Epidemiology and Outcomes of Pediatric Burn Injuries in Cairo University Hospital- Egypt

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Authors’ contributions

This work was carried out in collaboration between both authors. Author JRL contribute to design the study, acquisition of data and doing the clinical part also revising the manuscript for important clinical content, author SFS did the data analysis, interpretation of data and final writing the manuscript. Both of them prepare the final report for publishing.

ABSTRACT

Aim: To identify the epidemiology and outcome of pediatric burn injuries.
Study Design: Retrospective hospital-based analytical study.
Place and Duration of Duration: Burn unit at Cairo University hospital, in the period between the first of January 2007 till December 2011.
Methodology: The study retrospectively evaluated 564 children with different burn injuries, who were admitted to Cairo University Hospital during the period of the study. Data about age, sex, burn size, etiology of burn, and outcome of admission to the intensive care unit were retrieved from the medical records and the burn treatment registry. In addition, average length of hospital stay (ALOS) and bed occupancy rate (BOR) were calculated. Further analysis was done in the last year of the study (2011), by interviewing mothers of the patients and residents in charge.
Results: The average age of the children was 5.9 years (SD: ± 4.1). Under five children were found to be the most susceptible to burn injuries accounting for about 70% of the affected population. There was no significant difference in the number of patients between genders (P= 0.3). While scald type of burn was the most prevalent etiology of burn injuries representing more than 60% of all causes. Total burn surface area (TBSA)% was greater among females, patients from rural residencies and flame type of burn. The non-survivors represented 2.5% of the studied sample. Intensive care unit (ICU) admission was mainly due to renal impairment, sepsis and respiratory stress due

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Conclusion: Under five children are the most susceptible age group to burn injuries, this could be prevented by raising awareness of patients. More attention should be paid to reduce complications that necessitate ICU admission.

Keywords: Pediatric burn; epidemiology of burn; complications of burn; ICU admission due to burn injuries.

1. INTRODUCTION

Burns are the third most common cause of mortality in children and adolescents [1]. It is also a major cause of morbidity and mortality in individuals of all age groups, particularly in individuals living in the developing countries [2].

It has been reported that burns can lead to severe functional, social and psychological impairment [3]. Pediatric burns can be more severe than injuries in adults. Nevertheless, neither children nor their parents are usually aware of the serious outcomes of burn injuries [4].

The epidemiology of burns is diverse across the world and also within a country because of differences in the cultural and socioeconomic factors and the availability of health-care facilities [5].

Childhood burns in Egypt are a significant problem, especially in families of low socioeconomic status [6].

A sufficient knowledge of the epidemiological characteristics and risk factors for burns is necessary for their prevention. Sustained research on the epidemiology and risk factors of burns in many developed and high-income countries such as the United States has made a great contribution to primary and secondary prevention of fires and burns. However, this is not true for many developing or low- and middle-income countries [7,8].

Thus the current study was conducted to reveal the etiology, types and the different outcomes of pediatric burn for children from 1-18 years old admitted to Cairo University Hospital in the period from (2007-2011). The results will guide attempt to increase awareness among parents to protect their children against different types of burn especially scald burn which is proved by this study to be the most prevalent and which is most probably due to parents’ neglect.

1.1 Objective

To determine the epidemiological features and the outcome of paediatric burn injuries. To detect factors influencing mortality and morbidities in burn injuries. To outline some hospital statistics concerning the burn unit.

2. MATERIALS AND METHODS

This is a retrospective hospital - based analytical study conducted on burn patients aged younger than 18 years, admitted to the burn unit at Cairo University Hospital. This hospital
represents a reference centre across the region. It was chosen to be the setting of the study being a tertiary health care one that represents a reference center across the nation. The study was conducted in the period between 1 January 2007 to 31 December 2011.

The study retrospectively evaluated 564 children with different burn injuries. Data about age, sex, burn size % of total body surface area (TBSA), etiology of burn, causes and outcome of admission to the intensive care unit were retrieved from the medical records and the burn treatment registry.

Children were divided into three groups based on their ages as: less than 5 years, 6-10 years and 11-18 years.

Injuries were classified as scalds, flame, electrical, chemical and contact cause of burn.

In addition, length of hospital stay in the 5 studied years and bed occupancy rate were calculated (ALOS was calculated by dividing the total inpatient service days of discharged patients by the total number of discharges. BOR was calculated as percentages depending on the number of admitted patients, LOS and available beds). Outcome was recorded as patient survival or death.

Further analysis was done in the last year of the study (2011), by interviewing mothers of the patients, residents in charge. In addition to retrieving data from the records kept by the pediatrician who was responsible for performing the required interventions and follow up of patients admitted to the ICU. Moreover socioeconomic data were obtained about the age and working status and literacy of the mothers.

Administrative approvals were taken from the head of the burn department and the hospital manager, ethical approvals were taken from the pediatrics and burn department for the data collected from the registers in the period from 2007-2010 and no identifiable data were included. Participants were insured that the data will be used only for scientific purposes ensuring confidentiality and verbal consents were taken from the mothers or caregivers sharing in the last year of the study (2011), after being told about the nature of the study and its aim. We took permission from administrative and managerial heads and (followed the declaration of Helsinki).

2.1 Inclusion and Exclusion Criteria

Data was collected from the registers of the burn unit for all cases admitted to the burn unit, at Cairo University hospital, in the period from 2007-2010. All available cases were retrieved without any exclusion. To substitute for the missing data in the registers; more in-depth data was collected in the last year of the study from the mothers or the caregivers of the children admitted to the unit during. Data about causes and outcomes of ICU admission were obtained from the pediatrician in charge.

2.2 Statistical Analysis

Precoded data was statistically analyzed by the Statistical Package of Social Science Software Program (SPSS), version 21. Data was summarized using frequency and percentage. Comparison between groups was done using Chi-square test or Fisher’s exact test. Backward stepwise regression model was performed to get the significant predictors of
ICU admission. P values equal or less than 0.05 were considered statistically significant and if less than 0.01 were considered highly significant.

3. RESULTS AND DISCUSSION

Five hundred and sixty four burn patients aged less than 18 years were admitted to the burn unit at Cairo University hospital between 1 January 2007 and 31 December 2011, all were enrolled in the study.

3.1 Age and Sex

During the study period, 230 female and 334 male patients were hospitalized (ratio F: M 0.6:1). The average age of the children was 5.9 years (SD: ± 4.1) and median age was 4 years. The age group less than 5 years old had the highest proportion of patients. There was no significant difference in the number of patients between genders (P= 0.3) (Table 1).

3.2 Residence

Of the included sample 52.1% lived in urban areas while the rest (47.9%) in rural areas with no significant difference between both (P= 0.2) (Table 1).

In urban areas electric burn was shown to be the most prevalent cause of burn that was significantly different (p=0.05) while scald burn was the first cause in rural areas followed by chemical type of burn (Table 3).

3.3 Causes of Burn and TBSA %

Scald burns were the leading cause of burn injuries, accounting for 61.9% of all injuries, followed by flame burn at 28.4%, electric burn at 6.7%, contact burns at 2.3% and burns due to chemicals at 0.7% (Table 1).

About three quarters of the studied sample had TBSA% less than 15% (Table 1).

3.4 Outcome Regarding Survival or Death

Out of the 564 patients; 14 patients died with a percentage of 2.5% of the studied sample (Table 1).
Table 1. Distribution of burn injuries by sex, age, burn type, TBSA% and outcome

| Year | N | % | N | % | N | % | N | % | N | % | Total | P value |
|------|---|---|---|---|---|---|---|---|---|---|-------|---------|
|      |   |    |    |    |    |    |    |    |    |    | (564) |         |
| Sex  |   |    |    |    |    |    |    |    |    |    |       |         |
| Female | 40 | 44.9 | 35 | 37.6 | 55 | 41.7 | 47 | 34.6 | 53 | 46.5 | 230   | 40.8   | 0.3 |
| Male   | 49 | 55.1 | 58 | 62.4 | 77 | 58.3 | 89 | 65.4 | 61 | 53.5 | 334   | 59.2   | NS |
| Residence |   |    |    |    |    |    |    |    |    |    |       |         |
| Urban  | 47 | 52.8 | 51 | 54.8 | 78 | 59.1 | 61 | 44.9 | 57 | 50.0 | 294   | 52.1   | 0.2 |
| Rural  | 42 | 47.2 | 42 | 45.2 | 54 | 40.9 | 75 | 55.0 | 57 | 50.0 | 270   | 47.9   | NS |
| Age   |   |    |    |    |    |    |    |    |    |    |       |         |
| <5years | 63 | 70.8 | 67 | 72.0 | 91 | 68.9 | 88 | 64.7 | 87 | 76.3 | 396   | 70.2   | 0.6 |
| 6-10years | 13 | 14.6 | 10 | 10.8 | 16 | 12.1 | 19 | 14.0 | 8  | 7.0  | 66    | 11.7   | NS |
| 11-18years | 13 | 14.6 | 16 | 17.2 | 25 | 18.9 | 29 | 21.3 | 19 | 16.7 | 102   | 18.1   |   |
| Outcome |   |    |    |    |    |    |    |    |    |    |       |         |
| Survivors | 88 | 98.9 | 87 | 93.5 | 130 | 98.5 | 132 | 97.1 | 113 | 99.1 | 550   | 97.5   | 0.07 |
| Non-survivors | 1  | 1.1  | 6  | 6.5  | 2  | 1.5  | 4  | 2.9  | 1  | 0.9  | 14    | 2.5    | NS |
| Burn type |   |    |    |    |    |    |    |    |    |    |       |         |
| Chemical | 2  | 2.2  | 1  | 1.1  | 1  | 0.8  | 0  | 0.0  | 0  | 0.0  | 4     | 0.7    | 0.8 |
| Contact | 2  | 2.2  | 2  | 2.2  | 5  | 3.8  | 2  | 1.5  | 2  | 1.8  | 13    | 2.3    | NS |
| Electric | 8  | 9.0  | 5  | 5.4  | 8  | 6.1  | 7  | 5.1  | 10 | 8.8  | 38    | 6.7    |   |
| Flame   | 22 | 24.7 | 22 | 23.7 | 39 | 29.5 | 42 | 30.9 | 35 | 30.7 | 160   | 28.4   |   |
| Scald   | 55 | 61.8 | 63 | 67.7 | 79 | 59.8 | 85 | 62.5 | 67 | 58.8 | 349   | 61.9   |   |
| TBSA%   |   |    |    |    |    |    |    |    |    |    |       |         |
| <15     | 67 | 75.3 | 78 | 83.9 | 94 | 71.2 | 92 | 67.6 | 82 | 71.9 | 413   | 73.2   | 0.2 |
| 15-30   | 19 | 21.3 | 9  | 9.7  | 22 | 16.7 | 32 | 23.5 | 26 | 22.8 | 108   | 19.1   | NS |
| 30-50   | 3  | 3.4  | 5  | 5.4  | 13 | 9.8  | 8  | 5.9  | 6  | 5.3  | 35    | 6.2    |   |
| 50-75   | 0  | 0.0  | 0  | 0.0  | 1  | 0.8  | 2  | 1.5  | 0  | 0.0  | 3     | 0.5    |   |
| >75     | 0  | 0.0  | 1  | 1.1  | 2  | 1.5  | 2  | 1.5  | 0  | 0.0  | 5     | 0.9    |   |

*The mean age of the studied sample was: 5.9 ± 4.1 years.

3.5 Socio - Demographic Data of the Studied Group in the Year 2011

Most of the mothers of the children included in the last year of the study were young house wives. More than 83% of them were below 35 years old. Three quarters were not working and only one fifth of them had high education.

3.6 Factors Affecting TBSA%

TBSA % was greater among females who showed significant difference with P=0.02. Also greater in patients coming from rural residencies, with significant difference (P= 0.03). While it was less in the age group from 6-10 years old and more in flame type of burns which showed significant difference than other types of burn in causing higher TBSA (P less than 0.001)(Table 2).
Table 2. Factors affecting TBSA%

| TBSA% | P value |
|-------|---------|
| <15   | N       |
|       | %       |
| 15-30 | N       |
|       | %       |
| 30-50 | N       |
|       | %       |
| 50-75 | N       |
|       | %       |
| >75   | N       |
|       | %       |

| Sex    | 38.3 | 50.9 | 11.0 | 100.0 | 60.0 | 0.02 |
|--------|------|------|------|-------|------|------|
| Female | 158  | 55   | 21   | 1     | 2    | 40.0 |
| Male   | 255  | 49.1 | 24   | 68.6  | 0.0  | S    |

| Residence | 50.9 | 49.1 | 60.0 | 1     | 20.0 | 0.03 |
|------------|------|------|------|-------|------|------|
| Urban      | 227  | 44   | 21   | 60.0  | 1    | S    |
| Rural      | 186  | 64   | 14   | 40.0  | 2    | S    |

| Age      | 60.0 | 30.4 | 3    | 100.0 | 3    | 60.0 |
|----------|------|------|------|-------|------|------|
| <5years  | 298  | 72.2 | 18   | 51.4  | 0    | 2    |
| 6-10years| 45   | 10.9 | 6    | 17.1  | 2    | 1    |
| 11-18years| 70  | 16.9 | 11   | 31.4  | 1    | 3    |

| Burn type | 75.0 | 53.8 | 36.8 | 57    | 35.6 | 42.7 |
|-----------|------|------|------|-------|------|------|
| Chemical  | 2    | 1    | 2.9  | 0     | 0    | S    |
| Contact   | 13   | 0    | 0    | 0     | 0    | 0    |
| Electric  | 38   | 9.2  | 0    | 0     | 0    | 0    |
| Flame     | 88   | 21.3 | 32   | 62.9  | 3    | 100.0|
| Scald     | 272  | 65.8 | 65   | 60.2  | 12   | 34.3 |

3.7 Factors Affecting Burn Type

Electric type of burn was significantly higher in urban areas. While the scald type of burn followed by chemical causes of burn were the most prevalent causes of burn among patients coming from rural places.

Regarding the relation between age and types of burn injuries; Flame type was significantly higher in older age groups, while Scald burn was more common in younger age group (less than 5 years) (Table 3).

Table 3. Factors affecting burn type

| Burn type | P value |
|-----------|---------|
| Chemical  | Contact | Electric | Flame | Scald |
| N         | %       | N        | %     | N     | %     |

| Sex    | 75.0 | 53.8 | 36.8 | 57    | 35.6 | 42.7 | 0.2 |
|--------|------|------|------|-------|------|------|-----|
| Female | 3    | 7    | 14   | 57    | 35.6 | 149  | 42.7|
| Male   | 1    | 2.5  | 6    | 24    | 103  | 200  | 57.3|

| Residence | 53.8 | 36.8 | 57    | 35.6 | 42.7 |
|------------|------|------|-------|------|------|
| Urban      | 2    | 50.0 | 7     | 53.8 | 27   |
| Rural      | 2    | 50.0 | 6     | 46.2 | 11   |

| Age      | 36.8 | 57    | 35.6 | 42.7 |
|----------|------|-------|------|------|
| <5years  | 50.0 | 28    | 73.7 | 54   |
| 6-10years| 25.0 | 7     | 7.9  | 33   |
| 11-18years| 25.0| 7     | 18.4 | 73   |

| Sex    | 42.7 | 57    | 57    | 35.6 | 42.7 |
|--------|------|-------|-------|------|------|
| Female | 149  | 200   | 200   | 200  | 200  |
| Male   | 149  | 200   | 200   | 200  | 200  |

| Residence | 57    | 57    | 57    | 35.6 | 42.7 |
|------------|------|-------|-------|------|------|
| Urban      | 167  | 182   | 182   | 182  | 182  |
| Rural      | 167  | 182   | 182   | 182  | 182  |

| Age      | 35.6 | 42.7 |
|----------|------|------|
| <5years  | 33   | 33   |
| 6-10years| 33   | 33   |
| 11-18years| 33  | 33   |

| Age      | 42.7 |
|----------|------|
| <5years  | 33   |
| 6-10years| 33   |
| 11-18years| 33  |
3.8 Factors Affecting Mortality

Total number of non-survivors was 14 children out of 564. Mortality was significantly higher in older age groups, Flame type of burn and higher TBSA% (Table 4).

Table 4. Factors affecting mortality

|                | Survivors (n=550) | Non-survivors (n=14) | P value |
|----------------|-------------------|----------------------|---------|
|                | N     | %     | N     | %     |         |
| Sex            |       |       |       |       |         |
| Female         | 223   | 40.5  | 7     | 50.0  | 0.5     |
| Male           | 327   | 59.5  | 7     | 50.0  | NS      |
| Residence      |       |       |       |       |         |
| Urban          | 285   | 51.8  | 9     | 64.3  | 0.6     |
| Rural          | 265   | 48.2  | 5     | 35.7  | NS      |
| Age            |       |       |       |       |         |
| <5years        | 391   | 71.1  | 5     | 35.7  | 0.02    |
| 6-10years      | 63    | 11.5  | 3     | 21.4  | S       |
| 11-18years     | 96    | 14.4  | 6     | 42.9  |         |
| Burn type      |       |       |       |       |         |
| Chemical       | 4     | 0.7   | 0     | 0.0   | <0.001  |
| Contact        | 13    | 2.4   | 0     | 0.0   | HS      |
| Electric       | 38    | 6.9   | 0     | 0.0   |         |
| Flame          | 148   | 26.9  | 12    | 85.7  |         |
| Scald          | 347   | 63.1  | 2     | 14.3  |         |
| TBSA%          |       |       |       |       |         |
| <15            | 410   | 74.5  | 3     | 21.4  | <0.001  |
| 15-30          | 104   | 18.9  | 4     | 28.6  | HS      |
| 30-50          | 32    | 5.8   | 3     | 21.4  |         |
| 50-75          | 2     | 0.4   | 1     | 7.1   |         |
| >75            | 2     | 0.4   | 3     | 21.4  |         |

3.9 Clinical Data of the Follow-Up Year (2011)

During hospital course in 2011, data concerning 114 patients were reviewed.

About one third of the studied sample developed sepsis which required further interventions. Only 12 children of those who developed sepsis responded to empirical antibiotics, yet 21 of them required sputum culture and sensitivity using bronchoscope to take bronchoalveolar lay age for culture and sensitivity and assist in clearing the airway from mucous and secretions relieving bronchospasm.

More complications were encountered; as 37 patients required mechanical ventilation and positive isotropic support for more than 24 hours. While renal impairment developed in 28.9% of the studied sample.

One case only was a non-survivor that was a four years’ old patient who suffered pneumonia following his exposure to burn injury.
3.10 Factors Affecting ICU Admission

Sepsis and renal impairment were the leading causes for ICU admission (Table 5).

### Table 5. Factors affecting ICU admission

|          | ICU Admission |          |          |          |          |          |
|----------|---------------|----------|----------|----------|----------|----------|
|          | No (n=77)     | Yes (n=37) | P value  | OR (95% CI) |          |          |
|          | N  | %  | N  | %  |          |          |
| Age      |    |    |    |    |          |          |
| <5 years | 55  | 63.2 | 32  | 36.8 | 0.2 | ............... |
| 6-10 years | 7  | 87.5 | 1   | 12.5 | NS  |          |
| 11-18 years | 15 | 78.9 | 4   | 21.1 |      |          |
| Sex      |    |    |    |    |          |          |
| Female   | 42  | 68.9 | 19  | 31.1 | 0.8 | 1.1 (0.5 - 2.5) |
| Male     | 35  | 66.0 | 18  | 34.0 | NS  |          |
| Residence|    |    |    |    |          |          |
| Rural    | 41  | 71.9 | 16  | 28.1 | 0.4 | 1.5 (0.7 - 3.3) |
| Urban    | 36  | 63.2 | 21  | 36.8 | NS  |          |
| Sepsis   |    |    |    |    |          |          |
| No       | 74  | 90.2 | 8   | 9.8  | <0.001 | 89.4 (22.2 - 360.7) |
| Yes      | 3   | 9.4  | 29  | 90.6 | HS  |          |
| Renal impairment |    |    |    |    |          |          |
| No       | 74  | 91.4 | 7   | 8.6  | <0.001 | 105.7 (25.6 - 436.2) |
| Yes      | 3   | 9.1  | 30  | 90.9 | HS  |          |

3.11 Predictors of ICU Admission

Multivariate analysis (Logistic regression model) was done to explain predictors of ICU admission & it revealed that sepsis and renal impairment were significant (P<0.001), $X^2 = 82.7$ (df=2), $R^2 = (0.52 - 0.7)$ (Table 6).

Backward stepwise regression model was conducted to explore the significant predictors of ICU admission for pediatric burn injuries , variables entered in step one were; age , sex , residence , sepsis and renal impairment. The last step revealed that the only significant predictors were sepsis and renal impairment. (P(less than 0.01). Chisquare = 82.7 (df=2), R=(0.52-0.7)

### Table 6. Predictors of ICU admission

|          | B   | S.E. | Wald | df | Sig. | OR   | 95% C.I for OR |
|----------|-----|------|------|----|------|------|----------------|
| Sepsis   | 2.5 | 0.9  | 7.6  | 1  | 0.006 | 12.1 | 2.1 - 71.7     |
| Renal impairment | 3.0 | 0.9  | 11.8 | 1  | 0.001 | 20.5 | 3.7 - 115.4    |
| Constant | -2.6| 0.4  | 36.2 | 1  | 0.000 | 0.08 |                |

3.12 Hospital Stay

Total hospital days (total number of days stayed by all patients in a certain period) decreased from 2100 days in 2007 to become 1048 in 2011, almost 50 % decrease. In the same
context, the average length of hospital stay (ALOS; the average number of days stayed by a patient in a certain period) was decreased from 23.6 days in 2007 to 9.2% days in 2011 (Table 7).

### 3.13 Bed Occupancy Rate

The capacity of beds assigned for pediatric burn patients in Cairo University hospital was 20 beds. The average bed occupancy rate remained about 60% in the five years of the study, reaching highest percentage (67.5%) in the year 2010 while lowest BOR was in the year 2007 (Table 7).

| Year | Bed capacity | Total hospital days | ALOS(Days) | BOR (%) |
|------|--------------|---------------------|------------|--------|
| 2007 | 20           | 2100                | 23.6       | 55.0   |
| 2008 | 20           | 1999                | 21.5       | 57.5   |
| 2009 | 20           | 2349                | 17.8       | 65.0   |
| 2010 | 20           | 1985                | 14.6       | 67.5   |
| 2011 | 20           | 1048                | 9.2        | 60.0   |

### 4. DISCUSSION

Mortality and morbidity from burns usually have more incidences among children in low and middle income countries. Incidence of burn is increasing among pediatric patients, where more than 96,000 patients are hospitalized yearly, in Africa, with children under five years having the highest incidence [9].

The current study was conducted to reveal the epidemiology and outcome of pediatric burns in Cairo University Hospital in Cairo - Egypt.

The study showed that under five children have the highest incidence of burn injuries (about 70% of the study population were under 5 years old). This goes in accordance with the "world report on child injury prevention", 2008 [10], which reported that in low-income and middle-income countries, children under the age of five years old have been shown to have a disproportionately higher rate of burns than is the case in high-income countries.

It is also consistent with a study done in the USA, 2010, in which under five children compromised 50% of the study population and were reported nationally to have the highest incidence of hospitalization for burn injuries in all age categories [11].

These findings could be explained by the fact that children in this age group are curious and once they are mobile they tend to explore the surroundings (world report on childhood injury, 2008) [10]. This puts blame on the mothers who ought to apply more close supervision on their young children especially that, in the present study more than two thirds of the mothers were house wives.

There is growing evidence that pediatric burns are associated with being socio-economically disadvantaged.
Research identified such parental factors as: education; income; knowledge of burn prevention and care; supervision; and features of the home as being significantly related to burns [2].

Poverty in and of itself is a major risk factor. Children from low income homes have 8 times greater risk of sustaining burns than those from higher income homes. Severity of burns increases with decreasing socioeconomic status (SES). Burn mortality is higher among children from lower SES [9].

A finding that is similar to the current study as most of the mothers of the studied patients were illiterate or didn't receive high levels of education.

Moreover, the study showed that patients living in rural residencies have significantly greater TBSA% than those from urban areas as demonstrated.

The results showed no significant difference in sex distribution, which indicates that burn injuries in children aren’t affected by sex difference. These results are consistent to a study done by Justin et al. [12], who reported the same finding in their research that was conducted in district hospitals in Tanzania. However, certain other studies showed that burn injuries were more common in adolescent girls who were exposed to cooking activities [13,14]. Despite of the above mentioned finding, the study showed that girls have significantly higher TBSA% than boys.

In the study population, male patients represented about 60% (n=334) of all the patients (n=564). This goes in accordance with other studies done in Turkey, Egypt, China, India, Kuwait and Ireland [15,6,16-18].

Regarding causes of burn; the current study showed that among the different etiologies; scald burn was the most common (62%), this finding was similar to other studies [15]. Followed by flame burn at 28.4%, electric burn at 6.7%, contact burns at 2.3% and burns due to chemicals at 0.7%.

Similar findings were found in a previous study done in Turkey [16].

As for mortality rate, out of the 564 patients admitted to the burn unit all over the four years of the study, 14 patients were non survivors. This may be due to advances in burn care that resulted in an increase in the survival rate of severely burned patients as shown in a study done in Texas [19].

As for factors affecting mortality, our study identified the TBSA% as a significant variable affecting mortality (Table 4), this goes consistent with the previously mentioned study conducted at Texas [19].

Children above 11 years old had significantly higher rates of mortality than younger ones. A finding that is partially similar to the WHO report on childhood injury which reported that death rates are lowest in those aged between 10 and 14 years, but the death rate climbs again for 15-19 years old.

Although scald burns were found to be the most prevalent, yet flame type of burn injury was found to be more dangerous as it was shown by the present study to be a significant variable
affecting mortality rate. A finding that is also similar to the WHO report which mentioned fire causes of burn to be the cause of the majority of burn-related deaths in children.

Coming to the last year of the study, where more analysis was done for hospitalized pediatric burn patients, 37 patients out of 114 were admitted to the ICU mainly due to sepsis or renal impairment.

This goes inconsistency with a study conducted by Pavoni et al. [20] that documented infectious complication to be the most common complication that occurred in 55% of all patients admitted to the ICU.

Also consistent with a study done by Linares [21] in his review of 115 pediatric burn autopsies, found that 75% of the deaths had sepsis as the primary cause of death.

In the last year of our research, 37 patients required mechanical ventilation and positive isotropic support for more than 24 hours. Renal impairment developed in 28.9% of the studied sample.

A finding that is similar to a study done by Wolf S. et al. [19] that reported serum creatinine, isotropic support requirement, and thrombocytopenia to be clear harbingers of multiorgan failure in burn patients.

During the follow up period, 27 patients (about one third of the studied population) suffered inhalation injury that required bronchoscopic intervention. One patient died due to pneumonia following his thermal injury.

A study done by SAFFLE JR. [22] showed that inhalation injury was present in fewer than half of those patients with severe pulmonary failure in a series of burned patients.

Shiarni et al. [23] reported that the development of pneumonia has been found to add between 20% and 60% to the expected mortality of burned patient.

Regarding LOS, the average length of stay in the present study has decreased from 26.3 days in the year 2007 to 9.6 days in the year 2011 which indicates improving the level of care and advances in management of cases that was reflected in shortening the LOS and decreasing mortality. In USA 2005 the ALOS was 8.22 days. In a study done by American Burn Association Report, [24].

5. CONCLUSION

Pediatric burn injuries vary across age and residence. The study revealed that under five children were more susceptible to burn injuries, with scald type of burn being the most prevalent. Low level of the mother's education is suggested to be a risk factor. Sepsis, pneumonia and renal impairment are common complications that are encountered as a result of burn injuries and are a cause of the need to ICU admission. Low mortality rates and shortening length of stay are both indicators of improving the level of care provided to the patients. Parents and caretakers of children should be offered education about preventive measures against burns. Intervention programs could be modified according to the cultural features of the target population to be more effective. Further research could be carried to identify determinants of the length of hospital stay.
CONSENT

All authors declare that an informed consent was taken for cases approached in the year 2011. Informed consent is not applicable for data collected in the years 2009 and 2010.

ETHICAL APPROVAL

All authors hereby declare that all research have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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