



EPIDEMIOLOGY OF BURNS IN A TEACHING HOSPITAL IN TAMILNADU- A RETROSPECTIVE OBSERVATION STUDY

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ABSTRACT

In spite of technical advances and molecular biological studies, burns continue to challenge the avenues of full proof treatment and infrastructure in terms of accessibility and affordability. Lack of committed and qualified experts and exorbitant cost due to the need for continuous care make their treatment modalities not at the reach of every one. Burn invokes an extremely traumatic experience for both the burn sufferers and also their dear relatives. In country like India, where there is large numbers of patients are presenting with burns, yet no significant epidemiological data are present. However these data are more vital for planning and understanding magnitude of the impact, incidence, measures of preventive methods and improve in the treatment modalities. This retrospective observation study is carried out in Kanyakumari Government Medical College Hospital in Tamilnadu, with all the burns patients admitted for 3 years 2013 January to 2016 December comprising 410 patients. The pre demographic profile, cause for the burns, treatment option, outcome were tabulated and analyzed. The percentage of burns, co-morbid conditions, and cause for treatment failure were analyzed. In our study among the 410 patients studied 256 (61%) are male and 154(39%) are female. Thermal injury is the most common cause of burns (79%) and followed by electrical burns 20% and others one percentage. 61% of injuries occurred in the home and 26% at work place and 12% in the street. 78% of injuries are accidental, 20% suicidal and 2% homicidal. People with <20% Total surface area burns survived. But 60-80% burns 96% and >80% burns 100% suffered mortality. Septicemia and hypovolemic shock are the major cause of death. Safety precaution, first aid education and accessibility of priority care are essential to reduce the mortality and morbidity.

KEYWORDS: BURNS. THERMAL, ACCIDENTAL, SEPTICAEMIA, HYPOVOLEMIC SHOCK.

INTRODUCTION

In this growing era of Industrialization and mounting anxiety, depression and lack of buffering effects in the families, burns has become a common presentation in Indian subcontinent. WHO estimated that annually 265,000 people have died due to burns and majority of these fatalities happen in low- to middle-income group population.^[1] As per the studies and Global epidemiology data available low and Middle Income countries, especially South East Asian region accounts for more than half of these burn victims. In India annually nearly one million people are affected by moderate to severe burns injury. Burn invokes an extremely traumatic experience for both the burn sufferers and also their dear relatives.^[2]

Burns result in not only major causes of mortality but also common cause of morbidity, disfigurement, contracture, prolonged hospital care and impoverisation. The outcome of the burns treatments based on the timely intervention, accurate fluid balance maintenance,

prevention of infection and enhancing wound healing without contracture and needs multi-modality management. It is also pertinent to assess the etiology and root cause for the episode and take adequate counseling for the same.

Most determinant factors for the mortality and outcome is based on the degree of burns, which is depends on the depth penetrations and severity. Accordingly (Figure: 1).



Figure: 1: Degree of burns

First degree Burns (Superficial Burns).

It involves only up to the epidermis. The site of burn shall be painful, dry, red and present with or without blisters.

Second degree Burns

Penetration up to the level of Dermis. Burns will present with pain, erythematic, edema and blisters.

Third Degree Burns

Penetration through Dermis and deep subcutaneous tissues and fat. If Burns present with white or black parchment, charring and as the nerves also affects present painless.

The outcome also depends on the extent (or) percentage of the burns surface areas. The standard protocol for assessment is based on the rule of nine. It gives guidelines for the calculation of fluid replacement. The percentage is allotted to various parts of the body as follows. (**Figure 2**).

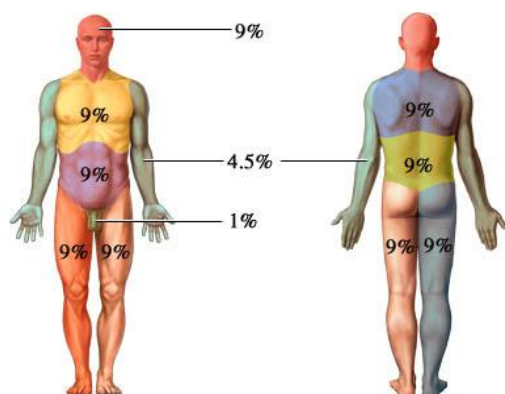


Figure 2: Rule of nine

Most often the associate co-morbid conditions like Diabetes and involvement of secondary burns effects like smoke also contribute to the outcome.

There is not much information on the cause, outcomes and barriers on the burns victims in our country.^[3] However burns being a preventable entity or accident the multimodality management improve the outcome. Hence this study is intended to analyze various factors for the better outcome to our patients and postulate means and methods to improve the outcome for burns victims and also prevent burns episode.

Table 1: Age and gender distribution (n=410)

	Male		Female		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Children<15	20	8%	12	7.7%	32	7.8%
Teenage 15-24	48	19%	57	37%*	105	25.6%
Young Adult 25-34	103	40.4%*	25	16%	128	31.2%
Adult 35-44	37	14.6%	31	20%	68	16.6%
Old Adult 45-64	18	7%	18	11%	36	8.8%
Old Age>64	28	11%	13	8.3%	41	10%
	254	38%	156	62%	410	100%

MATERIALS AND METHODS

This study is carried out as retrospective study in Kanyakumari Government Medical College Department of General Surgery in Tamilnadu, South India. Kanyakumari Government Medical College is a public teaching institution and has a burns ward which is mainly maintained by General Surgeons, but all the specialist especially plastic surgeons and physician co-ordinate in the treatment procedures.

Inclusive criteria

All the patients admitted with burns and treated from 2013 January to 2016 December.

Exclusive criteria

Being a retrospective study no patients were excluded. However as per the primary records available with MRD department, there is total number of 465 patients were admitted. 55 patients had left the hospital against Medical advice (or) referred at request were not included, resulting in net inclusive 410 patients for the study.

Ethical clearance

The study was presented and got approval from the ethical committee of Kanyakumari Government Medical College.

Analyses

The patient data and demographic profiles collected. The extent of burns, treatment offered, outcomes were studied. All data were checked manually and tabulated to computer excel sheet. Statistical analysis was done using statistical package for social sciences 20. Chi Square test was used for comparison.

RESULTS

1. Age and Gender

410 patients were treated in our department. Of these 254 patients were male (62%) and 156 patients were female (38%) with male to female ratio is 1.6:1. The male with age group of 25-34 and women with age group of 15-24 suffered maximum which is statistically significant ($P<0.05$). The age and gender wise distribution is shown in Table I and Figure 3.

$P < 0.05$ (chi square test) significant

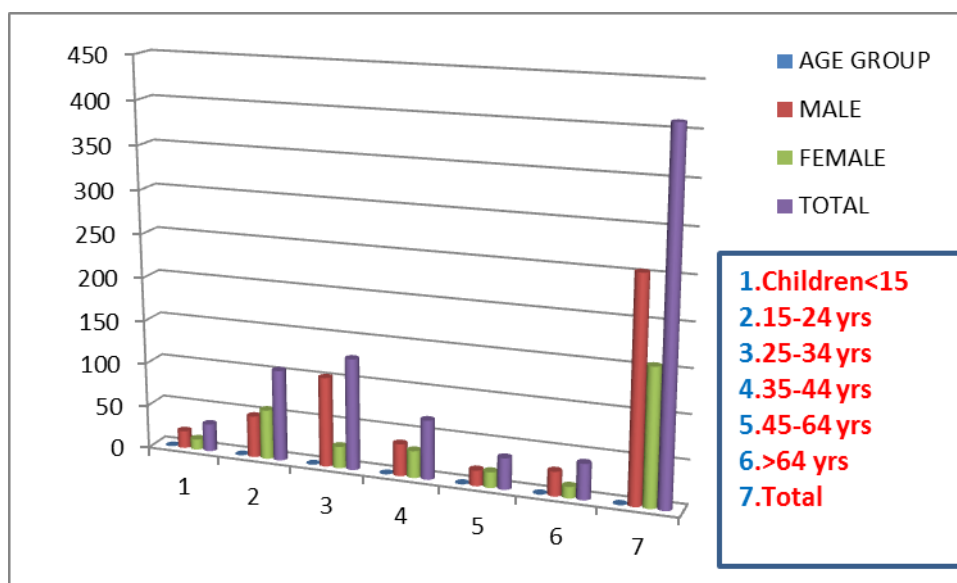


Figure 3: Age and gender distribution

2. Total Surface Area of Burns

The total surface area of burns calculated using Rule of 9 formulas and incorporated with each age group. It is evident from data, the age group of 25-34 had suffered more with extensive burns and had the highest surface

area of burns with the mean $\pm$ SD was 62 ± 31 which is a statistically significant ($P < 0.01$). The data are tabulated in Table 2.

Table 2: Total surface area of burns with age group

Age group(in years)	Mean $\pm$ SD TBSA in %	Median TBSA in %
<15	15 $\pm$ 34	55
15-24	55 $\pm$ 33	50
25-34	62$\pm$31*	83
35-44	47 $\pm$ 38	30
45-64	49 $\pm$ 34	45
>65	33 $\pm$ 29	20

Significant ($P < 0.01$), TBSA-Total Body Surface Area

3. Frequency of surface area involved in male to female

Majority of the patients were admitted with 20 -40 percentage burns (32%) followed by less than 20 percentage burns (25%). Female outnumbered male in

>80% burns. Most of the female patients had more surface area burns.

The data are tabulated in table 3 and figure 4.

Table 3: Frequency of burns surface area Male vs Female.

Burns	Total number of case		Total male case		Total female case	
	Frequency	percentage	Frequency	percentage	Frequency	percentage
<20%	103	25%	77	30.7	25	16%
21-40%	131	32%	78	30.7	53	34%
41-60%	29	7%	29	11.4	0	Nil
61-80%	69	17%	45	17.7	24	15%
81-100%	78	19%	24	9.5	54	35%
Total	410	100	254	100%	156	100

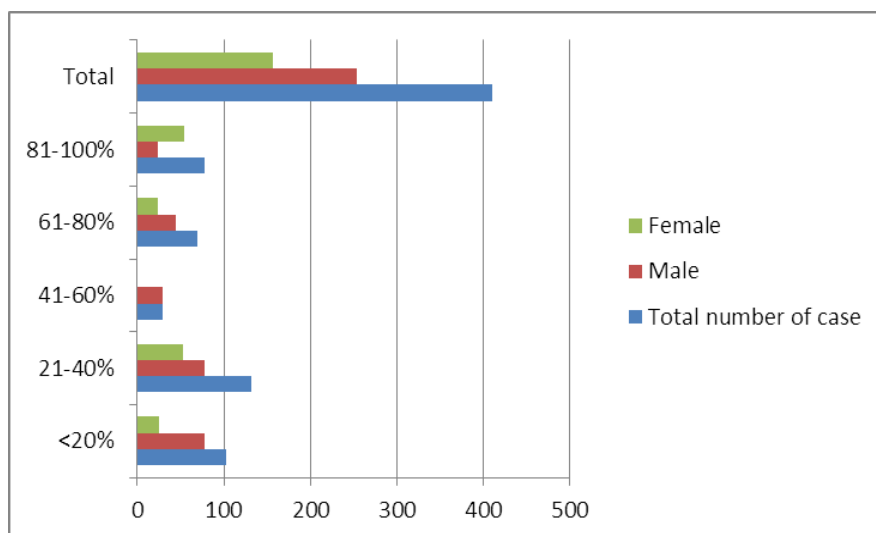


Figure 4: Frequency of burns surface area Male vs Female.

4. Cause of Burns

Thermal injury was the most common cause 79%. Next electrical burns 20% and other 1%. Electrical and chemical burns are significantly more in male than

women ($P < 0.05$) in pediatric age group of under 15 years of burns the common cause of injury is from electrical than thermal which is statistically significant ($P < 0.05$). The data are tabulated in table 4.

Table 4: Cause of Burn injury (n=410)

	Male	Female	Total	Pediatrics < 15 yrs.
Thermal	162 (40%)	124 (30.2%)	286	12
Electrical	58 (14%)	31 (7.5%)	89	20
Chemical	33 (8%)	1 (0.3%)	34	-
lighting	1	0	1	-
	254 (62%)	156 (38%)	410	32

5. Place of occurrence & Nature of Injury

The sites of occurrence of burns were noted. Majority of patients had household burns mainly involving LPG and

kerosene stoves. Work place burns contributed 26.58% and street nearly 12%. The data are tabulated in table 5 and Figure 5.

Table 5: Place of occurrence of burns injury

Pattern of Burn Injury	Frequency	Percentage
Place of Occurrence		
Home	252	61.46
Work place	109	26.58
Street	49	11.95

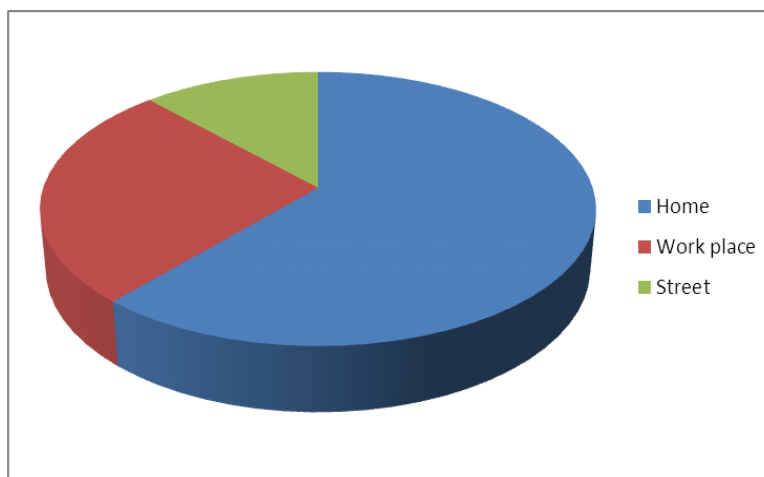


Figure 5: Place of occurrence of burns injury

6. Type of Burn Injury

It is noted 78% burns occurred due to accidental injuries mainly involving LPG or kerosene stoves, 22% burns are

due to suicidal attempts due to various stress and 2% burns occurred due to homicidal method. The data are tabulated in table 6.

Table 6: Types of burn injury in male and female

Mode of Burn	Total N(%)	Male N(%)	Female N(%)	P
Accidental	319(78)	228(90%)	91(58%)	<0.001
Suicidal	82(20)	22(9%)	60(39%)	<0.001
Homicidal	9(2)	4(1%)	5(3%)	<0.383
Total	410(100)	254(100%)	156(100%)	

Statistically significant differences ($P < 0.05$) P value for comparison between male and female.

7. Duration of treatment

Most of the patients are brought to our hospital after primary care in local hospital. The adequacy of fluid

replacement is not available. The duration of stay is more with burns injury as the morbidity is more. The data are tabulated in Table 7.

Table 7: Duration of hospital stay

Hospital	Frequency	Percentage
1-10 days	262	64
11-20 days	107	26
21-30 days	29	7
>30 days	12	3

8. Cause of Death and relation to period of hospitalization before death

In our study out of 410 patients, 180 persons succumbed to burns. Burns is a high mortality disease. More the surface area and co-morbid condition more the death occur. The common cause of death is due to

hypovolemic shock in an early period and septicemia in later period. The cause of death is significant statistically ($P < 0.05$) with duration of viable period in the hospital. The cause of death in relation to hospitalization is tabulated in Table 8.

Table 8: Cause of Death and period of hospitalization

	Septicemia	Hypovolemic shock	other	Total
<24 hour	20	62	-	82
24-48 hr	3	6		9
3-4 days	9	18		27
5-7 days	33	-		33
8-30 days	22	-		22
>81 days	3	-	4	7
	90	86	4	180

9. Anatomical location of Burns Injuries

The various parts of body were affected. The parts involved are tabulated in table 9. It is noted more than one site is involved many patients.

Table 9: Anatomical location of burns

Sites of burns	sites	%
Head and neck	386	22%
Anterior trunk	280	16%
Posterior trunk	87	5%
Upper limb	490	28%
Lower limb	420	24%
Peri and genitali	87	5%
Total	1750	100%

10. Correlation Death with Total surface area of burns

Depending upon the surface area mortality is observed. All burns above 80 percentage succumbed and out of 69

patients with 60 – 80 percentage of burns three of them were saved resulting in the death percentage as 96. All patients under 20 percentage of burns were saved. Data are tabulated in table 9.

Table 10: Death in relation to total body surface area of burns

Burns TBSA	Total number of case		Total number of Death	
	Frequency	percentage	Frequency	percentage
<20%	103	25%	Nil	Nil
21-40%	131	32%	16(131)	21%
41-60%	29	7%	21(29)	72%
61-80%	69	17%	66(69)	96%
81-100%	78	19%	78(78)	100%
Total	410	100	180	

Significant ($P < 0.01$), TBSA-Total Body Surface Area

Study	Total patients included in the study	Male	Female
Wani M et al ^[12]	428	272(39%)	156(61%)*
Gauder B V et al ^[5]	174	60 (34.5%)	114(65.5%)*
Shunmuga Krishna ^[13]	150	62(41.3%)	88(58.7%)*
Mohamed Osawa ^[10]	275	175(63.6%)*	100(36.4%)
Anwar Nukhbazia ^[11]	1470	842 (57.3%)*	628(42.7%)
Jayalal et al (present study)	410	254 (61%)*	156(39%)

DISCUSSION

Though there is decline in mortality due to burns are high in developed countries, in developed countries especially in public hospital where people come with more total surface area burns the mortality remains high.^[4] In our study the mortality is 44%. Goudar B.V et al has reported 42% mortality in a teaching hospital.^[5] Dr.M.Subramaniam et al in 1996 from a study in a district hospital in Western India reported a overall mortality of 56.5%.^[6] 40% mortality rate was reported, in another study by Gupta *et al.*^[7] Gowri *et al* had reported low fatality rate with 31.58%.^[8] Dr.Jayaraman et al in his study conducted in Madras with 1368 patient has reported death of nearly 58.9% patients in Burns victims.^[9]

Most of death occurs within 7 days of admission and the survival depends on various factors. 60-100% burns most often ends in mortality in public hospital and 40-60% burns 70% ends in mortality due to septicemia. Early death is due to hypovolemic shock. The appropriate fluid replacement is the crucial factors to prevent the early occurrence of death as hypovolemic shock contribute the major cause of death in the first two days.^[6] Steps should be taken to popularize the burns fluid management protocol in all primary health care set up. Once with adequate fluid replacement patient survive in the early days more care must be given to control the secondary infection. Dedicated burns units with barrier nursing will improve the status.

Unlike the findings of the majority of study conducted on epidemiology, our study shows 62% of burns victims were male and 38% were female. In our study comprising 410 patient 254 were male and 156 were female. Mohamed Osawa Anwar et al and Nukhbazia et al also have reported predominant male patient as burn victims.^{[10][11]}

In our study the most common etiology of the burns is accidental followed by suicidal and homicidal attempts

and is consistent with studies conducted by Toon *et al.*, Türeğün *et al.*, and Maghsoudi *et al.*^{[14][15][16]}

Accidental Burn constitute the major cause. On detailed analysis improper precaution on gas stove in the household is the commonest cause. Most often lack of knowledge on the protective safety measures, ignorance and also lack of primary care are the main reasons for the higher frequency of accidental burns in the house. It is also noted the adequate first aid is not provided to many of patients as many myths prevail in the society.

There is no concrete evidence with reference slips of patients (40%) who had primary care in local hospitals before carrying to teaching hospital, patient had adequate fluid balance. Hence it is noted many death occur within 24 hours 82% and most of the cause are hypovolemic shock. Adequate knowledge of need of primary fluid balance maintenance is lacking among the public.

In our study 20% cause of burns is due to suicidal attempts. Most often it is common in female of 20-30 years of age with various attributable stress situations including marriage relations, love failure, job failure. 2% remains homicidal in nature and commonest reason is related to dowry problem and improper sexual relationship.

Electrical burns constitute 20% of the burn injury and it is often results in morbidity rather than mortality. 50% of the individuals who had electrical burns had undergone some kind of amputations. Especially in pediatric age group electrical burns constitute more than 50%. Proper insulation of wires, precautions in handling the electrical points are important to reduce this incident.

In our study, 3 patients had chemical injury among which one is vitreolage attack. One individual had a severe lightning injury and died in the hospital within 24hrs.

Most of these burns are preventable and the morbidity and mortality associated can be curtailed if more care and protocol based high end treatment is accessible to public at their nearest place.

CONCLUSION

Most common cause of accidental burns is unawareness and lack of knowledge and accessible to safety precaution. It is important as we plan to reduce to the burns mortality preventive measures to empower the public on safety precaution and proper first aids for burns victims and early management is necessary. Every taluk and PHC level public hospital must be equipped to give primary care to burns victims. Counseling and life skill educations are necessary to reduce stress and suicidal impulses.

The fire safety training and infrastructure must be made mandatory for all public places and also in household settings. Special helplines may be instituted to enable the public to get adequate care in times of emergency.

Occupational hazards like electrical burns must be countered with adequate supply of insulator protective wears and safety thresholds in the electrical circuit. Proper educations on the first aid protocol for different type of burns must be made known to all public especially teacher, hotels staff, taxi drivers, police etc.

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