Mortality in Above 40% Thermal Burns Patients

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ABSTRACT

Objective — *To findout the frequency of mortality of thermal burns in different ages and gender.*

Study design — *Descriptive study.*

Place & Duration of study — *The studywas conducted in Burn Unit, Khyber Teaching Hospital Peshawar, from October 2007 to 31st March 2008.*

Methodology — *One hundred patients with TBSA more than 40%, any degree of depth and any thermal cause were included in the study. The interpretation and analysis of data were done with the help of SPSS 10.0.*

Results — *There were 52 (52%) males and 48 (48%) females. The mean age was 17.90 year + 14.5 year. The maximum number of patients (30%) were less than 10 year of age, followed by 18 (18%) of 21-30 year and 15 (15%) of 31- 40 year age group. According to TBSA burns, 47 (47%) patients had 51-60% burns, followed by 40 patients (40%) having 40-50% burns. Fifty five patients died, including 28 males (50.90%) and 27 females (49.10%). Mortality was 100% in patients who were above 80 year of age having more than 80% TBSA burns. Thirty three patients (60%) died of septicemia, followed by 11 (20%) and 10 (18.19%) patients with acute renal failure and irreversible shock respectively.*

Conclusion — *The mortality in this study was high due to large TBSA burns, deep burns, referral from peripheral areas without proper treatment, failure to avail medical treatment in time and septicemia.*

Key words — *Burns, Total body surface area, Mortality.*

INTRODUCTION:

Burns are the second leading cause of accidental death, following vehicle crashes.[1] Burn injuries are very common in developing countries due to high population density, domestic accidents, poverty, illiteracy, lack of appropriate safety measures, negligence in certain working environment and unsafe use of materials associated with festivals (fireworks).[2] Most common causes of burn injuries are flame burns followed by hot liquid burns and electric burns. The most common age groups affected are in the first three decades of life.[3] Females are more commonly affected than males in rural areas, and the overall mortality is higher in females as compared to males. Maximum number of female victims has more than 75% total body surface area (TBSA) burns.[4]

Depending upon the location of body affected and degree of severity, a burn victim may experience a wide number of potentially fatal complications including shock, infection, respiratory distress, electrolytes imbalance, psychological and emotional distress due to scarring and deformity, and economic and social consequences.[5] Mortality increases as the degrees and total body surface area of burn increase i.e. 0.25% mortality with less than 10% TBSA, 5.4% with 20-39% TBSA, and 96.6% for burns > 90% TBSA has been reported.[6] In burn patients, sepsis and its related complications are the leading

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cause of mortality followed by irreversible shock and inhalation injury.[3] Significant morbidity and mortality from smoke inhalation occurs in victims of fire. Inhalation injury increases the number of deaths and three fold prolongation of hospital stay.[7] Mortality from burn injuries has been reported from a rate of 4.3%[8] to 53.4%.[2]

Worldwide about 5% of deaths are due to burn injuries and overall global annual cost for treatment of burn patients has been estimated around 500 billion US dollars.[9] The available data on mortality in patients with thermal burns is not sufficient to address this issue properly in our local setup. This study aimed to find out the mortality in different ages and gendar, and its common cause, in above 40% TBSA burn patients.

METHODOLOGY:

This descriptive prospective study was done at Burns Unit, Khyber Teaching Hospital Peshawar from October 2007 to 31st March 2008. Total of 100 patients were included in the study by stratified random sampling technique comprising of 52 males and 48 females. The inclusion criteria was all patients having thermal burns of more than 40% TBSA of any age and gender and of any duration presenting for the first time to our unit. Burns due to any cause (accidental, homicidal, suicidal), and superficial and full thickness (partial or deep) burns were admitted. Other burns due to electric and chemical cause, and cases with associated (secondary) injuries like fractures, penetrating wounds were excluded from the study. Informed written consent was taken from the patients and the purpose of study, use of data for research and publication were explained.

After detailed clinical history, all patients having more than 40% TBSA burn injuries were examined. Their TBSA involvement according to rule of nine, depth of burn injuries, nature of burn and time of injury were recorded. Routine investigations were done including full blood count, blood urea, random blood glucose level, serum electrolytes, serum creatinine, urine routine examination, 12-lead ECG and chest radiograph(anterioposterior view). These patients were followed along with ongoing treatment. The data collection for each patient was completed at the time of discharge from hospital or death. The main outcome measures were death of patient and any complication related to thermal burn itself or procedure performed during treatment. The data was analysed with the help of SPSS for windows version 10.0, and expressed as mean and percentage.

RESULTS:

There were 52 (52%) males and 48 (48%) females with male to female ratio 1.08:1. The mean age of patients was 17.90 years + 14.5SD. The total number of patients presenting with superficial, partial thickness and full thickness burns were 28 (28%), 40 (40%) and 32 (32%) respectively. Fifteen (15%), 17 (17%) and 68 (68%) patients presented within 12 hours, 24 hours and 48 hours after burns injury respectively. Accidental burns were found in 85 patients (85%) while suicidal and homicidal burns were in 15 (15%) and 5 (5%) patients respectively. There were 29 local patients (29%) and 71 patients (71%) from the peripheral areas. The maximum number of patients were 30 (30%) who were of less than 10 years age, followed by 18 (18%) patients of 21-30 years and 15 (15%) patients of 31-40 years age group. According to TBSA burns, 47 patients (47%) had 51-60% burns, followed by 40 patients (40%) having 40-50% burns. Other results are shown in Table I.

The total number of patients died were 55 (55%) giving high mortality. Out of these, male patients were 27 (50.90%) and female patients 28 (49.10%). Mortality was 100% in patients of above 80 year age group and those having more than 80% TBSA burns. Mortality according to age groups and TBSA burns are shown in Table II. Thirty three patients (60%) died of septicemia, followed by acute renal failure in 11 patients (20%), irreversible shock in 10 patients (18.19%), and acute respiratory failure in one patient (1.82%) as given in table III.

DISCUSSION:

Burn injury occurs universally and has plagued mankind since antiquity till present day. In all societies including developed and developing countries, burn constitute a medical and psychological problem, but also has severe economic and social consequences not to them, but also to their family and society in general.[10]

In this study male patients (52%) were more than female (48%) with a ratio of 1.08:1. This overall male predominance is according to the results of other studies showing male to female ratios of 2.2:1,[11] 1.94:1,[12] and 2.4:1.[13] Also maximum number of patients with burn injuries was in 16 to 40 years age group (46%). This also favors the results of other studies.[14,15] It is due to the fact that this age group carries the daily routine of life in our set up and hence affected more. Ahuja RB et al has reported that almost 80% of admissions due to burns are in the 16-55 years age group.[16] Mean age in this study was 17.90 year. It is similar to Groohi B et al who

Table I: Total Body Surface Area Burns in Different Age Groups (n=100)

Age (Year)	40-50%	51-60%	61-70%	71-80%	81-90%	>90%	Total	
0-10	11	16	1	2	-	-	Male	Female
11-20	05	08	-	-	-	-	16 (16%)	14 (14%)
21-30	06	10	-	02	-	-	6 (6%)	7 (7%)
31-40	04	07	02	-	01	01	7 (7%)	8 (8%)
41-50	04	01	-	02	-	-	3 (3%)	4 (4%)
51-60	-	02	04	01	-	-	4 (4%)	3 (3%)
61-70	-	02	-	03	01	-	3 (3%)	3 (3%)
71-80	-	01	02	-	-	-	2 (2%)	1 (1%)
>80	-	-	-	-	-	01	1(1%)	-
Total	30 (30%)	47 (47%)	9 (9%)	10 (10%)	2 (2%)	2 (2%)	52 (52%)	48 (48%)
							100 (100%)	

Table II: Mortality in Different Age Groups and TBSA Burns (n=55)

Age (Year)	40-50% (n=30)	51-60% (n=47)	61-70% (n=9)	71-80% (n=10)	81-90% (n=2)	>90% (n=2)	Male	Female
0-10 (n=30)	05	09	01	02	-	-	9 (30.00%)	8 (26.67%)
11-20 (n=13)	02	03	-	-	-	-	3 (23.07%)	2 (15.38%)
21-30 (n=18)	04	04	02	-	-	-	4 (22.23%)	6 (33.33%)
31-40 (n=15)	03	03	01	-	01	01	4 (26.67%)	5 (33.33%)
41-50 (n=7)	03	-	-	01	-	-	2 (28.57%)	2 (28.57%)
51-60 (n=7)	-	01	03	-	-	-	2 (28.57%)	2 (28.57%)
61-70 (n=6)	-	-	-	03	01	-	3 (50.00%)	1 (16.67%)
71-80 (n=3)	-	-	-	-	-	-	1 (33.33%)	-
>80 (n=1)	-	-	-	-	-	01	-	1 (100%)
Total	17 (56.67%)	20 (42.55%)	06 (66.67%)	08 (80%)	02 (100%)	02 (100%)	28 (50.90%)	27 (49.10%)

reported 18.0 year as a mean age.[17] Song C et al[11] and Rimdeika R et al[18] have reported mean age of 32.5 years and 41.3 years respectively. Gradual decline in the number of patients has been seen in our study after 40 years of age. This observation was also reported by Abrol A et al.[2]

The overall mortality in our study was high i.e. 55% including 28% males and 27% females. In literature the mortality reported by others was from 6.6% to 36%.[19-22] From Pakistan overall mortality of 29.7% was reported by Khan N et al,[23] 19% by Muqeem RU et al[24] and 20.96% by Chaudhary IA et al.[3] In Jamu Kashmir, 53.4% mortality has been reported by Abrol et al.[2] The first reason for such a high mortality was that most of the patients were from the peripheral areas (71%) who were referred to our unit without proper medications. Second reason was the late presentation as 68% patients presented after 24 hours and by that time most of the patients had developed complications like septicemia, irreversible shock and acute renal failure. Third reason was that 77% patients were having 40 to 60% TBSA burns, and the fourth reason was that the patients having partial full thickness and full thickness burns were 72%.

In our study mortality was slightly more in male

Table III: Total Body Surface Area and Causes of Mortality

Age (Year)	40-50% (n=17)	51-60% (n=20)	61-70% (n=6)	71-80% (n=8)	81-90% (n=2)	>90% (n=2)	Total	
							Male	Female
Septicemia n=33	08	14	04	05	01	01	17 (30.91%)	16 (29.10%)
Irreversible shock n=10	04	02	01	01	01	01	6 (10.91%)	4 (7.27%)
Acute renal failure n=11	04	04	01	02	-	-	4 (7.27%)	7 (12.73%)
Respiratory failure n=1	01	-	-	-	-	-	1 (1.82%)	-

patients (50.90%) as compared to females (49.10%). But on analysis of the age groups, it has been noted that mortality in female patients were more than males (33.33% vs. 24.24%) between the age groups of 20 to 40 years. This may be attributed to the fact that female of this age group are more engaged in work at kitchen. About 77.5%[16] and 88.6%[2] flame burns has been reported to be sustained in the kitchen.

In this study, septicemia was the leading cause of death followed by acute renal failure (20%) and irreversible shock (18.19%). In a local study conducted by Chaudhary IA,[3] mortality was 75% due to sepsis and its related complications, and 13.46% due to irreversible shock who received extensive burns**.** Sepsis (63.6%) and respiratory failure (9.1%) were the causes of the deaths in a study from Turkey.[25]

CONCLUSIONS:

Younger age groups were affected more in above 40% TBSA burns. Large TBSA, deep burns, lack of burn care facilities at peripheral areas and referral without proper treatment, failure to avail medical treatment in time and septicemia were the main causes of mortality.

REFERENCES:

1. Olivera-Martinez I, Viallet JP, Michon F, Pearton DJ, Dhouailly D. The different steps of skin formation in vertebrates. Int J Dev Biol 2004; 48:107-15.
2. Abrol A, Saraf R, Singh S. Thermal and electrical burns in Jammu Province. J K Sci 2005;7:61-3.
3. Chaudhary IA. Burns: frequency and mortality related to various age groups. J Surg Pak 2009;14:67-71.
4. Allison K, Porter K. Consensus on the pre hospital approach to burns patient management. Emerg Med J 2004; 21:112-4.
5. Maghsoudi H, Pourzand A, Azarmir G. Etiology and outcome of burns in Tabriz, Iran. An analysis of 2963 cases. Scand J Surg 2005; 94:77-81.
6. Haik J, Liran A, Tessone A, Givon A, Orenstein A, Peleg K. Burns in Israel: demographic, etiologic and clinical trends, 1997-2003. Isr Med Assoc J 2007; 9:659-62.
7. Lee AS, Mellins RB. Lung injury from smoke inhalation. Pediatr Respir Rev 2006;7:123-8.
8. El-Badawy A, Mabrouk AR. Epidemiology of childhood burns in the burn unit of Ain Shmas university in Cairo, Egypt. Burns 1998; 24:728-32.
9. Atia RF, Reda AA, Mandil AM, Arafa MA, Massoud N. Predictive model for mortality and the length of hospital stay in an Egyptian burn centre. Easr Mediterr Health J 2000; 6:1055-61.
10. Jie X, Baoren C. Mortality rates among 5321

patients with burns admitted to a burn unit in China: 1980-1988. Burn 2003; 29:239-45.

11. Song C, Chua A. Epidemiology of burn injuries in Singapore from 1997 to 2003. Burns 2005;31:S18-26.

12. Tang K, Jian L, Qin Z, Zhenjiang L, Gomez M. A seven year epidemiology study of 12381 admitted burn patients in Taiwan. Burns 2005; 31:12-17.

13. Tang K, Jian L, Quin Z, Zhenjiang L, Gomez M. Characteristics of burn patients at a major burn center in Shanghai. Burns 2006; 32:1037-43.

14. Sharma BR, Dasari H, Sharma V, Vij K. Kitchen accidents vis-à-vis dowry death. Burns 2002; 28:250-3.

15. Ambade VN, Godbole HV. Study of burn deaths in Nagpur, Central India. Burns 2006; 32:902-08.

16. Ahuja RB, Bhattacharya S. An analysis of 11196 burn admissions and evaluation of conservative techniques. Burns 2002; 28:555-61.

17. Groohi B, Alaghebandan R, Lari AR. Analysis of 1089 burn patients in province of Kurdistan, Iran. Burns 2002;28:569-74.

18. Rimdeika R, Hankunas V, Pilipaityte L, Mikuzis M. The changes of characteristics of burn injuries and treatment data of burned adults in Kaunas university of medicine hospital in 1981-2001. Med Kaunas 2004; 40:238-45.

19. Lari AR, Alaghehbandan R, Nikui R. Epidemiological study of 3341 burn patients during three years in Tehran, Iran. Burns 2000; 26:49-53.

20. Mungadi IA. Child hood burn injuries in north western Nigeria. Niger J Med 2002; 11:30-2.

21. Dongo AE, Irekpita EE, Oseghale LO, Ogbebor CE, Iyamu CE, Onuminya JE. A five-year review of burn injuries in Irrua. BMC Health Serv Res. 2007; 7:171.

22. Adigun IO, Oluwatosin OM, Amanor-Boadu SD, Oluwole OA. Inhalation injury in burn patients in Ibadan. Nig J Surg Res 2001; 3:50-4.

23. Khan N, Malik MA. Presentation of burn injuries and their management outcome. J Pak Med Assoc 2006; 56:394-7.

24. Muqim R, Zareen M, Dilbag, Hayat M, Khan I. Epidemiology and outcome of burns at Khyber Teaching hospital Peshawar. Pak J Med Sci 2007; 23:420-4.

25. Haberal M, Kut A, Basaran O, Tarim A, Türk E, Sakallioglu E, et al. Preventable thermal burns ssociated with the ignition of paint thinner: experience of a burn care network in Turkey. 2007;98:653-9.