

# EPIDEMIOLOGICAL ANALYSIS OF BURN INJURIES IN GÜLHANE MILITARY MEDICAL ACADEMY BURN CENTER

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## SUMMARY

A review of 422 burn patients admitted to the burn center at Gülhane Military Medical Academy was carried out during the years 1989-1993. The majority of the patients were men aged between 20-29 years (mean age; 25.9). Flame injury was the most common type of burn (53.8 %) compared with 28.4 % of patients who sustained scald injury. 128 patients (30.3 %) had burns with a TBSA>50 %. Adult flame burns were more common during summer time whereas pediatric burns were more common in the winter. The overall mortality was 22.4 and mean TBSA was 55.7 % in patients who died.

**Key Words:** epidemiology, burn, burn epidemiology.

## ÖZET

1989-1993 yılları arasında Gülhane Askeri Tıp akademisi yanık merkezine başvuran 422 hasta incelendi. Hastaların çoğunluğu 20-29 yaş (ortalama yaş; 25.9) arasındaki erkeklerdi. Alev yanığı en sık görülen yanık türü (%53.8). 128 hasta (%30.3) yanık yüzdesi %50 den küçüktü. Çocuk yanıkları kış mevsiminde, erişkin yanıkları ise yaz mevsiminde daha sık idi. Mortalite oranı %22.4 ve ölen hastaların yanık yüzdesi ortalama %55.7 idi.

**Anahtar Kelimeler;** epidemiyoloji, yanık, yanık epidemiyolojisi.

## INTRODUCTION

The management of burn patient needs special care, equipment and well trained, educated personnel. During the last fifty years, the most important improvement in the management of burn patients may be that a team approach in a well equipped center had been understood to be necessary. Since most burn injuries are frequently accidental, 80-90 percent of which are potentially preventable<sup>1</sup>. Certainly the best way to cope with the problem is prevention by public awareness and attempts to minimize the risk factors. Prevention, of course, is much more rewarding than treatment and requires exploration of the epidemiological features of the injury in a given population. Hence, the findings obtained from this study will help in management and prevention of burn injuries. The aims of our study were to

identify the epidemiological features of burn injuries affecting our population which may be amenable to educational and preventive programmes and to compare our findings with those published in the literature.

## Patients and methods

This retrospective study was made on 422 burn patients admitted to the Gülhane Military Medical Academy (GMMA) burn center between the years 1989-1993. The patients who were admitted more than once for either reconstructive or follow-up purposes during this period are not included in this period are not included in this study. Admission policy of our burn center is to admit patients having moderate to major burn injuries using the categorization of severity described by American Burn Association (ABA)<sup>2</sup>. Assessment

of the percentage of body surface area (BSA) injured was made according to the Lund-Browder chart<sup>3</sup>. Although GMMA is a military hospital, civilian burn patients all over the country are also admitted to our burn center. Patients were reviewed for age, sex, etiology, seasonal variation of burn, place of burn, extent of injury (TBSA), age of patient on admission and mortality. Conservative therapy included application of nitrofurazone +triphampicin impregnated gauze, silversulphadiazine cream and saline soaks. Tangential excision and auto-homo skin grafting was considered early if carried out within the first five days postburn. Indications for surgical therapy included deep burns with a TBSA> 1 percent, and deep burns involving the hands or feet or crossing joints. Surgical treatment consisted of meticulous debridement under anesthesia followed by dressing changes every other day or as often as necessary. Escharatomies, flaps, skin grafting and amputation were performed as needed. Excision and grafting were frequently performed.

## RESULTS

### Sex and age:

Of the 422 patients studied, 348 (82.5 %) were males and 74 (17.5 %) females. Of the 348 males 182 (52.3 %) were between 20-29 years of age. The second most common injured patient group was children between 0-9 years (77; 18.2 %). The female predominance was more marked in 0-9 years of age (43; 58.1 %), male predominance was in 20-29 years of age group. 77 patients (18.2 %) were in the age group 0-9, 38 (9.0 %) patients in the age group 10-19, 188 patients (44.5 %) in the age group 20-29; 50 patients (11.8 %) in the age group 30-39 years, 32 patients (7.6 %) in the age group 40-49 years, 24 patients (5.7 %) in the age group 50-59 years and 13 patients (3.2 %) were older than 60 years of age (Table 1).

### Causes of burn:

The most common types of burn were flame (227 patients; 53.8 %), scalds (120 patients; 28.4 %), and electrical burns (57 patients; 13.5 %) respectively. The majority of flame burns were due to ignition of a flammable liquid such as

gasoline. Overall 60 % of female burns were scalds and 28.3 % were flame burns. The corresponding percentages for males were 22.4 percent for scalds and 59.2 % for flame burns. 57 patients had electrical burns. 25 of these were injured by high voltage overhead electric power lines and 32 (56.1 %) were injured in a flash type burn. 3 patients (0.7 %) were injured by chemicals. One patient was injured with highly concentrated acetyl salicylate. The other two were injured with phosphorous while checking artillery shells. 13 (3.1 %) patients were injured by explosion of hand grenades and mines (Figure 1).

### Extent of injury:

101 patients (23.9 %) had 40-49 % burn of total body surface area, 63 patients (14.9 %) had 20-29 % burn of TBSA, 128 patients (30.3 %) had burns covering more than 50 % of TBSA, 27 patients (6.4 %) had burns more than 80 % of TBSA (Figure 2).

### Seasonal variation:

Of the 422 burns, 138 (32.7 %), 118 (27.9 %), 93 (22 %) and 73 (17.3 %) burns occurred during summer, winter, spring and autumn respectively. Pediatric burns (47; 11.1 %) were more common in winter whereas adult flame burns (107; 25.4 %) were more frequent during summer (Table 2).

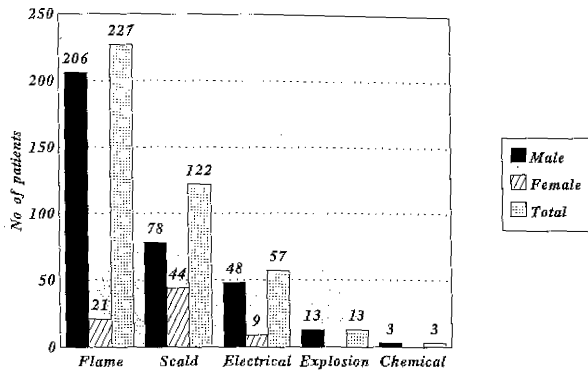
### Place of burn:

The majority of the burns (166 cases; 39.3 %) occurred at home. The next most common site was military barracks in our series (136 cases; 32.2 %). Majority of home burn injuries occurred in winter and summer respectively (60, 14.2 %; 55, 13 %). Burn injuries occurred at military barracks are common in summer (38 cases; 9 %). Outdoor burns occurred most frequently in spring and summer (12, 2.8 %, 21; 4.9 %) whereas it presented a decrease in autumn (61.4 %). The least number of burns (48 cases, 11.4 %) occurred in open areas (Figure 3).

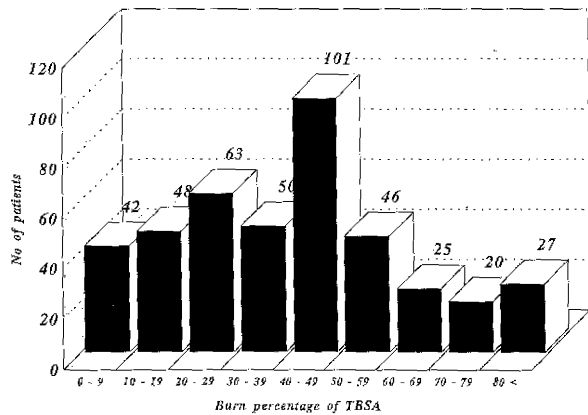
### Mortality:

Patient mortality was 20.4 % in our series. Mean extent of burn in patients who died was 55.7 % of the TBSA, versus only 28.9 percent in the patients who survived (Table 3).

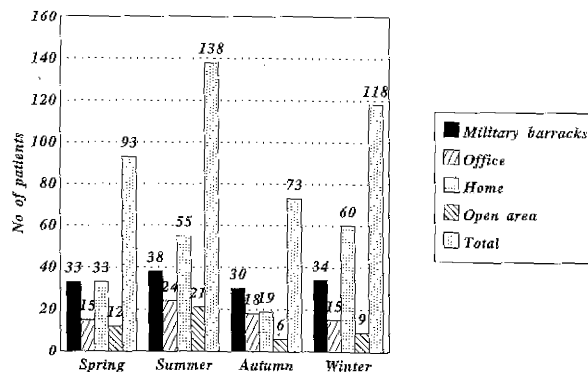
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**Figure 1:** The relationship of sex and causes of burns



**Figure 2:** The distribution of patients according to their extent of injury



**DISCUSSION**

The sex distribution of the burn patients shows that 82.5 percent of cases were males whereas only 17.5 % were females. Female to male ratio is 1/4.6. Review of literature shows that female to male ratio is about 1/1<sup>1,4,5,6</sup>. The difference between the literature and our findings may be related to that our burn center

**Table 1:** Relationship of age and sex

Age Group (yr)	Male		Female		Total	
	No	%	No	%	No	%
0-9	34	8.1	43	10.2	77	18.2
10-19	28	6.6	10	2.4	38	9
20-29	182	43.1	6	1.4	188	44.5
30-39	48	11.4	2	0.5	50	11.8
40-49	28	6.6	4	0.9	32	7.6
50-59	19	4.5	5	1.2	24	5.7
60<	9	2.1	4	0.9	13	3.1
<b>Total</b>	<b>346</b>	<b>82.5</b>	<b>74</b>	<b>17.5</b>	<b>422</b>	

**Table 2:** Relationship between age and seasons

Age Group (yr)	Spring	Summer	Autumn	Winter	Total	
	No	%	No	%	No	%
0-9	14	14	2	47	77	18.2
10-19	13	13	7	5	38	9
20-59	76	107	64	57	294	69.7
60<	—	4	—	9	13	3.1
<b>Total</b>	<b>93</b>	<b>138</b>	<b>73</b>	<b>116</b>	<b>422</b>	
	(%22)	(%32.7)	(%17.3)	(%28)		

**Table 3:** Relationship of burn mortality and the burn extent

Extent of burn (%)	Survival		Mortality	
	No	%	No	%
0-9	42	9.9		
10-19	48	11.4		
20-29	58	13.7	5	1.2
30-39	38	9	12	2.8
40-49	88	20.9	13	3.1
50-59	69	9.2	7	1.7
60-69	14	3.3	11	2.6
70-79	7	2.6	13	3.1
80<	2	0.5	25	5.9
<b>Total</b>	<b>336</b>	<b>79.6</b>	<b>86</b>	<b>20.4</b>

serves mostly for military personnel.

Majority of burn patients was in the 20-29 years of age group (44.5 %). This was followed by 77 (18.2 %) cases of 0-9 years of age group. In the studies regarding burns, patients in childhood period are under high risk of burn and constitutes the major part of the patients hospitalized<sup>1,5</sup>. Although our findings do not seem to correlate with literature, high number of 20-29 years of age group may explained by the fact that our patients are military personnel mostly. In fact, as shown in table 1, 52.3 % of male patients was composed of 20-29 years of

age group. Of those, 120 patients (65.9 %) were soldiers. Hence, in female patient group representing civilians, majority of the patients were in the 0-9 years of age group. More than 50% of all patients were children, below 18 years of age. This finding is consistent with other published studies of thermal injuries <sup>1,8</sup>.

Scalds are the most common type of burns and they are followed by flame burns <sup>5,6,7,9,10</sup>. In children between the ages of 0 and 6 years scalds were the main cause of injury while older ones sustained more flame burns <sup>11,12,13</sup>. In our series, flame was the major leading cause of injury (227 cases; 53.8 %). Scalds were the second (122 cases; 28.9 %). These findings do not correlate with the other reports <sup>5,6,7,9,10</sup>. This is easily explained by the fact that in our institution majority of our patients are soldiers who are 20 years of age.

Electrical burns account for 3-5.3 % of admissions to burn units <sup>14,15,16</sup>. The incidence of electrical burns in this study was 13 % which is nearly two fold higher than in the other series. This is because all electrical burns even if minor are hospitalized in our center at least for 48 hours. another reason may be because of the widespread use of overhead cables instead of underground cables. In this series there is much more frequent involvement of males compared to females in the electrical injuries (48 males versus 9 females). These data are similar to those in other series <sup>17,18</sup>. This can be explained by the fact that mainly males are in electrical work <sup>14</sup>.

Most of our patients had 40-49 percent burn of TBSA. In other series majority of patients hospitalized had burns less than 30 percent of their TBSA <sup>1</sup>. This may be attributed to that less severe burn patients could be treated in other regional military hospitals.

Burn injury occurs most frequently in winter time <sup>4,5,6</sup>. In this study, burn injury was most common in spring and summer. This may be due to the fact that during this period military field exercises are being held. Hence, burn injury rate is increased. As shown in Figure 3, home remains the main place where burn injuries occurred. It was reported that 73.6-85 % of burns occurred at home <sup>4,19</sup>. 167 patients (39.6 %) sustained burn injuries at home. 135

patients (32 %) burned at military barracks.

The mortality rate in our series was 20.4 %. Mortality rates are between 22-40 % depending on the patient age, burn percent of TBSA and burn depth <sup>4,8,9,10</sup>. Our findings are consistent with the mortality rates reported <sup>8,10,20</sup>.

Based on this study, this report emphasizes the importance of preventive measures to achieve an effective reduction in burn injuries. In preventive program of public education and applied prophylactic precautions are required.

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