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Surgery

Epidemiology of Burns in a Tertiary Care Hospital of Central India – A Retrospective Observational Study

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Abstract: Burns is not only a major cause of mortality but also a common cause of morbidity, disability and disfigurement. The epidemiological studies are very important to better understand the magnitude of the problem, to improve preventive measures and the approach towards burn patients. This retrospective observational study was carried out to study the epidemiology, outcome & cause of death and bacteriology of burn patients in the Department of General surgery, Government Medical College, Akola. In this study, all the data of patients admitted with the complaints of burns from January 2015 to December 2017 related to age, sex, cause of burns, type of burns, total body surface area of burns, respiratory tract involvement, outcome and cause of death were considered and analyzed. In this study we found that various factors like age, sex, total body surface area of burns, type of burns, cause of burns, conditions such as involvement of the respiratory tract are responsible for the morbidity and mortality in burn patients; Septicemic shock was the major cause of death & Staphylococcus aureus was the most commonly cultured organism followed by mixed type of infection and Pesudomonas aeruginosa.

Keywords: Epidemiology of Burns, morbidity and mortality of burns, burn injuries.

INTRODUCTION

Burn injuries are among the most devastating of all injuries & represent a serious problem around the world especially in the developing countries. Burns is not only a major cause of mortality but also a common cause of morbidity, disability and disfigurement [1]. The patients who survive after burns are left not only physically but also mentally, socially, emotionally and financially handicapped.

Over the past years, a declining trend of mortality has been seen in developed counties, but in the developing countries the mortality is still high [3].

Various factors like age, sex, total body surface area, thickness of burns, conditions such as involvement of the respiratory tract are responsible for the morbidity and mortality of burns. Multi organ failure which is usually due to hypovolemic or septic shock has been seen to be the main cause of late mortality in burn patients [2]. The epidemiological studies are very important to better understand the magnitude of the problem, to improve preventive measures and the approach towards burn patients. The present study of Epidemiology of burn patients presented at a tertiary care hospital can give us an estimate of the magnitude of the problem throughout the country.

MATERIALS AND METHODS

This is a retrospective observational study conducted at Government Medical College and Hospital, Akola in the Department of General surgery after taking permission from the Institute's ethical committee. All the patients admitted with the complaints of burns from January 2015 to December 2017 were analyzed. All the data related to age, sex, cause of burns, type of burns, total body surface area of burns, duration of hospital stay, outcome and cause of death, respiratory tract involvement, organisms found in burn wounds were considered and analyzed.

AIM AND OBJECTIVES

- To study the epidemiology of burn patients presented at Government Medical College and Hospital, Akola
- To study the outcome & cause of death in burn patients.
- To study the bacteriology in burn patients.

RESULTS

Total 1110 patients were admitted with the complaints of burns from January 2015 to December 2017. Of these patients, 399 (35.94 %) were males and 711 (64.05 %) were females. A total male:female ratio of 1:1.78 was seen. In this study, following observations were made.

Table-I: Age & sex distribution of burn patients

Age in years	No. of Patients (%)	Males (%)	Females (%)
0-10	88 (7.92)	52 (13.03)	36 (5.06)
11-20	62 (5.58)	23 (5.76)	39 (5.48)
21-40	389 (35.04)	98 (24.56)	291 (40.92)
41-60	352 (31.71)	127 (31.82)	225 (31.64)
61 & more	219 (19.72)	99 (24.81)	120 (16.87)
Total	1110	399 (35.94)	711 (64.05)

The above observation table shows that the incidence of burn is highest (35.04 %) in age group (21-40 years) followed by 31.71 % in age group (41-60 years) & in children below 10 years it is 7.92 %. In female patients, the common age group affected was 21-40 years & in males it was 41-60 years.

Table-II: Relation of age, sex and mortality

Age in years	Patients expired (%)	Males expired (%)	Females expired (%)
0-10	27 (7.29)	18 (16.82)	9 (3.42)
11-20	20 (5.40)	7 (6.54)	13 (4.94)
21-40	128 (34.59)	27 (25.23)	101 (38.40)
41-60	119 (32.16)	21 (19.62)	98 (37.26)
61 & more	76 (20.54)	34 (31.77)	42 (15.96)
Total	370	107 (28.91)	263 (71.08)

The above observation table shows that the mortality rate is highest (34.59 %) in age group (21-40 years) followed by 32.16 % in age group (41-60 years) & in children below 10 years it is 7.29 %. The mortality rate is highest (38.40 %) in females in age group (21-40 years).

Table-III: Relation of sex and overall mortality

Sex	No. of Patients	Patients expired (%)
Male	399	107 (28.91)
Female	711	263 (71.08)
Total	1110	370 (33.33)

The above observation table shows that the mortality rate is more (71.08 %) in females than that (28.91 %) in males & the overall mortality rate is 33.33 %.

Table-IV: Type of burns and mortality

Type of burns	No. of Patients (%)	Patients expired (%)
Flames	731 (65.85)	241 (65.13)
Scalds	247 (22.25)	86 (23.24)
Electric burns	132 (11.89)	43 (11.62)
Total	1110	370 (33.33)

The above observation table shows that the incidence of burn was more (65.85 %) due to flames burns, followed by scalds burns (22.25 %) and electric burns (11.89 %). The mortality was also higher (65.13 %) due to flames burns.

Table V: Cause of burns and mortality

Cause of burns	No. of Patients (%)	Patient expired (%)
Accidental	816 (73.51)	254 (68.64)

Suicidal	294 (26.48)	116 (31.35)
Total	1110	370 (33.33)

The above observation table shows that most burns (73.51 %) were accidental. The mortality was (68.64 %) due to accidental cause and (31.35 %) due to suicidal cause.

Table-VI: Total body surface area of burns and mortality

Total body surface area of burns (%)	No. of Patients (%)	Patients expired (%)
0-10	97 (8.73)	0 (0.00)
11-20	228 (20.54)	13 (3.51)
21-50	342 (30.81)	86 (23.24)
51-80	290 (26.12)	127 (34.32)
81 & more	153 (13.78)	144 (38.91)
Total	1110	370 (33.33)

The above observation table shows that the mortality rate is highest i.e. 38.91 % in patients having 81 % & more body surface area of burns followed by 34.32 % in patients having 51% to 80 % body surface area of burns.

Table 7 shows that most of the patients i.e 24.05 % expired in the duration from 11th to 30th day of admission to the hospital.

Table-VII: Duration of hospital stay before death

Duration of hospital stay	Patients expired (%)
Within 24 hours	76 (20.54)
25 – 48 hours	73 (19.72)
3 – 10 days	60 (16.21)
11 – 30 days	89 (24.05)
31 days & more	72 (19.45)
Total	370

Table-VIII: Hospital stay before death & its relation with cause of death

Duration of hospital stay	Deaths due to Hypovolemic shock (%)	Deaths due to Septicemic shock (%)
Within 24 hours	62 (42.46)	14 (6.25)
25 – 48 hours	39 (26.71)	34 (15.17)
3 – 10 days	24 (16.43)	36 (16.07)
11 – 30 days	11 (7.53)	78 (34.82)
31 days & more	10 (6.84)	62 (27.67)
Total	146 (39.45)	224 (60.54)

The above observation table shows that the mortality rate was more (60.54 %) due to Septicemic shock than due to Hypovolemic shock (39.45 %) & most of the deaths in first 48 hours were due to Hypovolemic shock & later on were due to Septicemic shock.

Table IX: Respiratory tract involvement and mortality

Respiratory tract involvement	No. of Patients (%)	Patients expired (%)
Present	291 (26.22)	215 (73.88)
Absent	819 (73.78)	155 (18.92)
Total	1110	370 (33.33)

The above observation table shows that out of total 1110 patients, 291 patients found to have Respiratory tract involvement & of these 291 patients, 215 (73.88 %) patients expired.

Table 10 shows that in most of the burn patients, the causative organism found was Staphylococcus aureus (36.57 %) followed by mixed type of infection (22.25 %) and Pesudomonas aeruginosa (20.63 %).

DISCUSSION

In the present study, the incidence of burn was highest (35.04 %) in the age group (21 – 40 years), followed by 31.71 % in the age group (41 – 60 years). In female patients, the common age group affected was 21-40 years & in males it was 41-60 years. These results are similar to other studies [6,7,10,16]. The incidence in children (0–10 years) was 7.92%. Subrahmanyam M. [4] reported that the incidence of burn in children in the age group (0–10 years) was 9.1%. In the present study, the incidence of burn was more (64.05 %) in female patients than that (35.94 %) in male patients & a total male:female ratio of 1:1.78 was seen. Ganesamoni S *et al*. [16] observed a male:female ratio of 1:1.7 in their study.

Table-X: Bacteriology in burn patients

Causative organism found	No. of Patients (%)
Staphylococcus aureus	406 (36.57)
Pesudomonas aeruginosa	229 (20.63)
Escherichia coli	117 (10.54)
Klebsiella pneumoniae	49 (4.41)
Mixed type of infection	247 (22.25)
Sterile	62 (5.58)
Total	1110

Subrahmanyam M. [4] reported that the incidence of burn in males was 43 % and in females it was 57 %. Similar results were also seen in other studies [6-9, 19] which suggest that one's own home can become a death trap, as heat generating appliances are regularly used at home by females.

In the present study, the mortality rate was highest (34.59 %) in age group (21-40 years) followed by 32.16 % in age group (41-60 years) & in children below 10 years it was 7.29 %. The mortality rate was highest (38.40 %) in females in age group (21-40 years). Singh D *et al*. [7] also observed that most burn deaths occurred in the age group 21-40 years (67 per cent) with female preponderance. The overall mortality rate was 33.33% in the present study. Attia AF *et al*. [8] & Gowri S *et al*. [19] in their study observed the overall mortality rate of 33 % & 31.58 % respectively.

In this study, the incidence of burn was more (65.85 %) due to flames burns, followed by scalds burns (22.25 %) and electric burns (11.89 %). Subrahmanyam M. [4] and Jayaraman V [5] reported 92 % & 81 % burns due to flames respectively. In various other studies also flame was found to be the most common agent in burn patients [7,16,19].

Attia AF *et al*. [8] observed that most burns were accidental (89.1 %). Singh D *et al*. [7] observed that accidental burns were 80 % followed by suicidal burns (16.2 %). In the present study also, most burns (73.51 %) were accidental. In this study, the mortality was more (68.64 %) due to accidental cause than that (31.35 %) due to suicidal cause. These results are similar to the study by Meera Th. *et al*. [20] where they reported that the nature of death was accidental in 50% of the cases; suicidal in 38.46% & homicidal in 11.54 % cases but these results are contradictory with the study by Subrahmanyam M. [4] where they reported that the mortality was more due to suicidal cause.

Various studies [11-13] have been conducted that correlate total body surface area of burns and mortality. In the present study also, the mortality rate is highest i.e. 38.91 % in patients having 81 % & more body surface area of burns followed by 34.32 % in patients having 51% to 80 % body surface area of burns.

In the present study, most of the patients i.e 24.05 % expired in the duration from 11^{th} to 30^{th} day of admission to the hospital. Subrahmanyam M. [4] observed that, longer the stay of the patient in the hospital, more are chances of infections from other patients admitted in the same ward.

Singh D *et al*. [7] observed that Septicaemia was the major cause of death (55 %). In this study also, the mortality rate was more (60.54 %) due to Septicemic shock than due to Hypovolemic shock (39.45 %). Most of the deaths in first 48 hours were due to Hypovolemic shock & later on were due to Septicemic shock.

Various studies [11-13] reported that the mortality due to inhalational burns was more. In this study also, out of total 1110 patients, 291 patients found to have Respiratory tract involvement & of these 291 patients, 215 (73.88 %) patients expired. So it is observed that involvement of upper respiratory tract is a good mortality indicator in burn patients.

In this study, in most of the burn patients, the causative organisms found were Staphylococcus aureus (36.57 %) followed by mixed type of infection (22.25 %) and Pesudomonas aeruginosa (20.63 %). Shrinivasan S *et al.* [18] observed that Klebsiella was the predominant organism in their set-up (33.91%), closely followed by Pseudomonas (31.84%). Devnikar AV *et al*. [15] observed that, the most frequent isolates

from burn wounds were Pseudomonas aeruginosa followed by Staphylococcus aureus and coagulase negative Staphylococcus. Ganesamoni S *et al*. [16] observed that the predominant organisms found were Pesudomonas aeruginosa (81.1 %) followed by Acinetobacter species and methicillin resistant Staphylococcus aureus. Kaushik R *et al*. [17] observed that *Pseudomonas* was the most commonly cultured organism (54.2%) followed by *Staphylococcus aureus* (20.8%).

CONCLUSION

In this study we conclude that, various factors like age, sex, total body surface area of burns, type of burns, cause of burns, duration of hospital stay, conditions such as involvement of the respiratory tract are responsible for the morbidity and mortality in burn patients. In this study, Septicemic shock was the major cause of death (60.54 %) & in most of the burn patients, the causative organism found was Staphylococcus aureus (36.57 %) followed by mixed type of infection (22.25 %) and Pesudomonas aeruginosa (20.63 %).

Most of the burns are preventable [14]. Hence burn injuries can be reduced by educating the people about common causes of burns, methods of prevention and protection from burn injuries, promoting less inflammable fabric to be worn while cooking and educating for safer first aid practices after burn injuries.

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