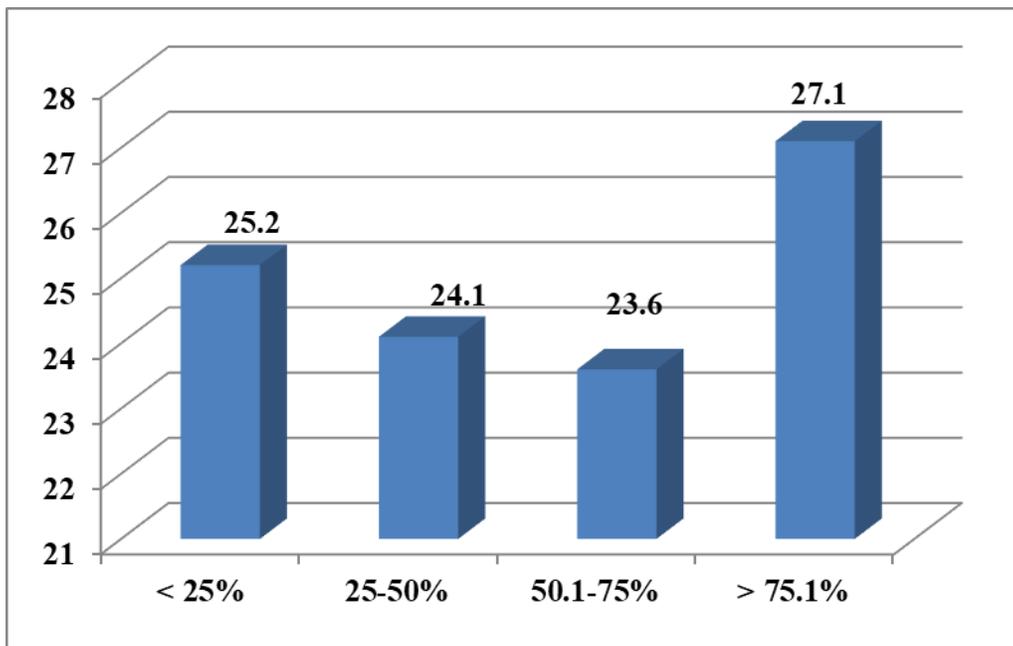


Figure 3: Total Body Surface Area (TBSA) of burned patients at emergency units

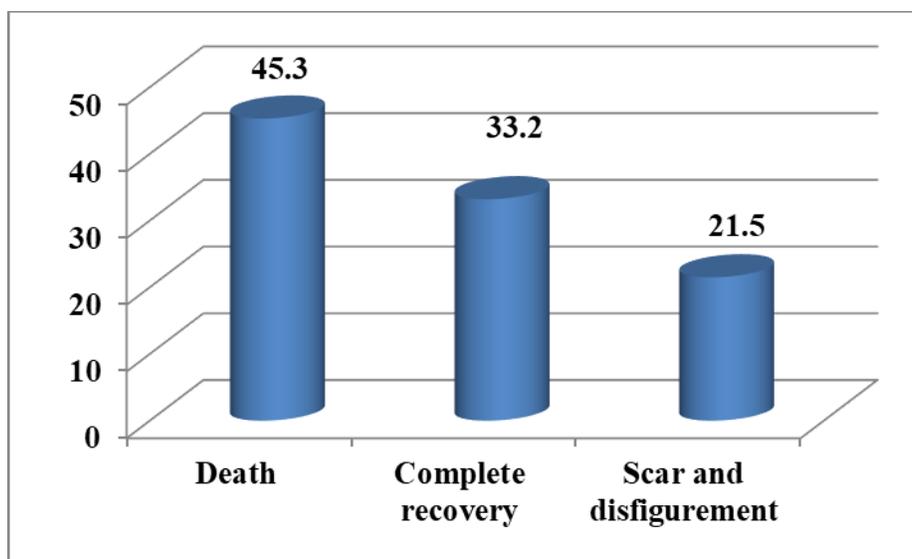


Figure 4: Outcomes of burn injuries among patients

Discussion

This study aimed to assess the characteristics and outcomes of burned patients in emergency units during the study period. Children are more likely to be burned than adults as a result of mistreatment by their parents [20]. Burning is the fifth and most common cause of non-fatal injuries to children [21].

In this study we found the highest frequency 41% of burn injuries occurred among the age group 15 to 44 years old; followed by 29.7% in the age 5 to 14 years old and the less frequency 14.6% in the age less than 5 years. This finding goes in line with other findings was done in India; they found that the most common age group was 21-40 years [14, 17, and 22]. Another finding was done in Kenya by Wanjeri et al, they found the burn injuries were the most common in the 0–4 years age bracket (n = 86, 42.6%), with the second most common age bracket being 20–40 years (n = 78, 38.6%)[23]. A study was conducted among 3030 burned patients in Iran; they reported that the patients had a median age of 21 years (interquartile range [ITQ] 9-30) and a mean \pm standard deviation (SD) ages of 22 ± 15.38 years. Most of the patients were aged 15 to 44 years (61%) [24]; this difference in results is due to the difference in the social, economic and cultural levels between countries.

Regarding gender, the impact on the gender difference in outcomes of hospitalized patients has been a recent topic of interest [25]. In this result we found that the male cases 51.9% were more slightly than 48.1% female cases and this result goes in line with other findings did it in Vietnam by Lam et al, they reported 3683 were male, accounting for 72.8%. Male patients were younger compared to female patients (35.5 vs. 37.2 years old; $p < .001$) [1]. Another finding done in Pakistan found out of a total of 1498 burnt patients presented to emergency departments. Females accounted for 40% of the patients and (adjusted odds ratio (aOR) = 1.49, 95% confidence interval (95% CI) = 1.09, 2.06) [18]. This is due to the

nature of women's work. The majority were housework, use traditional cooking methods, and sometimes do not pay attention to their children when they are cooking.

In our study, we found that 50.7% of them were unemployed. This finding goes in line with the finding that was done in Egypt; the majority of patients (67.2%) were not working. Of those, 31% were below school age, 25% were students, 41% were housewives and 3.2% were retired [26]. This is due to the same customs and traditions between the two countries.

In this study, we found the highest frequencies 58.1% of burned patients were living in rural areas. Compared with other results occurred in Vietnam [1], they reported a significantly higher proportion of female lived in an urban area (37.2% vs. 31.8%; $p < .001$) compared to male cases. Another finding done in Iraq by Bahir et al, reported that most of the victims are living in rural regions compared to urban dwellers, this difference is highly significant $p < 0.05$ [19]. This is due to the practice of traditional means of cooking or washing, and those who live in the countryside suffer from not providing them with the simplest components of life.

In our study, we found the flame was the main cause of burn and shows in 37%. A retrospective study was conducted among 5061 adult patients by Lam et al, the authors reported that more males suffered electrical and flame/heat surface contact injuries than females ($p < .001$), whereas more females suffered a scald injury (34.7% vs. 12.2%; $p < .001$) [1]. In Saudi, a cross-sectional study conducted among 180 burned patients, found the most common cause of burn injuries was hot water (36.1%) followed by gas fires (27.2%) and electrical fires (19.4%) [11]. In Pakistan, a pilot active surveillance studied was conducted among 403 burn injury patients, they found the main causes of burns were scalding ($n = 259$, 64.3%), followed by fire, flame, or smoke burns ($n = 66$, 16.4%) [27]. A study was done in China by Tain, who reported the vast majority of burns were caused by scalds (476, 42.27%) and flame (457, 40.59%). These leading causes were followed by electrical burns (81, 7.19%), explosion burns (58, 5.15%), chemical burns (31, 2.66%), and contact burns (15, 1.33%), each of which caused significantly fewer burns than scald and flame to burn [4]. Another finding was conducted in Iran; they reported the most frequent burn etiology was flame, which occurred in 70.5% of the cases. It was followed by scald injuries to 22.6%, electrical burns in 3%, contact burns in 1.3%, unknown causes in 1.7%, chemical burns in 0.8%, as well as lightning burns in 0.03% of the cases [24]. This is due to the use of the same old methods of cooking or washing.

However, the length of hospitalization, in this finding we found that 36.9% of burned patients stayed in the hospital for more than 30 days and this it depends on the degree and etiology of burn, followed by 31.8% with the range 16 to 30 days and 31.3% for less than 15 days. An observational study was done in Malawi; the authors found the mean hospital stay was 21.1 days [28].

Another finding was conducted in China by Tain [4], which reported the median length of hospitalization was 30 (15, 52) days. In Iran, a study conducted by Alipour et al mentioned the overall mortality rate was 14.21%. The hospital stay ranged from 1 to 113 days with a mean stay of 4.49 ± 4.67 days. More than 75% of the patients had a hospital stay of 7 days or shorter (85.4%), and only 7 patients had a hospital stay of 30 days or longer (0.2%) [24], this goes back to the same customs and traditions between the countries.

In this study more than half 52.3% of them had the second degree of burn; 33.1% had the third degree of burn and 14.6% had the first degree of burn. This finding goes with other finding done it in Saudi [11], they found the second-degree burns were prevalent (71.1%) followed by third-degree burns at 16.1% and first-degree burns at 12.8%. a study done in Iran reported the majority of the patients had third-degree burns (73%), followed by second-degree (26.3%) and first-degree (0.7%) burns. Flame and scald burns were the most common causes in all burn degrees [24]. This is explained according to the reasons mentioned, such as the cause of the burn, the substance causing the burn, the type of clothing worn by the burner and the duration of exposure to burning.

In our study we found that 27.1% of them had more than 75.1% of TBSA, followed by 25.2% had less than 25% and 24.1 % had the range 25 to 50% of TBSA. A study was conducted in India, the finding refers to burn injury involving up to 30% of TBSA was found in 55 cases (44.7%) and very few (7.3%) had >90% of TBSA involved[14]. In another study done in China[4], the youngest patients (0–6 years old) suffered a burn with a TBSA of less than 30%, while the oldest patients (45+ years old) had a TBSA of greater than 30.1%. Another finding was conducted in Iran by Karimi et al, the affected mean TBSA was $43.98 \pm 30.75\%$ (within the range of 2-100%). The highest TBSA frequency was related to the 10-19%, 20-29%, and $\geq 90\%$ categories. There was a significant correlation between TBSA and burn degree (Pearson's correlation coefficient = 0.421, P = 0.000), indicating that an increase in TBSA would be associated with an increase in burn degree [29]. This is explained according to the cause of the burn, the substance causing the burn, the type of clothing worn by the burner and the duration of exposure to burning.

In this study we found the highest frequency 45.3% of burned patients died, 33.2% had a complete recovery and only 21.5% had a scar and disfigurement as a result of a burn. Other studied in Iran; Less than half of the patients were discharged with some improvement and more than a quarter left the hospital against medical advice (LAMA), and a quarter of them had died and this indicating a mortality rate of 25%[30,31]. This depends on the extent of the body's response to treatment and the degree of burning and complications that follow the burn.

In our study we found that a highly significant association has been found between age, gender, length of hospitalization, TBSA, depth of burn and outcomes of burn by etiology of burn at a p. value less than 0.05. This finding go in line with other findings was done it in Pakistan[32] , China[33], Lebanon[34],

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Oman[35], Korea[36], Turkey[37], Nepal[38] and in Iraq[39-42]. This is due to the similarity in the customs and traditions used in treating burns between countries.

Conclusion

The majority of burn injuries occurred among those in the age group 15 to 44 years old, male cases were more than female cases. Half of them were unemployed and living in a rural area. Flame and scald are the main etiology for burn among them. Most of them stayed in the hospital for more than one month. Most of them had a second degree of burn. Deaths were the main outcomes of burn. A highly significant association has been found between the variables such as (age, gender, TBSA, depth of burn, length of hospitalization and outcomes) by etiology of burn at the p. value less than 0.00001.

Recommendation: we need to improve the effects of preventive measures; studies are needed to investigate the epidemiology, etiology and outcome of the burn patient population. Also, to determine the mortality and morbidity among burned cases.

Conflict of interest: None

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