



Original Research Article

Profile of Deaths Due to Burns at Tertiary Care Center with Special Emphasis on Septicemia: A One Year Retrospective Study

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ABSTRACT

Infection in the burn patient is a leading cause of morbidity and mortality and continues to be one of the most challenging concerns for the burn team. The importance of preventing infection has been recognized in an organized burn care since years. These included strict aseptic technique, use of sterile gloves and dressing materials, wearing masks for dressing changes and special separation of patients, either using private rooms or cubicles. The present retrospective study was conducted in the Department of Forensic Medicine & Toxicology, M. P. Shah Govt. Medical College and Government Guru Gobindsingh Hospital, Jamnagar during the period from July-2013 to August-2012, to determine the various bacterial pathogens responsible for burns wound infection, incidence of infection in various age groups, and to establish the relation between infection and total body surface area involved in burns victim. However, the present study reveals that only one-fourth of the burns victim experience septicemic episodes whereas, one-third of the patients died because burns extend above 90% of the total body surface area and due to these victims died within 48 hr of incidence, where majority of victims were females and shock was the most common cause of death. Majority of burn injuries were accidental in nature with maximum incidence of septicemia.

Keywords: Burns, Septicemia, Total body surface area

INTRODUCTION

In India, burns injury is one of the major causes of death, specifically in females. The problem of burns in India is more due to various socio-economical and cultural factors present in the country. Some of these factors may be poor housing conditions, customs of wearing sarees or dupatta, dowry, illiteracy, ignorance and poverty. The exact estimation of burns incidence is very much difficult due to large population and lack of reporting.^[1]

Most of the burn victims succumb to the infections and their complications, if they survive the initial 24 hours. A burn wound has higher incidence of sepsis as compared to other forms of trauma, because of extensive skin barrier disruption and an alteration in the cellular and humoral immune responses. A burn injury is known to cause devitalization of tissues and produce extensive raw areas. The wound is moist due to the outflow of serous exudates at a temperature approaching 37° C or

above. The dead and denatured burn eschars and the moist wound environment favor colonization and proliferation of a variety of microorganisms. [2,3]

It is therefore essential for every burn institution to determine its specific pattern of burn wound sepsis, time related changes in predominant flora and antimicrobial resistance profiles. This would allow early management of septic episodes with proper empirical systemic antibiotics, thus improving the overall infection-related morbidity and mortality. Various studies have been done with regard to the variations in all factors concerned with burns incidence. We attempt to examine the factors affecting risk of infection; strategies for infection control and prevention in burn victims.

MATERIALS AND METHODS

The present retrospective study was conducted in the Department of Forensic Medicine & Toxicology, M. P. Shah Govt. Medical College and Government Guru Gobindsingh Hospital, Jamnagar during the period from July-2013 to August-2012. This study was carried out in all the cases of burn victims who were admitted to the Burns ward including those who were referred,

discharged or dead or brought for the post mortem examination. Detailed history of the case was obtained from the patient's case paper, police paper, post mortem report, Proforma was filled and data was analyzed and tabulated by using various parameters.

Observation

As per table no. 1 out of total 180 burn cases, females outnumbered male; comprising of 141 cases (78.33%) as compared to 39 cases (21.66%) in males making a male: female ratio of 1:3.61. Out of total 50 cases of septicemia, the incidence of septicemia was highest in female cases (28.37%) than that of male cases which was 25.64%. The highest incidence of septicemia, 55.56% was recorded in the month of August followed by 38.89% in the month of July.

The maximum number of 23 septicemic cases (46%) was observed in the age-group 21-30 years, which comprised of 20 female cases (50%) and 3 male cases (30%). The overall incidence of septicemia was highest in the age-group 0-10 years with 44.44%, comprising of 50% incidence rate for female and 40% incidence for male. The overall incidence of septicemia for the age-group 21-30 years was 31.08%, with 20% incidence in males and 33.89% for females.

Table: 1 Gender wise distribution of cases:

Age group (in years)	Male			Female			Total		
	Cases	Septi.	Incidence septi	Cases	Septi.	Incidence septi	Cases	Septi.	Incidence septi
0-10	5 (2.78%)	2(20%)	40%	4 (2.22%)	2(5%)	50%	9 (5%)	4(8%)	44.44%
11-20	4 (2.22%)	2(20%)	50%	26 (14.44%)	6(15%)	23.08%	30 (16.66%)	8(16%)	26.67%
21-30	15 (8.33%)	3(30%)	20%	59 (32.79%)	20(50%)	33.89%	74 (41.12%)	23(46%)	31.08%
31-40	7 (3.89%)	1(10%)	14.26%	25 (13.89%)	8(20%)	32%	32 (17.78%)	9(18%)	28.13%
41-50	5 (2.77%)	2(20%)	40%	8 (4.44%)	2(5%)	25%	13 (7.21%)	4(8%)	30.77%
51-60	2 (1.11%)	0	0%	3 (1.67%)	1(2.5%)	33.33%	5 (2.78%)	1(2%)	20%
Above 60	1(0.57%)	0	0%	16 (8.89%)	1(2.5%)	6.25%	17 (9.46%)	1(2%)	5.83%
Total	39 (21.67%)	10 (100%)		141(78.33%)	40 (100%)		180 (100%)	50(100%)	

The incidence of burn cases was more in rural areas (55%) as compared to that in urban areas (45%). The incidence of septicemia was observed to be more in

urban areas, 28 cases (56%) than that of 22 cases (44%) of rural areas.

As per table no. 2 overall incidence of septicemia in flame group was 27.33% and that of scald group was 50%. The Flame

group recorded a septicemia incidence of 23.53% for females and 28.26% for females; whereas scald group recorded a septicemia

incidence of 50% for both male and females. The overall incidence of septicemia for electrocution group was 25%.

Table No. 2: Distribution of cases according to type of burns:

Type of burns	Male			Female			Total		
	Cases (N=39)	Septi. (n=10)	Incidence Septi	Cases (N=141)	Septi. (n=40)	Incidence Septi.	Cases (N=180)	Septi. (n=50)	Incidence septi.
Flame	34	8(80%)	23.53%	138	39(97.5%)	28.26%	172	47(94%)	27.33%
Scald	2	1(10%)	50%	2	1 (2.5%)	50%	4	2 (4%)	50%
Electrocution	3	1(10%)	33.33%	1	0 (0%)	0%	4	1 (2%)	25%
Total	39	10 (100%)		141	40 (100%)		180	50 (100%)	

In accidental burns, overall incidence of septicemia was 34.11%, whereas for suicidal burns, it was 10.64%. In the accidental burns group, females recorded a septicemia incidence of 32.39% as against 41.67% for males; whereas in suicidal group, it was 14.71% for females and 0% for males. The overall incidence of septicemia in homicidal burns was 25%.

As per table no.3 The maximum number of burn cases, 55(30.55%) were observed having total body surface area involving more than 90%, which observed 44 female burns cases (24.44%) followed by 11 male burns cases (6.11%). The 81-90% TBSA group recorded total 32 cases (17.78%) comprising 27 female cases (15%) and 5 male cases (2.78%), followed by total 21 cases in 71-80% TBSA group and 20 cases each in 41-50% and 51-60% TBSA group. Total 10 cases were recorded having TBSA <30%, consisting of 5 male cases

(2.78%) and 5 female cases (2.78%).The minimum burn cases 7 (3.89%) were recorded with total body surface area involving 31-40%.

The total body surface area burnt wise incidence of septicemia was recorded at 40% in <30% TBSA; 71.43% in 31-40% TBSA; 70% in 41-50% TBSA; 45% in 51-60% TBSA; 26.67% in 61-70% TBSA; 23.81% in 71-80% TBSA; 15.62% in 81-90% TBSA and 7.27% in >90% TBSA. The gender wise incidence of septicemia was 20% in males and 60% in females with <30% TBSA; 100% versus 60% in 31-40% TBSA; 83.33% versus 64.23% in 41-50% TBSA; 33.33% versus 47.01% in 51-60% TBSA; 50% versus 23.08% in 61-70% TBSA; 0% versus 31.25% in 71-80% TBSA; 0% versus 18.52% in 81-90% and 0% versus 9.09% in >90% TBSA in male and female burns respectively.

Table No. 3 Distribution of cases according to % of body surface area involvement:

TBSA	Male			Female			Total		
	cases	Septi.	Incidence septi	cases	Septi.	Incidence septi	cases	Septi.	Incidence septi
<30%	5 (2.78%)	1	20%	5 (2.78%)	3	60%	10 (5.56%)	4	40%
31-40%	2 (1.11%)	2	100%	5 (2.78%)	3	60%	7 (3.89%)	5	71.43%
41-50%	6 (3.33%)	5	83.33%	14 (7.78%)	9	64.23%	20 (11.11%)	14	70%
51-60%	3 (1.67%)	1	33.33%	17 (9.44%)	8	47.01%	20 (11.11%)	9	45%
61-70%	2 (1.11%)	1	50%	13 (7.22%)	3	23.08%	15 (8.33%)	4	26.67%
71-80%	5 (2.78%)	0	0%	16 (8.89%)	5	31.25%	21 (11.67%)	5	23.81%
81-90%	5 (2.78%)	0	0%	27 (15%)	5	18.52%	32 (17.78%)	5	15.62%
>90%	11 (6.11%)	0	0%	44 (24.44%)	4	9.09%	55 (30.55%)	4	7.27%
Total cases	39 (18.89%)	10		141(81.11%)	40		180 (100%)	50	

As per table no. 4 the maximum number of victims, 64 cases (35.56%)

survived for 3-7 days after getting burns. The above table also indicates that 35% of

total victims died within 24 hours after receiving burns, which includes 19 cases (10.55%) of survival period of <1 hour, 23 cases (12.78%) survived for <12 hours and

21 cases (11.67%) survived for 12-24 hours. Total 35 cases (19.44%) survived for >1 week after getting burns and 2 cases (1.11%) survived for 24-48 hours.

Table No. 4 Distribution of cases according to outcome of patient:

Outcome of Patient	Male			Female			Total		
	Cases	Septi.	Incidence Septi.	Cases	Septi.	Incidence Septi.	Cases	Septi.	Incidence Septi.
Died	31(17.22%)	8 (4.44%)	25.81%	133 (73.89%)	35 (19.44%)	26.31%	164 (91.11%)	43 (23.89%)	26.22%
Survived	5 (2.78%)	2 (1.11%)	40%	4 (2.22%)	3 (7.5%)	75%	9 (5%)	5 (2.78%)	55.56%
Referred	3 (1.67%)	00 (0%)	0%	4 (2.22%)	2 (5%)	50%	7 (3.89%)	2 (1.11%)	28.57%
Total	39 (21.67%)	10 (5.56%)		141 (78.33%)	40(22.22%)		180 (100%)	50 (27.78%)	

Out of total 50 cases of septicemia, 23 bacterial isolates were obtained. Staphylococcus aureus was the common isolate obtained in 8 culture isolates. Escherichia coli and klebsiella were isolated equally in 4 culture isolates followed by 3 isolates of Acinetobacter. The microbial combination of mixed infection was seen mainly with Escherichia coli, klebsiella and Acinetobacter.

The table no. 1 and 4 indicates that out of total 180 cases, 50 cases (27.78%) developed septicemia, of which 10 (5.56%) were males and 40 (22.22%) were females. Total 43 cases died due to septicemia, out of which 8 cases (4.44%) were males and 35 cases (19.44%) were females. Total 5 cases (2.78%) survived after developing septicemia, out of which there was 2 male cases (1.11%) and 3 female cases (1.67%).

The maximum number of cases, 40 was recorded in the female burns cases. 35 (19.44%) female burns cases died due to septicemia, while 3 cases (1.67%) survived and 2 cases (1.11%) were referred to the other tertiary care centers. There were 10 male cases (5.56%) that developed septicemia, out of which 8 cases (4.44%) died and 2 cases (1.11%) survived.

DISCUSSION

During the period of study, out of total 180 cases of burns, there was a predominance of female victims (78.33%) than males (21.67%). The gender wise analysis of burns cases showed female preponderance with a male to female ratio of 1: 3.61. These observations were similar with other studies from various regions of India; Chawla et al, [4] Dasari et al, [5] Shankar et al, [6] Singh et al, [7] Bharadwaj et al. [8] This may be due to gender difference, socio-cultural factors and dowry problems. Secondly, most of the women are housewives and they come more in contact with fire. [9]

The gender analysis of septicemic cases also showed a female predominance with a male to female ratio of 1: 4; moreover, the incidence of septicemia was 28.37% in females as compared to 25.64% in males and 27.78% in the overall study. Similar findings have also been reported by Dasari et al [5] and Singh et al. [6]

The hotter months from April to August recorded total 57 cases with 35.08% incidence of septicemia, whereas the colder months from November to March had total 89 burn cases that had 73.03% incidence of septicemia. Ideally, it is expected that infection rates should be lower in colder months, so a lower septicemia incidence is

expected, but a higher TBSA involved in burn injury was seen in these cooler months, so the resultant increase in septicemia was recorded. Similar findings were reported by Dasari et al^[5] and Singh et al.^[6]

The maximum number of burn cases were observed in the age group of 21-30 years, 74 cases(41.12%), which comprised of 59 female cases (32.79%) and 15 male cases (8.33%). These observations were confirmatory with other studies; Vaghela et al,^[1] Chawla et al,^[4] Dasari et al,^[5] Zanzad et al,^[10] Memchoubi et al.^[11] the maximum number, 23 septicemic cases (46%) was observed in the age-group 21-30 years, which comprised of 20 female cases (50%) and 3 male cases (30%). The overall incidence of septicemia for the age-group 21-30 years was 31.08%, with 20% incidence in males and 33.89% for females. Similar findings were reported by Zorgani et al.^[12] The overall incidence of septicemia was highest in the age-group 0-10 years with 44.44%, comprising of 50% incidence rate for female and 40% incidence for male. This is the productive age when they are generally active and more exposed to hazardous situations both at home and at work.

The overall incidence of septicemia for urban areas was 34.57% as compared to 22.22% for rural areas; this is because most of the burn cases belonged to urban slum areas. The low socio-economic status and unhygienic living conditions contribute to expose these post burn patient to multiple infection sources producing a higher septicemia incidence.

The overall incidence of septicemia in flame group was 27.33% and that of scald group was 50%. The Flame group recorded a septicemia incidence of 23.53% for males and 28.26% for females; whereas scald group recorded a septicemia incidence of 50% for both male and females. The overall incidence of septicemia for electrocution

group was 25%. Singh et al^[6] recorded 96.2% of the cases developing septicemia had suffered flame burns and this group had 66.2% incidence rate for septicemia.

Accidental burns (71.67%) were more common as compared to suicidal and homicidal burns. The accidental burns were more commonly observed in the married females (47.77%) than in unmarried females (10.56%).The suicidal cases were observed maximum in the married females (15%) as compared to married males (5.56%). The homicidal burn cases were equally distributed among both married and unmarried males and females (0.56%). This findings were consistent with several studies; Vaghela et al,^[1] Singh et al,^[6] Haralkar et al,^[9] Zanzad et al.^[10] This may be because of the fact that majority of the married females are working in kitchen and majority of burns occur at kitchen. The other factors which make Indian females more prone for burn injury are their low status, gender inequality and social evils like dowry.

In accidental burns, overall incidence of septicemia was 34.11%, whereas for suicidal burns, it was 10.64%. In the accidental burns group, females recorded a septicemia incidence of 32.39% as against 41.67% for males; whereas in suicidal group, it was 14.71% for females and 0% for males. The overall incidence of septicemia in homicidal burns was 25% with 50% incidence for females. Accidental burns are common, may be because of ignorance, poor standards of safety measures, cooking at floor level and wearing of sarees or dupatta.

The overall incidence of septicemia with total body surface area burnt was almost inversely proportional with 71.43% in 31-40% TBSA followed by 70% in 41-50% TBSA; 45% in 51-60% TBSA; 26.67% in 61-70% TBSA; 23.81% in 71-80% TBSA; 15.62% in 81-90% TBSA and 7.27% in >90% TBSA. This is due to fact that as

the total body surface area involved increased, the duration of survival decreased.

The gender wise incidence of septicemia was 20% in males and 60% in females with <30% TBSA; 100% versus 60% in 31-40% TBSA; 83.33% versus 64.23% in 41-50% TBSA; 33.33% versus 47.01% in 51-60% TBSA; 50% versus 23.08% in 61-70% TBSA; 0% versus 31.25% in 71-80% TBSA; 0% versus 18.52% in 81-90% and 0% versus 9.09% in >90% TBSA in male and female burns respectively.

Maximum number of victims, 64 cases (35.56%) survived for 3-7 days after getting burns. 35% of total victims died within 24 hours after receiving burns, which includes 19 cases (10.55%) of survival period of <1 hour, 23 cases (12.78%) survived for <12 hours and 21 cases (11.67%) survived for 12-24 hours. Total 35 cases (19.44%) survived for >1 week after getting burns and 2 cases (1.11%) survived for 24-48 hours. 9(5%) cases survived and 7(3.89%) cases were referred to other tertiary care centers

Out of total 50 cases of septicemia, 23 bacterial isolates were obtained. Staphylococcus aureus was the common isolate obtained in 8 culture isolates. Escherichia coli and klebsiella were isolated equally in 4 culture isolates followed by 3 isolates of Acinetobacter. The microbial combination of mixed infection was seen mainly with Escherichia coli, klebsiella and Acinetobacter.

Out of total 180 burn cases, 50 cases (27.78%) developed septicemia, of which 10 (5.56%) were males and 40 (22.22%) were females. Total 43(23.89%) cases died due to septicemia. Total 35 (19.44%) female burns cases died due to septicemia, while 3 cases (1.67%) survived and 2 cases (1.11%) were referred to the other tertiary care centers. There were 10 male cases (5.56%) that

developed septicemia, out of which 8 cases (4.44%) died and 2 cases (1.11%) survived.

SUMMARY AND CONCLUSION

During the present study, following findings were summarized and revealed: Septicemia is common in burns patients. However, the present study reveals that in the taken region, only one-fourth of the burns victim experience septicemic episodes whereas, one-third of the patients died because burns extend above 90% of the total body surface area and due to these victims died within 48 hr of incidence, where majority of victims are females and shock was the most common cause of death. Majority of burn injuries were accidental in nature with maximum incidence of septicemia and were more common in rural population with maximum incidence of septicemia in urban population. Burn injuries are more common in married persons with maximum incidence in married females in the age-group 21-30 years with 31.08% incidence of septicemia. Scald burns are seen in 0-10 years of age-group with maximum incidence of septicemia. Staphylococcus aureus was the most common bacterial isolate obtained.

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