



MORTALITY ASSOCIATED WITH BURN INJURIES: AN OBSERVATIONAL CROSS SECTIONAL STUDY FROM LATUR, MAHARASHTRA

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ABSTRACT

Introduction: Since From centuries, burn injuries are the major cause for human suffering and deaths. They are one of the oldest types of injuries that man knows, causing mortality and morbidity in humans time to time.

Methodology: This observational cross sectional study was conducted for period of one year started from July 2012 to June 2013 in burn ward of Govt. Medical College, Latur. Out of 302 patients admitted, 137 (45.36%) were died because of various degree burn injuries.

Results: 73.72% females were died because of the burn whereas males were only 26.28%. The male to female ratio was 1:2.81. 63.50% of burn deaths were from rural area. 80.29% burn victims were married. 96.35% of burns were caused because of flames. $\geq 80\%$ TBSA burn was found in 53.47% female patients as compared to 38.89% male patients.

Conclusion: Burn injuries are preventable through awareness in people specially in reproductive age group women's in which most of the cases were because of accidental burn while working in kitchen. Therefore proper educational and aggressive prevention program is needed to reduce the burden.

Key words: Mortality, burn injury, accidental burn.

INTRODUCTION

From centuries, burn injuries are the major cause for human suffering and deaths. They are one of the oldest types of injuries that man knows, causing mortality and morbidity in humans time to time. Throughout the world, it affects all segment of the society from rich to poor, men to women, childrens, adults, all fall victims to it.

Burn injury is life threatening as it's common sequel led to infection, septicemia, shock, contracture, multiple organ dysfunction or death in burn injured patients. Burn is one of the few conditions which are so painful with unpredictable results if untreated or inadequately treated. Even in well treated patients, mortality is high. Peoples who survive the event, suffers from the disability and disfigurement.

Burn constitute a major public health problem globally especially in low and medium income countries where over 95% of burn death occurs. Fire related burns alone account for over 300,000 deaths per year.¹

Apart from dowry deaths a large number of suicides by married women are associated with torture and humiliation by in-laws as most women are in joint families. The problems dealing with burns varies from false allegation of homicides in modern era to traditions and customs of "Sati and Joghar" in historical times. Homicidal burning of married women is common in India. Accidental burning is common in children and house wives.²

Microbiological infection after burns, where a large portion of the skin is damaged, is a very serious complication that often results in the death of the

patient. About 45% of the mortality in burn patients is caused by septicemia.³

This study has been undertaken to find out epidemiological profile and other important aspects of deaths caused because of burns so that to help reducing the mortality and incidence of burn in the community.

MATERIAL AND METHODS

This cross sectional descriptive study was conducted at the Burn Ward under Surgery department attached to Government Medical College, Latur, over a period of one year started from July 2012 to June 2013.

A preformed questionnaire was filled from each patient after full information about the study and written consent was taken. The questionnaire included demographics like age, gender, marital status, area of residence, type of burn, cause of burn, TBSA (total burnt surface area) etc.

The data was obtained from all the patient after admission, while in case of children or patients who were not well enough as a result of severe injury, it was obtained from relatives or who accompanied with them. Data was entered in MS Excel and analyzed with SPSS version 20. P-values were calculated to determine the significance of the data. The study was approved by the Ethical committee of the Govt. Medical College, Latur.

RESULTS:-

A total of 302 patients were admitted at the burns centre during the study duration including 41.4% males and 58.6% females. Out of which 137 (45.36%) were died because of various degrees of burn injuries.

Age and Sex: - Female patients outnumbered males. 73.72% females were died because of the burn whereas males were only 26.28%. The male to female ratio was 1:2.81. The most common age group affected and had high mortality due to burn was 16-45 years aged males and females (82.48%). 75% of the males and 85.15% of females among them were died because of burn injuries. The deaths below 15 years and above 60 years were minimal.

Place of Burn: - 63.50% of burn deaths were from rural area. In males, 61.11% and 38.89% were from rural and urban areas respectively. Likewise 64.36% of females were belongs to rural areas and 35.64% were from urban places.

Marital Status: - 80.29% burn victims were married. Out of total 36 males, 72.22% males and 79.21% out of 101 females were found married.

Table 1: Distribution of burn deaths according to Age, Area of Residence and Marital Status

| Variables | Male (n=36) | Female (n=101) | Total (n=137) | P value |
|-----------------------|-------------|----------------|---------------|---------|
| Age in years | | | | |
| ≤15 years | 2 (05.56) | 3 (02.97) | 5 (03.65) | 0.002 |
| 16-30 years | 14 (38.89) | 70 (69.31) | 84 (61.31) | |
| 31-45 years | 13 (36.11) | 16 (15.84) | 29 (21.17) | |
| 46-60 years | 4 (11.11) | 6 (05.94) | 10 (07.30) | |
| >60 years | 3 (08.33) | 6 (05.94) | 9 (06.57) | |
| Residence | | | | |
| Rural | 22 (61.11) | 65 (64.36) | 87 (63.50) | 0.88 |
| Urban | 14 (38.89) | 36 (35.64) | 50 (36.50) | |
| Marital status | | | | |
| Married | 26 (72.22) | 80 (79.21) | 110 (80.29) | 0.52 |
| Unmarried | 10 (27.78) | 21 (20.79) | 27 (19.71) | |

Figure in parenthesis indicate percentage

Table 2: Cause of burn, Mode of burn, TBSA burn and Length of Hospital Stay in relation to Burn Mortality.

| Variables | Male (n=36) | Female (n=101) | Total (n=137) | P value |
|--------------------------------|-------------|----------------|---------------|---------|
| Cause of burn | | | | |
| Flame | 32 (88.89) | 100 (99.01) | 132 (96.35) | 0.02 |
| Scald | 00 (00.00) | 01 (00.99) | 01 (00.73) | |
| Electric | 03 (08.33) | 00 (00.00) | 03 (02.19) | |
| Others | 01 (02.78) | 00 (00.00) | 01 (00.73) | |
| Mode of burn | | | | |
| Accidental | 19 (52.78) | 78 (77.23) | 97 (70.80) | 0.01 |
| Suicidal | 15 (41.67) | 15 (14.85) | 30 (21.90) | |
| Homicidal | 02 (05.55) | 08 (07.92) | 10 (07.30) | |
| TBSA | | | | |
| <40% | 01 (02.78) | 05 (04.95) | 06 (04.38) | 0.94 |
| 40-59% | 07 (19.44) | 11 (10.89) | 18 (13.14) | |
| 60-79% | 14 (38.89) | 31 (30.69) | 45 (32.85) | |
| ≥80% | 14 (38.89) | 54 (53.47) | 68 (49.63) | |
| Length of Hospital Stay | | | | |
| <24 hrs | 11 (30.56) | 22 (21.78) | 33 (24.09) | 0.08 |
| 1-3 days | 08 (22.22) | 10 (09.90) | 18 (13.14) | |
| 3-5 days | 07 (19.44) | 25 (24.75) | 32 (23.36) | |
| 5-7 days | 04 (11.11) | 10 (09.90) | 14 (10.22) | |
| >7 days | 06 (16.67) | 34 (33.67) | 40 (29.19) | |

Figure in parenthesis indicate percentage

Cause of Burn: - flame was most common agent in burn injuries. 96.35% of burns were caused because of flames. 88.89% of males and 99.01% of females fall victim to it. Rest of the agents constituted only 3.65% of total deaths.

Sex and Total Body Surface Area (TBSA) burn: - considering 40% of TBSA as cut-off point to describe severity of burn, only 4.38% patients were suffered <40% of TBSA with the burn and died. Severe burn injuries were found commonly in female patients i.e. ≥80% TBSA burn was found in 53.47% female patients as compared to 38.89% male patients.

Sex and Mode of Burn: - Deaths due to accidental burn (70.80%) was found more common than suicidal (21.90%) and Homicidal burn (7.30%) and females suffered with accidental burn (77.23%) more commonly than males (52.78%).

Length of Hospital Stay: - 70.81% of deaths occurred within first seven days of burn, out of which 24.09% patients died within first 24 hours of injury.

Table 3: Length of hospital stay and TBSA involved.

| Hospital Stay | TBSA involved | | | | Total |
|---------------|---------------|-----------|-----------|-----------|-----------|
| | <40% | 40-59% | 60-79% | >80% | |
| <24 hrs | 00 | 01 (05.6) | 04 (08.9) | 28 (41.1) | 33 (24.1) |
| 1-3 days | 00 | 03 (16.7) | 06 (13.3) | 09 (13.2) | 18 (13.1) |
| 3-5 days | 03 (50.0) | 03 (16.7) | 13 (28.9) | 13 (19.1) | 32 (23.4) |
| 5-7 days | 01 (16.7) | 01 (05.6) | 04 (08.9) | 08 (11.8) | 14 (10.2) |
| >7 days | 02 (33.3) | 10 (55.6) | 18 (40.0) | 10 (14.8) | 40 (29.1) |
| Total | 06 (100) | 18 (100) | 45 (100) | 68 (100) | 137 (100) |

χ^2 - 0.05, p- 0.81; Figure in parenthesis indicate percentage

Length of hospital stay and TBSA Burn: - The length of hospital stay was inversely proportional to the TBSA involved. As TBSA burn increases, the length of hospital stay decreases. Patients with burn injuries involving >80% TBSA, 41.18% died within 24 hours of injury.

DISCUSSION

The epidemiology of burn injuries in developing world is much different from that in the developed world. It also varies from one part of the world to another being a function of the level of civilization, industrialization and culture among other things. The differences of environmental and socio-demographic factors in different countries directly affect the outcome of the burn patients.

Burns are a global public health concern affecting about 1% of the general population annually. In addition to the physical and psychological morbidity that burns impose upon the injured patients and their families, these types of injuries are associated with a huge financial burden on medical care system.⁴

Burns constitute a major role in mortality and morbidity in the whole world, whether accidental, suicidal or homicidal. Burn injuries are among the most devastating of all injuries and a major global public health crisis.⁵ Burns are the fourth most common type of trauma worldwide following traffic accidents, falls, and interpersonal violence.⁶ According to World Health Organization statistics, 5-12% of the total injuries in the world are related to burn.⁷

Age was one of very important epidemiological indicator in this study. Most of the victims affected by burns were from 16-30 year age group (61.31%) followed by 31-45 years (21.17%). Incidence of burn in females was found high along the study. Female constitute 73.72% whereas only 26.28% males were fall victim to burn. 69.31% of females and 38.89% males belong to 16-30 years age group. This may be because of various reasons such as early responsibility taken by females to help mother in cooking, early marriages, conflicts in marriage and also because of the ignorance of safety. The traditional wear in Indian culture is saree and salwar kameez which are also common cause of most of accidental burns with unsafe cooking. Most of studies done in India also found high incidence of burn in young reproductive age group.^{1-3,8-10.}

The Male: Female ratio was found 1:2.81 in this study. Similar results were found in most of the studies done in India.^{8,9} Shinde A B² found Male: Female ratio 1:5.87, much higher than present study. On the other hand, the study did by Niekirk A V¹¹ in Cape Town, South Africa shows 2.2 times more fatal burn in Male patients. Also Memchoubi P,¹² and Tahir S M et al,¹³ Fazeli S et al,¹⁴ found male preponderance in their studies.

Burn fatality was much greater in rural population (63.50%) than urban (36.50%). Studies done in India by Lal et al¹ (71.84%), Gupta R et al³, Bhagora R V et al⁹ (60%) and Harish D et al¹⁵ (66%), Akhtar J M et al (73.1%)¹⁶ also found similar results. The reasons may be the use of kerosene stove and chulhas still utilized by most of the peoples for cooking and also kerosene lamp/ homemade chimney which is widely used in rural India and along with some other causes. Gupta R et al³ found incidence of burn in Varanasi region much greater than present study (86.6% rural, 15.4% urban).

80.29% of married persons were died because of burn. Married males and females affected were 72.22% and 79.21% respectively. Lal S et al (76.28% married, 56.73% male and 80.50% females)¹ found similar results except for married males which is lesser than our study. Studies conducted by other researchers also found similar results in their studies.^{2,3,9,15}

Agent commonly responsible for most of the burn deaths was flames. 96.35% of deaths were resulted because of it. 88.89% of males and 99.01 of females fall victim to it. Similar results were found in study conducted by Lal S et al¹ (95.56% flame burn, 83.65% male and 98.13% females). Other studies i.e. Bhagora R V et al (99%)⁹ Harish D et al (89.3%)¹⁵ Akhtar J M et al (87.81%),¹⁶ also found high rates of death in flame burn patients.

In dividing patients according to TBSA involved, only 4.38% patients had TBSA involved <40%. This was also in accordance with the finding of other studies conducted in different parts of India.^{1, 15}

48.63% of burn deaths were because of severe burn i.e. total body surface area involved was >80%. These demonstrate that such extents of burn are highly unlikely to survive. Gupta R et al,³ Bhagora R V et al,⁹ and Memchoubi P,¹² found 66.2%, 59% and 73.84% patient with TBSA involved >80% respectively which is much higher than present study but Ibran E A¹⁰ on the other hand found only 35% patients dies with >61% TBSA involved which is much lower than present study.

Accidental, Suicidal and Homicidal deaths in this study were 70.80%, 21.90% and 7.30%. Lal S et al¹ and Harish D et al¹⁵ found similar percentages like our study.

Shinde A B² found accidental burn only in 49.07% patients and in 16.36% cases reason of burns was not known, whereas, Memchoubi P¹² found only 35.38% accidental burns but suicidal and homicidal burns were much higher (24.61% and 29.23% respectively. other causes 10.75%). Akhtar J M et al¹⁶ found accidental burns in 92.64% patients, much higher than our study while suicidal and homicidal deaths were 4.32% and 3.04%. Hamayun M et al¹⁷ also found 88.8% accidental deaths.

70.81% of deaths occurred within first week of burn. This was consistent with studies done by Lal et al¹ (68% within week), Harish D et al¹⁵ (75.90%), Memchoubi P¹² (79.47%).

24.09% burn patients were died within first 24 hours of injury. Reason may be because most of persons were suffered with burn injuries involving >80% TBSA. This was in accordance with the studies of other authors.^{1, 8} Memchoubi P¹² found 66.15% deaths that occurred within first 24 hours, much higher than present study but Harish D et al¹⁵ found only 8% deaths within first 24 hours.

CONCLUSION

Injuries and deaths were found most commonly in 16-45 years age group. Incidence of burn was more common and severe in females in terms of body surface area and so the mortality was high. Burn injuries are preventable through awareness in people specially in reproductive age group women's in which most of the cases were because of accidental burn while working in kitchen. Therefore proper

educational and aggressive prevention program is needed to reduce the cases and also the mortality.

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