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### A Study of Burn Injuries in Patients Admitted to the Burn Unit, Suez Canal University Hospital: Medico-Legal Perspectives

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#### ABSTRACT

#### KEYWORDS

Burn injuries  
Medico-legal aspects  
Mortality predictors

Burn injuries present a major public health concern. This study aimed to assess burn injuries and their outcome in patients admitted to the Burn Unit of Suez Canal University Hospital, Ismailia, Egypt from the medico-legal point of view and to determine factors that affect their mortality. The medical records of all patients admitted to the Burn Unit, Suez Canal University Hospital in the period between 1<sup>st</sup> January 2013 and 31<sup>st</sup> December 2014 were reviewed retrospectively. The total number was 292 patient, the mean age of patients was 17.5±17.2 years; children less than 5 years of age were more exposed to burn injuries (35.6%) than other age groups. Males constituted 68.1% of the study group, while 63% came from rural areas. Flame burns and scalds represented 48.2% and 44.9% respectively with a predominance of injuries in colder months. The majority of cases (72.6%) showed a percentage of total body surface area (TBSA) less than 20%. Upper extremities were most commonly affected (58.2%). A significant relationship was found between TBSA and each of: type of burn, duration of the hospital stay, ICU admission and outcome. A significant relation was also found between type of burn and each of: age, gender, and duration of hospital stay. Mortality rate was 5.5% of cases and septicemia was the most common cause of death (43.8%). Using stepwise logistic regression, TBSA and ICU admission were the only detected mortality predictors.

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#### Introduction

Medico-legal studies correlate law with medicine using medical assessment for legal purposes. Burn injuries are of the conditions that are encountered in health; it represents an assault on many aspects of the patient (Kumar, 2015). Burn is an injury of the skin or other tissue which is caused by thermal trauma. It occurs when cells are damaged by hot liquid

(scald), hot solid (contact burn), flames (flame burns), radiation, electricity, friction or chemicals (Peck, 2011). Patient's age, extent of injury, affected site, depth of burn and coexisting health disorders are factors that affect the severity of burn injury (Stylianou et al., 2015). Burn injuries present a major public health concern. Burned patients may undergo many surgical procedures, requiring long hospitalization that imposes a great burden on victims, families, and societies. Physical scars and psychological trauma resulting from the burn can last a lifetime (Peck, 2011; Grivna et al., 2014). Burn injuries may range from minor to fatal injuries. Annually 256,000 deaths occur as a consequence to fire-related burns all over

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the world. Ninety percent of fire-related burns occur in low and middle-income countries (Forjuoh, 2006). Fatal burn injuries represented 2.6% of autopsies done from 2006 to 2010 in the mortuary of Forensic Medicine Institute, Cairo (Afify et al., 2012).

Worldwide, the incidence of burn victims who required medical care was 11 million/year in 2004 and among all injuries, burn injuries ranked the fourth according to WHO Global Burden of Disease report. Burns with total body surface area (TBSA) less than 20% represented the fifth most common cause of nonfatal injuries in children affecting about 153/100,000 of children aged 0–15 years (World Health Organization, 2008). In 2007, a pilot surveillance study in children less than 11 years of age in Bangladesh, Colombia, Egypt, and Pakistan found that of all 1559 unintentionally injured children: burns ranked the third (13%) coming after falls and road traffic accidents (Hyder et al., 2009).

Prevention programs can benefit greatly from studying and applying epidemiological data into them (Roberts, 2000; Scheven et al., 2012). There are studies that shed the light on the problem of burn, describe the pattern of burn injuries and analyze risk factors of this problem in various regions of Egypt (Attia et al., 2000; Hemeda et al., 2003; El Hadidy et al., 2009; Afify et al., 2012), however, there is lack of studies that describe burn injuries in Suez Canal region from the medico-legal aspect. The present study was conducted to assess burn injuries and their outcome in patients admitted to the Burn Unit of Suez Canal University Hospital, Ismailia, Egypt from the medico-legal point of view and to determine factors that affect their mortality.

## Patients and methods

This retrospective study was conducted on patients admitted to the Burn Unit of Suez Canal University Hospital. It is the main regional referral center for burn injuries from the Suez Canal and Sinai regions of Egypt. It

also receives tertiary referrals from other regional hospitals. The study group included burnt patients who were admitted to the Burn Unit of Suez Canal University Hospital in the period from 1<sup>st</sup> January 2013 to 31<sup>st</sup> December 2014.

Their medical records were reviewed from hospital registry unit after obtaining written approval from the General Manager of Suez Canal University Hospitals and confidentiality of data was maintained as collected data were kept anonymous. Data collection form was predesigned by the researchers. Collected data included socio-demographic data: age, sex, residence (rural or urban), data related to burn incidents: season, time of injury, type, degree of burn, total body surface area TBSA (estimated according to the rule of 9 for adults and the Lund and Browder's charts for children), anatomical region. Data related to the clinical course and outcome of the patients: duration of hospital stay, ICU admission, complications of burn, causes of death and duration of survival before death were included.

### *Statistical analysis:*

Data management was carried out using SPSS (Statistical Package for Social Sciences) version 18.0. Descriptive statistics are presented as ranges and mean values  $\pm$  standard deviation for quantitative variables. Qualitative variables were presented as numbers and percentages. Chi-square test was used to test their significant difference. Logistic regression analysis was conducted to determine factors that predict the outcome of burn patients, using the outcome as the dependent variable and age, sex, type of burn, TBSA and ICU admission as predictors. The confidence interval was set as 95%. P value less than 0.05 was considered significant.

## Results

A total number of 292 patients were admitted to the Burn Unit of Suez Canal University Hospital in the period from 1<sup>st</sup>

January 2013 to 31<sup>st</sup> December 2014. Their ages ranged from 6 months to 85 years ( $17.5 \pm 17.2$  years). Children less than 5 years of age represented 35.6% of all burn injuries. Males were 199 (68.1%). Sixty three percent of burnt patients live in rural area. Regarding the manner of injuries, eight cases were recorded as assaults and two cases were recorded as

suicidal, while no recording of accidental injuries.

The present study showed that the highest proportion occurred in autumn (37.7%), while the lowest occurred in spring 17.5%. Regarding its diurnal variations; the incidence in the day time was 67.1% (Table 1).

**Table (1):** Some demographic and clinical characteristics of burn patients (n=292).

Variable	number	%
<b>Season</b>		
Summer	57	19.5
Autumn	110	37.7
Winter	74	25.3
Spring	51	17.5
<b>Time of the day</b>		
Day	196	67.1
Night	96	32.9
<b>Type of burn</b>		
Flame	142	48.6
Scald	131	44.9
Chemical burn	12	4.1
Electric burn	7	2.4
<b>Degree of burn<sup>1</sup></b>		
1 <sup>st</sup> degree	77	26.4
2 <sup>nd</sup> degree	278	95.2
3 <sup>rd</sup> degree	94	32.2
<b>Anatomical region<sup>1</sup></b>		
Head & Neck	149	51
Trunk	113	38.7
Upper extremities	170	58.2
Lower extremities	131	44.9
Genitalia	26	8.9
Buttocks	26	8.9
<b>Duration of hospital stay</b>		
< 1 day	36	12.3
1-7 days	86	29.5
8-14 days	61	20.9
15-21 days	42	14.4
22-28 days	16	5.4
>28 days	51	17.5
<b>Outcome</b>		
Discharged home	190	65
Left against medical advice	86	29.5
Death	16	5.5

<sup>1</sup>more than one choice are allowed, n: number.

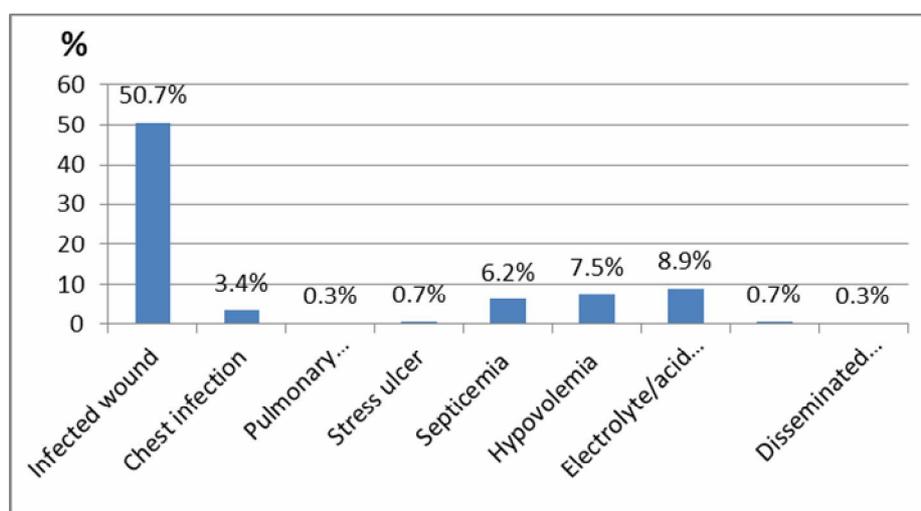
Flame burn was the major burn hazard (48.2%) followed by scalds (44.9). Multiple degrees of burn were present in most cases. The 2<sup>nd</sup> degree burn constituted 95.2% of cases. The most frequent burn injuries were located in the upper extremities (58.2%) followed by head and neck (51%), while the least affected regions were the buttocks and genitalia (8.9% each) (Table 1). The percentage of TBSA ranged from 1% to 80% with mean value  $15.3 \pm 13.6$ . Total body surface area less than 20% represented 72.6% of cases.

Duration of hospital stay was with a mean of  $16.7 \pm 25.64$  days, ranged from >1-344 days. Table (1) showed that 29.5% of the study group stayed in the hospital from one to seven days, 20.9% stayed for a period between 8 to 14 days, and 17.5% stayed in the hospital more than 28 days.

As shown in figure (1), the most frequent complication was wound infection (50.7%), followed by electrolyte and acid-base imbalance (8.9%), hypovolemia (7.5%) and septicemia (6.2%).

About two-thirds of the study group was discharged home for follow-up in the outpatient clinic (65%), while 29.5% left the hospital against medical advice (Table 1). The overall mortality was 16 patients (5.5%). The main cause of their death was septicemia in seven cases (43.8% of deaths), followed by hypovolemic shock and electrolyte and acid-base imbalance in 3 cases each (18.7% of deaths each). Multiple organ failure represented 12.5% of deaths (two cases) and the lowest proportion was for pneumonia in 6.3% of deaths (one case).

Nine deaths (56.2%) occurred within the period between one week and one month of the incident, four deaths (25%) occurred after one month of the incident while three patients (18.8% of deaths) died within the first 24 hours of the incident. No deaths occurred in the period between one day and one week.



**Fig. (1):** Complications of burn injuries.

Table (2) showed a statistically significant relation between the percentage of TBSA with type of burn, duration of hospital stay, ICU admission and outcome. Table (3) showed statistically significant relation between type of burn with age, gender and duration of hospital stay, while there was no significant correlation between type of burn and each of: residence, season, time of the day and the outcome.

Stepwise logistic regression analysis of age, sex, type of burn, TBSA, and ICU admission associated with fatal outcome of burn patients was shown in tables (4) and (5). Total body surface area and ICU admission were the factors significantly affecting mortality while age, sex and type of burn did not influence the outcome.

**Table (2):** The relation between TBSA and type of burn, duration of hospital stay, ICU admission and outcome (n=292).

TBSA	<20%		20 - 39 %		40-59 %		≥ 60 %		p value
	n=212	%	n=59	%	n=14	%	n=7	%	
<b>Type of burn</b>									
Flame burn ( n=142)	94	44.3	31	52.5	11	78.6	6	85.7	0.024*
Scald (n=131)	102	48.1	27	45.8	2	14.3	0	0	
Chemical burn (n=12)	11	5.2	0	0	0	0	1	14.3	
Electrical burn (n=7)	5	2.4	1	1.7	1	7.1	0	0	
<b>Duration of hospital stay</b>									
< 1 day	27	12.7	4	6.8	2	14.3	3	42.8	0.01*
1-7 days	75	35.4	10	16.9	0	0	1	14.3	
8-14 days	40	18.9	16	27.1	4	28.6	1	14.3	
15-21 days	31	14.6	7	11.9	3	21.4	1	14.3	
22-28 days	9	4.2	5	8.5	2	14.3	0	0	
> 28 days	30	14.2	17	28.8	3	21.4	1	14.3	
<b>ICU admission</b>									
Yes (n=15)	2	0.9	6	10.2	6	42.8	1	14.3	.000*
No (n=277)	210	99.1	53	89.8	8	57.2	6	85.7	
<b>Outcome</b>									
Discharged home (n= 190)	150	70.7	36	61	3	21.4	1	14.3	.00001*
Left against medical advice (n= 86)	61	28.8	18	30.5	6	42.8	1	14.3	
Death (n=16)	1	0.5	5	8.5	5	35.8	5	71.4	

TBSA: total body surface area, n: number, ICU: intensive care unit, \*statistically significant (p< 0.05).

**Table (3):** Relation between types of burns and socio-demographic characteristics, duration of hospital stay and outcome (n=292).

	Flame burn		Scald		Chemical burn		Electrical burn		p value
	n=142	%	n=131	%	n=12	%	n=7	%	
<b>Age group</b>									
< 5 years (n=104)	22	15.5	76	58	5	41.6	1	14.3	.000*
5 -9years (n=38)	14	9.9	24	18.3	0	0	0	0	
10-19 years (n=36)	27	19	6	4.6	2	16.7	1	14.3	
20-29 years (n=50)	37	26.1	9	6.9	2	16.7	2	28.5	
30-39 years (n=33)	21	14.7	8	6.1	3	25	1	14.3	
40-49 years (n=16)	11	7.8	5	3.8	0	0	0	0	
50-59 years (n=8)	6	4.2	1	0.8	0	0	1	14.3	
≥ 60 years (n=7)	4	2.8	2	1.5	0	0	1	14.3	
<b>Gender</b>									
Male (n=199)	107	75.4	76	58	10	83.3	6	85.7	.008*
Female (n=93)	35	24.6	55	42	2	16.7	1	14.3	
<b>Residence</b>									
Rural (n=184)	89	62.7	83	63.4	8	66.7	4	57.1	0.980
Urban (n=108)	53	37.3	48	36.6	4	33.3	3	42.9	
<b>Season</b>									
Summer (n=57)	21	14.8	29	22.1	4	33.3	3	42.9	0.188
Autumn (n=110)	53	37.3	52	39.7	2	16.7	3	42.9	
Winter (n=74)	38	26.8	31	23.7	5	41.7	0	0	
Spring (n=51)	30	21.1	19	14.5	1	8.3	1	14.2	
<b>Time</b>									
Day (n=196)	88	62	94	71.8	9	75	5	71.4	0.337
Night (n=96)	54	38	37	28.2	3	25	2	28.6	
<b>Duration of hospital stay</b>									
<day (n=36)	19	13.4	14	10.7	3	25	0	0	.000*
1- 7 days (n= 86)	35	24.6	44	33.6	5	41.7	2	28.6	
8-14 days (n=61)	26	18.3	35	26.7	0	0	0	0	
15-21 days (n=42)	17	12	24	18.4	0	0	1	14.3	
22-28 days (n=16)	9	6.3	7	5.3	0	0	0	0	
> 28 days (n=51)	36	25.4	7	5.3	4	33.3	4	57.1	
<b>Outcome</b>									
Discharged home	92	64.8	84	64.1	9	75	5	71.4	.69
Left against medical advice	39	27.5	42	32.1	3	25	2	28.6	
Death	11	7.7	5	3.8	0	0	0	0	

\*statistically significant ( $p < 0.05$ ), n: number.

**Table (4):** Logistic regression analysis for factors that influence fatal outcome (step.1)

Step 1	B	S.E	wald	df	Sig.	Exp (B)	95% CI for Exp(B)	
							Lower	upper
Age	.051	.339	.022	1	.882	1.052	.541	1.058
Sex(male)	.200	1.201	.028	1	.867	1.222	.116	327.328
<b>Type of Burn</b>			.760	3	.859			
Flame burn	15.984	1.654E4	.000	1	.999	8.749E6	.000	.
Scald	17.160	1.654E4	.000	1	.999	2.836E7	.000	.
Chemical burn	-10.426-	2.023E4	.000	1	1.000	.000	.000	.
<b>TBSA</b>	2.426	.762	15.465	1	.000*	20.000	4.494	1.223
<b>ICU admission</b>	5.263	1.544	11.620	1	.001*	193.084	9.365	3.981E3
<b>Constant</b>	-25.997-	1.654E4	.000	1	.999	.000		

S.E: Standard error, df: degree of freedom, TBSA: total body surface area, ICU: intensive care unit.

**Table (5):** Logistic regression analysis for factors that influence fatal outcome (step.4)

Step 4	B	S.E	wald	df	Sig.	Exp (B)	95% CI for Exp(B)	
							Lower	upper
<b>TBSA</b>	2.219	.464	22.882	1	.000*	9.196	3.705	22.825
<b>ICU admission</b>	3.796	1.016	13.957	1	.000*	44.517	6.077	326.129
<b>Constant</b>	-7.402 -	1.205	37.754	1	.000*	.001		

S.E: Standard error, df: degree of freedom, TBSA: total body surface area, ICU: intensive care unit.

## Discussion

Burn is one of the most common methods encountered in suicide or homicide (Ahmed et al., 2009). It constitutes a significant problem in developing countries. Age, gender, economic status, traditions, environmental and social circumstances are factors that affect the incidence, types and causes of burn and are responsible for their variation from one community to another (Adil et al., 2016).

The present study revealed that males were more exposed to burns than females (68.1% vs. 31.9 %) which agrees with other findings from South Africa (Scheven et al., 2012), Egypt (El Hadidy et al., 2009), Emirates (Grivna et al., 2014), Kuwait (Sharma et al., 2005), Portugal (Bartosch et al., 2013), Pakistan (Khaliq et al., 2013; Adil et al., 2016) and Iran (Mirmohammadi, et al., 2012). On the contrary, other studies in Egypt (Hemeda et

al., 2003; Mgahed et al., 2013) and India (Basu et al., 2014) reported the preponderance of females. This variation may be attributed to the difference in gender to age distribution in different studies. In some studies; the incidence of burns reported for females tended to increase with increasing age (Forjuoh et al., 1995; Hemeda et al., 2003), as they become more involved in household activities.

The present study revealed that flame burn represented the most common type of burn followed by scalds; which comes in accordance with results from other studies in Egypt, Kuwait, Portugal and Iraq (Attia et al., 2000; Hemeda et al., 2003; Sharma et al., 2005; El Hadidy et al., 2009; Qader, 2012; Bartosch et al., 2013). This finding was reversed in studies from South Africa (Scheven et al., 2012), England (Stylianou et al., 2015), United Arab of Emirates (Grivna et al., 2014) and Iran (Mirmohammadi, et al., 2012). In the present study, scalds followed by

flame burns represented the most common burn hazard in females which corroborates reports from other studies (Forjuoh, 2006; Mirmohammadi, et al., 2012; Grivna et al., 2014). This might be explained by the fact that females are more involved in household and cooking activities. In agreement with studies from low and middle-income countries (Attia et al., 2000; Sharma et al., 2005; Forjuoh, 2006; Mirmohammadi, et al., 2012; El Mehrat et al., 2014), the present study showed low proportions of electric and chemical burn injuries. Those injuries showed a higher occurrence rate in young adults and middle aged males, which agrees with other studies (Hemeda et al., 2003; Mimohammadi, et al., 2012; Khaliq et al., 2013; Stylianou et al., 2015) and might be related to occupational exposure or to their engagement in household maintenance activities.

The present study revealed that children especially those under the age of 5 years were more exposed to burn injuries especially scalds, which agrees with reports from other studies (Hemeda et al., 2003; Qader, 2012; Scheven et al., 2012; Mgahed et al., 2013;; Grivna et al., 2014; Stylianou et al., 2015), raising suspicions concerning child abuse either by omission or commission. Leaving children without supervision in the kitchen or bathroom may expose them to scalding either from boiling water and hot food spillage or turning on hot water taps and showers. They are sometimes being placed in hot water by caregivers either accidentally or deliberately as a kind of disciplinary action. The proportion of flame burns increased in young adults and middle-aged subjects which agrees with reports from other studies (Hemeda et al., 2003; Scheven et al., 2012), and this can be explained by exposure to occupational hazards for males and household burn injuries in females.

The current study revealed that cases presented from rural regions superseded those

from urban regions. Rural regions lack tertiary care as well as advanced care of burn injuries so, almost all burn injuries are usually referred to Suez Canal University Hospital. Use of kerosene stoves in cooking and kerosene lanterns is common in rural regions especially in those villages lacking electricity or exposed to repeated cut-off of electric current. Poor housing conditions, hazardous cooking practices and crowded homes are factors that pose a greater risk for burn injuries in rural community. This finding contradicts this reported from a study conducted in Ain-Shams University Burn center (Hemeda et al., 2003) in which 70% of burn cases came from urban region. The difference between the two studies could be attributed to the differences in the geographical location and the demographic characteristics of the regions where the two studied have been conducted.

In agreement with other studies from Egypt and India (Hemeda et al., 2003; El Hadidy et al., 2009; Basu et al., 2014), the present study revealed that the majority of burn cases especially flames and scalds occurred in colder months. In colder months there is a greater need for hot and boiling water for bathing. Moreover, the traditional primitive kerosene stove that lacks safety measures is being used in slums and in rural areas for these purposes which might explain the high incidence of flame and scald burns in those months as explained previously by El-Badawy and Mabrouk (1998). As burn injuries depend to a large extent on the activities and practices of the patients, the present study as well as studies from low and middle-income countries (Forjuoh, 2006) revealed that the majority of burn injuries occurred at the day-time which is coincident with most household activities, cooking practices and occupational exposure.

The majority of studies reported the predominance of non-intentional burn injuries (Attia et al., 2000; El Hadidy et al., 2009; Scheven et al., 2012; Basu et al., 2014; Grivna

et al., 2014). In the present study data concerning the manner of burn were lacking in the majority of reports as only 8 cases were reported as assaults and 2 cases as suicidal. Underestimation of intentional burn injuries is expected. It is expected that reporters of the incidents will refrain from reporting the true cause of burn for fear of legal liability, especially where the majority of victims are children less than 5 years of age as in the present study, raising suspicions of negligence or child abuse. It is the duty of physician to document the circumstances of injury (Shepherd, 2003), however, negligence of physicians or their ignorance about the medico-legal importance of these data might be the reason for not recording them in hospital registries. These data can be valuable in cases of assault or unexplained death to confirm how injury occurred and exclude natural death (World Health Organization, 2002). In a study conducted recently in Suez Canal University Hospital, it was found that the circumstances of injuries were reported in only 6.1% of the final medical reports for traumatic cases (Altantawy et al., 2016). However, true circumstances would only be confirmed by legal authority investigations, which are unfortunately not recorded in hospital registries, hence their reliability is always questioned.

Different distribution of affected body regions is dependent upon different mechanisms of injury. In agreement with other studies (El-Hadidy et al., 2009; Khaliq et al., 2013; Basu et al., 2014; Grivna et al., 2014), the present study reported upper extremities to be the most affected body regions.

Cases with TBSA < 20% represented the majority of admissions in the present study, which corroborates findings from United Arab of Emirates (Grivna et al., 2014), Egypt (Mgahed et al., 2013; El-Mehrat et al., 2014), Iraq (Qader, 2012), South Africa (Scheven et al., 2012), Portugal (Bartosch et al., 2013) and

Iran (Mirmohammadi, et al., 2012). A significant relation was detected between TBSA and burn type, which supports results from Iran (Mirmohammadi, et al., 2012). A high proportion of patients with TBSA > 39% was found to be in flame burn injured patients, which comes in accordance with findings reported by Grivna et al. (2014) indicating the severity of those burns.

In agreement with other studies from Egypt (Attia et al., 2000; El Hadidy et al., 2009), the present study showed a tendency to increased length of the hospital stay with increasing TBSA, which may be inferred to increased complications; infection, need for surgical interference or ICU admission. Cases with TBSA  $\geq$  60% had high mortality rate (71.4%) in agreement with other studies (Sharma et al., 2005; Khaliq et al., 2013; El Mehrat et al., 2014), reflecting the severity of their condition as emphasized by Bartosch et al. (2013). High mortality or leaving against medical advice might explain their tendency to stay in hospital for shorter durations. Less severe cases (TBSA < 20%) stayed for about one week, which reflects either good response to early and improved management or less complicated cases.

The present study showed a low mortality rate (5.5%) similar to the mortality rate reported in a study in Kuwait (Sharma et al., 2005), near to that in United Arab of Emirates (Grivna et al., 2014) and higher than that in England and Wales (1.5%) (Stylianou et al., 2015). Surprisingly, the mortality rate in the present study was much lower than that reported in other studies from Egypt (Attia et al., 2000; El Hadidy et al., 2009; Mgahed et al., 2013; El Mehrat et al., 2014). El Hadidy et al. (2009) attributed high mortality rate to larger TBSA in their study. Low mortality might reflect advanced knowledge on burn injuries, early and improved management of cases and health condition of the patients (El Hadidy et al., 2009). It also might be due to the fact the

majority of cases in the present study presented with TBSA <20% or due to the fact that 29.5% of cases left against medical advice with unknown final outcome. Additionally, most cases were from rural regions and death might have occurred in severe cases before reaching the hospital leading to apparently low mortality rate. The study included deaths that occurred only in the Burn Unit excluding those who reached the hospital after death which might have also led to underestimation of mortality rate.

Mgahed et al., (2013) stated that comparisons of outcomes in different studies of burn injuries are usually misleading unless the severity of injuries is standardized. In the present study, mortality rate was high in flame burns followed by scalds, which is in agreement to the study that was conducted in Kuwait (Sharma et al., 2005) and this might reflect the severity of those injuries or due to the preponderance of those types of burn in the present study.

On analysis of the predictors of mortality in the present study, TBSA and ICU admission were found to be the only significant predictors of mortality. This might be due to the low mortality rate in the present study leading to decreased number of significant mortality predictors. Different mortality predictors were reported in various studies. The most commonly reported mortality predictors were, TBSA and age (Attia et al., 2000; Sharma et al., 2005; El Hadidy et al., 2009; Khaliq et al., 2013; Bartoschet al., 2015), gender and type of burn (Sharma et al., 2005; Khaliq et al., 2013) and depth of burn (Attia et al., 2000; Hadidy et al., 2009).

About 56% of deaths occurred in the time period between one week and one month, which might be due to the fact that septicemia was the leading cause of death. This finding corroborates results from Iraq as septicemia represented 55% of cases (Qader, 2012), however it represented the second common

cause of death as reported by Afify et al. (2012) and El-Mehrat et al. (2014).

Some other limitations existed in the present study. This is a retrospective study collected from burn unit registries, important data regarding the activity that the patients were practicing during the incident, the mechanism and circumstances of burn, the place in which the burn occurred and socioeconomic variables were missing. No data regarding long term follow-up was found in records, so long term complications as scars and permanent infirmity were not documented in the study.

## Conclusion

The study concluded that most burn injuries were due to flame burns and scalds with children less than 5 years of age were more exposed to burn injuries especially scalds. Three-fourths of cases showed TBSA less than 20%. Mortality rate was low (5.5%) with septicemia being the leading cause of death. TBSA and ICU admission were the only significant predictors of mortality in this study.

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دراسة لإصابات الحروق للمرضى الذين تم إدخالهم وحدة الحروق بمستشفيات  
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الإصابات الناجمة عن الحروق تمثل خطر شديد على الصحة العامة. هدفت هذه الدراسة إلى تقييم الإصابات الناجمة عن الحروق ونتائجها للمرضى الذين تم إدخالهم وحدة الحروق بمستشفيات جامعة قناة السويس بالإسماعيلية بمصر من وجهة النظر الطبية الشرعية، وتحديد العوامل التي قد تؤدي للوفاة من تلك الإصابات. ولقد تم فحص ملفات جميع المرضى الذين تم علاجهم بوحدة الحروق في الفترة ما بين أول يناير ٢٠١٣ و ٣١ ديسمبر ٢٠١٤ بصورة ارتجاعية. وقد وجد أن العدد الكلي للمصابين ٢٩٢ مصاب، متوسط أعمارهم  $17,5 \pm 17,2$  عاماً، وقد مثل الأطفال أقل من ٥ سنوات الفئة الأكثر عرضة لخطر الإصابة بالحروق  $35,6\%$ . كما مثل الذكور  $86,1\%$  من عينة الدراسة بينما مثل المقيمون من المناطق الريفية  $63\%$  من عينة الدراسة. وقد أسفرت الدراسة عن أن حروق اللهب والحروق السلقية مثلت  $48,2\%$  و  $44,9\%$  على الترتيب من إجمالي الإصابات في الأشهر الباردة. وقد كانت المساحة الكلية للحرق أقل من  $20\%$  في معظم الحالات ( $72,6\%$ ). كما وجد أن الطرفان العلويان تعرضا لأعلى نسبة للإصابة بالحروق ( $58,2\%$ ). وقد أسفرت الدراسة علي أن هناك علاقة ذات دلالة إحصائية بين مساحة الحرق الكلية وكل من نوع الحرق، مدة البقاء في المستشفى، دخول العناية المركزة، ونتائج الحرق. كما وجدت علاقة ذات دلالة إحصائية بين نوع الحرق وكلا من السن، النوع، ومدة البقاء في المستشفى. وقد وجدت الدراسة أن معدل الوفيات قد مثل  $5,5\%$  من عينة الدراسة وقد كان تسمم الدم أعلى مسبب للوفيات بنسبة  $44\%$ . هذا وباستخدام الانحدار اللوجستي التدريجي، أسفرت الدراسة عن أن مساحة الحرق الكلية ودخول العناية المركزة هما فقط عاملي التكهن بالوفاة.