

A Five-Year Burn Unit Experience at King Hussein Medical Center: 2005 to 2009

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ABSTRACT

Objective: To describe the demographic characteristics, age, gender, monthly distribution, causes of burns, burned Total Body Surface Area, site of injury and mortality among burn patients referred to the burn unit at the Royal Rehabilitation Center.

Methods: The medical records of 400 patients (range, one day to 95 years of age) admitted to the Royal Rehabilitation Center Burn unit at King Hussein Medical Center during the period between January 2005 and December 2009 were retrospectively reviewed. A specially designed medical record abstract form was used to collect the relevant data. Simple descriptive statistics (frequency, mean, percentage, Pie and Bar charts) were used to describe the study variables.

Result: The highest risk age group of burn injuries was from one day to 14 years of age (n=156, 39%), with the greatest number of injuries occurring to children who were between one to two years of age. The overall male-to-female ratio was 1.5:1. Seasonal variations had an influence on the increased number of admissions to the burn unit where the frequency increased in the winter season, and mainly in January and February. Scalding was the major cause among pediatric burns. Direct flame burns were the most frequent cause of burns in adults and the second-leading cause in children. Trunk and arms were mostly affected by burns. Fifty- seven patients died, with an over all mortality of 14.3%, the mortality rate in children was 2.3 %, and the mortality rate in adult males and females were 7.0 % and 5.0%, respectively. The average percentage of burns for all patients was 27.2%, while it was 59.9% in the deceased patients.

Conclusion: Children are at high risk from burn injuries, the main cause of which is scalding. Among adults, the main cause of burn injuries was flame burns. The mortality rate is highly related to the percentage of burn. Most burns are preventable and, hence, educational programs should be included in the school and university curriculum to inform the public about the causes of burns and methods of prevention social network media should be in the program.

Key words: Burns, Direct Flame, Mortality, Scald

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Introduction

Burn injury is a serious health problem worldwide. A severe burn injury is not only a life

threatening problem for the injured patient, but it also may have serious physical, psychological and financial effects on the patient, the patient's family and society.⁽¹⁾ In different communities

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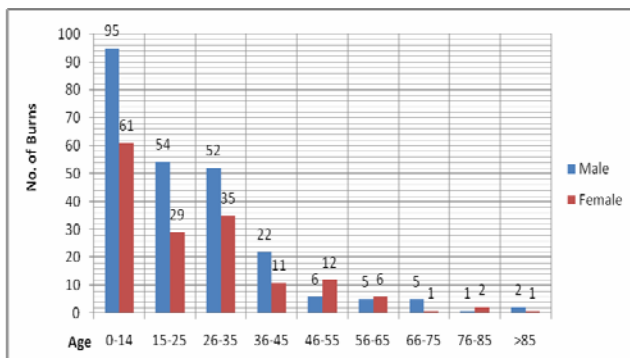


Fig.1. Patient distribution according to age and gender

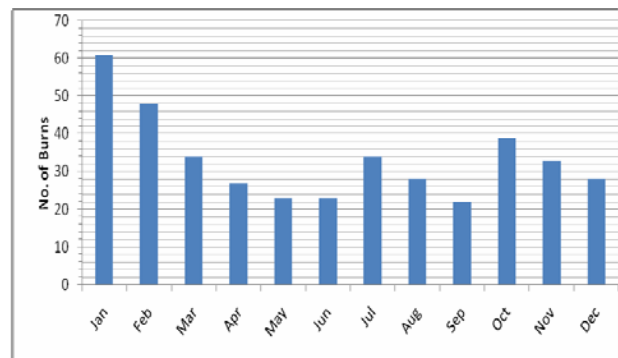


Fig. 2. Monthly distribution of burn admissions among the study group

the etiological factor of burn injuries varies considerably hence epidemiological studies provide objective information on hazardous agents and on the setting in which burns are most likely to occur.⁽²⁾ Our unit is situated in Amman; patients are referred to the Royal Rehabilitation Center Burn Unit from 6 peripheral military hospitals present in the north and south of Jordan which means that our Burn Unit provides care for an extensive geographical population. It has 9 beds, 12 doctors, 26 nursing staff, with an intensive care facility, a well equipped unit that contains an operating theater, hydrotherapy room and an admission room with a shower trolley.

This study was conducted to describe the demographic pattern, age, and gender, monthly distribution, causes of burns, burned Total Body Surface Area (TBSA), site of injury and mortality of burn patients referred to the burn unit at the Royal Rehabilitation Center.

Methods

The medical records of 400 patients (range, 0 - 95 years of age) admitted to the Royal Rehabilitation center Burn unit at the King Hussein Medical Center during the period between January 2005 and December 2009 were retrospectively reviewed. Outpatients were not included in this study. Patients experiencing electrical, chemical, and inhalation burns as well as burns of the face, hands, feet, and genitoperineal region were hospitalized regardless of the burned TBSA. A specially designed medical record abstract form was used to collect the relevant data. Simple descriptive methods (frequency, mean, percentage, Pie and Bar charts) were used to describe the study variables.

Results

A total of 400 patients with all types and degrees of burns were admitted to our unit between January 2005 and December 2009, of which 156 belong to the pediatric age group (one day to 14 years). The age of patients ranged from (one day to 95) years. The average age was 22.2 years; there were 242 (60.5%) males and 158 (39.5%) females. The overall male to female ratio was 1.53:1. Female predominance occurred in the age group of patients between (46-65) years which comprised 18 patients (4.5% of the total sample) while male predominance occurred in the remaining age groups as demonstrated in Fig. 1.

Table I shows the yearly distribution of burn admissions and mortality rates from January 2005 to December 2009. The year 2009 had the highest percentage. The lowest percentage was in the year 2008. Regarding the monthly distribution, the highest percentage was in January and February (15.3% and 12.0%, respectively) followed by October 9.8% as presented in Fig. 2.

The most common causative agent of burns was different between children and adults as illustrated in Table II. In children younger than 14 years of age, 64.1% of burns were caused by accidents involving hot liquids. Flame burns followed at 33.3%, and the remaining involved other causes such as electric, chemical burns (Fig. 3). The most common causative agent of burns in adults was direct flame burns (n=206, 84.4%) followed by scald burns (n=121, 8.6%) (Fig. 4).

Female patients had more scald and chemical burns than male patients. All 12 (4.9%) electrical burns occurred in adult males (Table II).

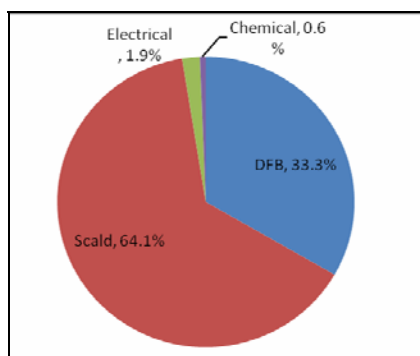


Fig. 3. Causes of burns in children

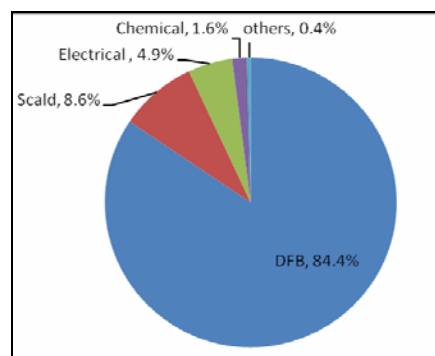


Fig. 4. Causes of burns in adults

Table I: Yearly distribution of burn admissions and mortality rate of burns among the study groups.

Year	No. Burns		Mortality	
	No.	%	No.	%
2005	86	21.5	10	11.6
2006	73	18.2	21	28.8
2007	86	21.5	8	9.3
2008	52	13.0	6	11.6
2009	103	25.8	12	11.7
Total	400		57	

Table II: Causes of burns among the study group

	Children				Adults			
	Male		Female		Male		Female	
	No.	%	No.	%	No.	%	No.	%
DFB*	31	32.6	21	34.4	125	85.0	81	83.5
Scald	62	65.3	38	62.4	8	5.4	13	13.4
Electrical	2	2.1	1	1.6	12	8.2	0	0.0
Chemical	0	0.0	1	1.6	1	0.7	3	3.1
Others	0	0.0	0	0.0	1	0.7	0	0.0
	95		61		147		97	

*Direct flame burns

Table III: Site of Injury

Burn Area	No. of Patients	%
Head and neck	212	53
Trunk	305	76.3
Buttock	102	25.5
Genitalia	9	2.3
Arms	314	78.5
Hands	46	11.5
Legs	198	49.5
Feet	31	7.8

Table IV: Frequency and percentage of burned TBSA among age and gender distribution within the study group

Percent Burned BSA	Children		Adults				Total Patients	
	No.	%	Male		Female		No.	%
			No.	%	No.	%		
1-20	100	64.1	60	40.8	33	34.0	193	48.3
21-40	44	28.2	55	37.4	30	30.9	129	32.3
41-60	7	4.5	18	12.3	16	16.5	41	10.2
61-80	4	2.6	4	2.7	15	15.5	23	5.7
81-100	1	0.6	10	6.8	3	3.1	14	3.5
Total	156		147		97		400	

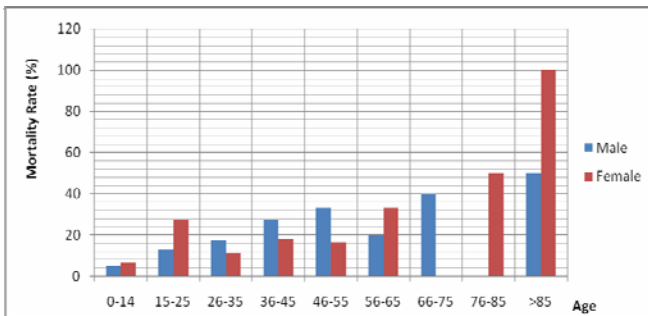


Fig. 5. Mortality rate according to age and gender among the study group

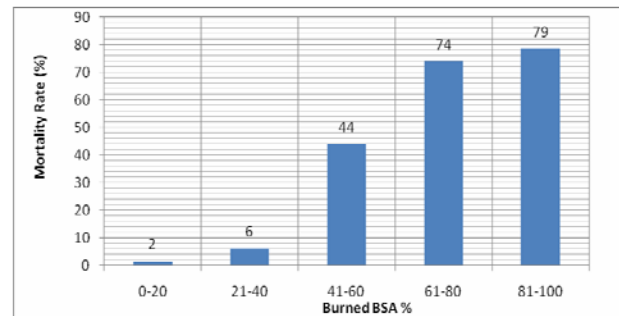


Fig. 6. Mortality rate according to burned BSA among the study group

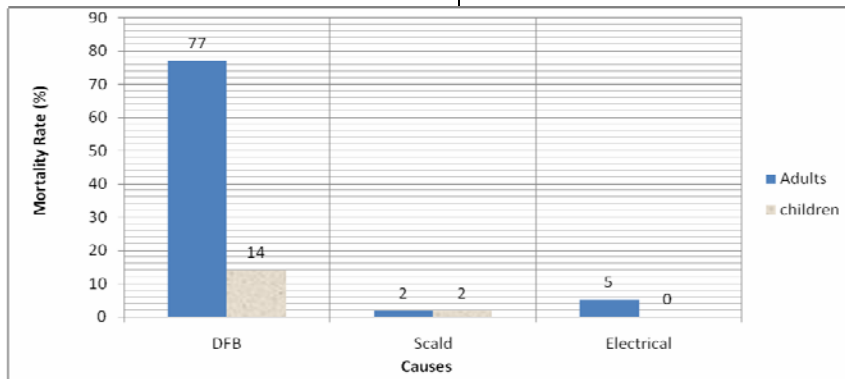


Fig. 7. Mortality rate according to causes of burns in adult and children

Twelve patients had self-inflicted burns who had a history of psychiatric illness which account only for 3% of the cases.

Table III presents the highest percentage of burns sites which were in the arms and trunk (78.3 and 76.3%) respectively, while the lowest percentage was in the genitalia (2.3%).

Most of the patients received burn injuries in the range of 1-2% burned BSA (48.3%) followed by 21% to 40% burned BAS (32.3%). Only few patients received burn injuries >40% burned BSA (19.5%). The average burned BSA was 27.2% as shown in Table IV.

Of the 400 patients, 9 patients presented with inhalational injuries and three (3.33%) of them died. All inhalation injuries were caused by direct flame burns. Ninety-six percent of the patients had no significant past medical history. Twelve patients (3%) had a psychiatric history; four patients (1%) were epileptics on medication.

The mortality rate was 5.8% for all patients younger than 14 years of age and 19.7% for all patients aged 14 years and older. The overall mortality rate was 14.3% for all the 400 patients.

Figure 5 shows the mortality rate according to age and gender. The mortality rate was higher in males (8.3%) than in females (6%). Figure 6

shows mortality rate according to burned BSA. Figure 7 shows the mortality rate according to the causes of burns in adults and children. Flame burns had the highest overall mortality rate (91.2%), followed by hot liquids in both children and adults.

Discussion

In our study, children were frequently affected victims of burn injuries and 39% of the cases were patients younger than 14 years of age, which are higher than the studies conducted by Andrew *et al.* and Rytis *et al.*^(3,4) but similar to the study done by Haberal *et al.*⁽⁵⁾ The highest burn injury occurring in children indicates a higher exposure to burn accidents at this age. The greatest number of injuries occurred to children who were one to two years of age.⁽⁶⁾ which is younger than the age in other studies,^(7,8,9) however, older than the study of Francis.⁽¹⁰⁾ Males were more frequently the victims of burns than females in all age groups This male percentage is similar to that reported in other studies.^(9,11)

The cold weather in Jordan commences in November and lasts till March. Kerosene and butane gas are commonly used in Jordan during

cold weather and these cause the majority of the Direct Flame Burns. This explains most of the seasonal variation in patients' numbers in our study. While regarding to the yearly distribution further analytical studies are needed to determine their significance.

Direct Flame was the leading cause of burns in adults and had the highest rate of mortality, and was mostly caused by butane gas heater or a light stove causing stove explosions and fires. Scald burn was the second common cause of burns in adults. These findings are consistent with most of the other studies.^(1,5)

In our study, the most common causes of burns in children were hot liquids such as water, tea, coffee, and soup. Additionally, some traditional Jordanian customs were also a cause of these burns. One example is the preparation Mansaf, a traditional Jordanian dish, which requires hot yogurt (laban). Previous studies also have shown that burn injuries in children were most frequently caused by hot liquids⁽⁷⁾ which is also consistent with the other regional and international studies.^(12,13)

Burns caused by flames are the second-leading cause of burn injury in children, which is consistent with the study conducted by El-Badawy *et al.*⁽¹²⁾ In our study, we found that adult females had more scald and chemical burns than adult males. Electrical and Direct Flame Burns (DFB) affect male more than females. The reason is probably most of the males were burned at work, as opposed to females, who were burned at home. Two female patients were burned by chemicals as a victim of a criminal act. Fortunately, this is a rare event in comparison with a study done by Asaria.⁽¹³⁾

Mercier *et al.*⁽¹⁴⁾ and Harmel *et al.*⁽¹⁵⁾ reported that electric burns were less common in the pediatric age group when compared with other types of burn injuries. We found that none of the pediatric age group had electrical burn. However other studies^(8,9,11) show quite variable frequency of electrical burns in children. El-Badawy⁽¹²⁾ reported that the rate of electrical burns in children was 3%, and two other studies published in Turkey by Haberal *et al.*⁽⁵⁾ and Anlatıcı *et al.*⁽¹⁶⁾ reported that the rate of electrical injuries in the pediatric age group was 10% and 16.8% respectively.

In our study, the overall mortality rate was

14.3%, which are lower than the study conducted by De-Souza *et al.*⁽¹⁾ and Mukerji *et al.*⁽⁹⁾ and higher than other studies.⁽¹⁷⁻¹⁹⁾ This difference may be partly explained by the varying severity of burns, if we compare only the patients with an equal burned BSA, the mortality rate observed in our unit is similar to that of other centers. De-Souza *et al.*⁽¹⁾ reported a mortality rate of 59.4% for patients with burned BSA of more than 40%. We found 59% mortality rate in our unit for patients with burned BSA more than 40%.

In this study, the elderly patients (over 65 years old) mortality rate was (41.7%), which is higher than the younger patient groups (younger than 65 years old) 13.4%. Nguyen *et al.*⁽¹⁹⁾ reported that the effective initial management of burns considerably reduced the risk of morbidity and mortality, and since most of our patient were referred to our unit from other cities by a land ambulance, or referred to us from other countries, a higher mortality rate is explainable.

Conclusion

Children are at high risk from burn injuries, the main cause of which is scalding. In the adult age group, the main cause of burn injuries was flame burns. The mortality correlates highly with the percentage of burn and its main cause is direct flame burns. Most burns are preventable and, hence, educational programs should be conducted to inform the public of the causes of burns and their prevention.

References

1. **De-Souza DA, Marchesan WG, Greene LJ.** Epidemiological data and mortality rate of patients hospitalized with burns in Brazil. *Burns* 1998; 24: 433-438.
2. **Liu EH, Khatri B, Shakya YM.** A 3-year prospective audit of burns patients treated at the Western Regional Hospital of Nepal. *Burns* 1998; 24: 129-133.
3. **Dongo AE, Irekpita EE, Oseghale LO, et al.** A five years review of burn injuries in Irrua. *BMC Health Serv Res* 2007; 7: 171.
4. **Rytis R, Mindaugas K, Darius K.** Epidimology of burns in Lithuania during 1991-2004. *Medicina (Kaunas)* 2008; 44(7).
5. **Haberal M, Ucar N, Bilgin N.** Epidemiological survey of burns treated in Ankara, Turkey and desirable burn-prevention strategies. *Burns* 1995; 21: 601-606.
6. **Abdolaziz L, Mohammad P, Ali-Rezi T.** Epidimology of childhood burn injuries in Fars

- Province, Iran. *Journal of Burn Care and Rehabilitation*. 2002; 23: 39-45.
7. **Khaldoon H, Haddad H.** Profile of pediatric scald burns in Jordan. *JRMS* 1999; 6(1): 4-8.
 8. **Kumar P, Chirayil PT, Chittoria R.** Ten years epidemiological study of paediatric burns in Manipal, India. *Burns* 2000; 26: 261-264
 9. **Mukerji G, Chamania S, Patidar GP, Gupta S.** Epidemiology of pediatric burns in Indore, India. *Burns* 2001; 27: 33-38
 10. **Francis S, Arkadi G, Mona B.** characteristics of thermal burns in children admitted to an Israeli pediatric surgical ward. *IMAJ* 2008; 10:282-286.
 11. **Fukunishi K, Takahashi H, Kitagishi H, et al.** Epidemiology of childhood burns in the critical care medical center of Kinki University Hospital in Osaka, Japan. *Burns* 2000; 26:465-9.
 12. **El-Badawy A, Mabrouk AR.** Epidemiology of childhood burns in the burn unit of Ain Shams University in Cairo, Egypt. *Burns* 1998; 24: 728-732.
 13. **Asaria J, Kobusingye OC, Khingi BA, et al.** Acid burns from personal assault in Uganda. *Burns* 2004; 30(1):78-81.
 14. **Mercier C, Blond MH.** Epidemiological survey of childhood burn injuries in France. *Burns* 1996; 22: 29-34
 15. **Harmel RP Jr., Vane DW, King DR.** Burn care in children: special considerations. *Clin Plast Surg* 1986; 13: 95-105.
 16. **Anlatici R, Ozerdem OR, Dalay C, et al.** A retrospective analysis of 1083 Turkish patients with serious burns. *Burns* 2002; 28: 231-237.
 17. **Al-Shlash S, Warnasuriya ND, Al-Shareef Z.** Eight years experience of a regional burns unit in Saudi Arabia: clinical and epidemiological aspects. *Burns* 1996; 22: 376-380
 18. **Ho WS, Ying SY.** An epidemiological study of 1063 hospitalized burn patients in a tertiary burns centre in Hong Kong. *Burns* 2001; 27:119-23.
 19. **Nguyen NL, Gun RT, Sparnon AL, Ryan P.** The importance of initial management: a case series of childhood burns in Vietnam. *Burns* 2002; 28: 167-172.