



SOCIO-DEMOGRAPHIC PROFILE IN THERMAL DEATHS – AN AUTOPSY BASED STUDY

Forensic Medicine

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ABSTRACT

Burns are the fourth leading traumatic event in the world after road traffic accidents, falls and violence among individuals. Burns of skin or other tissue are caused by fire, radiant heat, radiation, chemical, or electrical contact¹. Burns are a critical public health problem, causing deaths, disability and disfigurement. According to the National Burns Programme, 91,000 of these deaths are women; a figure higher than that for maternal mortality. Deaths due to burns are four times higher amongst women aged 18-35 yrs¹. On an average, 1/4th of the deaths constitute due to burns among all post-mortem examinations conducted. Mortality rate due to burns in India is much more than any other developed countries². As everywhere else, the modes of sustaining burn injuries in India are the same i.e. flames, scalds and electrical burns. The most common cause of flame burns is accident³. There are several social, economic, cultural and psychological factors interplaying that influence the reporting, treatment, management and if the patient dies further investigation.

KEYWORDS

Thermal Deaths, Burns, Kitchen burns, Accidental.

Introduction

Thermal Deaths are the fourth leading traumatic event in the world after road traffic accidents, falls and violence among individuals. Burns are caused by fire, radiant heat, radiation, chemical, or electrical contact¹. Burns are a critical public health problem causing deaths, disability and disfigurement. Thermal injury is one of the devastating injuries to the human body. According to the National Burns Programme, 91,000 of these deaths belong to women; a figure higher than that for maternal mortality. Thermal deaths are four times higher amongst women aged 18-35 yrs¹. In India, Thermal injuries are more common, which stand next to road traffic accidents. Mortality rate due to burns in India is much more than any other developed countries². As everywhere else, the modes of sustaining burn injuries in India are the same i.e. flames, scalds and electrical burns. The most common cause of burns is accident³. Among the flame burns, most of the female victims accidentally caught fire while cooking.

During autopsy, in the thermal deaths, all visceral organs are congested. In few extensive burns cases, Curling ulcers also seen. The present study aims at studying the several social, economic, cultural and psychological factors interplaying that influence the reporting, treatment, management and if the patient dies the further investigation.

Material and Methods

The present study is a retrospective study conducted in the Department of Forensic Medicine and Toxicology in a tertiary care hospital. The study consisted of 78 cases alleged to have died of burns and brought to mortuary attached to the Department of Forensic Medicine and Toxicology, Rangaraya Medical College, Kakinada from January 2020 to December 2021. The socio-demographic profile of all the cases were collected from the Medicolegal documents available in the department, hospital records, and inquest papers to ascertain the incidence, manner and circumstances of burns.

Observations and Discussion

In the present study a total of 78 cases were studied out of which 27 were males and 51 were females. The study shows Female deaths are more than males and male to female ratio is 1:1.8 (Table No. 1). Chawla R et al observed 64% of female victims and 36% of male victims (3). Aggarwal and Chandra (4) observed 67 female cases out of 100 cases of burns showing females were affected more than the males. Doshi (5) observed 157 females and 143 males in 300 cases with male to female ratio of 1:1.17. Ganguly (6) observed 58.34% cases belonged

to females as compared to 41.66% males. Sinha et al (7) observed that females outnumbered males in the ratio of 1.25:1. Haralkar and Rayate (8) observed 239 females and 104 males in total of 343 cases. Naralwar and Meshram (9) found 64% females and 36% males were involved. The present study is similar to the above studies as female outnumbered males. The maximum cases of burns were seen in the age group of 21-30 years, comprising of 26 cases out of which 3 were males and 23 were females followed by age group >60 years which include 15 cases out of which 9 cases were male and 6 were females. Few cases were observed in the age group of 1-10 years (4 cases) and 11-20 years (4 cases) (Table No. 1). The present study shows female preponderance of domestic fire. In the home, either it is stove burst, gas leakage during kitchen work, or wearing loose clothes which are more vulnerable to catch fire.

Table No. 1: Age and sex distribution of Burns cases

Age	Male	Female	Total
0-1	0	0	0
1-10	2	2	4
11-20	2	2	4
21-30	3	23	26
31-40	6	6	12
41-50	3	8	11
51-60	2	4	6
>60	9	6	15
Total	27	51	78

In the present study, two-thirds of total cases were from the rural area (66.67%) when compared to urban area (33.33%) (Table 2). The present study is in contrast to the study done by Chawla et al (3), in which urban fatalities were more than rural cases.

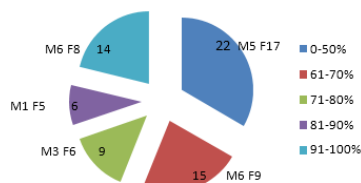
Table No. 2: Area wise Incidence – Urban vs Rural

Area	No.	Percentage
Rural	52	66.67%
Urban	26	33.33%
Total	78	100%

The extent of burns in this study which is based on involvement of total body surface area with maximum cases (22 cases) 0-50% affected category in which females outnumbered males (males-5; females-17).

The next category affected was with 61-70% of burns (15 cases) followed by 91-100% burns in 14 cases. In all these categories mentioned, females were more affected than males (Fig. 1). In the study of Aggarwal and Chandra (4), percentage of burns was up to 25% in 3 cases, between 25-50% in 32 cases, between 50-75% in 23 cases and was more than 75% of surface area in 42 cases. Maximum deaths due to burns were because of the greater surface area involved due to the burn injury. Sukhai et al (9) observed the mean age burn surface area of 63.3% leading to death irrespective of depth. Betz et al (10) study of suicidal cases, the extent of burns ranged from 50% to 100% of body surface area.

Figure No. 1: Extent of Body surface area involved



The time of incidence as per this study shows maximum cases (49 cases) were observed during the night time i.e., from 6PM to 6AM when compared to day time which could be due to accidental gas leak, poor lighting conditions in the residential premises, accidental catching of fire to the clothing etc., (Table 3).

Table 3: Time of incidence of Burns

Time	No. of cases	Percentage
Day (6AM – 6PM)	29	37%
Night (6PM – 6AM)	49	63%
Total	78	100%

According to the present study, the place of incidence in most of the cases occurred inside home mainly while performing cooking and other domestic work in the kitchen (41 cases) (Table 4). The present study was in consistence with studies of Haralkar and Rayate [11] and Chawla R et al (3) due to involvement of females in the kitchen work.

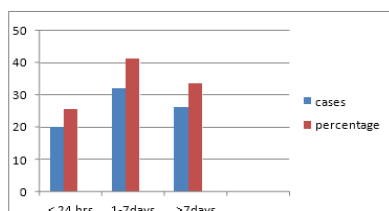
Table 4: Place of Incidence of Burns

Place	No. of cases	Percentage
Home	41	52.6%
Outside	37	47.4%
Total	78	100%

In this study, almost all the victims (77 cases) were brought to the hospital for treatment. Even though victims were rushed to the hospital for treatment, the fatality rate is more in burns. This suggests the government to emphasize more in improving the primary health set ups so that the fatalities could be reduced.

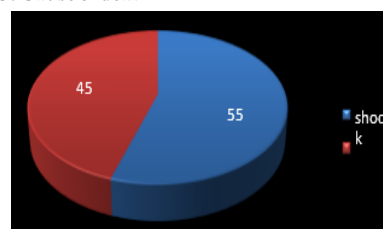
As per the survival time after being affected by the burns, maximum number of deaths as per this study happened within 1-7 day time period (32 cases) followed by > 7 days survival (26 cases) and < 24 hours survival period in (20 cases). The study is in consistent with the study of Poonam Singh et al (12). It shows that more people died within the first week of incidence as a result of burns which could be due to less aggressive treatment of the victims at nearby primary health centres and uncontrollable hospital acquired infections (Fig. 2).

Figure No. 2: Survival period of victims



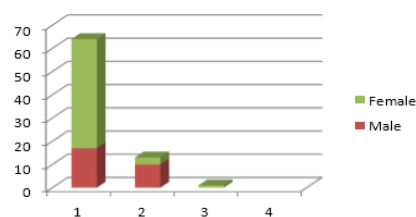
The cause of death as per the present study was attributed mainly to the shock as a result of burns (43 cases) followed by sepsis (35 cases) (Figure No. 3). This is in contrast to the study of Poonam Singh et al (12) where deaths due to septicaemia are more than that of deaths due to shock.

Figure 3: Cause of death



The manner of death in the present study shows accidental burns (64 cases) were more common than suicidal (13 cases) and homicidal burns (01 case). This is consistent with the study of Sunil Gorakh Vidhate and Harish Pathak (13) and some of other studies mentioned above. In the accidental burns, females (47 cases) suffered more than males (17 cases) which mainly show the importance of accidental kitchen burns (Fig. 4).

Figure No. 4: Manner of death due to burns



Conclusion

- Shock and septicemia are the causes of death following burn injuries. Hence, proper facilities should be provided & improved even in a primary health care hospital for aggressive management by rehydrating and preventing hospital acquired infections in order to prevent deaths due to burns.
- “Kitchen burns” while cooking is the reason for burns in most female cases with household responsibilities. Safety measures should be followed while cooking. Stringent laws and detailed investigation should be implemented so that the exact cause of kitchen burns is found out.
- In most of the cases of death due to burn injury, accident is the alleged manner of death.
- Government should increase the rate of recording of dying declaration in deaths due to burns and improve the quality of statement recorded.
- More emphasis should be on improving documentation, communication between service providers and public in understanding of the risks due to burns.

Conflict of interest: Nil

Institutional Ethics Committee approval: Approved

REFERENCES:

1. Poonam Singh, Pankaj Kumar, Sohan Prasad Choudhary. Forensic analysis of Burns Cases at PMCH with Female Context. Global J for Research Analysis. 2020; Vol.9(1): 7-8.
2. Pradeep Kumar Yadav et al. A Study on the Cause of Death Due to Burn Cases and Histopathological Changes in North Indian Setting - A Cross Sectional Study. Medicolegal Update. 2020; Vol.20(1): 47-50.
3. Chawla R, Chanana A, Rai H, Aggarwal AD, Singh H, Sharma G (2010). A two year burns & fatality study. J Indian Acad Forensic Med 32(4):292-297.
4. Aggarwal BBL, Chandra J. A Study of Fatal Cases of Burns in South Zone Delhi. Punjab Med J 1970; 20(12): 451.
5. Doshi AJ. Aetiology of Burns. Curr Med Pract 1976; 20: 316-320.
6. Ganguli AC. Burns. J Ind Med Assoc 1976; 67: 150-152.
7. Sinha JK, Khanna NN, Tripathi K. Etiology and Prevention of Burns. Ind J Surg 1976; 38: 82.
8. Haralkar SJ, Rayate M. Socio-demographic profile of burn cases in the reproductive age group (15-45 years) admitted in SCSM General Hospital, Solapur. Solapur Med J 2005; 2(2): 3-9.
9. Sukhai A, Harris C, Moorad RG, Dada MA. Suicide by self immolation in Durban South Africa; A fine year retrospective review. Am J Forensic Med Pathol 2002; 23(3): 295-298.
10. Betz P, Roeder G, Meyer LV, Drasch G, Eisenmenger W. Carboxyhemoglobin Blood Concentrations in Suicides by Fire. J British Acad Forensic Sci 1996; 36: 313-316.
11. Haralkar SJ, Rayate M. Socio-demographic profile of burn cases in the reproductive age group (15-45 years) admitted in SCSM General Hospital, Solapur. Solapur Med J 2005; 2(2): 3-9.
12. Poonam Singh, Pankaj Kumar, Sohan Prasad Choudhary. Forensic Analysis Of Burn Cases At Pmch With Female Context. Global Journal For Research Analysis 2020 9(1): 7-8.
13. Gorakh Vidhate, Harish Pathak. A study of medico-legal aspects of death due to burns at a tertiary care centre in Mumbai, India. Egyptian Journal of Forensic Sciences (2017) 7:21