Original Article
Epidemiological, demographic and outcomes of burns among females at reproductive age in Baghdad/Iraq

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Abstract: Background: Burns remained a major health problem in most developing countries which have increased the mortality and morbidity among the people. This study aimed to describe the epidemiology and outcomes of burn among females at reproductive age and investigate the factors that associated with mortality during the study period in in Baghdad/Iraq. Methods: A retrospective cohort study was undertaken at Al-Karama academic Hospital in Baghdad. Four hundred and thirty-seven females were admitted to this center from 1st of January 2017 to the end of October 2018. Data were collected from the records and patient file at the department of statistics. The information was including the age, education, marital status, occupation, TBSA, degree of burn, length of stay in hospital, causes, and patient condition. Software of STATA version 13 was used to analysis this data. Results: The mean age was 27.1 and SD 0.34 with 95% CI (26.4358 to 27.8067). the fire 64.8% (283/437) were the most cause of burn among females. Housewives 65% (284/437) were more probably exposed to burn than others with the mechanism of burning and females with primary education 42.8% (187/437) were more probability of burn than others group. Regard to length of stay, the mean was 7 days and the 95% CI [6.489-7.629]. Thus, 79.2% (346/437) of females that stayed in the hospital for less than 10 days had higher percentage of burn comparing with another period. Mean and SE of TBSA was 57.8 and 1.2 with the 95% CI [55.4051-60.2516]. A significant relationship was found between occupation, education status, TBSA, length of stay, causes of burn and outcomes at the p. value <0.05. The time at risk was 3085 with the incidence rate. 14. The survivor function in one day (Kaplan Meier estimate) was 0.8970 and SE 0.0144 with 95% CI [0.8645-0.9221]. Conclusion: The patients at age 26-45 years have equal hazard ratio of death (HR=1) at all the times of follow-upping. There is not statistically significant have been found at the (p. value =0.486), the 95% CI for the HR includes the null value of 1. As well the causes of burn, the patients with fire cause have a higher hazard of death HR=1.1 with the (p. value =0.012). Half of cases were single. A significant relationship has been found between the marital status and the age groups of the p. value 0.000. Also, a significant result of the intent status with causes of burn at the p. value 0.000.

Keywords: Epidemiology, female, burns, Iraq, retrospective study, survival, Kaplan

Introduction

In spite, the increasing of development in most countries, burns remained a major health problem in most developing countries which have increased the mortality and morbidity rate among people [1].

Therefore, the WHO reported that more than one thousand and eighty deaths happened by burning every year [1]. Further, the wars, poverty, unemployment, violence and other factors led to an increase in mortality rate among females and adults rather than another groups [2]. In Iraq the total number of burn patients was 92,734 patients per year (250 patients per day) and regarding to the side effects after burn as the bacterial and viral infections, ulcers and other diseases, it was one of the causes for death and its approximately 37% of the total number of deaths [3]. In Baghdad, the prevalence of burn injuries in 2016 was 1.2% per 100,000 population [4]. In Basra 2017, the researcher reported that the most common

Characteristics of burned patients after burns. A retrospective study

Table 1. Characteristic of study sample in relation to causes of burn

	Causes of burn					p. value
	Number % Fire	Number % Hot liquid	Number % Chemical	Number % Electricity	Number % Total	
Age groups (years)						
15-25	141	46	20	9	216	0.669
	65.3	21.3	9.3	4.2	100	
26-35	100	37	12	11	160	
	62.5	23.1	7.5	6.9	100	
36-45	42	9	5	5	61	
	68.9	14.8	8.2	8.2	100	
Occupation						
Housewife	187	55	24	18	284	0.695
	65.9	19.4	8.5	6.3	100	
Employee	57	26	7	5	95	
	60.0	27.4	7.4	5.3	100	
Student	39	11	6	2	58	
	67.2	19.0	10.3	3.5	100	
Education status						
Elementary	127	39	13	8	187	0.300
	67.9	20.9	6.9	4.3	100	
Secondary	80	34	16	8	138	
	58.0	24.6	11.6	5.8	100	
Collage	76	19	8	9	112	
	100	16.9	7.1	8.0	100	
Length stay						
1-10 day	207	85	34	20	346	0.000
	59.8	24.6	9.8	5.8	100	
>10 day	76	7	3	5	91	
	83.5	7.7	3.3	5.5	100	
TBSA						
<25%	18	38	12	6	74	0.000
	24.3	51.4	16.2	8.1	100	
25-50%	67	19	18	6	110	
	60.9	17.3	16.4	5.5	100	
50.1-75%	99	21	6	8	134	
	73.9	15.7	4.5	5.9	100	
>75.1%	99	14	1	5	119	
	83.2	11.8	0.8	4.2	100	
Outcomes						
Death	122	28	19	6	175	0.000
	69.7	16.0	10.9	3.4	100	
Recovery	92	61	17	11	181	
	50.8	33.7	9.4	6.1	100	
Transfer to another unit	26	1	0	1	28	
	92.9	3.6	0.0	3.6	100	
Discharge by her own	43	2	1	7	53	
	81.1	3.8	1.9	13.2	100	

mechanisms of burns were respectively flame scalds, electrical burns and chemical burns [1].

In addition, the 2nd and 3rd degree of burns are the most dangerous and common among

Table 2. Characteristic of study sample in relation to outcomes

| | Outcomes | | | |
	Number % Died	Number % Survivors	Number % Total	p. value
Age groups				
15-25	96	120	216	0.078
	44.4	55.6	100	
26-35	53	107	160	
	33.1	66.9	100	
36-45	26	35	61	
	42.6	57.4	100	
Occupation				
Housewife	140	144	284	0.000
	49.3	50.7	100	
Employee	12	83	95	
	12.6	87.4	100	
Student	23	35	58	
	39.7	60.3	100	
Education status				
Elementary	102	85	187	0.000
	54.6	45.5	100	
Secondary	44	94	138	
	31.9	68.1	100	
Collage	29	83	112	
	25.9	74.1	100	
Length stay in hospital				
1-10 day	150	196	346	0.006
	43.4	56.7	100	
>10 day	25	66	91	
	27.5	72.5	100	
TBSA				
<25%	3	71	74	0.000
	4.1	95.9	100	
25-50%	19	91	110	
	17.3	82.7	100	
50.1-75%	44	90	134	
	32.8	67.2	100	
>75.1%	109	10	119	
	91.6	8.4	100	
Causes of burn				
Fire	122	161	283	0.026
	43.1	56.9	100	
Hot liquid	28	64	92	
	30.4	69.6	100	
Chemical	19	118	37	
	51.4	48.7	100	
Electricity	6	19	25	
	24.0	76.0	100	

burned cases and the main causes for losing the humanity and disfigurements [5]. Therefore, females who survived from the process of burning, they are living in a state of isolation and deprived from their most basic rights, which is living in a normal life [6]. It has been reported that women at reproductive age are often the victims of intentional burning due to their low socioeconomic status, living in crowded houses and using unsafe cooking appliances [6]. This study aim at describing the epidemiology and outcomes of burn among female at reproductive age and investigate the factors that associated with mortality during the study period in in Baghdad/Iraq.

Methods

A retrospective cohort study was undertaken at Al-Karama Academic Hospital in Baghdad. it's one of the largest hospitals in Baghdad, which has fourteen private burn wards and two operation rooms. Four hundred and thirty-seven females were admitted to this centre from 1st of January 2017 to the end of October 2018. before starting to collect the data, the ethical clearance was obtained from Ministry of health and from Al-Karama hospital to collect our data. Data were collected from the records and patient files at the department of statistics. then, entered in the Microsoft Excel sheet daily. the information obtained from the record were including the age, education, marriage, Job, TBSA, degree of burn, length of hospital stay, causes, and patient condition data. The inclusion criteria of cases were the females at the reproductive age (15-45). females in the age less than 15 years and more than 45 years and if there is any empty field in the record or in the patient's file were excluded from our study. in addition, the patients in emergency ward were excluded from this study. STATA version 13 was used to analysis this data, Frequency and percentage was used for summarizing the category variables. The Chi Square statistic was used to find the relationships between categorical variables. MLR was used to explain the relationship between

Table 3. Distribution of studied sample according to marital status and age groups

| Marital status | Age groups | | | Total |
	Number % 15-25	Number % 26-35	Number % 36-45	Number %
Single	155	79	20	254
	61.0	31.1	7.87	100.0
Married	46	61	33	140
	32.9	43.6	23.6	100.0
Divorce	15	20	8	43
	34.9	46.5	18.6	100.0
Total	216	160	61	437
	49.4	36.6	13.9	100.0

Pearson chi2(4)=38.3, *p*. value =0.000.

Table 4. Distribution of studied sample according to intent status and causes of burn

| Intent | Causes of burn | | | | Total |
	Number % Fire	Number % Hot liquid	Number % Chemical	Number % Electrical	
Intentional	186	38	6	8	238
	78.15	15.97	2.52	3.36	100
Unintentional	97	54	31	17	199
	48.74	27.14	15.58	8.54	100

Pearson chi2(3)=47.8041; Pr=0.000.

one variable and two or more independent variables. the Kaplan-Meier method was used to compare the survival curve in two or more groups, Cox regression (or PHR) was used to analyse the effect of several risk factors on survival.

Results

Four hundred and thirty-seven females were admitted to the Burns Units during the study. The mean age was 27.1 and SD 0.34 with 95% CI (26.4358 to 27.8067). According to our results, the fire 64.8% (283/437) were the most cause of burn among females. In the age group of 15-25 years, the highest percentage of burn cause were fire 65.3% (141/283); the hot liquid cause 21.3% (46/283); chemical cause in 9.3% (20/283) electricity cause in 4.2% (9/283), respectively no statistically significant relationship has been found between the age groups and causes of burn at the *p*. value <0.05. Housewives 65% (284/437) were more probably exposed to burn than others with the mechanism of burning. Also, no statis-

tically significant relationship has been found between the occupation and causes of burn at the *p*. value <0.05. For education status, females with elementary education 42.8% (187/437) were more at risks of burn than others group. Also, there is no statistically significant relationship has been found between the education status with causes of burn at the *p*. value <0.05. Regard to length of stay, the mean was 7 days and the 95% CI [6.489-7.629]. Thus, 79.2% (346/437) of females that stayed in the hospital for less than 10 days has higher percentage of burn comparing with another periods. A statistically significant relationship has been found between the length of stayed in the hospital and causes of burn at the *p*. value <0.05 (**Table 1**). Mean and SE of TBSA was 57.8 and 1.2 with the 95% CI [55.4051-60.2516]. Therefore, the highest percentage of TBSA was 30.7% (134/437) between the range of 50.1% and 75% from the total body surfaces. There is statistically significant relationship has been found between the TBSA and causes of burn at the *p*. value <0.05. The highest percentage of females was 69.7% (122/175) who died by the fire. There is statistically significant relationship has been found between outcomes and causes of burn at the *p*. value <0.05 (**Table1**).

A significant relationship was found between occupation, education status, TBSA, length of stay, causes of burn and outcomes (*p*. value <0.05) (**Table 2**). The case fatality rate was 40% (# deaths assigned to a specific disease during a given year/# new cases of that disease reported during the same year *100) (**Table 2**). Regarding to marital status, the 58.1% (254/437) was single status, followed by 32% (140/437) were married. A significant relationship has been found between marital status and age groups of the Pearson chi2 38.3 and *p*. value 0.000 (**Table 3**). As well, a significant relationship has been found between intent status and causes of burn with the Pearson chi2 47.8; degree of freedom (3) and *p*. value 0.000 (**Table 4**).

Table 5. Multiple linear regression analysis of factors associated with outcomes

Outcomes	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Age	-.0002571	.0025968	-0.10	0.921	-.0053468	.0048326
TBSA	-.013537	.0006651	-20.35	0.000	-.0148407	-.0122334
Occupation	.0813175	.0226134	3.60	0.000	.036996	.125639
Education	.0861449	.0233936	3.68	0.000	.0402944	.1319955
Causes of burn	-.0775645	.0191262	-4.06	0.000	-.1150512	-.0400777
Length stay in hospital	.0166713	.0026648	6.26	0.000	.0114485	.0218942
_cons	2.281366	.0883883	25.81	0.000	2.108128	2.454604

Table 6. Time and incidence rate of study sample

Time at risk	Incidence rate	No. of subjects	Survival time		
			25%	50%	75%
3085	.1416532	437	2	6	9

Multiple linear regression was performed on 437 females. Six independent predictors of death were identified: age, TBSA, occupation, education, causes of burn and length of stay in hospital (**Table 5**). There is a relationship has been found between TBSA, occupation, education, causes of burn, length stay in hospital with the outcomes at the *p*. value 0.000 (**Table 5**).

The time at risk was 3085 with the incidence rate .14. the 25th and 75th shown in the table [6]; the 25th percentile is 2 days and its mean 25% of participants have survival times less than 2 days and in 75% the participants have been survival time at least 9 days (**Table 6**).

And when use the comments lists to estimate the survivor function and get the Kaplan-Meier Estimates (**Table 7**). In one day the survivor function (Kaplan Meier estimate) was 0.8970 and SE 0.0144 with 95% CI [0.8645-0.9221]. while in forty-nine days, the survivor function was 0.000 (**Table 7**).

For Cox PH model, the patient with the age group 26-45 years have equal hazard ratio of death (HR=1) during the follow-up. There is not statistically significant have been found at the (*p*. value =0.486) with 95% CI for the HR includes the null value of 1. For the total body surfaces area, the patient with TBSA more than 25% having of equal hazard of death (HR=.989 ≈ 1) at all the times of follow-up, there are statistically significant have been found at the (*p*. value =0.000). Thus, the causes of burn, the

patients with fire cause having a higher hazard of death HR=1 and there is statistically significant have been found at the (*p*. value =0.012). therefore, the married patients have lower HR=.94 and there is not statistically significant *p*. value =0.820. in addition, the patients with length of stay in hospital less than 10 days have lower HZ=.99 of death with 95% CI (.9830-1.0145) (**Table 8**).

Plots of Kaplan-Meier product limit estimates of survival patients of burning (**Figures 1** and **2**).

Discussion

The aims of our study are describing the epidemiology and outcomes of burn among females at reproductive age and investigating the factors associated with mortality during the study in Baghdad/Iraq, the case fatality rate of this study was 40.1%. Studies reported to investigate the mortality rate by the burn injuries included Iran [7], India [8, 9], Nigeria [10], Iraq [11], Turkey [12], Colombia [13], Pakistan [14] and Nepal [15] with mortality rate of 64%, 39.88%. 23.2%, 22%. 14%. 1.270%. 36.12% and 18.6%, respectively. The age of female is considered the one of the risk factor especially among the youngest group. In this study the mortality was higher in the age groups 15-25 years. A study from Iran [7] reports the highest frequency of burns (53.5%) occurs to the age groups 16-25-year-old. An Indian [9] proposes the highest incidence of the burns was 47.01% in the 21-30-year age group. This could be due to different economic and psychological situations in different countries, especially among countries with instability due to wars. Moreover, the mortality was higher among housewives, because of household equipment and standing. An Indian [8], the authors indicated that 47.01% of female burns patients are house-

Table 7. Kaplan-Meier estimates

Time	Beg. Total	Fail	Net lost	Survivor function	SE	95% CI
1	437	45	0	0.8970	0.0145	0.8645-0.9221
2	392	70	0	0.7368	0.0211	0.6929-0.7755
3	322	27	0	0.6751	0.0224	0.6290-0.7168
4	295	28	0	0.6110	0.0233	0.5636-0.6549
5	267	35	0	0.5309	0.0239	0.4830-0.5764
6	232	38	0	0.4439	0.0238	0.3969-0.4899
7	194	33	0	0.3684	0.0231	0.3233-0.4135
8	161	21	0	0.3204	0.0223	0.2771-0.3644
9	140	32	0	0.2471	0.0206	0.2078-0.2884
10	108	17	0	0.2082	0.0194	0.1715-0.2475
11	91	28	0	0.1442	0.0168	0.1131-0.1788
12	63	11	0	0.1190	0.0155	0.0907-0.1513
13	52	6	0	0.1053	0.0147	0.0787-0.1362
14	46	8	0	0.0870	0.0135	0.0629-0.1157
15	38	3	0	0.0801	0.0130	0.0571-0.1080
16	35	5	0	0.0686	0.0121	0.0475-0.0949
17	30	6	0	0.0549	0.0109	0.0362-0.0790
18	24	2	0	0.0503	0.0105	0.0325-0.0737
19	22	6	0	0.0366	0.0090	0.0218-0.0573
20	16	1	0	0.0343	0.0087	0.0201-0.0545
21	15	2	0	0.0297	0.0081	0.0167-0.0489
22	13	3	0	0.0229	0.0072	0.0118-0.0403
23	10	3	0	0.0160	0.0060	0.0072-0.0314
24	7	1	0	0.0137	0.0056	0.0057-0.0284
27	6	1	0	0.0114	0.0051	0.0044-0.0253
29	5	1	0	0.0092	0.0046	0.0031-0.0221
35	4	1	0	0.0069	0.0039	0.0019-0.0188
38	3	1	0	0.0046	0.0032	0.0009-0.0155
41	2	1	0	0.0023	0.0023	0.0002-0.0122
49	1	1	0	0.0000	-	-

Table 8. Cox PH model regression

T	Haz. Ratio	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Age	1.004577	.0065856	0.70	0.486	.9917525	1.017568
TBSA	.98965	.002480	-4.15	0.000	.98481	.994532
Occupation	.8779079	.058099	-1.97	0.049	.7711118	.999495
Education	1.020794	.0603241	0.35	0.728	.909151	1.146146
Causes	1.137271	.058242	2.51	0.012	1.028661	1.257349
Marital status	.9842376	.0686968	-0.23	0.820	.8583979	1.128525
Length stay	.9986535	.0080467	-0.17	0.867	.9830062	1.01455
Outcomes	.7842665	.0382297	-4.99	0.000	.7128057	.8628914

A mortality rate of 62.3% occurred in patients with more than 75% TBSA involved in burns. An Iranian [7] studied showed the Mean (SD) of the TBSA burnt across all patients was 56% (28.5%), with a survival rate of 29% (13.4%). The relationship between TBSA and mortality was statistically significant. another Indian studied [8] reported a mortality rate of 65.67% in patients with 80%-100% of their body burnt, and 19% in patients with 60-79% of their body burnt. Another study reports a mortality rate of 35% in patients with more than 60% of total body surface area involved in burns [16]. This is due to kind of materials which were used by them to burn themselves. The mortality rate was 85.7% of cases that stays in the hospital for less than ten days while the survival case was 74.8%. Literature reports the different mortality rates. For example, An Iranian study to report a mean (SD) length of stay in hospital stayed as 13 days [16], An Indian [8] study reports that 47% of patients that died within 24 hrs and 28.4% survived with the two to seven days and the longest survival day was 55, with the most of patients (75.35%) dying within 1 week. The type of treatment, severity of the burns, the patient's response to treatment and available facilities to treat the patients played significant roles in the patient outcome. This study found that most burns 54.5% was a result of intentional burned. These results agree with previously studies from India and Pakistan [9, 14].

Most patients were burnt while using old-fashioned cooking methods and a poor understanding of how to use them safely.

wives and this is because of poverty and customs in which countries force women to work at home.
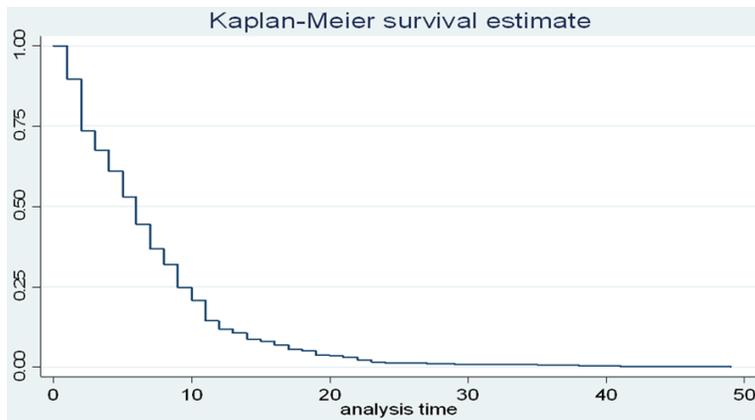
Figure 1. Plots of Kaplan-Meier product limit estimates of survival of a group of patients who that survive after burning.
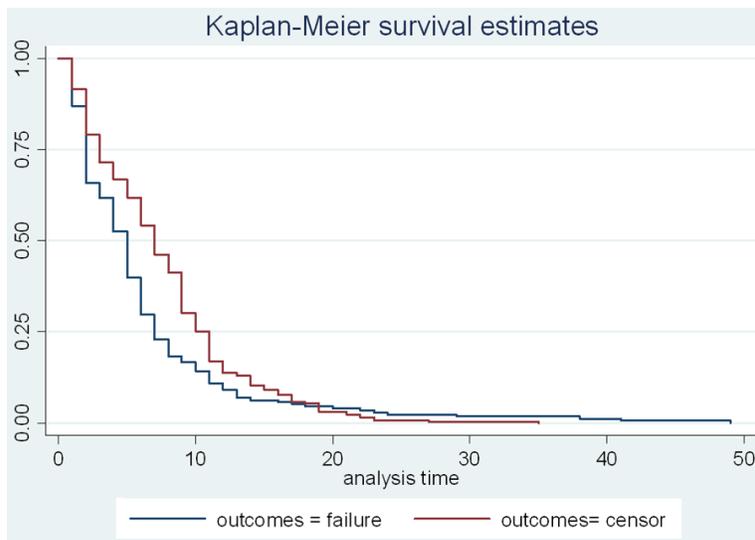

Figure 2. Plots of Kaplan-Meier product limit estimates of survival of patient with burning who dead and survived during the study period.

the causes of burn, the patients with fire cause have a higher hazard of death HR=1.1 with the (*p*. value =0.012). Half cases were single. A significant relationship has been found between the marital status with the age groups of the *p*. value 0.000. Also, a significant result of the intent status with causes of burn at the *p*. value 0.000. It is necessary to increase the public awareness in the treatment of burns, particularly for specialized and urgent care. This requires specialized infrastructure to cope with the large number of burn injuries which occur annually. Therefore, the economic burden of treatment is a major obstacle due to the length and high cost of treatment. Although the general medical sector provides most of these medical services, concerted efforts are needed to increase the treatment and support of patients with burns.

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Disclosure of conflict of interest

None.

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Naked flame was the cause of the highest percentage of mortality, 78.9%, among females at reproductive age. Several studies in the literature also report this finding in countries including Iran 98.2% [16], Nigeria 49.1% [17], Iraq 51% [1], Nepal 41.7% [15], Pakistan 89.3% [14] and Bangladesh 88% [18]. However, a study in Colombia [13] it has been reported that electricity is the leading cause of burn related death (49.5%), followed by fire (28.5%).

Conculsion

The patients at age 26-45 years have equal hazard ratio of death (HR=1) at all the times of follow-upping. Not statistically significant have been found at the (*p*. value =0.486), the 95% CI for the HR includes the null value of 1. As well

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