

## PATTERN OF BURN INJURIES AT KING FAHAD HOSPITAL, AL-BAHA: A STUDY OF 277 CASES

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Burn injuries, a unique form of trauma which is sometimes avoidable,<sup>1</sup> are categorized among the most severe injuries an individual can experience.<sup>2,3</sup> Burns represent a major health problem worldwide, with high mortality and morbidity,<sup>4-7</sup> and economic loss, even with small burns.<sup>1,8</sup> Causes, types and incidence of burns vary from one community to another and are influenced by age, sex, economic status, local customs and social and environmental circumstances.<sup>8-13</sup> Numerous papers discussing the various aspects of burn injuries are being published worldwide, but few works have been done in Saudi Arabia.<sup>14,15</sup> The treatment of burn patients in a specialized facility is of inestimable worth.<sup>3</sup> Facilities of burn management in Saudi Arabia are distributed all over the Kingdom, with 17 burn units.<sup>16</sup> In Al-Baha, a rural area located in South Western Saudi Arabia, no specialized facility for burn care is available. Most burn injuries are managed in King Fahad Hospital (KFH), the only referral hospital in the region. Burn cases are admitted to the surgical wards under the care of the Plastic Surgery Unit, staffed by one consultant and one specialist. The policy of admission is to admit all referred burn cases unless they are minor (superficial and less than 10% of total body surface area [TBSA]) and can be managed as an outpatient.

Surgical procedures, i.e., excision and skin grafting, are usually carried out at the end of two operating lists per week. The aim of this paper is to focus on the pattern of burn injuries at KFH and to describe the general figures of morbidity and mortality.

### Methods

This is a retrospective study of all burn injury cases admitted to KFH Al-Baha from January 1990 through December 1994. The medical records of all patients were reviewed. The following data were collected: 1) age, sex

and nationality; 2) date of admission and discharge; 3) type, cause, place, and mode of injury; 4) extent of burn (summation of second- and third-degree burns in % TBSA), areas affected, morbidity and mortality; and 5) surgical procedures performed. The estimation of the extent of burn was done by the consultant plastic surgeon. Acute burn cases treated as outpatient and cases admitted for treatment of postburn contractures were excluded. The information obtained was tabulated and analyzed. Chi-squared test and Student's *t*-test were used where applicable to determine statistical differences and a *P* value of <0.05 was considered to be significant.

### Results

A total of 277 patients were admitted during the period studied. There were 165 males and 112 females (a ratio of 1.5:1). Males outnumbered females in all age groups except between 11 and 20. The Saudi to non-Saudi ratio was 4.4:1. The patients ranged in age from 21 days to 85 years, with children up to age 10 accounting for the main victims (59.2%), Table 1.

Scalds (mostly from hot water and tea) were the main injuries sustained (49.1%), followed by flame burns (37.5%). Among 104 flame burn cases, there were 40 cases of gas cylinder accidents, 21 burns due to flammable liquids and 16 cases caused by wood or charcoal stoves. The remaining flame burns were due to other causes. The type of burns in different age groups is shown in Table 2. In the miscellaneous group, there were two cases of lightning injury, three cases of contact burns and one case of an unusual extensive deep burn caused by traditional cauterization.

Approximately 87% of all burns were domestic. Burn accidents at work were seen in 26 cases (9.4%, all were male and mainly non-Saudi). Three cases of intended burns were encountered (two homicidal and one suicidal). The remaining 274 patients were injured accidentally, either by their own actions or as innocent bystanders. A slight insignificant seasonal variation in the frequency of burns was observed, with high incidence in spring (28.5%) and winter (27.8%) and fewer occurrences in summer (23.8%) and autumn (19.9%).

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TABLE 1. *Distribution of patients according to age, sex and nationality.*

Age group (years)	Males	Females	Saudi	Non-Saudi	Total (%)
1-10	94	70	153	11	164 (59.2%)
11-20	10	25	35	0	35 (12.6%)
21-30	23	4	10	17	27 (9.7%)
31-40	20	3	7	16	23 (8.3%)
41-50	8	3	5	6	11 (4%)
>50	10	7	16	1	17 (6.1%)
Total (%)	165 (59.6%)	112 (40.4%)	226 (81.6%)	51 (18.4%)	277 (100%)

TABLE 2. *Types of burns in various age groups.*

Age group	Sex	Scald	Flame	Elect	Chemical	Misc.	Total (%)
1-10	M	70	16	5	2	1	164 (59.2%)
	F	45	16	3	3	3	
11-20	M	3	5	1	1	0	35 (12.6%)
	F	7	13	2	1	2	
21-30	M	1	16	5	1	0	27 (9.7%)
	F	0	2	2	0	0	
31-40	M	2	17	1	0	0	23 (8.3%)
	F	1	2	0	0	0	
41-50	M	2	5	1	0	0	11 (4%)
	F	2	1	0	0	0	
>50	M	2	5	1	2	0	17 (6.1%)
	F	1	6	0	0	0	
Total (%)		136 (49.1%)	104 (37.5%)	21 (7.6%)	10 (3.6%)	6 (2.2%)	277 (100%)

The extent of the burns (% TBSA) ranged from 1% to 90% (mean 15.23%). More than half (51.2%) of the cases were burns of 10% or less. Twenty-nine patients (10.5%) sustained burns of more than 30% TBSA. The mean extent of flame burns was significantly higher than that of scalds; mean (SD) 21.65 (20.56) versus 12.55 (8.77),  $P < 0.01$ . Third-degree burns occurred in 65 cases (23.5%).

The upper limbs were involved in 66.8%, followed by lower limbs (49.1%), head and neck regions (48.4%) and trunk (44%). Genital and perineal areas were the least affected (9%). Length of hospital stay ranged from one day to 147 days, with a mean of 20.4. The mean hospital stay for flame burns was significantly higher than that for scalds; mean (SD) 27.76 (27.06) versus 14.94 (13.36),  $P < 0.01$ . Most of the patients (56.5%) stayed in hospital for less than 15 days. Fifty patients (18.9%) required more than one month in hospital and 67 patients (24.9%) stayed between 16 and 30 days.

Twenty-eight patients (10%) were discharged against medical advice. Seventy-eight patients (28.1%) needed surgical intervention (excision and grafting). Surgery was carried out for 66 patients, some requiring more than one

operation. The remaining 12 patients refused surgery and discharged themselves against medical advice. Twelve patients (4.3%) had some type of amputation. Those included seven children (six toddlers and one school age), burned by charcoal or wood stoves, and five young adults who sustained high voltage electrical injury. The overall mortality rate was 2.8% (eight patients). All the deaths were massive flame burn cases with a mean extent of 70% TBSA (range 35% to 90%).

## Discussion

The information available from Saudi Arabia on the burn injuries has been drawn from specialized burn facilities.<sup>14-18</sup> The present report, in contrast, was based on a retrospective review of medical records of the burn cases admitted to the general surgical wards at KFH, Al-Baha. Our study was carried out with the objective of describing the patterns of burns in the hospital rather than estimating their total incidence in the community. It is considered that the sample is representative of the pattern in the area.

The general sex distribution (male to female ratio of 1.5:1) is comparable with that reported by others.<sup>2,11,14-16,19</sup> However, males were more affected than females above 20 years of age (ratio of 3.5:1) compared with a ratio of 1.3:1 related cases in the 10 years or less category, which is in agreement with the figures reported by others.<sup>2,11</sup> Exceptionally, there were more females than males (ratio of 2.5:1) in the 11-20-year age group, for no obvious reason (Table 1).

There is nothing surprising about the age of burn cases in this series. Children up to 10 years of age were the main victims (59.2%), which agrees with other reports.<sup>2,11,14</sup> Such high incidence of burns among children is probably due to large families in the community, and the fact that a lot of time is spent at home. In this age group, the non-Saudi made up only 6.6%, which is in sharp contrast to what was observed in Jeddah.<sup>17</sup> This could be explained by the low number of non-Saudi families in this area.

The present report showed that the majority of burns admitted to hospital occurred at home, with the most common type being scalding in children and flame burns among adults. These observations are not new and are consistent with those reported by others.<sup>14,15,17,19</sup> Gas cylinder accidents featured in 38.5% of flame burns, reflecting the careless handling of this commonly used cooking facility. Others showed similar observation.<sup>11,14</sup> It is worth mentioning that wood and charcoal stoves, commonly used for heating in the Al-Baha area, were responsible for flame burns in about 15% of cases. This is because those heaters are designed to be installed at floor level, within easy reach of toddlers and children. To the best of our knowledge, no information is available from

other regions of the Kingdom on this serious problem, which was the cause for seven cases of amputation among children. Electric and chemical burns constituted 11.2% of the cases, whereas they were less in other reports.<sup>11,14,15,19</sup>

Burns at work occurred predominantly among expatriates from low socioeconomic status working as manual or semi-skilled workers. A high incidence of burns among the lower socioeconomic class has been alluded to by some authors.<sup>8,10,11,21-23</sup>

The seasonal variation in the frequency of burns shown in this report is in sharp disagreement with reported results from Jeddah, where the highest occurrence was in autumn (35.7%) and the lowest was in spring (10.7%).<sup>14</sup> We did not find obvious reasons for these different observations. It was of interest that the majority of burns were relatively small in area, similar to other figures.<sup>11,14,15,19,20</sup> This is a reflection of an overwhelming number of scalds, which caused significantly less severe burns. It is also probably due to admitting minor burns, which could be treated on an outpatient basis, into the hospital because of social circumstances, i.e., the parents cannot take care of their burned child or live in a remote area.

It is beyond the scope of this report to discuss the morbidity and mortality in details. Length of hospitalization and mortality are usually used for describing the outcome. We agree with others that these parameters are not adequate, and more objective and subjective parameters are necessary to determine the late outcome.<sup>25</sup> Figures of the hospital stay of the present report are similar to those reported from Jeddah,<sup>14</sup> Kuwait,<sup>11</sup> and Libya.<sup>20</sup>

A 10% rate of discharge against medical advice is quite high in comparison with reports from Jeddah<sup>14,17</sup> and Kuwait,<sup>11</sup> and similar to that observed in Libya.<sup>20</sup> The available data do not offer an explanation for this. As there was no standard policy for treatment of burns at KFH, Al-Baha, no specific conclusions could be drawn in this regard, but some points are worth comment: 1) the number of cases requiring surgical intervention was quite high in comparison to the reports from Jeddah<sup>14,17</sup> and Qatar;<sup>19</sup> 2) the number of patients requiring amputation was also alarming.

The mortality of burn injuries varies widely, from 1% to 52%, depending on several factors, such as the nature of the study population, the burn facility concerned, and the policy of admission.<sup>2,6,9,12,14-17,19-24</sup> Our mortality rate of 2.8% was quite low compared with that of other studies.<sup>2,10,11,14,15,19,21</sup> Very low mortality is reported from one burn unit in Riyadh.<sup>16</sup> The low mortality of this series could be due to the dominance of young patients, and minor and moderate burns, which carry very low mortality. Among massive burns of more than 30% TBSA, the mortality was quite high, eight out of 29 cases (27.6%), compared to that reported in other series.<sup>14,26</sup> Female burn

victims were significantly higher in number than males, without obvious reasons. Based on the unacceptable figures of outcome, we strongly recommend referral of major burn cases to a proper burn center, in order to offer the best management.

The picture drawn from this report shows that burn injuries represent a serious public problem, with children and young adults being the main victims. As most of these injuries would have been avoidable, an intensive educational program is needed to increase public awareness of burn dangers and to teach the proper prevention and safety measures at home and work. It is of the utmost importance to have accurate collection and analysis of data from different regions of the country to spotlight the differences in etiology, morbidity and mortality and to indicate the methods used by the most successful facilities, as it appears that burn injuries in Saudi Arabia are not adequately studied. The accurately collected and analyzed information would help to establish a national program of burn prevention.

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